SBML Model Report

Model name: “Stanford2013 - Kinetic model of yeast metabolic network (regulation)”

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah[1] and Natalie Stanford[2] at November 26$^{\text{th}}$ 2013 at 12:56 a. m. and last time modified at April fourth 2014 at three o’ clock in the afternoon. Table 1 gives an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	2
species types	0	species	295
events	1	constraints	0
reactions	285	function definitions	286
global parameters	0	unit definitions	0
rules	0	initial assignments	0

Model Notes

Stanford2013 - Kinetic model of yeast metabolic network (standard)

Large-scale model construction based on a logical layering of data such as reaction fluxes, metabolite concentrations, and kinetic constants. This model is built with regulatory information.

[1]EMBL-EBI, viji@ebi.ac.uk
[2]Humboldt University Berlin, natalie.stanford-2@postgrad.manchester.ac.uk

This model is described in the article:Systematic construction of kinetic models from genome-scale metabolic networks.Stanford NJ, Lubitz T, Smallbone K, Klipp E, Mendes P, Liebermeister W.PLoS ONE 2013; 8(11): e79195

Abstract:

The quantitative effects of environmental and genetic perturbations on metabolism can be studied in silico using kinetic models. We present a strategy for large-scale model construction based on a logical layering of data such as reaction fluxes, metabolite concentrations, and kinetic constants. The resulting models contain realistic standard rate laws and plausible parameters, adhere to the laws of thermodynamics, and reproduce a predefined steady state. These features have not been simultaneously achieved by previous workflows. We demonstrate the advantages and limitations of the workflow by translating the yeast consensus metabolic network into a kinetic model. Despite crudely selected data, the model shows realistic control behaviour, a stable dynamic, and realistic response to perturbations in extracellular glucose concentrations. The paper concludes by outlining how new data can continuously be fed into the workflow and how iterative model building can assist in directing experiments.

This model is hosted on BioModels Database and identifiedby: BIOMD0000000497 .

To cite BioModels Database, please use: BioModels Database: An enhanced, curated and annotated resourcefor published quantitative kinetic models .

2 Unit Definitions

This is an overview of five unit definitions which are all predefined by SBML and not mentioned in the model.

2.1 Unit substance

Notes Mole is the predefined SBML unit for substance.

Definition mol

2.2 Unit volume

Notes Litre is the predefined SBML unit for volume.

Definition l

2.3 Unit area

Notes Square metre is the predefined SBML unit for area since SBML Level 2 Version 1.

Definition m^2

2.4 Unit `length`

Notes Metre is the predefined SBML unit for `length` since SBML Level 2 Version 1.

Definition m

2.5 Unit `time`

Notes Second is the predefined SBML unit for `time`.

Definition s

3 Compartments

This model contains two compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
`intracellular`	intracellular		3	1	litre	☑	
`extracellular`	extracellular		3	1	litre	☑	

3.1 Compartment `intracellular`

This is a three dimensional compartment with a constant size of one litre.

Name intracellular

3.2 Compartment `extracellular`

This is a three dimensional compartment with a constant size of one litre.

Name extracellular

4 Species

This model contains 295 species. The boundary condition of 15 of these species is set to `true` so that these species' amount cannot be changed by any reaction. Section 8 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0001	(1->3)-beta-D-glucan [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0007	(2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0008	(2R,3S)-3-isopropylmalate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0009	(2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0010	(2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0015	(6R)-5,10-methenyltetrahydrofolic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0017	(N(omega)-L-arginino)succinic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0018	(R)-2,3-dihydroxy-3-methylbutanoate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0021	(R)-5-diphosphomevalonic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0022	(R)-5-phosphomevalonic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0031	(R)-mevalonate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0040	(S)-2,3-epoxysqualene [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0042	(S)-2-acetyl-2-hydroxybutanoate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0046	(S)-3-hydroxyhexacosanoyl-CoA [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0052	(S)-3-hydroxypalmitoyl-CoA [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0055	(S)-3-hydroxytetradecanoyl-CoA [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0058	(S)-3-methyl-2-oxopentanoate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0064	(S)-dihydroorotate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0069	(S)-malate(2-) [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0078	1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0079	1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0080	1-(5-phosphoribosyl)-5'-AMP [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0083	1-acyl-sn-glycerol 3-phosphate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0088	1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0090	1-phosphatidyl-1D-myo-inositol [intracellular]	`intracellular`	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0118	1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0120	1-pyrroline-5-carboxylate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0122	10-formyltetrahydrofolic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0124	14-demethyllanosterol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0128	1D-myo-inositol 1-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0145	2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0146	2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0149	2-acetamido-5-oxopentanoate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0150	2-acetyllactic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0158	2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0163	2-hydroxy-3-oxobutyl phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0167	2-isopropylmalate(2-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0170	2-isopropylmaleic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0180	2-oxaloglutaric acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0181	2-oxoadipic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0183	2-oxobutanoate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0185	2-oxoglutarate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0193	2-phospho-D-glyceric acid [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0195	2-trans,6-trans-farnesyl diphosphate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0206	3'-phospho-5'-adenylyl sulfate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0209	3-(4-hydroxyphenyl)pyruvate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0212	3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0215	3-dehydro-4-methylzymosterol [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0216	3-dehydroquinate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0217	3-dehydroshikimate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0218	3-dehydrosphinganine [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0225	3-hydroxy-3-methylglutaryl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0234	3-hydroxyoctadecanoyl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0238	3-methyl-2-oxobutanoate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0247	3-oxohexacosanoyl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0254	3-oxooctadecanoyl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0257	3-oxopalmitoyl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0261	3-oxotetradecanoyl-CoA [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0264	3-phospho-D-glyceric acid [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0265	3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟
s_0267	3-phosphoshikimic acid [intracellular]	intracellular	$\mathrm{mol \cdot l^{-1}}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0268	4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0297	4-methyl-2-oxopentanoate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0301	4-phospho-L-aspartate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0302	4alpha-methylzymosterol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0303	4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0304	5'-adenylyl sulfate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0306	5'-xanthylic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0315	5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0316	5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0318	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0319	5-amino-6-(5-phosphoribitylamino)uracil [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0325	5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0328	5-methyltetrahydrofolate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0330	5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0333	5-phospho-beta-D-ribosylamine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0334	5-phosphoribosyl-ATP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0335	6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0356	7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0366	acetaldehyde [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0369	acetate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0374	acetoacetyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0380	acetyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0386	acyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0393	adenosine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0397	adenosine 3',5'-bismonophosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0400	ADP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0416	alpha,alpha-trehalose [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0419	alpha,alpha-trehalose 6-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0427	alpha-D-ribose 5-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0430	ammonium [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0434	AMP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0438	amylose [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0439	anthranilate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0446	ATP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0455	beta-D-glucose 6-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0458	bicarbonate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0463	biomass [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0468	but-1-ene-1,2,4-tricarboxylic acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0469	carbamoyl phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0470	carbon dioxide [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0481	CDP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0485	CDP-diacylglycerol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0500	chorismate(2-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0501	cis-aconitate(3-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0507	citrate(3-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0511	CMP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0514	coenzyme A [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0521	CTP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0529	D-arabinono-1,4-lactone [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
s_0530	D-arabinose [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0532	D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0537	D-fructose 1,6-bisphosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0539	D-fructose 6-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0545	D-glucose [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0549	D-glucose 1-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0553	D-mannose 1-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0554	D-mannose 6-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0557	D-ribulose 5-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0561	D-xylulose 5-phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0562	dADP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0564	dAMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0566	dATP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0569	dCMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0574	decanoate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0582	decanoyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0591	dGDP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0593	dGMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0596	diglyceride [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0601	dihydrofolic acid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0605	diphosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$
s_0615	dolichyl D-mannosyl phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	$\boxminus$	$\boxminus$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0616	dolichyl phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0619	dTMP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0622	dUDP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0624	dUMP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0627	episterol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0635	ergosterol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0641	ergosterol ester [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0650	ethanol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0657	FAD [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0659	FADH2 [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0663	fatty acid [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0669	fecosterol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0689	formate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0692	fumarate(2-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0706	GDP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0710	GDP-alpha-D-mannose [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0712	geranyl diphosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0731	glyceraldehyde 3-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0732	glycerol [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0734	glycerone [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0735	glycerone phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0740	glycine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0743	glycogen [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0749	glyoxylate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_0752	GMP [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0755	GTP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0798	homocitrate(3-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0800	homoisocitrate(3-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0801	hydrogen peroxide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0805	hydrogen sulfide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0816	IMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0824	inositol phosphomannosylinositol phosphoceramide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0828	inositol-P-ceramide B [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0847	isocitrate(3-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0850	isopentenyl diphosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0859	keto-phenylpyruvate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0861	L-2-aminoadipate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0863	L-alanine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0867	L-allysine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0873	L-arginine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0877	L-asparagine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0881	L-aspartate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0886	L-aspartate 4-semialdehyde [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0887	L-citrulline [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0888	L-cystathionine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0889	L-cysteine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0894	L-gamma-glutamyl phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0899	L-glutamate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0905	L-glutamic 5-semialdehyde [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0907	L-glutamine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0911	L-histidine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0915	L-histidinol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0916	L-histidinol phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0917	L-homocysteine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0919	L-homoserine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0920	L-isoleucine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0925	L-leucine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0929	L-lysine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0933	L-methionine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0936	L-phenylalanine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0939	L-proline [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0942	L-saccharopine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0943	L-serine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0949	L-threonine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0952	L-tryptophan [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0955	L-tyrosine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0960	L-valine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0963	lanosterol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0968	laurate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0977	lauroyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0987	lignocerate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1000	lipid [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑
s_1005	malonyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1011	mannan [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1013	mannosylinositol phosphorylceramide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1020	myo-inositol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_1028	myristate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1044	myristoyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1048	N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1051	N(2)-acetyl-L-ornithine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1052	N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1053	N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1060	N-(24-hydroxytetracosanyl)sphinganine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1066	N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1070	N-acetyl-L-gamma-glutamyl phosphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1071	N-acetyl-L-glutamate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1073	N-carbamoyl-L-aspartate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1080	N-tetracosanylsphinganine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1082	NAD(+) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1087	NADH [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1091	NADP(+) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1096	NADPH [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1117	O-acetyl-L-homoserine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1122	O-phospho-L-homoserine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1132	octanoate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1140	octanoyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1151	ornithine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_1154	orotate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1155	orotidine 5'-(dihydrogen phosphate) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1156	oxaloacetate(2-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1160	oxygen [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1170	palmitate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1187	palmitoyl-CoA [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1207	phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	☑	☑
s_1215	phosphatidate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1219	phosphatidyl-L-serine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1225	phosphatidyl-N,N-dimethylethanolamine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1226	phosphatidyl-N-methylethanolamine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1228	phosphatidylcholine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1233	phosphatidylethanolamine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1243	phosphoenolpyruvate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1257	prenyl diphosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1258	prephenate(2-) [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1277	pyruvate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1283	riboflavin [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1290	S-adenosyl-L-homocysteine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1293	S-adenosyl-L-methionine [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1304	sedoheptulose 7-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1306	shikimate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟
s_1315	sn-glycerol 3-phosphate [intracellular]	intracellular	$mol \cdot l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
s_1325	sphinganine [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1327	squalene [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1329	stearate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1334	stearoyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1338	succinate(2-) [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1342	succinyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1347	sulphate [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1349	sulphite [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1355	tetracosanoyl-CoA [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1379	trans-4-hydroxy-L-proline [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1399	triglyceride [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑
s_1411	UDP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1415	UDP-D-glucose [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1417	UMP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1430	UTP [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1447	zymosterol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1455	zymosterol intermediate 1a [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1456	zymosterol intermediate 1b [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1457	zymosterol intermediate 1c [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1458	zymosterol intermediate 2 [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1517	thioredoxin disulfide [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_1521	thioredoxin dithiol [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0763_b	H+ [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑
s_1434_b	water [intracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑
species_1	glucose [extracellular]	intracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
s_0431_b	ammonium [extracellular]	extracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑
s_0464_b	biomass [extracellular]	extracellular	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	☑	☑

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s_0472_b	carbon dioxide [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_0547_b	D-glucose [extracellular]	extracellular	$mol \cdot l^{-1}$	⊟	☑
s_0651_b	ethanol [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_0766_b	H+ [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_1162_b	oxygen [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_1209_b	phosphate [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_1339_b	succinate(2-) [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑
s_1348_b	sulphate [extracellular]	extracellular	$mol \cdot l^{-1}$	☑	☑

5 Function definitions

This is an overview of 286 function definitions.

5.1 Function definition MAX

Arguments a, b

Mathematical Expression

$$\begin{cases} \mathrm{a} & \text{if } \mathrm{a} \geq \mathrm{b} \\ \mathrm{b} & \text{otherwise} \end{cases} \tag{1}$$

5.2 Function definition function_36

Name Function for adenosylhomocysteinase

Arguments Keq_r_0159, Vmax_r_0159, vol (intracellular), kmp_s_0393r_0159, kmp_s_0917r_0159, kms_s_1290r_0159, kms_s_1434_br_0159, [s_0393], [s_0917], [s_1290], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0159} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1290r\_0159}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0159}}\right)^{1} \cdot \left([\mathrm{s\_1290}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0393}]^{1} \cdot [\mathrm{s\_0917}]^{1}}{\mathrm{Keq\_r\_0159}}\right)}{\left(1 + \frac{[\mathrm{s\_1290}]}{\mathrm{kms\_s\_1290r\_0159}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0159}}\right) + \left(1 + \frac{[\mathrm{s\_0393}]}{\mathrm{kmp\_s\_0393r\_0159}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0917}]}{\mathrm{kmp\_s\_0917r\_0159}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{2}$$

5.3 Function definition function_37

Name Function for adenylate kinase

Arguments Keq_r_0163, Vmax_r_0163, vol (intracellular), kmp_s_0434r_0163, kmp_s_0446r_0163, kms_s_0400r_0163, [s_0400], [s_0434], [s_0446]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0163} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0163}}\right)^{2} \cdot \left([\mathrm{s\_0400}]^{2} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0446}]^{1}}{\mathrm{Keq\_r\_0163}}\right)}{1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0163}} + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0163}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0163}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{3}$$

5.4 Function definition `function_38`

Name Function for adenylate kinase (GTP)

Arguments Keq_r_0165, Vmax_r_0165, vol (intracellular), kmp_s_0434r_0165, kmp_s_0755r_0165, kms_s_0400r_0165, kms_s_0706r_0165, [s_0400], [s_0434], [s_0706], [s_0755]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0165} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0165}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0706r\_0165}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0706}]^{1} - \frac{[\text{s\_0434}]^{1} \cdot [\text{s\_0755}]^{1}}{\text{Keq\_r\_0165}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0165}}\right) \cdot \left(1+\frac{[\text{s\_0706}]}{\text{kms\_s\_0706r\_0165}}\right) + \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0165}}\right) \cdot \left(1+\frac{[\text{s\_0755}]}{\text{kmp\_s\_0755r\_0165}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{4}$$

5.5 Function definition `function_39`

Name Function for adenylosuccinate lyase

Arguments Keq_r_0169, Vmax_r_0169, vol (intracellular), kmp_s_0317r_0169, kmp_s_0692r_0169, kms_s_0009r_0169, [s_0009], [s_0317], [s_0692]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0169} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0009r\_0169}}\right)^{1} \cdot \left([\text{s\_0009}]^{1} - \frac{[\text{s\_0317}]^{1} \cdot [\text{s\_0692}]^{1}}{\text{Keq\_r\_0169}}\right)}{1+\frac{[\text{s\_0009}]}{\text{kms\_s\_0009r\_0169}} + \left(1+\frac{[\text{s\_0317}]}{\text{kmp\_s\_0317r\_0169}}\right) \cdot \left(1+\frac{[\text{s\_0692}]}{\text{kmp\_s\_0692r\_0169}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{5}$$

5.6 Function definition `function_40`

Name Function for adenylosuccinate synthase

Arguments Keq_r_0170, Vmax_r_0170, vol (intracellular), kmp_s_0706r_0170, kmp_s_0763_br_0170, kmp_s_1053r_0170, kmp_s_1207r_0170, kms_s_0755r_0170, kms_s_0816r_0170, kms_s_0881r_0170, [s_0706], [s_0755], [s_0763_b], [s_0816], [s_0881], [s_1053], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0170} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0755r\_0170}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0816r\_0170}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0881r\_0170}}\right)^{1} \cdot \left([\text{s\_0755}]^{1} \cdot [\text{s\_0816}]^{1} \cdot [\text{s\_0881}]^{1} - \frac{[\text{s\_0706}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1053}]^{1} \cdot [\text{s\_12}] \cdots}{\text{Keq\_r\_0170}}\right)}{\left(1+\frac{[\text{s\_0755}]}{\text{kms\_s\_0755r\_0170}}\right) \cdot \left(1+\frac{[\text{s\_0816}]}{\text{kms\_s\_0816r\_0170}}\right) \cdot \left(1+\frac{[\text{s\_0881}]}{\text{kms\_s\_0881r\_0170}}\right) + \left(1+\frac{[\text{s\_0706}]}{\text{kmp\_s\_0706r\_0170}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0170}}\right) \cdot \left(1+\frac{[\text{s\_1053}]}{\text{kmp\_s\_1053r\_0170}}\right) \cdot \cdots}}{\text{vol}\left(\text{intracellular}\right)} \tag{6}$$

5.7 Function definition function_41

Name Function for adenylsuccinate lyase

Arguments Keq_r_0171, Vmax_r_0171, vol (intracellular), kmp_s_0434r_0171, kmp_s_0692r_0171, kms_s_1053r_0171, [s_0434], [s_0692], [s_1053]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0171} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1053r\_0171}}\right)^{1} \cdot \left([\text{s\_1053}]^{1} - \frac{[\text{s\_0434}]^{1} \cdot [\text{s\_0692}]^{1}}{\text{Keq\_r\_0171}}\right)}{1 + \frac{[\text{s\_1053}]}{\text{kms\_s\_1053r\_0171}} + \left(1 + \frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0171}}\right) \cdot \left(1 + \frac{[\text{s\_0692}]}{\text{kmp\_s\_0692r\_0171}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{7}$$

5.8 Function definition function_42

Name Function for adenylyl-sulfate kinase

Arguments Keq_r_0172, Vmax_r_0172, vol (intracellular), kmp_s_0206r_0172, kmp_s_0400r_0172, kmp_s_0763_br_0172, kms_s_0304r_0172, kms_s_0446r_0172, [s_0206], [s_0304], [s_0400], [s_0446], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0172} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0304r\_0172}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0172}}\right)^{1} \cdot \left([\text{s\_0304}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0206}]^{1} \cdot [\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0172}}\right)}{\left(1 + \frac{[\text{s\_0304}]}{\text{kms\_s\_0304r\_0172}}\right) \cdot \left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0172}}\right) + \left(1 + \frac{[\text{s\_0206}]}{\text{kmp\_s\_0206r\_0172}}\right) \cdot \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0172}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0172}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{8}$$

5.9 Function definition function_43

Name Function for alanine glyoxylate aminotransferase

Arguments Keq_r_0174, Vmax_r_0174, vol (intracellular), kmp_s_0740r_0174, kmp_s_1277r_0174, kms_s_0749r_0174, kms_s_0863r_0174, [s_0740], [s_0749], [s_0863], [s_1277]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0174} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0749r\_0174}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0863r\_0174}}\right)^{1} \cdot \left([\text{s\_0749}]^{1} \cdot [\text{s\_0863}]^{1} - \frac{[\text{s\_0740}]^{1} \cdot [\text{s\_1277}]^{1}}{\text{Keq\_r\_0174}}\right)}{\left(1 + \frac{[\text{s\_0749}]}{\text{kms\_s\_0749r\_0174}}\right) \cdot \left(1 + \frac{[\text{s\_0863}]}{\text{kms\_s\_0863r\_0174}}\right) + \left(1 + \frac{[\text{s\_0740}]}{\text{kmp\_s\_0740r\_0174}}\right) \cdot \left(1 + \frac{[\text{s\_1277}]}{\text{kmp\_s\_1277r\_0174}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{9}$$

5.10 Function definition `function_44`

Name Function for alcohol dehydrogenase, reverse rxn (acetaldehyde -> ethanol)

Arguments Keq_r_0183, Vmax_r_0183, vol (intracellular), kmp_s_0650r_0183, kmp_s_1082r_0183, kms_s_0366r_0183, kms_s_0763_br_0183, kms_s_1087r_0183, [s_0366], [s_0650], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0183} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0366r\_0183}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0183}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0183}}\right)^1 \cdot \left([\text{s\_0366}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1087}]^1 - \frac{[\text{s\_0650}]^1 \cdot [\text{s\_1082}]^1}{\text{Keq\_r\_0183}}\right)}{\left(1+\frac{[\text{s\_0366}]}{\text{kms\_s\_0366r\_0183}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0183}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0183}}\right) + \left(1+\frac{[\text{s\_0650}]}{\text{kmp\_s\_0650r\_0183}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0183}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{10}$$

5.11 Function definition `function_45`

Name Function for aldehyde dehydrogenase (acetaldehyde, NADP)

Arguments Keq_r_0191, Vmax_r_0191, vol (intracellular), kmp_s_0369r_0191, kmp_s_0763_br_0191, kmp_s_1096r_0191, kms_s_0366r_0191, kms_s_1091r_0191, kms_s_1434_br_0191, [s_0366], [s_0369], [s_0763_b], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0191} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0366r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0191}}\right)^1 \cdot \left([\text{s\_0366}]^1 \cdot [\text{s\_1091}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0369}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0191}}\right)}{\left(1+\frac{[\text{s\_0366}]}{\text{kms\_s\_0366r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0191}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0191}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{11}$$

5.12 Function definition `function_47`

Name Function for anthranilate phosphoribosyltransferase

Arguments Keq_r_0220, Vmax_r_0220, vol (intracellular), kmp_s_0605r_0220, kmp_s_1066r_0220, kms_s_0331r_0220, kms_s_0439r_0220, [s_0331], [s_0439], [s_0605], [s_1066]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0220} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0331r\_0220}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0439r\_0220}}\right)^1 \cdot \left([\text{s\_0331}]^1 \cdot [\text{s\_0439}]^1 - \frac{[\text{s\_0605}]^1 \cdot [\text{s\_1066}]^1}{\text{Keq\_r\_0220}}\right)}{\left(1+\frac{[\text{s\_0331}]}{\text{kms\_s\_0331r\_0220}}\right) \cdot \left(1+\frac{[\text{s\_0439}]}{\text{kms\_s\_0439r\_0220}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0220}}\right) \cdot \left(1+\frac{[\text{s\_1066}]}{\text{kmp\_s\_1066r\_0220}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{12}$$

5.13 Function definition `function_48`

Name Function for anthranilate synthase

Arguments Keq_r_0221, Vmax_r_0221, vol (intracellular), kmp_s_0439r_0221, kmp_s_0763_br_0221, kmp_s_0899r_0221, kmp_s_1277r_0221, kms_s_0500r_0221, kms_s_0907r_0221, [s_0439], [s_0500], [s_0763_b], [s_0899], [s_0907], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0221} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0500r\_0221}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0221}}\right)^{1} \cdot \left([\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_0907}]^{1} - \frac{[\mathrm{s\_0439}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0221}}\right)}{\left(1+\frac{[\mathrm{s\_0500}]}{\mathrm{kms\_s\_0500r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0221}}\right) + \left(1+\frac{[\mathrm{s\_0439}]}{\mathrm{kmp\_s\_0439r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0221}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{13}$$

5.14 Function definition `function_49`

Name Function for argininosuccinate lyase

Arguments Keq_r_0225, Vmax_r_0225, vol (intracellular), kmp_s_0692r_0225, kmp_s_0873r_0225, kms_s_0017r_0225, [s_0017], [s_0692], [s_0873]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0225} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0017r\_0225}}\right)^{1} \cdot \left([\mathrm{s\_0017}]^{1} - \frac{[\mathrm{s\_0692}]^{1} \cdot [\mathrm{s\_0873}]^{1}}{\mathrm{Keq\_r\_0225}}\right)}{1+\frac{[\mathrm{s\_0017}]}{\mathrm{kms\_s\_0017r\_0225}} + \left(1+\frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0225}}\right) \cdot \left(1+\frac{[\mathrm{s\_0873}]}{\mathrm{kmp\_s\_0873r\_0225}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{14}$$

5.15 Function definition `function_50`

Name Function for argininosuccinate synthase

Arguments Keq_r_0226, Vmax_r_0226, vol (intracellular), kmp_s_0017r_0226, kmp_s_0434r_0226, kmp_s_0605r_0226, kmp_s_0763_br_0226, kms_s_0446r_0226, kms_s_0881r_0226, kms_s_0887r_0226, [s_0017], [s_0434], [s_0446], [s_0605], [s_0763_b], [s_0881], [s_0887]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0226} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0226}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0226}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0887r\_0226}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0881}]^{1} \cdot [\mathrm{s\_0887}]^{1} - \frac{[\mathrm{s\_0017}]^{1} \cdot [\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0763} \ldots}{\mathrm{Keq\_r\_0226}} \ldots\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0226}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0226}}\right) \cdot \left(1+\frac{[\mathrm{s\_0887}]}{\mathrm{kms\_s\_0887r\_0226}}\right) + \left(1+\frac{[\mathrm{s\_0017}]}{\mathrm{kmp\_s\_0017r\_0226}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0226}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0226}}\right) \cdot \left(1+ \ldots\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{15}$$

5.16 Function definition function_51

Name Function for asparagine synthase (glutamine-hydrolysing)

Arguments Keq_r_0229, Vmax_r_0229, vol (intracellular), kmp_s_0434r_0229, kmp_s_0605r_0229, kmp_s_0763_br_0229, kmp_s_0877r_0229, kmp_s_0899r_0229, kms_s_0446r_0229, kms_s_0881r_0229, kms_s_0907r_0229, kms_s_1434_br_0229, [s_0434], [s_0446], [s_0605], [s_0763_b], [s_0877], [s_0881], [s_0899], [s_0907], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0229} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0229}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0881}]^1 \cdot [\mathrm{s\_0907}]^1 \cdot [\mathrm{s\_1434\_} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0229}}\right) + \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0229}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (16)$$

5.17 Function definition function_52

Name Function for aspartate carbamoyltransferase

Arguments Keq_r_0232, Vmax_r_0232, vol (intracellular), kmp_s_0763_br_0232, kmp_s_1073r_0232, kmp_s_1207r_0232, kms_s_0469r_0232, kms_s_0881r_0232, [s_0469], [s_0763_b], [s_0881], [s_1073], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0232} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0469r\_0232}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0232}}\right)^1 \cdot \left([\mathrm{s\_0469}]^1 \cdot [\mathrm{s\_0881}]^1 - \frac{[\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1073}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0232}}\right)}{\left(1+\frac{[\mathrm{s\_0469}]}{\mathrm{kms\_s\_0469r\_0232}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0232}}\right) + \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0232}}\right) \cdot \left(1+\frac{[\mathrm{s\_1073}]}{\mathrm{kmp\_s\_1073r\_0232}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0232}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (17)$$

5.18 Function definition function_53

Name Function for aspartate kinase

Arguments Keq_r_0233, Vmax_r_0233, vol (intracellular), kmp_s_0301r_0233, kmp_s_0400r_0233, kms_s_0446r_0233, kms_s_0881r_0233, [s_0301], [s_0400], [s_0446], [s_0881]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0233} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0233}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0233}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0881}]^1 - \frac{[\mathrm{s\_0301}]^1 \cdot [\mathrm{s\_0400}]^1}{\mathrm{Keq\_r\_0233}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0233}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0233}}\right) + \left(1+\frac{[\mathrm{s\_0301}]}{\mathrm{kmp\_s\_0301r\_0233}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0233}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (18)$$

5.19 Function definition function_54

Name Function for aspartate transaminase

Arguments Keq_r_0235, Vmax_r_0235, vol (intracellular), kmp_s_0185r_0235, kmp_s_0881r_0235, kms_s_0899r_0235, kms_s_1156r_0235, [s_0185], [s_0881], [s_0899], [s_1156]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0235} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0899r\_0235}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1156r\_0235}}\right)^{1} \cdot \left([\text{s\_0899}]^{1} \cdot [\text{s\_1156}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0881}]^{1}}{\text{Keq\_r\_0235}}\right)}{\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0235}}\right) \cdot \left(1+\frac{[\text{s\_1156}]}{\text{kms\_s\_1156r\_0235}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0235}}\right) \cdot \left(1+\frac{[\text{s\_0881}]}{\text{kmp\_s\_0881r\_0235}}\right) - 1}}{\text{vol (intracellular)}} \tag{19}$$

5.20 Function definition function_55

Name Function for aspartate-semialdehyde dehydrogenase

Arguments Keq_r_0238, Vmax_r_0238, vol (intracellular), kmp_s_0886r_0238, kmp_s_1091r_0238, kmp_s_1207r_0238, kms_s_0301r_0238, kms_s_0763_br_0238, kms_s_1096r_0238, [s_0301], [s_0763_b], [s_0886], [s_1091], [s_1096], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0238} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0301r\_0238}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0238}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0238}}\right)^{1} \cdot \left([\text{s\_0301}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0886}]^{1} \cdot [\text{s\_1091}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0238}}\right)}{\left(1+\frac{[\text{s\_0301}]}{\text{kms\_s\_0301r\_0238}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0238}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0238}}\right) + \left(1+\frac{[\text{s\_0886}]}{\text{kmp\_s\_0886r\_0238}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0238}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0238}}\right) - 1}}{\text{vol (intracellular)}} \tag{20}$$

5.21 Function definition function_56

Name Function for ATP phosphoribosyltransferase

Arguments Keq_r_0245, Vmax_r_0245, vol (intracellular), kmp_s_0334r_0245, kmp_s_0605r_0245, kms_s_0331r_0245, kms_s_0446r_0245, [s_0331], [s_0334], [s_0446], [s_0605]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0245} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0331r\_0245}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0245}}\right)^{1} \cdot \left([\text{s\_0331}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0334}]^{1} \cdot [\text{s\_0605}]^{1}}{\text{Keq\_r\_0245}}\right)}{\left(1+\frac{[\text{s\_0331}]}{\text{kms\_s\_0331r\_0245}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0245}}\right) + \left(1+\frac{[\text{s\_0334}]}{\text{kmp\_s\_0334r\_0245}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0245}}\right) - 1}}{\text{vol (intracellular)}} \tag{21}$$

5.22 Function definition `function_57`

Name Function for ATP synthase

Arguments Keq_r_0246, Vmax_r_0246, vol (intracellular), kmp_s_0446r_0246, kmp_s_0763_br_0246, kmp_s_1434_br_0246, kms_s_0400r_0246, kms_s_0763_br_0246, kms_s_1207r_0246, [s_0400], [s_0446], [s_0763_b], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0246}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0246}}\right)^{1}\cdot\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0246}}\right)^{3}\cdot\left(\frac{1}{\mathrm{kms\_s\_1207r\_0246}}\right)^{1}\cdot\left([\mathrm{s\_0400}]^{1}\cdot[\mathrm{s\_0763\_b}]^{3}\cdot[\mathrm{s\_1207}]^{1}-\frac{[\mathrm{s\_0446}]^{1}\cdot[\mathrm{s\_0763\_b}]^{2}\cdot[\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0246}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0246}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0246}}\right)\cdot\left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kms\_s\_1207r\_0246}}\right)+\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0246}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0246}}\right)\cdot\left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0246}}\right)-}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{22}$$

5.23 Function definition `function_1`

Name Function for 1,3-beta-glucan synthase

Arguments Keq_r_0005, Vmax_r_0005, vol (intracellular), kmp_s_0001r_0005, kmp_s_0763_br_0005, kmp_s_1411r_0005, kms_s_1415r_0005, [s_0001], [s_0763_b], [s_1411], [s_1415]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0005}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0005}}\right)^{1}\cdot\left([\mathrm{s\_1415}]^{1}-\frac{[\mathrm{s\_0001}]^{1}\cdot[\mathrm{s\_0763\_b}]^{1}\cdot[\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0005}}\right)}{1+\frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0005}}+\left(1+\frac{[\mathrm{s\_0001}]}{\mathrm{kmp\_s\_0001r\_0005}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0005}}\right)\cdot\left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0005}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{23}$$

5.24 Function definition `function_2`

Name Function for 1,4-alpha-glucan branching enzyme

Arguments Keq_r_0006, Vmax_r_0006, vol (intracellular), kmp_s_0743r_0006, kmp_s_1434_br_0006, kms_s_0438r_0006, [s_0438], [s_0743], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0006}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0438r\_0006}}\right)^{1}\cdot\left([\mathrm{s\_0438}]^{1}-\frac{[\mathrm{s\_0743}]^{1}\cdot[\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0006}}\right)}{1+\frac{[\mathrm{s\_0438}]}{\mathrm{kms\_s\_0438r\_0006}}+\left(1+\frac{[\mathrm{s\_0743}]}{\mathrm{kmp\_s\_0743r\_0006}}\right)\cdot\left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0006}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{24}$$

5.25 Function definition function_3

Name Function for 1-(5-phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino)imidazole-4-carboxamide isomerase

Arguments Keq_r_0008, Vmax_r_0008, vol (intracellular), kmp_s_0315r_0008, kms_s_0079r_0008, [s_0079], [s_0315]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0008} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0079r\_0008}}\right)^{1} \cdot \left([\mathrm{s\_0079}]^{1} - \frac{[\mathrm{s\_0315}]^{1}}{\mathrm{Keq\_r\_0008}}\right)}{1+\frac{[\mathrm{s\_0079}]}{\mathrm{kms\_s\_0079r\_0008}}+1+\frac{[\mathrm{s\_0315}]}{\mathrm{kmp\_s\_0315r\_0008}}-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{25}$$

5.26 Function definition function_4

Name Function for 1-acyl-sn-gylcerol-3-phosphate acyltransferase

Arguments Keq_r_0009, Vmax_r_0009, vol (intracellular), kmp_s_0514r_0009, kmp_s_0763_br_0009, kmp_s_1215r_0009, kms_s_0083r_0009, kms_s_0386r_0009, [s_0083], [s_0386], [s_0514], [s_0763_b], [s_1215]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0009} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0083r\_0009}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0386r\_0009}}\right)^{1} \cdot \left([\mathrm{s\_0083}]^{1} \cdot [\mathrm{s\_0386}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{4} \cdot [\mathrm{s\_1215}]^{1}}{\mathrm{Keq\_r\_0009}}\right)}{\left(1+\frac{[\mathrm{s\_0083}]}{\mathrm{kms\_s\_0083r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0386}]}{\mathrm{kms\_s\_0386r\_0009}}\right)+\left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kmp\_s\_1215r\_0009}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{26}$$

5.27 Function definition function_5

Name Function for 2,5-diamino-6-ribitylamino-4(3H)-pyrimidinone 5'-phosphate deaminase

Arguments Keq_r_0014, Vmax_r_0014, vol (intracellular), kmp_s_0319r_0014, kmp_s_0430r_0014, kms_s_0146r_0014, kms_s_0763_br_0014, kms_s_1434_br_0014, [s_0146], [s_0319], [s_0430], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0014} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0146r\_0014}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0014}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0014}}\right)^{1} \cdot \left([\mathrm{s\_0146}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0319}]^{1} \cdot [\mathrm{s\_0430}]^{1}}{\mathrm{Keq\_r\_0014}}\right)}{\left(1+\frac{[\mathrm{s\_0146}]}{\mathrm{kms\_s\_0146r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0014}}\right)+\left(1+\frac{[\mathrm{s\_0319}]}{\mathrm{kmp\_s\_0319r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0014}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{27}$$

5.28 Function definition function_6

Name Function for 2,5-diamino-6-ribosylamino-4(3H)-pyrimidinone 5'-phosphate reductase (NADPH)

Arguments Keq_r_0015, Vmax_r_0015, vol (intracellular), kmp_s_0146r_0015, kmp_s_1091r_0015, kms_s_0145r_0015, kms_s_0763_br_0015, kms_s_1096r_0015, [s_0145], [s_0146], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0015} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0145r\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0015}}\right)^{1} \cdot \left([\mathrm{s\_0145}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0146}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0015}}\right)}{\left(1+\frac{[\mathrm{s\_0145}]}{\mathrm{kms\_s\_0145r\_0015}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0015}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0015}}\right) + \left(1+\frac{[\mathrm{s\_0146}]}{\mathrm{kmp\_s\_0146r\_0015}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0015}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{28}$$

5.29 Function definition function_7

Name Function for 2-aceto-2-hydroxybutanoate synthase

Arguments Keq_r_0016, Vmax_r_0016, vol (intracellular), kmp_s_0042r_0016, kmp_s_0470r_0016, kms_s_0183r_0016, kms_s_0763_br_0016, kms_s_1277r_0016, [s_0042], [s_0183], [s_0470], [s_0763_b], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0016} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0183r\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0016}}\right)^{1} \cdot \left([\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0042}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0016}}\right)}{\left(1+\frac{[\mathrm{s\_0183}]}{\mathrm{kms\_s\_0183r\_0016}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0016}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0016}}\right) + \left(1+\frac{[\mathrm{s\_0042}]}{\mathrm{kmp\_s\_0042r\_0016}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0016}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{29}$$

5.30 Function definition function_8

Name Function for 2-aminoadipate transaminase

Arguments Keq_r_0018, Vmax_r_0018, vol (intracellular), kmp_s_0185r_0018, kmp_s_0861r_0018, kms_s_0181r_0018, kms_s_0899r_0018, [s_0181], [s_0185], [s_0861], [s_0899]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0018} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0181r\_0018}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0018}}\right)^{1} \cdot \left([\mathrm{s\_0181}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0861}]^{1}}{\mathrm{Keq\_r\_0018}}\right)}{\left(1+\frac{[\mathrm{s\_0181}]}{\mathrm{kms\_s\_0181r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0018}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0861}]}{\mathrm{kmp\_s\_0861r\_0018}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{30}$$

5.31 Function definition `function_9`

Name Function for 2-deoxy-D-arabino-heptulosonate 7-phosphate synthetase

Arguments Keq_r_0021, Vmax_r_0021, vol (intracellular), kmp_s_0356r_0021, kmp_s_1207r_0021, kms_s_0533r_0021, kms_s_1243r_0021, kms_s_1434_br_0021, [s_0356], [s_0533], [s_1207], [s_1243], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0021} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0533r\_0021}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0021}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0021}}\right)^{1} \cdot \left([\mathrm{s\_0533}]^{1} \cdot [\mathrm{s\_1243}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0356}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0021}}\right)}{\left(1+\frac{[\mathrm{s\_0533}]}{\mathrm{kms\_s\_0533r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0021}}\right) + \left(1+\frac{[\mathrm{s\_0356}]}{\mathrm{kmp\_s\_0356r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0021}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{31}$$

5.32 Function definition `function_10`

Name Function for 2-isopropylmalate hydratase

Arguments Keq_r_0025, Vmax_r_0025, vol (intracellular), kmp_s_0170r_0025, kmp_s_1434_br_0025, kms_s_0167r_0025, [s_0167], [s_0170], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0025} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0167r\_0025}}\right)^{1} \cdot \left([\mathrm{s\_0167}]^{1} - \frac{[\mathrm{s\_0170}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0025}}\right)}{1+\frac{[\mathrm{s\_0167}]}{\mathrm{kms\_s\_0167r\_0025}} + \left(1+\frac{[\mathrm{s\_0170}]}{\mathrm{kmp\_s\_0170r\_0025}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0025}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{32}$$

5.33 Function definition `function_11`

Name Function for 2-isopropylmalate synthase

Arguments Keq_r_0026, Vmax_r_0026, vol (intracellular), kmp_s_0167r_0026, kmp_s_0514r_0026, kmp_s_0763_br_0026, kms_s_0238r_0026, kms_s_0380r_0026, kms_s_1434_br_0026, [s_0167], [s_0238], [s_0380], [s_0514], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0026} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0238r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0026}}\right)^{1} \cdot \left([\mathrm{s\_0238}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0167}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0026}}\right)}{\left(1+\frac{[\mathrm{s\_0238}]}{\mathrm{kms\_s\_0238r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0026}}\right) + \left(1+\frac{[\mathrm{s\_0167}]}{\mathrm{kmp\_s\_0167r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0026}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{33}$$

5.34 Function definition function_12

Name Function for 2-methylcitrate dehydratase

Arguments Keq_r_0029, Vmax_r_0029, vol (intracellular), kmp_s_0468r_0029, kmp_s_1434_br_0029, kms_s_0798r_0029, [s_0468], [s_0798], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0029} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0798r\_0029}}\right)^{1} \cdot \left([\mathrm{s\_0798}]^{1} - \frac{[\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0029}}\right)}{1 + \frac{[\mathrm{s\_0798}]}{\mathrm{kms\_s\_0798r\_0029}} + \left(1 + \frac{[\mathrm{s\_0468}]}{\mathrm{kmp\_s\_0468r\_0029}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0029}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{34}$$

5.35 Function definition function_13

Name Function for 2-oxo-4-methyl-3-carboxypentanoate decarboxylation

Arguments Keq_r_0031, Vmax_r_0031, vol (intracellular), kmp_s_0297r_0031, kmp_s_0470r_0031, kms_s_0010r_0031, kms_s_0763_br_0031, [s_0010], [s_0297], [s_0470], [s_0763_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0031} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0010r\_0031}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0031}}\right)^{1} \cdot \left([\mathrm{s\_0010}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0297}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0031}}\right)}{\left(1 + \frac{[\mathrm{s\_0010}]}{\mathrm{kms\_s\_0010r\_0031}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0031}}\right) + \left(1 + \frac{[\mathrm{s\_0297}]}{\mathrm{kmp\_s\_0297r\_0031}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0031}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{35}$$

5.36 Function definition function_14

Name Function for 3',5'-bisphosphate nucleotidase

Arguments Keq_r_0034, Vmax_r_0034, vol (intracellular), kmp_s_0434r_0034, kmp_s_1207r_0034, kms_s_0397r_0034, kms_s_1434_br_0034, [s_0397], [s_0434], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0034} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0397r\_0034}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0034}}\right)^{1} \cdot \left([\mathrm{s\_0397}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0034}}\right)}{\left(1 + \frac{[\mathrm{s\_0397}]}{\mathrm{kms\_s\_0397r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0034}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0034}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{36}$$

5.37 Function definition function_15

Name Function for 3,4-dihydroxy-2-butanone-4-phosphate synthase

Arguments Keq_r_0040, Vmax_r_0040, vol (intracellular), kmp_s_0163r_0040, kmp_s_0689r_0040, kmp_s_0763_br_0040, kms_s_0557r_0040, [s_0163], [s_0557], [s_0689], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0040} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0557r\_0040}}\right)^{1} \cdot \left([\text{s\_0557}]^{1} - \frac{[\text{s\_0163}]^{1} \cdot [\text{s\_0689}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0040}}\right)}{1 + \frac{[\text{s\_0557}]}{\text{kms\_s\_0557r\_0040}} + \left(1 + \frac{[\text{s\_0163}]}{\text{kmp\_s\_0163r\_0040}}\right) \cdot \left(1 + \frac{[\text{s\_0689}]}{\text{kmp\_s\_0689r\_0040}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0040}}\right) - 1}}{\text{vol (intracellular)}} \tag{37}$$

5.38 Function definition function_16

Name Function for 3-dehydroquinate dehydratase

Arguments Keq_r_0042, Vmax_r_0042, vol (intracellular), kmp_s_0217r_0042, kmp_s_1434_br_0042, kms_s_0216r_0042, [s_0216], [s_0217], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0042} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0216r\_0042}}\right)^{1} \cdot \left([\text{s\_0216}]^{1} - \frac{[\text{s\_0217}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0042}}\right)}{1 + \frac{[\text{s\_0216}]}{\text{kms\_s\_0216r\_0042}} + \left(1 + \frac{[\text{s\_0217}]}{\text{kmp\_s\_0217r\_0042}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0042}}\right) - 1}}{\text{vol (intracellular)}} \tag{38}$$

5.39 Function definition function_17

Name Function for 3-dehydroquinate synthase

Arguments Keq_r_0043, Vmax_r_0043, vol (intracellular), kmp_s_0216r_0043, kmp_s_1207r_0043, kms_s_0356r_0043, [s_0216], [s_0356], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0043} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0356r\_0043}}\right)^{1} \cdot \left([\text{s\_0356}]^{1} - \frac{[\text{s\_0216}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0043}}\right)}{1 + \frac{[\text{s\_0356}]}{\text{kms\_s\_0356r\_0043}} + \left(1 + \frac{[\text{s\_0216}]}{\text{kmp\_s\_0216r\_0043}}\right) \cdot \left(1 + \frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0043}}\right) - 1}}{\text{vol (intracellular)}} \tag{39}$$

5.40 Function definition function_18

Name Function for 3-dehydrosphinganine reductase

Arguments Keq_r_0044, Vmax_r_0044, vol (intracellular), kmp_s_1091r_0044, kmp_s_1325r_0044, kms_s_0218r_0044, kms_s_0763_br_0044, kms_s_1096r_0044, [s_0218], [s_0763_b], [s_1091], [s_1096], [s_1325]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0044} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0218r\_0044}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0044}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0044}}\right)^{1} \cdot \left([\text{s\_0218}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_1091}]^{1} \cdot [\text{s\_1325}]^{1}}{\text{Keq\_r\_0044}}\right)}{\left(1+\frac{[\text{s\_0218}]}{\text{kms\_s\_0218r\_0044}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0044}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0044}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0044}}\right) \cdot \left(1+\frac{[\text{s\_1325}]}{\text{kmp\_s\_1325r\_0044}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (40)$$

5.41 Function definition `function_19`

Name Function for 3-hydroxyacyl-CoA dehydrogenase (3-oxohexacosyl-CoA)

Arguments Keq_r_0057, Vmax_r_0057, vol (intracellular), kmp_s_0046r_0057, kmp_s_1082r_0057, kms_s_0247r_0057, kms_s_0763_br_0057, kms_s_1087r_0057, [s_0046], [s_0247], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0057} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0247r\_0057}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0057}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0057}}\right)^{1} \cdot \left([\text{s\_0247}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1087}]^{1} - \frac{[\text{s\_0046}]^{1} \cdot [\text{s\_1082}]^{1}}{\text{Keq\_r\_0057}}\right)}{\left(1+\frac{[\text{s\_0247}]}{\text{kms\_s\_0247r\_0057}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0057}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0057}}\right) + \left(1+\frac{[\text{s\_0046}]}{\text{kmp\_s\_0046r\_0057}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0057}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (41)$$

5.42 Function definition `function_20`

Name Function for 3-hydroxyacyl-CoA dehydrogenase (3-oxohexadecanoyl-CoA)

Arguments Keq_r_0058, Vmax_r_0058, vol (intracellular), kmp_s_0052r_0058, kmp_s_1082r_0058, kms_s_0257r_0058, kms_s_0763_br_0058, kms_s_1087r_0058, [s_0052], [s_0257], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0058} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0257r\_0058}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0058}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0058}}\right)^{1} \cdot \left([\text{s\_0257}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1087}]^{1} - \frac{[\text{s\_0052}]^{1} \cdot [\text{s\_1082}]^{1}}{\text{Keq\_r\_0058}}\right)}{\left(1+\frac{[\text{s\_0257}]}{\text{kms\_s\_0257r\_0058}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0058}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0058}}\right) + \left(1+\frac{[\text{s\_0052}]}{\text{kmp\_s\_0052r\_0058}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0058}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (42)$$

5.43 Function definition `function_21`

Name Function for 3-hydroxyacyl-CoA dehydrogenase (3-oxooctadecanoyl-CoA)

Arguments Keq_r_0059, Vmax_r_0059, vol (intracellular), kmp_s_0234r_0059, kmp_s_1082r_0059, kms_s_0254r_0059, kms_s_0763_br_0059, kms_s_1087r_0059, [s_0234], [s_0254], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0059}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0254r\_0059}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0763\_br\_0059}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1087r\_0059}}\right)^{1}\cdot\left([\text{s\_0254}]^{1}\cdot[\text{s\_0763\_b}]^{1}\cdot[\text{s\_1087}]^{1}-\frac{[\text{s\_0234}]^{1}\cdot[\text{s\_1082}]^{1}}{\text{Keq\_r\_0059}}\right)}{\left(1+\frac{[\text{s\_0254}]}{\text{kms\_s\_0254r\_0059}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0059}}\right)\cdot\left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0059}}\right)+\left(1+\frac{[\text{s\_0234}]}{\text{kmp\_s\_0234r\_0059}}\right)\cdot\left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0059}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (43)$$

5.44 Function definition function_22

Name Function for 3-hydroxyacyl-CoA dehydrogenase (3-oxotetradecanoyl-CoA)

Arguments Keq_r_0060, Vmax_r_0060, vol (intracellular), kmp_s_0055r_0060, kmp_s_1082r_0060, kms_s_0261r_0060, kms_s_0763_br_0060, kms_s_1087r_0060, [s_0055], [s_0261], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0060}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0261r\_0060}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0763\_br\_0060}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1087r\_0060}}\right)^{1}\cdot\left([\text{s\_0261}]^{1}\cdot[\text{s\_0763\_b}]^{1}\cdot[\text{s\_1087}]^{1}-\frac{[\text{s\_0055}]^{1}\cdot[\text{s\_1082}]^{1}}{\text{Keq\_r\_0060}}\right)}{\left(1+\frac{[\text{s\_0261}]}{\text{kms\_s\_0261r\_0060}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0060}}\right)\cdot\left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0060}}\right)+\left(1+\frac{[\text{s\_0055}]}{\text{kmp\_s\_0055r\_0060}}\right)\cdot\left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0060}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (44)$$

5.45 Function definition function_23

Name Function for 3-isopropylmalate dehydratase

Arguments Keq_r_0063, Vmax_r_0063, vol (intracellular), kmp_s_0008r_0063, kms_s_0170r_0063, kms_s_1434_br_0063, [s_0008], [s_0170], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0063}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0170r\_0063}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1434\_br\_0063}}\right)^{1}\cdot\left([\text{s\_0170}]^{1}\cdot[\text{s\_1434\_b}]^{1}-\frac{[\text{s\_0008}]^{1}}{\text{Keq\_r\_0063}}\right)}{\left(1+\frac{[\text{s\_0170}]}{\text{kms\_s\_0170r\_0063}}\right)\cdot\left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0063}}\right)+1+\frac{[\text{s\_0008}]}{\text{kmp\_s\_0008r\_0063}}-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (45)$$

5.46 Function definition function_24

Name Function for 3-isopropylmalate dehydrogenase

Arguments Keq_r_0064, Vmax_r_0064, vol (intracellular), kmp_s_0010r_0064, kmp_s_0763_br_0064, kmp_s_1087r_0064, kms_s_0008r_0064, kms_s_1082r_0064, [s_0008], [s_0010], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0064}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0008r\_0064}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1082r\_0064}}\right)^{1}\cdot\left([\text{s\_0008}]^{1}\cdot[\text{s\_1082}]^{1}-\frac{[\text{s\_0010}]^{1}\cdot[\text{s\_0763\_b}]^{1}\cdot[\text{s\_1087}]^{1}}{\text{Keq\_r\_0064}}\right)}{\left(1+\frac{[\text{s\_0008}]}{\text{kms\_s\_0008r\_0064}}\right)\cdot\left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0064}}\right)+\left(1+\frac{[\text{s\_0010}]}{\text{kmp\_s\_0010r\_0064}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0064}}\right)\cdot\left(1+\frac{[\text{s\_1087}]}{\text{kmp\_s\_1087r\_0064}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (46)$$

5.47 Function definition function_25

Name Function for 3-phosphoshikimate 1-carboxyvinyltransferase

Arguments Keq_r_0068, Vmax_r_0068, vol (intracellular), kmp_s_0330r_0068, kmp_s_1207r_0068, kms_s_0267r_0068, kms_s_1243r_0068, [s_0267], [s_0330], [s_1207], [s_1243]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0068} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0267r\_0068}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1243r\_0068}}\right)^{1} \cdot \left([\text{s\_0267}]^{1} \cdot [\text{s\_1243}]^{1} - \frac{[\text{s\_0330}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0068}}\right)}{\left(1+\frac{[\text{s\_0267}]}{\text{kms\_s\_0267r\_0068}}\right) \cdot \left(1+\frac{[\text{s\_1243}]}{\text{kms\_s\_1243r\_0068}}\right) + \left(1+\frac{[\text{s\_0330}]}{\text{kmp\_s\_0330r\_0068}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0068}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{47}$$

5.48 Function definition function_26

Name Function for 5,10-methylenetetrahydrofolatereductase (NADPH)

Arguments Keq_r_0093, Vmax_r_0093, vol (intracellular), kmp_s_0328r_0093, kmp_s_1091r_0093, kms_s_0307r_0093, kms_s_0763_br_0093, kms_s_1096r_0093, [s_0307], [s_0328], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0093} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0307r\_0093}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0093}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0093}}\right)^{1} \cdot \left([\text{s\_0307}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0328}]^{1} \cdot [\text{s\_1091}]^{1}}{\text{Keq\_r\_0093}}\right)}{\left(1+\frac{[\text{s\_0307}]}{\text{kms\_s\_0307r\_0093}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0093}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0093}}\right) + \left(1+\frac{[\text{s\_0328}]}{\text{kmp\_s\_0328r\_0093}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0093}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{48}$$

5.49 Function definition function_27

Name Function for acetohydroxy acid isomeroreductase

Arguments Keq_r_0111, Vmax_r_0111, vol (intracellular), kmp_s_0018r_0111, kmp_s_1091r_0111, kms_s_0150r_0111, kms_s_0763_br_0111, kms_s_1096r_0111, [s_0018], [s_0150], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0111} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0150r\_0111}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0111}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0111}}\right)^{1} \cdot \left([\text{s\_0150}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0018}]^{1} \cdot [\text{s\_1091}]^{1}}{\text{Keq\_r\_0111}}\right)}{\left(1+\frac{[\text{s\_0150}]}{\text{kms\_s\_0150r\_0111}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0111}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0111}}\right) + \left(1+\frac{[\text{s\_0018}]}{\text{kmp\_s\_0018r\_0111}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0111}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{49}$$

5.50 Function definition function_28

Name Function for acetolactate synthase

Arguments Keq_r_0112, Vmax_r_0112, vol (intracellular), kmp_s_0150r_0112, kmp_s_0470r_0112, kms_s_0763_br_0112, kms_s_1277r_0112, [s_0150], [s_0470], [s_0763_b], [s_1277]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0112} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0112}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1277r\_0112}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1277}]^{2} - \frac{[\text{s\_0150}]^{1} \cdot [\text{s\_0470}]^{1}}{\text{Keq\_r\_0112}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0112}}\right) \cdot \left(1+\frac{[\text{s\_1277}]}{\text{kms\_s\_1277r\_0112}}\right) + \left(1+\frac{[\text{s\_0150}]}{\text{kmp\_s\_0150r\_0112}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0112}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{50}$$

5.51 Function definition function_29

Name Function for acetyl-CoA C-acetyltransferase

Arguments Keq_r_0118, Vmax_r_0118, vol (intracellular), kmp_s_0374r_0118, kmp_s_0514r_0118, kms_s_0380r_0118, [s_0374], [s_0380], [s_0514]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0118} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0118}}\right)^{2} \cdot \left([\text{s\_0380}]^{2} - \frac{[\text{s\_0374}]^{1} \cdot [\text{s\_0514}]^{1}}{\text{Keq\_r\_0118}}\right)}{1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0118}} + \left(1+\frac{[\text{s\_0374}]}{\text{kmp\_s\_0374r\_0118}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0118}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{51}$$

5.52 Function definition function_30

Name Function for acetyl-Coa carboxylase

Arguments Keq_r_0123, Vmax_r_0123, vol (intracellular), kmp_s_0400r_0123, kmp_s_0763_br_0123, kmp_s_1005r_0123, kmp_s_1207r_0123, kms_s_0380r_0123, kms_s_0446r_0123, kms_s_0458r_0123, [s_0380], [s_0400], [s_0446], [s_0458], [s_0763_b], [s_1005], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0123} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0123}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0123}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0458r\_0123}}\right)^{1} \cdot \left([\text{s\_0380}]^{1} \cdot [\text{s\_0446}]^{1} \cdot [\text{s\_0458}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_120}}{\text{Keq\_r\_0123}}\right.}{\left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0123}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0123}}\right) \cdot \left(1+\frac{[\text{s\_0458}]}{\text{kms\_s\_0458r\_0123}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0123}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0123}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kmp\_s\_1005r\_0123}}\right) \cdot \left(1-\right.}}{\text{vol}\,(\text{intracellular})} \tag{52}$$

5.53 Function definition function_31

Name Function for acetyl-CoA hydrolase

Arguments Keq_r_0125, Vmax_r_0125, vol (intracellular), kmp_s_0380r_0125, kmp_s_1434_br_0125, kms_s_0369r_0125, kms_s_0514r_0125, kms_s_0763_br_0125, [s_0369], [s_0380], [s_0514], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0125} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0369r\_0125}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0514r\_0125}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0125}}\right)^{1} \cdot \left([\text{s\_0369}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0763\_b}]^{1} - \frac{[\text{s\_0380}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0125}}\right)}{\left(1+\frac{[\text{s\_0369}]}{\text{kms\_s\_0369r\_0125}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kms\_s\_0514r\_0125}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0125}}\right) + \left(1+\frac{[\text{s\_0380}]}{\text{kmp\_s\_0380r\_0125}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0125}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{53}$$

5.54 Function definition function_32

Name Function for acetyl-CoA synthetase

Arguments Keq_r_0127, Vmax_r_0127, vol (intracellular), kmp_s_0369r_0127, kmp_s_0446r_0127, kmp_s_0514r_0127, kms_s_0380r_0127, kms_s_0434r_0127, kms_s_0605r_0127, [s_0369], [s_0380], [s_0434], [s_0446], [s_0514], [s_0605]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0127} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0127}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0434r\_0127}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0605r\_0127}}\right)^{1} \cdot \left([\text{s\_0380}]^{1} \cdot [\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} - \frac{[\text{s\_0369}]^{1} \cdot [\text{s\_0446}]^{1} \cdot [\text{s\_0514}]^{1}}{\text{Keq\_r\_0127}}\right)}{\left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0127}}\right) \cdot \left(1+\frac{[\text{s\_0434}]}{\text{kms\_s\_0434r\_0127}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kms\_s\_0605r\_0127}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0127}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0127}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0127}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{54}$$

5.55 Function definition function_33

Name Function for acetylglutamate kinase

Arguments Keq_r_0130, Vmax_r_0130, vol (intracellular), kmp_s_0400r_0130, kmp_s_1070r_0130, kms_s_0446r_0130, kms_s_1071r_0130, [s_0400], [s_0446], [s_1070], [s_1071]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0130} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0130}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1071r\_0130}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_1071}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_1070}]^{1}}{\text{Keq\_r\_0130}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0130}}\right) \cdot \left(1+\frac{[\text{s\_1071}]}{\text{kms\_s\_1071r\_0130}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0130}}\right) \cdot \left(1+\frac{[\text{s\_1070}]}{\text{kmp\_s\_1070r\_0130}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{55}$$

5.56 Function definition `function_34`

Name Function for acteylornithine transaminase

Arguments Keq_r_0133, Vmax_r_0133, vol (intracellular), kmp_s_0185r_0133, kmp_s_1051r_0133, kms_s_0149r_0133, kms_s_0899r_0133, [s_0149], [s_0185], [s_0899], [s_1051]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0133} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0149r\_0133}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0133}}\right)^{1} \cdot \left([\mathrm{s\_0149}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_1051}]^{1}}{\mathrm{Keq\_r\_0133}}\right)}{\left(1+\frac{[\mathrm{s\_0149}]}{\mathrm{kms\_s\_0149r\_0133}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0133}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0133}}\right) \cdot \left(1+\frac{[\mathrm{s\_1051}]}{\mathrm{kmp\_s\_1051r\_0133}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{56}$$

5.57 Function definition `function_35`

Name Function for adenosine kinase

Arguments Keq_r_0157, Vmax_r_0157, vol (intracellular), kmp_s_0400r_0157, kmp_s_0434r_0157, kmp_s_0763_br_0157, kms_s_0393r_0157, kms_s_0446r_0157, [s_0393], [s_0400], [s_0434], [s_0446], [s_0763_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0157} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0393r\_0157}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0157}}\right)^{1} \cdot \left([\mathrm{s\_0393}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0157}}\right)}{\left(1+\frac{[\mathrm{s\_0393}]}{\mathrm{kms\_s\_0393r\_0157}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0157}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0157}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0157}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0157}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{57}$$

5.58 Function definition `function_58`

Name Function for ATPase, cytosolic

Arguments Keq_r_0249, Vmax_r_0249, kmp_s_0400r_0249, kmp_s_0766_br_0249, kmp_s_1207r_0249, kms_s_0446r_0249, kms_s_1434_br_0249, [s_0400], [s_0446], [s_0766_b], [s_1207], [s_1434_b]

Mathematical Expression

$$\begin{aligned} &\mathrm{Vmax\_r\_0249} \\ &\cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0249}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0249}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0766\_b}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0249}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0249}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0766\_b}]}{\mathrm{kmp\_s\_0766\_br\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0}} \right.} \end{aligned} \tag{58}$$

5.59 Function definition function_59

Name Function for bicarbonate formation

Arguments Keq_r_0251, Vmax_r_0251, vol (intracellular), kmp_s_0458r_0251, kmp_s_0763_br_0251, kms_s_0470r_0251, kms_s_1434_br_0251, [s_0458], [s_0470], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0251} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0470r\_0251}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0251}}\right)^{1} \cdot \left([\text{s\_0470}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0458}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0251}}\right)}{\left(1+\frac{[\text{s\_0470}]}{\text{kms\_s\_0470r\_0251}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0251}}\right) + \left(1+\frac{[\text{s\_0458}]}{\text{kmp\_s\_0458r\_0251}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0251}}\right) - 1}}{\text{vol (intracellular)}} \tag{59}$$

5.60 Function definition function_60

Name Function for C-14 sterol reductase

Arguments Keq_r_0258, Vmax_r_0258, vol (intracellular), kmp_s_0124r_0258, kmp_s_1091r_0258, kms_s_0268r_0258, kms_s_0763_br_0258, kms_s_1096r_0258, [s_0124], [s_0268], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0258} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0268r\_0258}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0258}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0258}}\right)^{1} \cdot \left([\text{s\_0268}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0124}]^{1} \cdot [\text{s\_1091}]^{1}}{\text{Keq\_r\_0258}}\right)}{\left(1+\frac{[\text{s\_0268}]}{\text{kms\_s\_0268r\_0258}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0258}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0258}}\right) + \left(1+\frac{[\text{s\_0124}]}{\text{kmp\_s\_0124r\_0258}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0258}}\right) - 1}}{\text{vol (intracellular)}} \tag{60}$$

5.61 Function definition function_61

Name Function for C-3 sterol dehydrogenase

Arguments Keq_r_0261, Vmax_r_0261, vol (intracellular), kmp_s_0470r_0261, kmp_s_0763_br_0261, kmp_s_1096r_0261, kmp_s_1458r_0261, kms_s_1091r_0261, kms_s_1457r_0261, [s_0470], [s_0763_b], [s_1091], [s_1096], [s_1457], [s_1458]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0261} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1091r\_0261}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1457r\_0261}}\right)^{1} \cdot \left([\text{s\_1091}]^{1} \cdot [\text{s\_1457}]^{1} - \frac{[\text{s\_0470}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1458}]^{1}}{\text{Keq\_r\_0261}}\right)}{\left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1457}]}{\text{kms\_s\_1457r\_0261}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1458}]}{\text{kmp\_s\_1458r\_0261}}\right) - 1}}{\text{vol (intracellular)}} \tag{61}$$

5.62 Function definition function_62

Name Function for C-3 sterol dehydrogenase (4-methylzymosterol)

Arguments Keq_r_0262, Vmax_r_0262, vol (intracellular), kmp_s_0215r_0262, kmp_s_0470r_0262, kmp_s_0763_br_0262, kmp_s_1087r_0262, kms_s_0303r_0262, kms_s_1082r_0262, [s_0215], [s_0303], [s_0470], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0262} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0303r\_0262}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0262}}\right)^{1} \cdot \left([\text{s\_0303}]^{1} \cdot [\text{s\_1082}]^{1} - \frac{[\text{s\_0215}]^{1} \cdot [\text{s\_0470}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1087}]^{1}}{\text{Keq\_r\_0262}}\right)}{\left(1+\frac{[\text{s\_0303}]}{\text{kms\_s\_0303r\_0262}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0262}}\right) + \left(1+\frac{[\text{s\_0215}]}{\text{kmp\_s\_0215r\_0262}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0262}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0262}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kmp\_s\_1087r\_0262}}\right) - 1}}{\text{vol (intracellular)}} \tag{62}$$

5.63 Function definition function_63

Name Function for C-3 sterol keto reductase (4-methylzymosterol)

Arguments Keq_r_0263, Vmax_r_0263, vol (intracellular), kmp_s_0302r_0263, kmp_s_1091r_0263, kms_s_0215r_0263, kms_s_0763_br_0263, kms_s_1096r_0263, [s_0215], [s_0302], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0263} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0215r\_0263}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0263}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0263}}\right)^{1} \cdot \left([\text{s\_0215}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0302}]^{1} \cdot [\text{s\_1091}]^{1}}{\text{Keq\_r\_0263}}\right)}{\left(1+\frac{[\text{s\_0215}]}{\text{kms\_s\_0215r\_0263}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0263}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0263}}\right) + \left(1+\frac{[\text{s\_0302}]}{\text{kmp\_s\_0302r\_0263}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0263}}\right) - 1}}{\text{vol (intracellular)}} \tag{63}$$

5.64 Function definition function_64

Name Function for C-3 sterol keto reductase (zymosterol)

Arguments Keq_r_0264, Vmax_r_0264, vol (intracellular), kmp_s_1091r_0264, kmp_s_1447r_0264, kms_s_0763_br_0264, kms_s_1096r_0264, kms_s_1458r_0264, [s_0763_b], [s_1091], [s_1096], [s_1447], [s_1458]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0264} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0264}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0264}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1458r\_0264}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1458}]^{1} - \frac{[\text{s\_1091}]^{1} \cdot [\text{s\_1447}]^{1}}{\text{Keq\_r\_0264}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0264}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0264}}\right) \cdot \left(1+\frac{[\text{s\_1458}]}{\text{kms\_s\_1458r\_0264}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0264}}\right) \cdot \left(1+\frac{[\text{s\_1447}]}{\text{kmp\_s\_1447r\_0264}}\right) - 1}}{\text{vol (intracellular)}} \tag{64}$$

5.65 Function definition function_65

Name Function for C-4 methyl sterol oxidase

Arguments Keq_r_0265, Vmax_r_0265, vol (intracellular), kmp_s_1091r_0265, kmp_s_1434_br_0265, kmp_s_1455r_0265, kms_s_0302r_0265, kms_s_0763_br_0265, kms_s_1096r_0265, kms_s_1160r_0265, [s_0302], [s_0763_b], [s_1091], [s_1096], [s_1160], [s_1434_b], [s_1455]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0265} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0302r\_0265}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0265}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0265}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0265}}\right)^1 \cdot \left([\mathrm{s\_0302}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 - \frac{[\mathrm{s\_1091}]^1 \cdot}{\mathrm{K}}\right)}{\left(1+\frac{[\mathrm{s\_0302}]}{\mathrm{kms\_s\_0302r\_0265}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0265}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0265}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0265}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0265}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0265}}\right) \cdot}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (65)$$

5.66 Function definition function_66

Name Function for C-4 methyl sterol oxidase_2

Arguments Keq_r_0266, Vmax_r_0266, vol (intracellular), kmp_s_1091r_0266, kmp_s_1434_br_0266, kmp_s_1456r_0266, kms_s_0763_br_0266, kms_s_1096r_0266, kms_s_1160r_0266, kms_s_1455r_0266, [s_0763_b], [s_1091], [s_1096], [s_1160], [s_1434_b], [s_1455], [s_1456]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0266} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0266}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0266}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0266}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1455r\_0266}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1455}]^1 - \frac{[\mathrm{s\_1091}]^1 \cdot}{\mathrm{K}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0266}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0266}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0266}}\right) \cdot \left(1+\frac{[\mathrm{s\_1455}]}{\mathrm{kms\_s\_1455r\_0266}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0266}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0266}}\right) \cdot}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (66)$$

5.67 Function definition function_67

Name Function for C-4 methyl sterol oxidase_3

Arguments Keq_r_0267, Vmax_r_0267, vol (intracellular), kmp_s_1091r_0267, kmp_s_1434_br_0267, kmp_s_1457r_0267, kms_s_0763_br_0267, kms_s_1096r_0267, kms_s_1160r_0267, kms_s_1456r_0267, [s_0763_b], [s_1091], [s_1096], [s_1160], [s_1434_b], [s_1456], [s_1457]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0267} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1456r\_0267}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1456}]^1 - \frac{[\mathrm{s\_1091}]^1 \cdot}{\mathrm{K}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1456}]}{\mathrm{kms\_s\_1456r\_0267}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0267}}\right) \cdot}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (67)$$

5.68 Function definition `function_68`

Name Function for C-4 sterol methyl oxidase (4,4-dimethylzymosterol)

Arguments Keq_r_0268, Vmax_r_0268, vol (intracellular), kmp_s_0303r_0268, kmp_s_1091r_0268, kmp_s_1434_br_0268, kms_s_0124r_0268, kms_s_0763_br_0268, kms_s_1096r_0268, kms_s_1160r_0268, [s_0124], [s_0303], [s_0763_b], [s_1091], [s_1096], [s_1160], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0268}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0124r\_0268}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0763\_br\_0268}}\right)^{3}\cdot\left(\frac{1}{\text{kms\_s\_1096r\_0268}}\right)^{3}\cdot\left(\frac{1}{\text{kms\_s\_1160r\_0268}}\right)^{3}\cdot\left([\text{s\_0124}]^{1}\cdot[\text{s\_0763\_b}]^{3}\cdot[\text{s\_1096}]^{3}\cdot[\text{s\_1160}]^{3}-\frac{[\text{s\_0303}]^{1}\cdot[\ldots}{\text{K}\ldots}\right.}{\left(1+\frac{[\text{s\_0124}]}{\text{kms\_s\_0124r\_0268}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0268}}\right)\cdot\left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0268}}\right)\cdot\left(1+\frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0268}}\right)+\left(1+\frac{[\text{s\_0303}]}{\text{kmp\_s\_0303r\_0268}}\right)\cdot\left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0268}}\right)\cdot\left(1-\ldots\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{68}$$

5.69 Function definition `function_69`

Name Function for C-8 sterol isomerase

Arguments Keq_r_0270, Vmax_r_0270, vol (intracellular), kmp_s_0627r_0270, kms_s_0669r_0270, [s_0627], [s_0669]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0270}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0669r\_0270}}\right)^{1}\cdot\left([\text{s\_0669}]^{1}-\frac{[\text{s\_0627}]^{1}}{\text{Keq\_r\_0270}}\right)}{1+\frac{[\text{s\_0669}]}{\text{kms\_s\_0669r\_0270}}+1+\frac{[\text{s\_0627}]}{\text{kmp\_s\_0627r\_0270}}-1}}{\text{vol}\left(\text{intracellular}\right)} \tag{69}$$

5.70 Function definition `function_70`

Name Function for C-s24 sterol reductase

Arguments Keq_r_0271, Vmax_r_0271, vol (intracellular), kmp_s_0635r_0271, kmp_s_1091r_0271, kms_s_0632r_0271, kms_s_0763_br_0271, kms_s_1096r_0271, [s_0632], [s_0635], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0271}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0632r\_0271}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0763\_br\_0271}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1096r\_0271}}\right)^{1}\cdot\left([\text{s\_0632}]^{1}\cdot[\text{s\_0763\_b}]^{1}\cdot[\text{s\_1096}]^{1}-\frac{[\text{s\_0635}]^{1}\cdot[\text{s\_1091}]^{1}}{\text{Keq\_r\_0271}}\right)}{\left(1+\frac{[\text{s\_0632}]}{\text{kms\_s\_0632r\_0271}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0271}}\right)\cdot\left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0271}}\right)+\left(1+\frac{[\text{s\_0635}]}{\text{kmp\_s\_0635r\_0271}}\right)\cdot\left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0271}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \tag{70}$$

5.71 Function definition `function_71`

Name Function for carbamoyl-phosphate synthase (glutamine-hydrolysing)

Arguments Keq_r_0277, Vmax_r_0277, vol (intracellular), kmp_s_0400r_0277, kmp_s_0469r_0277, kmp_s_0763_br_0277, kmp_s_0899r_0277, kmp_s_1207r_0277, kms_s_0446r_0277, kms_s_0458r_0277, kms_s_0907r_0277, kms_s_1434_br_0277, [s_0400], [s_0446], [s_0458], [s_0469], [s_0763_b], [s_0899], [s_0907], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0277} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0277}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0277}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{2} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1434\_}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0277}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0469}]}{\mathrm{kmp\_s\_0469r\_0277}}\right) \cdot \left(1+\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{71}$$

5.72 Function definition `function_72`

Name Function for catalase

Arguments Keq_r_0282, Vmax_r_0282, vol (intracellular), kmp_s_1160r_0282, kmp_s_1434_br_0282, kms_s_0801r_0282, [s_0801], [s_1160], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0282} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0801r\_0282}}\right)^{2} \cdot \left([\mathrm{s\_0801}]^{2} - \frac{[\mathrm{s\_1160}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0282}}\right)}{1+\frac{[\mathrm{s\_0801}]}{\mathrm{kms\_s\_0801r\_0282}} + \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kmp\_s\_1160r\_0282}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0282}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{72}$$

5.73 Function definition `function_73`

Name Function for CDP-diacylglycerol synthase

Arguments Keq_r_0284, Vmax_r_0284, vol (intracellular), kmp_s_0485r_0284, kmp_s_0605r_0284, kms_s_0521r_0284, kms_s_0763_br_0284, kms_s_1215r_0284, [s_0485], [s_0521], [s_0605], [s_0763_b], [s_1215]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0284} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0521r\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1215r\_0284}}\right)^{1} \cdot \left([\mathrm{s\_0521}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1215}]^{1} - \frac{[\mathrm{s\_0485}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0284}}\right)}{\left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kms\_s\_1215r\_0284}}\right) + \left(1+\frac{[\mathrm{s\_0485}]}{\mathrm{kmp\_s\_0485r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0284}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{73}$$

5.74 Function definition function_74

Name Function for ceramide-1 hydroxylase (24C)

Arguments Keq_r_0287, Vmax_r_0287, vol (intracellular), kmp_s_1060r_0287, kmp_s_1091r_0287, kmp_s_1434_br_0287, kms_s_0763_br_0287, kms_s_1080r_0287, kms_s_1096r_0287, kms_s_1160r_0287, [s_0763_b], [s_1060], [s_1080], [s_1091], [s_1096], [s_1160], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0287} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1080r\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0287}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1080}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 - \frac{[\mathrm{s\_1060}]^1 \cdot \cdots}{\cdots}\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0287}}\right) \cdot \left(1+\frac{[\mathrm{s\_1080}]}{\mathrm{kms\_s\_1080r\_0287}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0287}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0287}}\right) + \left(1+\frac{[\mathrm{s\_1060}]}{\mathrm{kmp\_s\_1060r\_0287}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0287}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{74}$$

5.75 Function definition function_75

Name Function for ceramide-1 synthase (24C)

Arguments Keq_r_0290, Vmax_r_0290, vol (intracellular), kmp_s_0514r_0290, kmp_s_0763_br_0290, kmp_s_1080r_0290, kms_s_1325r_0290, kms_s_1355r_0290, [s_0514], [s_0763_b], [s_1080], [s_1325], [s_1355]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0290} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1325r\_0290}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1355r\_0290}}\right)^1 \cdot \left([\mathrm{s\_1325}]^1 \cdot [\mathrm{s\_1355}]^1 - \frac{[\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1080}]^1}{\mathrm{Keq\_r\_0290}}\right)}{\left(1+\frac{[\mathrm{s\_1325}]}{\mathrm{kms\_s\_1325r\_0290}}\right) \cdot \left(1+\frac{[\mathrm{s\_1355}]}{\mathrm{kms\_s\_1355r\_0290}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0290}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0290}}\right) \cdot \left(1+\frac{[\mathrm{s\_1080}]}{\mathrm{kmp\_s\_1080r\_0290}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{75}$$

5.76 Function definition function_76

Name Function for cholestenol delta-isomerase, lumped reaction

Arguments Keq_r_0298, Vmax_r_0298, vol (intracellular), kmp_s_0632r_0298, kmp_s_0763_br_0298, kmp_s_1290r_0298, kmp_s_1434_br_0298, kms_s_1160r_0298, kms_s_1293r_0298, kms_s_1447r_0298, [s_0632], [s_0763_b], [s_1160], [s_1290], [s_1293], [s_1434_b], [s_1447]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0298} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1160r\_0298}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1293r\_0298}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1447r\_0298}}\right)^1 \cdot \left([\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1293}]^1 \cdot [\mathrm{s\_1447}]^1 - \frac{[\mathrm{s\_0632}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1290}]^1 \cdot [\mathrm{s\_143}\cdots}{\mathrm{Keq\_r\_0298}}\right.}{\left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0298}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0298}}\right) \cdot \left(1+\frac{[\mathrm{s\_1447}]}{\mathrm{kms\_s\_1447r\_0298}}\right) + \left(1+\frac{[\mathrm{s\_0632}]}{\mathrm{kmp\_s\_0632r\_0298}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0298}}\right) \cdot \left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0298}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{76}$$

5.77 Function definition `function_77`

Name Function for chorismate mutase

Arguments Keq_r_0304, Vmax_r_0304, vol (intracellular), kmp_s_1258r_0304, kms_s_0500r_0304, [s_0500], [s_1258]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0304} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0500r\_0304}}\right)^{1} \cdot \left([\mathrm{s\_0500}]^{1} - \frac{[\mathrm{s\_1258}]^{1}}{\mathrm{Keq\_r\_0304}}\right)}{1 + \frac{[\mathrm{s\_0500}]}{\mathrm{kms\_s\_0500r\_0304}} + 1 + \frac{[\mathrm{s\_1258}]}{\mathrm{kmp\_s\_1258r\_0304}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{77}$$

5.78 Function definition `function_78`

Name Function for chorismate synthase

Arguments Keq_r_0306, Vmax_r_0306, vol (intracellular), kmp_s_0500r_0306, kmp_s_1207r_0306, kms_s_0330r_0306, [s_0330], [s_0500], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0306} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0330r\_0306}}\right)^{1} \cdot \left([\mathrm{s\_0330}]^{1} - \frac{[\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0306}}\right)}{1 + \frac{[\mathrm{s\_0330}]}{\mathrm{kms\_s\_0330r\_0306}} + \left(1 + \frac{[\mathrm{s\_0500}]}{\mathrm{kmp\_s\_0500r\_0306}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0306}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{78}$$

5.79 Function definition `function_79`

Name Function for cis-aconitate(3-) to isocitrate

Arguments Keq_r_0307, Vmax_r_0307, vol (intracellular), kmp_s_0847r_0307, kms_s_0501r_0307, kms_s_1434_br_0307, [s_0501], [s_0847], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0307} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0501r\_0307}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0307}}\right)^{1} \cdot \left([\mathrm{s\_0501}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0847}]^{1}}{\mathrm{Keq\_r\_0307}}\right)}{\left(1 + \frac{[\mathrm{s\_0501}]}{\mathrm{kms\_s\_0501r\_0307}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0307}}\right) + 1 + \frac{[\mathrm{s\_0847}]}{\mathrm{kmp\_s\_0847r\_0307}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{79}$$

5.80 Function definition `function_80`

Name Function for citrate synthase

Arguments Keq_r_0328, Vmax_r_0328, vol (intracellular), kmp_s_0507r_0328, kmp_s_0514r_0328, kmp_s_0763_br_0328, kms_s_0380r_0328, kms_s_1156r_0328, kms_s_1434_br_0328, [s_0380], [s_0507], [s_0514], [s_0763_b], [s_1156], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0328} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0328}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1156r\_0328}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0328}}\right)^{1} \cdot \left([\text{s\_0380}]^{1} \cdot [\text{s\_1156}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0507}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0328}}\right)}{\left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0328}}\right) \cdot \left(1+\frac{[\text{s\_1156}]}{\text{kms\_s\_1156r\_0328}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0328}}\right) + \left(1+\frac{[\text{s\_0507}]}{\text{kmp\_s\_0507r\_0328}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0328}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0328}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{80}$$

5.81 Function definition `function_81`

Name Function for citrate to cis-aconitate(3-)

Arguments Keq_r_0330, Vmax_r_0330, vol (intracellular), kmp_s_0501r_0330, kmp_s_1434_br_0330, kms_s_0507r_0330, [s_0501], [s_0507], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0330} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0507r\_0330}}\right)^{1} \cdot \left([\text{s\_0507}]^{1} - \frac{[\text{s\_0501}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0330}}\right)}{1+\frac{[\text{s\_0507}]}{\text{kms\_s\_0507r\_0330}} + \left(1+\frac{[\text{s\_0501}]}{\text{kmp\_s\_0501r\_0330}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0330}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{81}$$

5.82 Function definition `function_82`

Name Function for CTP synthase (NH3)

Arguments Keq_r_0336, Vmax_r_0336, vol (intracellular), kmp_s_0400r_0336, kmp_s_0521r_0336, kmp_s_0763_br_0336, kmp_s_1207r_0336, kms_s_0430r_0336, kms_s_0446r_0336, kms_s_1430r_0336, [s_0400], [s_0430], [s_0446], [s_0521], [s_0763_b], [s_1207], [s_1430]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0336} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0430r\_0336}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0336}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1430r\_0336}}\right)^{1} \cdot \left([\text{s\_0430}]^{1} \cdot [\text{s\_0446}]^{1} \cdot [\text{s\_1430}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0521}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_120}}{\text{Keq\_r\_0336}}\right.}{\left(1+\frac{[\text{s\_0430}]}{\text{kms\_s\_0430r\_0336}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0336}}\right) \cdot \left(1+\frac{[\text{s\_1430}]}{\text{kms\_s\_1430r\_0336}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0336}}\right) \cdot \left(1+\frac{[\text{s\_0521}]}{\text{kmp\_s\_0521r\_0336}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0336}}\right) \cdot \left(1+\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{82}$$

5.83 Function definition `function_83`

Name Function for cystathionine beta-synthase

Arguments Keq_r_0338, Vmax_r_0338, vol (intracellular), kmp_s_0888r_0338, kmp_s_1434_br_0338, kms_s_0917r_0338, kms_s_0943r_0338, [s_0888], [s_0917], [s_0943], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0338} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0917r\_0338}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0943r\_0338}}\right)^{1} \cdot \left([\text{s\_0917}]^{1} \cdot [\text{s\_0943}]^{1} - \frac{[\text{s\_0888}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0338}}\right)}{\left(1+\frac{[\text{s\_0917}]}{\text{kms\_s\_0917r\_0338}}\right) \cdot \left(1+\frac{[\text{s\_0943}]}{\text{kms\_s\_0943r\_0338}}\right) + \left(1+\frac{[\text{s\_0888}]}{\text{kmp\_s\_0888r\_0338}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0338}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{83}$$

5.84 Function definition function_84

Name Function for cystathionine g-lyase

Arguments Keq_r_0339, Vmax_r_0339, vol (intracellular), kmp_s_0183r_0339, kmp_s_0430r_0339, kmp_s_0889r_0339, kms_s_0888r_0339, kms_s_1434_br_0339, [s_0183], [s_0430], [s_0888], [s_0889], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0339} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0888r\_0339}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0339}}\right)^{1} \cdot \left([\text{s\_0888}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0183}]^{1} \cdot [\text{s\_0430}]^{1} \cdot [\text{s\_0889}]^{1}}{\text{Keq\_r\_0339}}\right)}{\left(1 + \frac{[\text{s\_0888}]}{\text{kms\_s\_0888r\_0339}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0339}}\right) + \left(1 + \frac{[\text{s\_0183}]}{\text{kmp\_s\_0183r\_0339}}\right) \cdot \left(1 + \frac{[\text{s\_0430}]}{\text{kmp\_s\_0430r\_0339}}\right) \cdot \left(1 + \frac{[\text{s\_0889}]}{\text{kmp\_s\_0889r\_0339}}\right) - 1}}{\text{vol (intracellular)}} \tag{84}$$

5.85 Function definition function_85

Name Function for cystathionine gamma-synthase

Arguments Keq_r_0340, Vmax_r_0340, vol (intracellular), kmp_s_0369r_0340, kmp_s_0763_br_0340, kmp_s_0888r_0340, kms_s_0889r_0340, kms_s_1117r_0340, [s_0369], [s_0763_b], [s_0888], [s_0889], [s_1117]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0340} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0889r\_0340}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1117r\_0340}}\right)^{1} \cdot \left([\text{s\_0889}]^{1} \cdot [\text{s\_1117}]^{1} - \frac{[\text{s\_0369}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0888}]^{1}}{\text{Keq\_r\_0340}}\right)}{\left(1 + \frac{[\text{s\_0889}]}{\text{kms\_s\_0889r\_0340}}\right) \cdot \left(1 + \frac{[\text{s\_1117}]}{\text{kms\_s\_1117r\_0340}}\right) + \left(1 + \frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0340}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0340}}\right) \cdot \left(1 + \frac{[\text{s\_0888}]}{\text{kmp\_s\_0888r\_0340}}\right) - 1}}{\text{vol (intracellular)}} \tag{85}$$

5.86 Function definition function_86

Name Function for cytidylate kinase (CMP)

Arguments Keq_r_0345, Vmax_r_0345, vol (intracellular), kmp_s_0446r_0345, kmp_s_0511r_0345, kms_s_0400r_0345, kms_s_0481r_0345, [s_0400], [s_0446], [s_0481], [s_0511]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0345} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0345}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0481r\_0345}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0481}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0511}]^{1}}{\text{Keq\_r\_0345}}\right)}{\left(1 + \frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0481}]}{\text{kms\_s\_0481r\_0345}}\right) + \left(1 + \frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0345}}\right) - 1}}{\text{vol (intracellular)}} \tag{86}$$

5.87 Function definition `function_87`

Name Function for cytochrome P450 lanosterol 14-alpha-demethylase (NAD)

Arguments Keq_r_0347, Vmax_r_0347, vol (intracellular), kmp_s_0268r_0347, kmp_s_0689r_0347, kmp_s_1082r_0347, kmp_s_1434_br_0347, kms_s_0763_br_0347, kms_s_0963r_0347, kms_s_1087r_0347, kms_s_1160r_0347, [s_0268], [s_0689], [s_0763_b], [s_0963], [s_1082], [s_1087], [s_1160], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0347} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0347}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0963r\_0347}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0347}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0347}}\right)^{3} \cdot \left([\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_0963}]^{1} \cdot [\mathrm{s\_1087}]^{3} \cdot [\mathrm{s\_1160}]^{3} - \right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0963}]}{\mathrm{kms\_s\_0963r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0347}}\right) + \left(1+\frac{[\mathrm{s\_0268}]}{\mathrm{kmp\_s\_0268r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0347}}\right) \cdot \left(1+\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (87)$$

5.88 Function definition `function_88`

Name Function for D-arabinose 1-dehydrogenase (NAD)

Arguments Keq_r_0351, Vmax_r_0351, vol (intracellular), kmp_s_0530r_0351, kmp_s_1082r_0351, kms_s_0529r_0351, kms_s_0763_br_0351, kms_s_1087r_0351, [s_0529], [s_0530], [s_0763_b], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0351} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0529r\_0351}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0351}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0351}}\right)^{1} \cdot \left([\mathrm{s\_0529}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0530}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0351}}\right)}{\left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kms\_s\_0529r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0351}}\right) + \left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kmp\_s\_0530r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0351}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (88)$$

5.89 Function definition `function_89`

Name Function for D-arabinose 1-dehydrogenase (NADP)

Arguments Keq_r_0352, Vmax_r_0352, vol (intracellular), kmp_s_0529r_0352, kmp_s_0763_br_0352, kmp_s_1096r_0352, kms_s_0530r_0352, kms_s_1091r_0352, [s_0529], [s_0530], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0352} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0530r\_0352}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0352}}\right)^{1} \cdot \left([\mathrm{s\_0530}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0529}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0352}}\right)}{\left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kms\_s\_0530r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0352}}\right) + \left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kmp\_s\_0529r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0352}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (89)$$

5.90 Function definition function_90

Name Function for dCMP deaminase

Arguments Keq_r_0357, Vmax_r_0357, vol (intracellular), kmp_s_0569r_0357, kmp_s_0763_br_0357, kmp_s_1434_br_0357, kms_s_0430r_0357, kms_s_0624r_0357, [s_0430], [s_0569], [s_0624], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0357} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0430r\_0357}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0624r\_0357}}\right)^{1} \cdot \left([\text{s\_0430}]^{1} \cdot [\text{s\_0624}]^{1} - \frac{[\text{s\_0569}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0357}}\right)}{\left(1+\frac{[\text{s\_0430}]}{\text{kms\_s\_0430r\_0357}}\right) \cdot \left(1+\frac{[\text{s\_0624}]}{\text{kms\_s\_0624r\_0357}}\right) + \left(1+\frac{[\text{s\_0569}]}{\text{kmp\_s\_0569r\_0357}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0357}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0357}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{90}$$

5.91 Function definition function_91

Name Function for deoxyadenylate kinase

Arguments Keq_r_0360, Vmax_r_0360, vol (intracellular), kmp_s_0446r_0360, kmp_s_0564r_0360, kms_s_0400r_0360, kms_s_0562r_0360, [s_0400], [s_0446], [s_0562], [s_0564]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0360} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0360}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0562r\_0360}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0562}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0564}]^{1}}{\text{Keq\_r\_0360}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0360}}\right) \cdot \left(1+\frac{[\text{s\_0562}]}{\text{kms\_s\_0562r\_0360}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0360}}\right) \cdot \left(1+\frac{[\text{s\_0564}]}{\text{kmp\_s\_0564r\_0360}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{91}$$

5.92 Function definition function_92

Name Function for deoxyguanylate kinase (dGMP:ATP)

Arguments Keq_r_0362, Vmax_r_0362, vol (intracellular), kmp_s_0446r_0362, kmp_s_0593r_0362, kms_s_0400r_0362, kms_s_0591r_0362, [s_0400], [s_0446], [s_0591], [s_0593]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0362} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0362}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0591r\_0362}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0591}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0593}]^{1}}{\text{Keq\_r\_0362}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0362}}\right) \cdot \left(1+\frac{[\text{s\_0591}]}{\text{kms\_s\_0591r\_0362}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0362}}\right) \cdot \left(1+\frac{[\text{s\_0593}]}{\text{kmp\_s\_0593r\_0362}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{92}$$

5.93 Function definition function_93

Name Function for diacylglycerol acyltransferase

Arguments Keq_r_0370, Vmax_r_0370, vol (intracellular), kmp_s_0514r_0370, kmp_s_0763_br_0370, kmp_s_1399r_0370, kms_s_0386r_0370, kms_s_0596r_0370, [s_0386], [s_0514], [s_0596], [s_0763_b], [s_1399]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0370} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0386r\_0370}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0596r\_0370}}\right)^1 \cdot \left([\text{s\_0386}]^1 \cdot [\text{s\_0596}]^1 - \frac{[\text{s\_0514}]^1 \cdot [\text{s\_0763\_b}]^4 \cdot [\text{s\_1399}]^1}{\text{Keq\_r\_0370}}\right)}{\left(1+\frac{[\text{s\_0386}]}{\text{kms\_s\_0386r\_0370}}\right) \cdot \left(1+\frac{[\text{s\_0596}]}{\text{kms\_s\_0596r\_0370}}\right) + \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0370}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0370}}\right) \cdot \left(1+\frac{[\text{s\_1399}]}{\text{kmp\_s\_1399r\_0370}}\right) - 1}}{\text{vol (intracellular)}} \tag{93}$$

5.94 Function definition function_94

Name Function for diacylglycerol pyrophosphate phosphatase

Arguments Keq_r_0371, Vmax_r_0371, vol (intracellular), kmp_s_0596r_0371, kmp_s_0763_br_0371, kmp_s_1207r_0371, kms_s_1215r_0371, kms_s_1434_br_0371, [s_0596], [s_0763_b], [s_1207], [s_1215], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0371} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1215r\_0371}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0371}}\right)^1 \cdot \left([\text{s\_1215}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0596}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_0371}}\right)}{\left(1+\frac{[\text{s\_1215}]}{\text{kms\_s\_1215r\_0371}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0371}}\right) + \left(1+\frac{[\text{s\_0596}]}{\text{kmp\_s\_0596r\_0371}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0371}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0371}}\right) - 1}}{\text{vol (intracellular)}} \tag{94}$$

5.95 Function definition function_95

Name Function for dihydoorotic acid dehydrogenase

Arguments Keq_r_0374, Vmax_r_0374, vol (intracellular), kmp_s_0801r_0374, kmp_s_1154r_0374, kms_s_0064r_0374, kms_s_1160r_0374, [s_0064], [s_0801], [s_1154], [s_1160]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0374} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0064r\_0374}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1160r\_0374}}\right)^1 \cdot \left([\text{s\_0064}]^1 \cdot [\text{s\_1160}]^1 - \frac{[\text{s\_0801}]^1 \cdot [\text{s\_1154}]^1}{\text{Keq\_r\_0374}}\right)}{\left(1+\frac{[\text{s\_0064}]}{\text{kms\_s\_0064r\_0374}}\right) \cdot \left(1+\frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0374}}\right) + \left(1+\frac{[\text{s\_0801}]}{\text{kmp\_s\_0801r\_0374}}\right) \cdot \left(1+\frac{[\text{s\_1154}]}{\text{kmp\_s\_1154r\_0374}}\right) - 1}}{\text{vol (intracellular)}} \tag{95}$$

5.96 Function definition function_96

Name Function for dihydrofolate reductase

Arguments Keq_r_0375, Vmax_r_0375, vol (intracellular), kmp_s_0309r_0375, kmp_s_1091r_0375, kms_s_0601r_0375, kms_s_0763_br_0375, kms_s_1096r_0375, [s_0309], [s_0601], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0375} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0601r\_0375}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0375}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0375}}\right)^{1} \cdot \left([\text{s\_0601}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0309}]^{1} \cdot [\text{s\_1091}]^{1}}{\text{Keq\_r\_0375}}\right)}{\left(1+\frac{[\text{s\_0601}]}{\text{kms\_s\_0601r\_0375}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0375}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0375}}\right) + \left(1+\frac{[\text{s\_0309}]}{\text{kmp\_s\_0309r\_0375}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0375}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{96}$$

5.97 Function definition function_97

Name Function for dihydroorotase

Arguments Keq_r_0381, Vmax_r_0381, vol (intracellular), kmp_s_0064r_0381, kmp_s_1434_br_0381, kms_s_0763_br_0381, kms_s_1073r_0381, [s_0064], [s_0763_b], [s_1073], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0381} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0381}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1073r\_0381}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1073}]^{1} - \frac{[\text{s\_0064}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0381}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0381}}\right) \cdot \left(1+\frac{[\text{s\_1073}]}{\text{kms\_s\_1073r\_0381}}\right) + \left(1+\frac{[\text{s\_0064}]}{\text{kmp\_s\_0064r\_0381}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0381}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{97}$$

5.98 Function definition function_98

Name Function for dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylbutanoate)

Arguments Keq_r_0384, Vmax_r_0384, vol (intracellular), kmp_s_0238r_0384, kmp_s_1434_br_0384, kms_s_0018r_0384, [s_0018], [s_0238], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0384} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0018r\_0384}}\right)^{1} \cdot \left([\text{s\_0018}]^{1} - \frac{[\text{s\_0238}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0384}}\right)}{1+\frac{[\text{s\_0018}]}{\text{kms\_s\_0018r\_0384}} + \left(1+\frac{[\text{s\_0238}]}{\text{kmp\_s\_0238r\_0384}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0384}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{98}$$

5.99 Function definition function_99

Name Function for dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylpentanoate)

Arguments Keq_r_0385, Vmax_r_0385, vol (intracellular), kmp_s_0058r_0385, kmp_s_1434_br_0385, kms_s_0007r_0385, [s_0007], [s_0058], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0385} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0007r\_0385}}\right)^{1} \cdot \left([\text{s\_0007}]^{1} - \frac{[\text{s\_0058}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0385}}\right)}{1 + \frac{[\text{s\_0007}]}{\text{kms\_s\_0007r\_0385}} + \left(1 + \frac{[\text{s\_0058}]}{\text{kmp\_s\_0058r\_0385}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0385}}\right) - 1}}{\text{vol (intracellular)}} \tag{99}$$

5.100 Function definition function_100

Name Function for dihydroxyacetone kinase

Arguments Keq_r_0386, Vmax_r_0386, vol (intracellular), kmp_s_0400r_0386, kmp_s_0735r_0386, kmp_s_0763_br_0386, kms_s_0446r_0386, kms_s_0734r_0386, [s_0400], [s_0446], [s_0734], [s_0735], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0386} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0386}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0734r\_0386}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0734}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0735}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0386}}\right)}{\left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0386}}\right) \cdot \left(1 + \frac{[\text{s\_0734}]}{\text{kms\_s\_0734r\_0386}}\right) + \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0386}}\right) \cdot \left(1 + \frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0386}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0386}}\right) - 1}}{\text{vol (intracellular)}} \tag{100}$$

5.101 Function definition function_101

Name Function for dimethylallyltranstransferase

Arguments Keq_r_0387, Vmax_r_0387, vol (intracellular), kmp_s_0605r_0387, kmp_s_0712r_0387, kms_s_0850r_0387, kms_s_1257r_0387, [s_0605], [s_0712], [s_0850], [s_1257]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0387} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0850r\_0387}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1257r\_0387}}\right)^{1} \cdot \left([\text{s\_0850}]^{1} \cdot [\text{s\_1257}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_0712}]^{1}}{\text{Keq\_r\_0387}}\right)}{\left(1 + \frac{[\text{s\_0850}]}{\text{kms\_s\_0850r\_0387}}\right) \cdot \left(1 + \frac{[\text{s\_1257}]}{\text{kms\_s\_1257r\_0387}}\right) + \left(1 + \frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0387}}\right) \cdot \left(1 + \frac{[\text{s\_0712}]}{\text{kmp\_s\_0712r\_0387}}\right) - 1}}{\text{vol (intracellular)}} \tag{101}$$

5.102 Function definition function_102

Name Function for dolichyl-phosphate D-mannosyltransferase

Arguments Keq_r_0393, Vmax_r_0393, vol (intracellular), kmp_s_0615r_0393, kmp_s_0706r_0393, kms_s_0616r_0393, kms_s_0710r_0393, [s_0615], [s_0616], [s_0706], [s_0710]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0393} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0616r\_0393}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0710r\_0393}}\right)^1 \cdot \left([\text{s\_0616}]^1 \cdot [\text{s\_0710}]^1 - \frac{[\text{s\_0615}]^1 \cdot [\text{s\_0706}]^1}{\text{Keq\_r\_0393}}\right)}{\left(1+\frac{[\text{s\_0616}]}{\text{kms\_s\_0616r\_0393}}\right) \cdot \left(1+\frac{[\text{s\_0710}]}{\text{kms\_s\_0710r\_0393}}\right) + \left(1+\frac{[\text{s\_0615}]}{\text{kmp\_s\_0615r\_0393}}\right) \cdot \left(1+\frac{[\text{s\_0706}]}{\text{kmp\_s\_0706r\_0393}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{102}$$

5.103 Function definition function_103

Name Function for dolichyl-phosphate-mannose–protein mannosyltransferase

Arguments Keq_r_0394, Vmax_r_0394, vol (intracellular), kmp_s_0616r_0394, kmp_s_0763_br_0394, kmp_s_1011r_0394, kms_s_0615r_0394, [s_0615], [s_0616], [s_0763_b], [s_1011]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0394} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0615r\_0394}}\right)^1 \cdot \left([\text{s\_0615}]^1 - \frac{[\text{s\_0616}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1011}]^1}{\text{Keq\_r\_0394}}\right)}{1+\frac{[\text{s\_0615}]}{\text{kms\_s\_0615r\_0394}} + \left(1+\frac{[\text{s\_0616}]}{\text{kmp\_s\_0616r\_0394}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0394}}\right) \cdot \left(1+\frac{[\text{s\_1011}]}{\text{kmp\_s\_1011r\_0394}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{103}$$

5.104 Function definition function_104

Name Function for enolase

Arguments Keq_r_0398, Vmax_r_0398, vol (intracellular), kmp_s_1243r_0398, kmp_s_1434_br_0398, kms_s_0193r_0398, [s_0193], [s_1243], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0398} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0193r\_0398}}\right)^1 \cdot \left([\text{s\_0193}]^1 - \frac{[\text{s\_1243}]^1 \cdot [\text{s\_1434\_b}]^1}{\text{Keq\_r\_0398}}\right)}{1+\frac{[\text{s\_0193}]}{\text{kms\_s\_0193r\_0398}} + \left(1+\frac{[\text{s\_1243}]}{\text{kmp\_s\_1243r\_0398}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0398}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{104}$$

5.105 Function definition `function_105`

Name Function for fatty acid synthase (n-C10:0)

Arguments Keq_r_0417, Vmax_r_0417, vol (intracellular), kmp_s_0470r_0417, kmp_s_0514r_0417, kmp_s_0574r_0417, kmp_s_1091r_0417, kmp_s_1434_br_0417, kms_s_0763_br_0417, kms_s_1005r_0417, kms_s_1096r_0417, kms_s_1132r_0417, [s_0470], [s_0514], [s_0574], [s_0763_b], [s_1005], [s_1091], [s_1096], [s_1132], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0417} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0417}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0417}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0417}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1132r\_0417}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_1096}]^{2} \cdot [\mathrm{s\_113} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kms\_s\_1132r\_0417}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0417}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{105}$$

5.106 Function definition `function_106`

Name Function for fatty acid synthase (n-C12:0)

Arguments Keq_r_0418, Vmax_r_0418, vol (intracellular), kmp_s_0470r_0418, kmp_s_0514r_0418, kmp_s_0968r_0418, kmp_s_1091r_0418, kmp_s_1434_br_0418, kms_s_0574r_0418, kms_s_0763_br_0418, kms_s_1005r_0418, kms_s_1096r_0418, [s_0470], [s_0514], [s_0574], [s_0763_b], [s_0968], [s_1005], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0418} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0574r\_0418}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0418}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0418}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0418}}\right)^{2} \cdot \left([\mathrm{s\_0574}]^{1} \cdot [\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_109} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0574}]}{\mathrm{kms\_s\_0574r\_0418}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0418}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0418}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0418}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0418}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0418}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{106}$$

5.107 Function definition `function_107`

Name Function for fatty acid synthase (n-C14:0)

Arguments Keq_r_0419, Vmax_r_0419, vol (intracellular), kmp_s_0470r_0419, kmp_s_0514r_0419, kmp_s_1028r_0419, kmp_s_1091r_0419, kmp_s_1434_br_0419, kms_s_0763_br_0419, kms_s_0968r_0419, kms_s_1005r_0419, kms_s_1096r_0419, [s_0470], [s_0514], [s_0763_b], [s_0968], [s_1005], [s_1028], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0419} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0419}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_0968r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0419}}\right)^{2} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_0968}]^{1} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_109} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0419}}\right) \cdot \left(1+\frac{[\mathrm{s\_0968}]}{\mathrm{kms\_s\_0968r\_0419}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0419}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0419}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0419}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0419}}\right) \cdot \left(1 \cdots\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{107}$$

5.108 Function definition function_108

Name Function for fatty acid synthase (n-C16:0)

Arguments Keq_r_0421, Vmax_r_0421, vol (intracellular), kmp_s_0470r_0421, kmp_s_0514r_0421, kmp_s_1091r_0421, kmp_s_1170r_0421, kmp_s_1434_br_0421, kms_s_0763_br_0421, kms_s_1005r_0421, kms_s_1028r_0421, kms_s_1096r_0421, [s_0470], [s_0514], [s_0763_b], [s_1005], [s_1028], [s_1091], [s_1096], [s_1170], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0421} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0421}}\right)^3 \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0421}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1028r\_0421}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0421}}\right)^2 \cdot \left([\text{s\_0763\_b}]^3 \cdot [\text{s\_1005}]^1 \cdot [\text{s\_1028}]^1 \cdot [\text{s\_109}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1028}]}{\text{kms\_s\_1028r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0421}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0421}}\right) \cdot \left(1-\right.}}{\text{vol}\,(\text{intracellular})} \quad (108)$$

5.109 Function definition function_109

Name Function for fatty acid synthase (n-C18:0)

Arguments Keq_r_0423, Vmax_r_0423, vol (intracellular), kmp_s_0470r_0423, kmp_s_0514r_0423, kmp_s_1091r_0423, kmp_s_1329r_0423, kmp_s_1434_br_0423, kms_s_0763_br_0423, kms_s_1005r_0423, kms_s_1096r_0423, kms_s_1170r_0423, [s_0470], [s_0514], [s_0763_b], [s_1005], [s_1091], [s_1096], [s_1170], [s_1329], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0423} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0423}}\right)^3 \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0423}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0423}}\right)^2 \cdot \left(\frac{1}{\text{kms\_s\_1170r\_0423}}\right)^1 \cdot \left([\text{s\_0763\_b}]^3 \cdot [\text{s\_1005}]^1 \cdot [\text{s\_1096}]^2 \cdot [\text{s\_117}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0423}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0423}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0423}}\right) \cdot \left(1+\frac{[\text{s\_1170}]}{\text{kms\_s\_1170r\_0423}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0423}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0423}}\right) \cdot \left(1-\right.}}{\text{vol}\,(\text{intracellular})} \quad (109)$$

5.110 Function definition function_110

Name Function for fatty acid synthase (n-C24:0), lumped reaction

Arguments Keq_r_0425, Vmax_r_0425, vol (intracellular), kmp_s_0470r_0425, kmp_s_0514r_0425, kmp_s_0987r_0425, kmp_s_1091r_0425, kmp_s_1434_br_0425, kms_s_0763_br_0425, kms_s_1005r_0425, kms_s_1096r_0425, kms_s_1329r_0425, [s_0470], [s_0514], [s_0763_b], [s_0987], [s_1005], [s_1091], [s_1096], [s_1329], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0425} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0425}}\right)^9 \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0425}}\right)^3 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0425}}\right)^6 \cdot \left(\frac{1}{\text{kms\_s\_1329r\_0425}}\right)^1 \cdot \left([\text{s\_0763\_b}]^9 \cdot [\text{s\_1005}]^3 \cdot [\text{s\_1096}]^6 \cdot [\text{s\_132}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1329}]}{\text{kms\_s\_1329r\_0425}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0425}}\right) \cdot \left(1-\right.}}{\text{vol}\,(\text{intracellular})} \quad (110)$$

5.111 Function definition `function_111`

Name Function for fatty acyl-CoA synthase (n-C10:0CoA)

Arguments Keq_r_0429, Vmax_r_0429, vol (intracellular), kmp_s_0470r_0429, kmp_s_0514r_0429, kmp_s_0582r_0429, kmp_s_1091r_0429, kmp_s_1434_br_0429, kms_s_0763_br_0429, kms_s_1005r_0429, kms_s_1096r_0429, kms_s_1140r_0429, [s_0470], [s_0514], [s_0582], [s_0763_b], [s_1005], [s_1091], [s_1096], [s_1140], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0429} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0429}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0429}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0429}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1140r\_0429}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1096}]^{2} \cdot [\text{s\_114}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1140}]}{\text{kms\_s\_1140r\_0429}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0429}}\right) \cdot \left(1\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{111}$$

5.112 Function definition `function_112`

Name Function for fatty acyl-CoA synthase (n-C8:0CoA), lumped reaction

Arguments Keq_r_0430, Vmax_r_0430, vol (intracellular), kmp_s_0470r_0430, kmp_s_0514r_0430, kmp_s_1091r_0430, kmp_s_1140r_0430, kmp_s_1434_br_0430, kms_s_0380r_0430, kms_s_0763_br_0430, kms_s_1005r_0430, kms_s_1096r_0430, [s_0380], [s_0470], [s_0514], [s_0763_b], [s_1005], [s_1091], [s_1096], [s_1140], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0430} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0430}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0430}}\right)^{9} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0430}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0430}}\right)^{6} \cdot \left([\text{s\_0380}]^{1} \cdot [\text{s\_0763\_b}]^{9} \cdot [\text{s\_1005}]^{3} \cdot [\text{s\_109}\right.}{\left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0430}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0430}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0430}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0430}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0430}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0430}}\right) \cdot \left(1\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{112}$$

5.113 Function definition `function_113`

Name Function for fatty-acid–CoA ligase (n-C24:0)

Arguments Keq_r_0437, Vmax_r_0437, vol (intracellular), kmp_s_0434r_0437, kmp_s_0605r_0437, kmp_s_1355r_0437, kms_s_0446r_0437, kms_s_0514r_0437, kms_s_0987r_0437, [s_0434], [s_0446], [s_0514], [s_0605], [s_0987], [s_1355]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0437} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0514r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0987r\_0437}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0987}]^{1} - \frac{[\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_1355}]^{1}}{\text{Keq\_r\_0437}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0437}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kms\_s\_0514r\_0437}}\right) \cdot \left(1+\frac{[\text{s\_0987}]}{\text{kms\_s\_0987r\_0437}}\right) + \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0437}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0437}}\right) \cdot \left(1+\frac{[\text{s\_1355}]}{\text{kmp\_s\_1355r\_0437}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{113}$$

5.114 Function definition function_114

Name Function for fatty-acid–CoA ligase (octadecanoate)

Arguments Keq_r_0439, Vmax_r_0439, vol (intracellular), kmp_s_0446r_0439, kmp_s_0514r_0439, kmp_s_1329r_0439, kms_s_0434r_0439, kms_s_0605r_0439, kms_s_1334r_0439, [s_0434], [s_0446], [s_0514], [s_0605], [s_1329], [s_1334]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0439} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1334r\_0439}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1334}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1329}]^{1}}{\mathrm{Keq\_r\_0439}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1334}]}{\mathrm{kms\_s\_1334r\_0439}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1329}]}{\mathrm{kmp\_s\_1329r\_0439}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (114)$$

5.115 Function definition function_115

Name Function for fatty-acid–CoA ligase (octanoate)

Arguments Keq_r_0442, Vmax_r_0442, vol (intracellular), kmp_s_0446r_0442, kmp_s_0514r_0442, kmp_s_1132r_0442, kms_s_0434r_0442, kms_s_0605r_0442, kms_s_1140r_0442, [s_0434], [s_0446], [s_0514], [s_0605], [s_1132], [s_1140]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0442} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1140r\_0442}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1140}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1132}]^{1}}{\mathrm{Keq\_r\_0442}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1140}]}{\mathrm{kms\_s\_1140r\_0442}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kmp\_s\_1132r\_0442}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (115)$$

5.116 Function definition function_116

Name Function for fatty-acyl-CoA synthase (n-C12:0CoA)

Arguments Keq_r_0464, Vmax_r_0464, vol (intracellular), kmp_s_0470r_0464, kmp_s_0514r_0464, kmp_s_0977r_0464, kmp_s_1091r_0464, kmp_s_1434_br_0464, kms_s_0582r_0464, kms_s_0763_br_0464, kms_s_1005r_0464, kms_s_1096r_0464, [s_0470], [s_0514], [s_0582], [s_0763_b], [s_0977], [s_1005], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0464} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0582r\_0464}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0464}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0464}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0464}}\right)^{2} \cdot \left([\mathrm{s\_0582}]^{1} \cdot [\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_109}\right.}{\left(1+\frac{[\mathrm{s\_0582}]}{\mathrm{kms\_s\_0582r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0464}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0464}}\right) \cdot \left(1+\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (116)$$

5.117 Function definition function_117

Name Function for fatty-acyl-CoA synthase (n-C14:0CoA)

Arguments Keq_r_0465, Vmax_r_0465, vol (intracellular), kmp_s_0470r_0465, kmp_s_0514r_0465, kmp_s_1044r_0465, kmp_s_1091r_0465, kmp_s_1434_br_0465, kms_s_0763_br_0465, kms_s_0977r_0465, kms_s_1005r_0465, kms_s_1096r_0465, [s_0470], [s_0514], [s_0763_b], [s_0977], [s_1005], [s_1044], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0465} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0465}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_0977r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0465}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_0977}]^{1} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_109}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0465}}\right) \cdot \left(1+\frac{[\text{s\_0977}]}{\text{kms\_s\_0977r\_0465}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0465}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0465}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0465}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0465}}\right) \cdot (1-}}{\text{vol (intracellular)}} \quad (117)$$

5.118 Function definition function_118

Name Function for fatty-acyl-CoA synthase (n-C16:0CoA)

Arguments Keq_r_0466, Vmax_r_0466, vol (intracellular), kmp_s_0470r_0466, kmp_s_0514r_0466, kmp_s_1091r_0466, kmp_s_1187r_0466, kmp_s_1434_br_0466, kms_s_0763_br_0466, kms_s_1005r_0466, kms_s_1044r_0466, kms_s_1096r_0466, [s_0470], [s_0514], [s_0763_b], [s_1005], [s_1044], [s_1091], [s_1096], [s_1187], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0466} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0466}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0466}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1044r\_0466}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0466}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1044}]^{1} \cdot [\text{s\_109}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0466}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0466}}\right) \cdot \left(1+\frac{[\text{s\_1044}]}{\text{kms\_s\_1044r\_0466}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0466}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0466}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0466}}\right) \cdot (1-}}{\text{vol (intracellular)}} \quad (118)$$

5.119 Function definition function_119

Name Function for fatty-acyl-CoA synthase (n-C18:0CoA)

Arguments Keq_r_0467, Vmax_r_0467, vol (intracellular), kmp_s_0470r_0467, kmp_s_0514r_0467, kmp_s_1091r_0467, kmp_s_1334r_0467, kmp_s_1434_br_0467, kms_s_0763_br_0467, kms_s_1005r_0467, kms_s_1096r_0467, kms_s_1187r_0467, [s_0470], [s_0514], [s_0763_b], [s_1005], [s_1091], [s_1096], [s_1187], [s_1334], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0467} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0467}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0467}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0467}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1187r\_0467}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1096}]^{2} \cdot [\text{s\_118}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1187}]}{\text{kms\_s\_1187r\_0467}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0467}}\right) \cdot (1-}}{\text{vol (intracellular)}} \quad (119)$$

5.120 Function definition `function_120`

Name Function for formate-tetrahydrofolate ligase

Arguments Keq_r_0479, Vmax_r_0479, vol (intracellular), kmp_s_0122r_0479, kmp_s_0400r_0479, kmp_s_1207r_0479, kms_s_0309r_0479, kms_s_0446r_0479, kms_s_0689r_0479, [s_0122], [s_0309], [s_0400], [s_0446], [s_0689], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0479} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0689r\_0479}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0689}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0479}}\right)}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kms\_s\_0689r\_0479}}\right) + \left(1+\frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0479}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{120}$$

5.121 Function definition `function_121`

Name Function for fructose-bisphosphate aldolase

Arguments Keq_r_0484, Vmax_r_0484, vol (intracellular), kmp_s_0731r_0484, kmp_s_0735r_0484, kms_s_0537r_0484, [s_0537], [s_0731], [s_0735]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0484} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0537r\_0484}}\right)^{1} \cdot \left([\mathrm{s\_0537}]^{1} - \frac{[\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_0735}]^{1}}{\mathrm{Keq\_r\_0484}}\right)}{1+\frac{[\mathrm{s\_0537}]}{\mathrm{kms\_s\_0537r\_0484}} + \left(1+\frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_0484}}\right) \cdot \left(1+\frac{[\mathrm{s\_0735}]}{\mathrm{kmp\_s\_0735r\_0484}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{121}$$

5.122 Function definition `function_122`

Name Function for fumarase

Arguments Keq_r_0485, Vmax_r_0485, vol (intracellular), kmp_s_0692r_0485, kmp_s_1434_br_0485, kms_s_0069r_0485, [s_0069], [s_0692], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0485} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0069r\_0485}}\right)^{1} \cdot \left([\mathrm{s\_0069}]^{1} - \frac{[\mathrm{s\_0692}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0485}}\right)}{1+\frac{[\mathrm{s\_0069}]}{\mathrm{kms\_s\_0069r\_0485}} + \left(1+\frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0485}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0485}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{122}$$

5.123 Function definition function_123

Name Function for fumarate reductase

Arguments Keq_r_0488, Vmax_r_0488, vol (intracellular), kmp_s_0657r_0488, kmp_s_1338r_0488, kms_s_0659r_0488, kms_s_0692r_0488, [s_0657], [s_0659], [s_0692], [s_1338]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0488} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0659r\_0488}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0692r\_0488}}\right)^1 \cdot \left([\text{s\_0659}]^1 \cdot [\text{s\_0692}]^1 - \frac{[\text{s\_0657}]^1 \cdot [\text{s\_1338}]^1}{\text{Keq\_r\_0488}}\right)}{\left(1+\frac{[\text{s\_0659}]}{\text{kms\_s\_0659r\_0488}}\right) \cdot \left(1+\frac{[\text{s\_0692}]}{\text{kms\_s\_0692r\_0488}}\right) + \left(1+\frac{[\text{s\_0657}]}{\text{kmp\_s\_0657r\_0488}}\right) \cdot \left(1+\frac{[\text{s\_1338}]}{\text{kmp\_s\_1338r\_0488}}\right) - 1}}{\text{vol (intracellular)}} \tag{123}$$

5.124 Function definition function_124

Name Function for geranyltranstransferase

Arguments Keq_r_0496, Vmax_r_0496, vol (intracellular), kmp_s_0195r_0496, kmp_s_0605r_0496, kms_s_0712r_0496, kms_s_0850r_0496, [s_0195], [s_0605], [s_0712], [s_0850]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0496} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0712r\_0496}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0850r\_0496}}\right)^1 \cdot \left([\text{s\_0712}]^1 \cdot [\text{s\_0850}]^1 - \frac{[\text{s\_0195}]^1 \cdot [\text{s\_0605}]^1}{\text{Keq\_r\_0496}}\right)}{\left(1+\frac{[\text{s\_0712}]}{\text{kms\_s\_0712r\_0496}}\right) \cdot \left(1+\frac{[\text{s\_0850}]}{\text{kms\_s\_0850r\_0496}}\right) + \left(1+\frac{[\text{s\_0195}]}{\text{kmp\_s\_0195r\_0496}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0496}}\right) - 1}}{\text{vol (intracellular)}} \tag{124}$$

5.125 Function definition function_125

Name Function for glucokinase

Arguments Keq_r_0499, Vmax_r_0499, vol (intracellular), kmp_s_0400r_0499, kmp_s_0455r_0499, kmp_s_0763_br_0499, kms_s_0446r_0499, kms_s_0545r_0499, [s_0400], [s_0446], [s_0455], [s_0545], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0499} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0499}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0545r\_0499}}\right)^1 \cdot \left([\text{s\_0446}]^1 \cdot [\text{s\_0545}]^1 - \frac{[\text{s\_0400}]^1 \cdot [\text{s\_0455}]^1 \cdot [\text{s\_0763\_b}]^1}{\text{Keq\_r\_0499}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0499}}\right) \cdot \left(1+\frac{[\text{s\_0545}]}{\text{kms\_s\_0545r\_0499}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0499}}\right) \cdot \left(1+\frac{[\text{s\_0455}]}{\text{kmp\_s\_0455r\_0499}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0499}}\right) - 1}}{\text{vol (intracellular)}} \tag{125}$$

5.126 Function definition function_127

Name Function for glucose-6-phosphate isomerase_2

Arguments Keq_r_0505, Vmax_r_0505, vol (intracellular), kmp_s_0539r_0505, kms_s_0410r_0505, [s_0410], [s_0539]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0505} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0505}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} - \frac{[\mathrm{s\_0539}]^{1}}{\mathrm{Keq\_r\_0505}}\right)}{1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0505}} + 1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0505}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{126}$$

5.127 Function definition function_128

Name Function for glutamate 5-kinase

Arguments Keq_r_0506, Vmax_r_0506, vol (intracellular), kmp_s_0400r_0506, kmp_s_0894r_0506, kms_s_0446r_0506, kms_s_0899r_0506, [s_0400], [s_0446], [s_0894], [s_0899]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0506} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0506}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0506}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0894}]^{1}}{\mathrm{Keq\_r\_0506}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0506}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0506}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0506}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0894}]}{\mathrm{kmp\_s\_0894r\_0506}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{127}$$

5.128 Function definition function_129

Name Function for glutamate dehydrogenase (NADP)

Arguments Keq_r_0509, Vmax_r_0509, vol (intracellular), kmp_s_0899r_0509, kmp_s_1091r_0509, kmp_s_1434_br_0509, kms_s_0185r_0509, kms_s_0430r_0509, kms_s_0763_br_0509, kms_s_1096r_0509, [s_0185], [s_0430], [s_0763_b], [s_0899], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0509} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0430r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0509}}\right)^{1} \cdot \Big([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0899}]^{1} \cdot}{}}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0509}}\right) + \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0509}}\right) \cdot \Big(1 +}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{128}$$

5.129 Function definition `function_130`

Name Function for glutamate synthase (NADH2)

Arguments Keq_r_0510, Vmax_r_0510, vol (intracellular), kmp_s_0899r_0510, kmp_s_1082r_0510, kms_s_0185r_0510, kms_s_0763_br_0510, kms_s_0907r_0510, kms_s_1087r_0510, [s_0185], [s_0763_b], [s_0899], [s_0907], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0510} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0510}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0899}]^{2} \cdot [\mathrm{s\_108} \ldots}{\mathrm{Keq\_r\_0510}} \ldots\right.}{\left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0510}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0510}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0510}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0510}}\right) + \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0510}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0510}}\right) - \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{129}$$

5.130 Function definition `function_131`

Name Function for glutamate-5-semialdehyde dehydrogenase

Arguments Keq_r_0512, Vmax_r_0512, vol (intracellular), kmp_s_0905r_0512, kmp_s_1082r_0512, kmp_s_1207r_0512, kms_s_0763_br_0512, kms_s_0894r_0512, kms_s_1087r_0512, [s_0763_b], [s_0894], [s_0905], [s_1082], [s_1087], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0512} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0894r\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0512}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0894}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0905}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0512}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_0894}]}{\mathrm{kms\_s\_0894r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0512}}\right) + \left(1+\frac{[\mathrm{s\_0905}]}{\mathrm{kmp\_s\_0905r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0512}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{130}$$

5.131 Function definition `function_132`

Name Function for glutamine phosphoribosyldiphosphate amidotransferase

Arguments Keq_r_0514, Vmax_r_0514, vol (intracellular), kmp_s_0333r_0514, kmp_s_0605r_0514, kmp_s_0899r_0514, kms_s_0331r_0514, kms_s_0907r_0514, kms_s_1434_br_0514, [s_0331], [s_0333], [s_0605], [s_0899], [s_0907], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0514} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0514}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0333}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0899}]^{1}}{\mathrm{Keq\_r\_0514}}\right)}{\left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0514}}\right) + \left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kmp\_s\_0333r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0514}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{131}$$

5.132 Function definition `function_133`

Name Function for glutamine synthetase

Arguments Keq_r_0515, Vmax_r_0515, vol (intracellular), kmp_s_0400r_0515, kmp_s_0763_br_0515, kmp_s_0907r_0515, kmp_s_1207r_0515, kms_s_0430r_0515, kms_s_0446r_0515, kms_s_0899r_0515, [s_0400], [s_0430], [s_0446], [s_0763_b], [s_0899], [s_0907], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0515} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0430r\_0515}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0515}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0515}}\right)^{1} \cdot \left([\text{s\_0430}]^{1} \cdot [\text{s\_0446}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0907}]^{1} \cdot \text{[s\_120}}{\text{Keq\_r\_0515}}\right.}{\left(1+\frac{[\text{s\_0430}]}{\text{kms\_s\_0430r\_0515}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0515}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0515}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0515}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0515}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kmp\_s\_0907r\_0515}}\right) \cdot \left(1\right.}}{\text{vol}\left(\text{intracellular}\right)} \quad (132)$$

5.133 Function definition `function_135`

Name Function for glycerol dehydrogenase (NADP-dependent)

Arguments Keq_r_0526, Vmax_r_0526, vol (intracellular), kmp_s_0734r_0526, kmp_s_0763_br_0526, kmp_s_1096r_0526, kms_s_0732r_0526, kms_s_1091r_0526, [s_0732], [s_0734], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0526} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0732r\_0526}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0526}}\right)^{1} \cdot \left([\text{s\_0732}]^{1} \cdot [\text{s\_1091}]^{1} - \frac{[\text{s\_0734}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1}}{\text{Keq\_r\_0526}}\right)}{\left(1+\frac{[\text{s\_0732}]}{\text{kms\_s\_0732r\_0526}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0526}}\right) + \left(1+\frac{[\text{s\_0734}]}{\text{kmp\_s\_0734r\_0526}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0526}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0526}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (133)$$

5.134 Function definition `function_136`

Name Function for glycerol-3-phosphatase

Arguments Keq_r_0528, Vmax_r_0528, vol (intracellular), kmp_s_0732r_0528, kmp_s_1207r_0528, kms_s_1315r_0528, kms_s_1434_br_0528, [s_0732], [s_1207], [s_1315], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0528} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1315r\_0528}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0528}}\right)^{1} \cdot \left([\text{s\_1315}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0732}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0528}}\right)}{\left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0528}}\right) + \left(1+\frac{[\text{s\_0732}]}{\text{kmp\_s\_0732r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0528}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (134)$$

5.135 Function definition function_137

Name Function for glycerol-3-phosphate dehydrogenase (fad)

Arguments Keq_r_0529, Vmax_r_0529, vol (intracellular), kmp_s_0659r_0529, kmp_s_0735r_0529, kms_s_0657r_0529, kms_s_1315r_0529, [s_0657], [s_0659], [s_0735], [s_1315]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0529} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0657r\_0529}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0529}}\right)^{1} \cdot \left([\text{s\_0657}]^{1} \cdot [\text{s\_1315}]^{1} - \frac{[\text{s\_0659}]^{1} \cdot [\text{s\_0735}]^{1}}{\text{Keq\_r\_0529}}\right)}{\left(1+\frac{[\text{s\_0657}]}{\text{kms\_s\_0657r\_0529}}\right) \cdot \left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0529}}\right) + \left(1+\frac{[\text{s\_0659}]}{\text{kmp\_s\_0659r\_0529}}\right) \cdot \left(1+\frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0529}}\right) - 1}}{\text{vol (intracellular)}} \tag{135}$$

5.136 Function definition function_138

Name Function for glycerol-3-phosphate dehydrogenase (NAD)

Arguments Keq_r_0530, Vmax_r_0530, vol (intracellular), kmp_s_1082r_0530, kmp_s_1315r_0530, kms_s_0735r_0530, kms_s_0763_br_0530, kms_s_1087r_0530, [s_0735], [s_0763_b], [s_1082], [s_1087], [s_1315]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0530} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0735r\_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0530}}\right)^{1} \cdot \left([\text{s\_0735}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1087}]^{1} - \frac{[\text{s\_1082}]^{1} \cdot [\text{s\_1315}]^{1}}{\text{Keq\_r\_0530}}\right)}{\left(1+\frac{[\text{s\_0735}]}{\text{kms\_s\_0735r\_0530}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0530}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0530}}\right) + \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0530}}\right) \cdot \left(1+\frac{[\text{s\_1315}]}{\text{kmp\_s\_1315r\_0530}}\right) - 1}}{\text{vol (intracellular)}} \tag{136}$$

5.137 Function definition function_139

Name Function for glycerol-3-phosphate/dihydroxyacetone phosphate acyltransferase

Arguments Keq_r_0534, Vmax_r_0534, vol (intracellular), kmp_s_0083r_0534, kmp_s_0514r_0534, kmp_s_0763_br_0534, kms_s_0386r_0534, kms_s_1315r_0534, [s_0083], [s_0386], [s_0514], [s_0763_b], [s_1315]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0534} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0386r\_0534}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0534}}\right)^{1} \cdot \left([\text{s\_0386}]^{1} \cdot [\text{s\_1315}]^{1} - \frac{[\text{s\_0083}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0763\_b}]^{2}}{\text{Keq\_r\_0534}}\right)}{\left(1+\frac{[\text{s\_0386}]}{\text{kms\_s\_0386r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0534}}\right) + \left(1+\frac{[\text{s\_0083}]}{\text{kmp\_s\_0083r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0534}}\right) - 1}}{\text{vol (intracellular)}} \tag{137}$$

5.138 Function definition `function_140`

Name Function for glycine cleavage system

Arguments Keq_r_0538, Vmax_r_0538, vol (intracellular), kmp_s_0307r_0538, kmp_s_0430r_0538, kmp_s_0470r_0538, kmp_s_1087r_0538, kms_s_0309r_0538, kms_s_0740r_0538, kms_s_1082r_0538, [s_0307], [s_0309], [s_0430], [s_0470], [s_0740], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0538} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0538}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0740}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1087}]}{\mathrm{Keq\_r\_0538}} \right.}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0538}}\right) + \left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kmp\_s\_0307r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0538}}\right) \cdot \left(1+\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{138}$$

5.139 Function definition `function_141`

Name Function for glycine hydroxymethyltransferase

Arguments Keq_r_0539, Vmax_r_0539, vol (intracellular), kmp_s_0309r_0539, kmp_s_0943r_0539, kms_s_0307r_0539, kms_s_0740r_0539, kms_s_1434_br_0539, [s_0307], [s_0309], [s_0740], [s_0943], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0539} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0539}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0539}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0539}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0740}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0943}]^{1}}{\mathrm{Keq\_r\_0539}}\right)}{\left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0539}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kmp\_s\_0943r\_0539}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{139}$$

5.140 Function definition `function_142`

Name Function for glycogen (starch) synthase

Arguments Keq_r_0547, Vmax_r_0547, vol (intracellular), kmp_s_0438r_0547, kmp_s_0763_br_0547, kmp_s_1411r_0547, kms_s_1415r_0547, kms_s_1434_br_0547, [s_0438], [s_0763_b], [s_1411], [s_1415], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0547} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0547}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0547}}\right)^{1} \cdot \left([\mathrm{s\_1415}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0438}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0547}}\right)}{\left(1+\frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0547}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0547}}\right) + \left(1+\frac{[\mathrm{s\_0438}]}{\mathrm{kmp\_s\_0438r\_0547}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0547}}\right) \cdot \left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0547}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{140}$$

5.141 Function definition `function_143`

Name Function for GMP synthase

Arguments Keq_r_0551, Vmax_r_0551, vol (intracellular), kmp_s_0434r_0551, kmp_s_0605r_0551, kmp_s_0752r_0551, kmp_s_0763_br_0551, kmp_s_0899r_0551, kms_s_0306r_0551, kms_s_0446r_0551, kms_s_0907r_0551, kms_s_1434_br_0551, [s_0306], [s_0434], [s_0446], [s_0605], [s_0752], [s_0763_b], [s_0899], [s_0907], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0551}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0306r\_0551}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0446r\_0551}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0907r\_0551}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1434\_br\_0551}}\right)^{1}\cdot\left([\text{s\_0306}]^{1}\cdot[\text{s\_0446}]^{1}\cdot[\text{s\_0907}]^{1}\cdot[\text{s\_1434\_}\right.}{\left(1+\frac{[\text{s\_0306}]}{\text{kms\_s\_0306r\_0551}}\right)\cdot\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0551}}\right)\cdot\left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0551}}\right)\cdot\left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0551}}\right)+\left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0551}}\right)\cdot\left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0551}}\right)\cdot\left(1-\right.}}{\text{vol}\,(\text{intracellular})} \tag{141}$$

5.142 Function definition `function_144`

Name Function for GTP cyclohydrolase II

Arguments Keq_r_0562, Vmax_r_0562, vol (intracellular), kmp_s_0145r_0562, kmp_s_0605r_0562, kmp_s_0689r_0562, kmp_s_0763_br_0562, kms_s_0755r_0562, kms_s_1434_br_0562, [s_0145], [s_0605], [s_0689], [s_0755], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0562}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0755r\_0562}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1434\_br\_0562}}\right)^{3}\cdot\left([\text{s\_0755}]^{1}\cdot[\text{s\_1434\_b}]^{3}-\frac{[\text{s\_0145}]^{1}\cdot[\text{s\_0605}]^{1}\cdot[\text{s\_0689}]^{1}\cdot[\text{s\_0763\_b}]^{2}}{\text{Keq\_r\_0562}}\right)}{\left(1+\frac{[\text{s\_0755}]}{\text{kms\_s\_0755r\_0562}}\right)\cdot\left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0562}}\right)+\left(1+\frac{[\text{s\_0145}]}{\text{kmp\_s\_0145r\_0562}}\right)\cdot\left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0562}}\right)\cdot\left(1+\frac{[\text{s\_0689}]}{\text{kmp\_s\_0689r\_0562}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0562}}\right)-}}{\text{vol}\,(\text{intracellular})} \tag{142}$$

5.143 Function definition `function_145`

Name Function for guanylate kinase (GMP:ATP)

Arguments Keq_r_0567, Vmax_r_0567, vol (intracellular), kmp_s_0400r_0567, kmp_s_0706r_0567, kms_s_0446r_0567, kms_s_0752r_0567, [s_0400], [s_0446], [s_0706], [s_0752]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0567}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0446r\_0567}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0752r\_0567}}\right)^{1}\cdot\left([\text{s\_0446}]^{1}\cdot[\text{s\_0752}]^{1}-\frac{[\text{s\_0400}]^{1}\cdot[\text{s\_0706}]^{1}}{\text{Keq\_r\_0567}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0567}}\right)\cdot\left(1+\frac{[\text{s\_0752}]}{\text{kms\_s\_0752r\_0567}}\right)+\left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0567}}\right)\cdot\left(1+\frac{[\text{s\_0706}]}{\text{kmp\_s\_0706r\_0567}}\right)-1}}{\text{vol}\,(\text{intracellular})} \tag{143}$$

5.144 Function definition `function_146`

Name Function for guanylate kinase (GMP:dATP)

Arguments Keq_r_0568, Vmax_r_0568, vol (intracellular), kmp_s_0562r_0568, kmp_s_0706r_0568, kms_s_0566r_0568, kms_s_0752r_0568, [s_0562], [s_0566], [s_0706], [s_0752]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0568} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0566r\_0568}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0752r\_0568}}\right)^{1} \cdot \left([\text{s\_0566}]^{1} \cdot [\text{s\_0752}]^{1} - \frac{[\text{s\_0562}]^{1} \cdot [\text{s\_0706}]^{1}}{\text{Keq\_r\_0568}}\right)}{\left(1+\frac{[\text{s\_0566}]}{\text{kms\_s\_0566r\_0568}}\right) \cdot \left(1+\frac{[\text{s\_0752}]}{\text{kms\_s\_0752r\_0568}}\right) + \left(1+\frac{[\text{s\_0562}]}{\text{kmp\_s\_0562r\_0568}}\right) \cdot \left(1+\frac{[\text{s\_0706}]}{\text{kmp\_s\_0706r\_0568}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{144}$$

5.145 Function definition `function_147`

Name Function for hexokinase (D-glucose:ATP)

Arguments Keq_r_0573, Vmax_r_0573, vol (intracellular), kmp_s_0400r_0573, kmp_s_0410r_0573, kmp_s_0763_br_0573, kms_s_0446r_0573, kms_s_0545r_0573, [s_0400], [s_0410], [s_0446], [s_0545], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0573} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0573}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0545r\_0573}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0545}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0410}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0573}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0573}}\right) \cdot \left(1+\frac{[\text{s\_0545}]}{\text{kms\_s\_0545r\_0573}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0573}}\right) \cdot \left(1+\frac{[\text{s\_0410}]}{\text{kmp\_s\_0410r\_0573}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0573}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{145}$$

5.146 Function definition `function_148`

Name Function for histidinol dehydrogenase

Arguments Keq_r_0575, Vmax_r_0575, vol (intracellular), kmp_s_0763_br_0575, kmp_s_0911r_0575, kmp_s_1087r_0575, kms_s_0915r_0575, kms_s_1082r_0575, kms_s_1434_br_0575, [s_0763_b], [s_0911], [s_0915], [s_1082], [s_1087], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0575} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0915r\_0575}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0575}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0575}}\right)^{1} \cdot \left([\text{s\_0915}]^{1} \cdot [\text{s\_1082}]^{2} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0763\_b}]^{3} \cdot [\text{s\_0911}]^{1} \cdot [\text{s\_1087}]^{2}}{\text{Keq\_r\_0575}}\right)}{\left(1+\frac{[\text{s\_0915}]}{\text{kms\_s\_0915r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0575}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0575}}\right) \cdot \left(1+\frac{[\text{s\_0911}]}{\text{kmp\_s\_0911r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kmp\_s\_1087r\_0575}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{146}$$

5.147 Function definition function_149

Name Function for histidinol-phosphatase

Arguments Keq_r_0576, Vmax_r_0576, vol (intracellular), kmp_s_0915r_0576, kmp_s_1207r_0576, kms_s_0916r_0576, kms_s_1434_br_0576, [s_0915], [s_0916], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0576} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0916r\_0576}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0576}}\right)^{1} \cdot \left([\mathrm{s\_0916}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0915}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0576}}\right)}{\left(1+\frac{[\mathrm{s\_0916}]}{\mathrm{kms\_s\_0916r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0576}}\right) + \left(1+\frac{[\mathrm{s\_0915}]}{\mathrm{kmp\_s\_0915r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0576}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{147}$$

5.148 Function definition function_150

Name Function for histidinol-phosphate transaminase

Arguments Keq_r_0577, Vmax_r_0577, vol (intracellular), kmp_s_0185r_0577, kmp_s_0916r_0577, kms_s_0212r_0577, kms_s_0899r_0577, [s_0185], [s_0212], [s_0899], [s_0916]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0577} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0212r\_0577}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0577}}\right)^{1} \cdot \left([\mathrm{s\_0212}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0916}]^{1}}{\mathrm{Keq\_r\_0577}}\right)}{\left(1+\frac{[\mathrm{s\_0212}]}{\mathrm{kms\_s\_0212r\_0577}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0577}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0577}}\right) \cdot \left(1+\frac{[\mathrm{s\_0916}]}{\mathrm{kmp\_s\_0916r\_0577}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{148}$$

5.149 Function definition function_151

Name Function for homoacontinate hydratase

Arguments Keq_r_0581, Vmax_r_0581, vol (intracellular), kmp_s_0800r_0581, kms_s_0468r_0581, kms_s_1434_br_0581, [s_0468], [s_0800], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0581} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0468r\_0581}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0581}}\right)^{1} \cdot \left([\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0800}]^{1}}{\mathrm{Keq\_r\_0581}}\right)}{\left(1+\frac{[\mathrm{s\_0468}]}{\mathrm{kms\_s\_0468r\_0581}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0581}}\right) + 1 + \frac{[\mathrm{s\_0800}]}{\mathrm{kmp\_s\_0800r\_0581}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{149}$$

5.150 Function definition function_152

Name Function for homocitrate synthase

Arguments Keq_r_0582, Vmax_r_0582, vol (intracellular), kmp_s_0514r_0582, kmp_s_0763_br_0582, kmp_s_0798r_0582, kms_s_0185r_0582, kms_s_0380r_0582, kms_s_1434_br_0582, [s_0185], [s_0380], [s_0514], [s_0763_b], [s_0798], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0582} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0582}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0798}]^{1}}{\mathrm{Keq\_r\_0582}}\right)}{\left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0582}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0582}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0582}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0582}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0582}}\right) \cdot \left(1+\frac{[\mathrm{s\_0798}]}{\mathrm{kmp\_s\_0798r\_0582}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{150}$$

5.151 Function definition function_153

Name Function for homoisocitrate dehydrogenase

Arguments Keq_r_0585, Vmax_r_0585, vol (intracellular), kmp_s_0180r_0585, kmp_s_0763_br_0585, kmp_s_1087r_0585, kms_s_0800r_0585, kms_s_1082r_0585, [s_0180], [s_0763_b], [s_0800], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0585} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0800r\_0585}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0585}}\right)^{1} \cdot \left([\mathrm{s\_0800}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0585}}\right)}{\left(1+\frac{[\mathrm{s\_0800}]}{\mathrm{kms\_s\_0800r\_0585}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0585}}\right) + \left(1+\frac{[\mathrm{s\_0180}]}{\mathrm{kmp\_s\_0180r\_0585}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0585}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0585}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{151}$$

5.152 Function definition function_154

Name Function for homoserine dehydrogenase (NADH)

Arguments Keq_r_0586, Vmax_r_0586, vol (intracellular), kmp_s_0919r_0586, kmp_s_1082r_0586, kms_s_0763_br_0586, kms_s_0886r_0586, kms_s_1087r_0586, [s_0763_b], [s_0886], [s_0919], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0586} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0586}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0886r\_0586}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0586}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0886}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0919}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0586}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_0886}]}{\mathrm{kms\_s\_0886r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0586}}\right) + \left(1+\frac{[\mathrm{s\_0919}]}{\mathrm{kmp\_s\_0919r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0586}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{152}$$

5.153 Function definition function_155

Name Function for homoserine kinase

Arguments Keq_r_0588, Vmax_r_0588, vol (intracellular), kmp_s_0400r_0588, kmp_s_0763_br_0588, kmp_s_1122r_0588, kms_s_0446r_0588, kms_s_0919r_0588, [s_0400], [s_0446], [s_0763_b], [s_0919], [s_1122]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0588} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0588}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0919r\_0588}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0919}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1122}]^{1}}{\text{Keq\_r\_0588}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0588}}\right) \cdot \left(1+\frac{[\text{s\_0919}]}{\text{kms\_s\_0919r\_0588}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0588}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0588}}\right) \cdot \left(1+\frac{[\text{s\_1122}]}{\text{kmp\_s\_1122r\_0588}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{153}$$

5.154 Function definition function_156

Name Function for homoserine O-trans-acetylase

Arguments Keq_r_0589, Vmax_r_0589, vol (intracellular), kmp_s_0514r_0589, kmp_s_1117r_0589, kms_s_0380r_0589, kms_s_0919r_0589, [s_0380], [s_0514], [s_0919], [s_1117]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0589} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0380r\_0589}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0919r\_0589}}\right)^{1} \cdot \left([\text{s\_0380}]^{1} \cdot [\text{s\_0919}]^{1} - \frac{[\text{s\_0514}]^{1} \cdot [\text{s\_1117}]^{1}}{\text{Keq\_r\_0589}}\right)}{\left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0589}}\right) \cdot \left(1+\frac{[\text{s\_0919}]}{\text{kms\_s\_0919r\_0589}}\right) + \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0589}}\right) \cdot \left(1+\frac{[\text{s\_1117}]}{\text{kmp\_s\_1117r\_0589}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{154}$$

5.155 Function definition function_157

Name Function for hydroxymethylglutaryl CoA reductase

Arguments Keq_r_0598, Vmax_r_0598, vol (intracellular), kmp_s_0031r_0598, kmp_s_0514r_0598, kmp_s_1091r_0598, kms_s_0225r_0598, kms_s_0763_br_0598, kms_s_1096r_0598, [s_0031], [s_0225], [s_0514], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0598} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0225r\_0598}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0598}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0598}}\right)^{2} \cdot \left([\text{s\_0225}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1096}]^{2} - \frac{[\text{s\_0031}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_1091}]^{2}}{\text{Keq\_r\_0598}}\right)}{\left(1+\frac{[\text{s\_0225}]}{\text{kms\_s\_0225r\_0598}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0598}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0598}}\right) + \left(1+\frac{[\text{s\_0031}]}{\text{kmp\_s\_0031r\_0598}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0598}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0598}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{155}$$

5.156 Function definition `function_158`

Name Function for hydroxymethylglutaryl CoA synthase

Arguments Keq_r_0599, Vmax_r_0599, vol (intracellular), kmp_s_0225r_0599, kmp_s_0514r_0599, kmp_s_0763_br_0599, kms_s_0374r_0599, kms_s_0380r_0599, kms_s_1434_br_0599, [s_0225], [s_0374], [s_0380], [s_0514], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0599} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0374r\_0599}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0380r\_0599}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0599}}\right)^1 \cdot \left([\text{s\_0374}]^1 \cdot [\text{s\_0380}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0225}]^1 \cdot [\text{s\_0514}]^1 \cdot [\text{s\_0763\_b}]^1}{\text{Keq\_r\_0599}}\right)}{\left(1+\frac{[\text{s\_0374}]}{\text{kms\_s\_0374r\_0599}}\right) \cdot \left(1+\frac{[\text{s\_0380}]}{\text{kms\_s\_0380r\_0599}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0599}}\right) + \left(1+\frac{[\text{s\_0225}]}{\text{kmp\_s\_0225r\_0599}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0599}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0599}}\right) - 1}}{\text{vol (intracellular)}} \tag{156}$$

5.157 Function definition `function_159`

Name Function for Imidazole-glycerol-3-phosphate synthase

Arguments Keq_r_0604, Vmax_r_0604, vol (intracellular), kmp_s_0317r_0604, kmp_s_0532r_0604, kmp_s_0763_br_0604, kmp_s_0899r_0604, kms_s_0315r_0604, kms_s_0907r_0604, [s_0315], [s_0317], [s_0532], [s_0763_b], [s_0899], [s_0907]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0604} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0315r\_0604}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0907r\_0604}}\right)^1 \cdot \left([\text{s\_0315}]^1 \cdot [\text{s\_0907}]^1 - \frac{[\text{s\_0317}]^1 \cdot [\text{s\_0532}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_0899}]^1}{\text{Keq\_r\_0604}}\right)}{\left(1+\frac{[\text{s\_0315}]}{\text{kms\_s\_0315r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0604}}\right) + \left(1+\frac{[\text{s\_0317}]}{\text{kmp\_s\_0317r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0532}]}{\text{kmp\_s\_0532r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kmp\_s\_0899r\_0604}}\right) - 1}}{\text{vol (intracellular)}} \tag{157}$$

5.158 Function definition `function_160`

Name Function for imidazoleglycerol-phosphate dehydratase

Arguments Keq_r_0605, Vmax_r_0605, vol (intracellular), kmp_s_0212r_0605, kmp_s_1434_br_0605, kms_s_0532r_0605, [s_0212], [s_0532], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0605} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0532r\_0605}}\right)^1 \cdot \left([\text{s\_0532}]^1 - \frac{[\text{s\_0212}]^1 \cdot [\text{s\_1434\_b}]^1}{\text{Keq\_r\_0605}}\right)}{1+\frac{[\text{s\_0532}]}{\text{kms\_s\_0532r\_0605}} + \left(1+\frac{[\text{s\_0212}]}{\text{kmp\_s\_0212r\_0605}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0605}}\right) - 1}}{\text{vol (intracellular)}} \tag{158}$$

5.159 Function definition function_161

Name Function for IMP cyclohydrolase

Arguments Keq_r_0606, Vmax_r_0606, vol (intracellular), kmp_s_0816r_0606, kmp_s_1434_br_0606, kms_s_0325r_0606, [s_0325], [s_0816], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0606} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0325r\_0606}}\right)^{1} \cdot \left([\mathrm{s\_0325}]^{1} - \frac{[\mathrm{s\_0816}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0606}}\right)}{1+\frac{[\mathrm{s\_0325}]}{\mathrm{kms\_s\_0325r\_0606}}+\left(1+\frac{[\mathrm{s\_0816}]}{\mathrm{kmp\_s\_0816r\_0606}}\right)\cdot\left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0606}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{159}$$

5.160 Function definition function_162

Name Function for IMP dehydrogenase

Arguments Keq_r_0607, Vmax_r_0607, vol (intracellular), kmp_s_0306r_0607, kmp_s_0763_br_0607, kmp_s_1087r_0607, kms_s_0816r_0607, kms_s_1082r_0607, kms_s_1434_br_0607, [s_0306], [s_0763_b], [s_0816], [s_1082], [s_1087], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0607} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0816r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0607}}\right)^{1} \cdot \left([\mathrm{s\_0816}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0306}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0607}}\right)}{\left(1+\frac{[\mathrm{s\_0816}]}{\mathrm{kms\_s\_0816r\_0607}}\right)\cdot\left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0607}}\right)\cdot\left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0607}}\right)+\left(1+\frac{[\mathrm{s\_0306}]}{\mathrm{kmp\_s\_0306r\_0607}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0607}}\right)\cdot\left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0607}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{160}$$

5.161 Function definition function_163

Name Function for indole-3-glycerol-phosphate synthase

Arguments Keq_r_0608, Vmax_r_0608, vol (intracellular), kmp_s_0088r_0608, kmp_s_0470r_0608, kmp_s_1434_br_0608, kms_s_0078r_0608, kms_s_0763_br_0608, [s_0078], [s_0088], [s_0470], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0608} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0078r\_0608}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0608}}\right)^{1} \cdot \left([\mathrm{s\_0078}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0088}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0608}}\right)}{\left(1+\frac{[\mathrm{s\_0078}]}{\mathrm{kms\_s\_0078r\_0608}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0608}}\right)+\left(1+\frac{[\mathrm{s\_0088}]}{\mathrm{kmp\_s\_0088r\_0608}}\right)\cdot\left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0608}}\right)\cdot\left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0608}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{161}$$

5.162 Function definition function_164

Name Function for inorganic diphosphatase

Arguments Keq_r_0610, Vmax_r_0610, vol (intracellular), kmp_s_0763_br_0610, kmp_s_1207r_0610, kms_s_0605r_0610, kms_s_1434_br_0610, [s_0605], [s_0763_b], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0610} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0605r\_0610}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0610}}\right)^1 \cdot \left([\text{s\_0605}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0763\_b}]^1 \cdot [\text{s\_1207}]^2}{\text{Keq\_r\_0610}}\right)}{\left(1+\frac{[\text{s\_0605}]}{\text{kms\_s\_0605r\_0610}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0610}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0610}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0610}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{162}$$

5.163 Function definition function_165

Name Function for inositolphosphotransferase

Arguments Keq_r_0618, Vmax_r_0618, vol (intracellular), kmp_s_0824r_0618, kms_s_0128r_0618, kms_s_1013r_0618, [s_0128], [s_0824], [s_1013]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0618} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0128r\_0618}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1013r\_0618}}\right)^1 \cdot \left([\text{s\_0128}]^1 \cdot [\text{s\_1013}]^1 - \frac{[\text{s\_0824}]^1}{\text{Keq\_r\_0618}}\right)}{\left(1+\frac{[\text{s\_0128}]}{\text{kms\_s\_0128r\_0618}}\right) \cdot \left(1+\frac{[\text{s\_1013}]}{\text{kms\_s\_1013r\_0618}}\right) + 1 + \frac{[\text{s\_0824}]}{\text{kmp\_s\_0824r\_0618}} - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{163}$$

5.164 Function definition function_166

Name Function for IPC synthase

Arguments Keq_r_0621, Vmax_r_0621, vol (intracellular), kmp_s_0828r_0621, kms_s_0128r_0621, kms_s_1060r_0621, [s_0128], [s_0828], [s_1060]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0621} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0128r\_0621}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1060r\_0621}}\right)^1 \cdot \left([\text{s\_0128}]^1 \cdot [\text{s\_1060}]^1 - \frac{[\text{s\_0828}]^1}{\text{Keq\_r\_0621}}\right)}{\left(1+\frac{[\text{s\_0128}]}{\text{kms\_s\_0128r\_0621}}\right) \cdot \left(1+\frac{[\text{s\_1060}]}{\text{kms\_s\_1060r\_0621}}\right) + 1 + \frac{[\text{s\_0828}]}{\text{kmp\_s\_0828r\_0621}} - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{164}$$

5.165 Function definition function_167

Name Function for isocitrate dehydrogenase (NADP)

Arguments Keq_r_0630, Vmax_r_0630, vol (intracellular), kmp_s_0185r_0630, kmp_s_0470r_0630, kmp_s_1096r_0630, kms_s_0847r_0630, kms_s_1091r_0630, [s_0185], [s_0470], [s_0847], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0630} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0847r\_0630}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0630}}\right)^1 \cdot \left([\text{s\_0847}]^1 \cdot [\text{s\_1091}]^1 - \frac{[\text{s\_0185}]^1 \cdot [\text{s\_0470}]^1 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0630}}\right)}{\left(1+\frac{[\text{s\_0847}]}{\text{kms\_s\_0847r\_0630}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0630}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0630}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0630}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0630}}\right) - 1}}{\text{vol (intracellular)}} \tag{165}$$

5.166 Function definition function_168

Name Function for isocitrate lyase

Arguments Keq_r_0633, Vmax_r_0633, vol (intracellular), kmp_s_0749r_0633, kmp_s_1338r_0633, kms_s_0847r_0633, [s_0749], [s_0847], [s_1338]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0633} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0847r\_0633}}\right)^1 \cdot \left([\text{s\_0847}]^1 - \frac{[\text{s\_0749}]^1 \cdot [\text{s\_1338}]^1}{\text{Keq\_r\_0633}}\right)}{1+\frac{[\text{s\_0847}]}{\text{kms\_s\_0847r\_0633}} + \left(1+\frac{[\text{s\_0749}]}{\text{kmp\_s\_0749r\_0633}}\right) \cdot \left(1+\frac{[\text{s\_1338}]}{\text{kmp\_s\_1338r\_0633}}\right) - 1}}{\text{vol (intracellular)}} \tag{166}$$

5.167 Function definition function_169

Name Function for isoleucine transaminase

Arguments Keq_r_0634, Vmax_r_0634, vol (intracellular), kmp_s_0185r_0634, kmp_s_0920r_0634, kms_s_0058r_0634, kms_s_0899r_0634, [s_0058], [s_0185], [s_0899], [s_0920]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0634} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0058r\_0634}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0634}}\right)^1 \cdot \left([\text{s\_0058}]^1 \cdot [\text{s\_0899}]^1 - \frac{[\text{s\_0185}]^1 \cdot [\text{s\_0920}]^1}{\text{Keq\_r\_0634}}\right)}{\left(1+\frac{[\text{s\_0058}]}{\text{kms\_s\_0058r\_0634}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0634}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0634}}\right) \cdot \left(1+\frac{[\text{s\_0920}]}{\text{kmp\_s\_0920r\_0634}}\right) - 1}}{\text{vol (intracellular)}} \tag{167}$$

5.168 Function definition `function_170`

Name Function for isopentenyl-diphosphate D-isomerase

Arguments Keq_r_0638, Vmax_r_0638, vol (intracellular), kmp_s_1257r_0638, kms_s_0850r_0638, [s_0850], [s_1257]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0638} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0850r\_0638}}\right)^{1} \cdot \left([\mathrm{s\_0850}]^{1} - \frac{[\mathrm{s\_1257}]^{1}}{\mathrm{Keq\_r\_0638}}\right)}{1 + \frac{[\mathrm{s\_0850}]}{\mathrm{kms\_s\_0850r\_0638}} + 1 + \frac{[\mathrm{s\_1257}]}{\mathrm{kmp\_s\_1257r\_0638}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{168}$$

5.169 Function definition `function_171`

Name Function for ketol-acid reductoisomerase (2-aceto-2-hydroxybutanoate)

Arguments Keq_r_0640, Vmax_r_0640, vol (intracellular), kmp_s_0007r_0640, kmp_s_1091r_0640, kms_s_0042r_0640, kms_s_0763_br_0640, kms_s_1096r_0640, [s_0007], [s_0042], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0640} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0042r\_0640}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0640}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0640}}\right)^{1} \cdot \left([\mathrm{s\_0042}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0007}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0640}}\right)}{\left(1 + \frac{[\mathrm{s\_0042}]}{\mathrm{kms\_s\_0042r\_0640}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0640}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0640}}\right) + \left(1 + \frac{[\mathrm{s\_0007}]}{\mathrm{kmp\_s\_0007r\_0640}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0640}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{169}$$

5.170 Function definition `function_172`

Name Function for L-alanine transaminase

Arguments Keq_r_0647, Vmax_r_0647, vol (intracellular), kmp_s_0185r_0647, kmp_s_0863r_0647, kms_s_0899r_0647, kms_s_1277r_0647, [s_0185], [s_0863], [s_0899], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0647} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0647}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0647}}\right)^{1} \cdot \left([\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0863}]^{1}}{\mathrm{Keq\_r\_0647}}\right)}{\left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0647}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0863}]}{\mathrm{kmp\_s\_0863r\_0647}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{170}$$

5.171 Function definition function_173

Name Function for L-aminoadipate-semialdehyde dehydrogenase (NADH)

Arguments Keq_r_0650, Vmax_r_0650, vol (intracellular), kmp_s_0434r_0650, kmp_s_0605r_0650, kmp_s_0867r_0650, kmp_s_1082r_0650, kms_s_0446r_0650, kms_s_0763_br_0650, kms_s_0861r_0650, kms_s_1087r_0650, [s_0434], [s_0446], [s_0605], [s_0763_b], [s_0861], [s_0867], [s_1082], [s_1087]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0650} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0650}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0650}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0861r\_0650}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0650}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0861}]^{1} \cdot [\text{s\_1087}]^{1} - \ldots\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0861}]}{\text{kms\_s\_0861r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0650}}\right) + \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0650}}\right) \cdot \left(1 \ldots\right.}}{\text{vol}\,(\text{intracellular})} \tag{171}$$

5.172 Function definition function_174

Name Function for L-glutamate 5-semialdehyde dehydratase

Arguments Keq_r_0657, Vmax_r_0657, vol (intracellular), kmp_s_0120r_0657, kmp_s_0763_br_0657, kmp_s_1434_br_0657, kms_s_0905r_0657, [s_0120], [s_0763_b], [s_0905], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0657} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0905r\_0657}}\right)^{1} \cdot \left([\text{s\_0905}]^{1} - \frac{[\text{s\_0120}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0657}}\right)}{1+\frac{[\text{s\_0905}]}{\text{kms\_s\_0905r\_0657}} + \left(1+\frac{[\text{s\_0120}]}{\text{kmp\_s\_0120r\_0657}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0657}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0657}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{172}$$

5.173 Function definition function_175

Name Function for L-hydroxyproline dehydrogenase (NADP)

Arguments Keq_r_0660, Vmax_r_0660, vol (intracellular), kmp_s_0118r_0660, kmp_s_0763_br_0660, kmp_s_1096r_0660, kms_s_1091r_0660, kms_s_1379r_0660, [s_0118], [s_0763_b], [s_1091], [s_1096], [s_1379]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0660} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1091r\_0660}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1379r\_0660}}\right)^{1} \cdot \left([\text{s\_1091}]^{1} \cdot [\text{s\_1379}]^{1} - \frac{[\text{s\_0118}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1096}]^{1}}{\text{Keq\_r\_0660}}\right)}{\left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0660}}\right) \cdot \left(1+\frac{[\text{s\_1379}]}{\text{kms\_s\_1379r\_0660}}\right) + \left(1+\frac{[\text{s\_0118}]}{\text{kmp\_s\_0118r\_0660}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0660}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0660}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{173}$$

5.174 Function definition `function_176`

Name Function for L-hydroxyproline reductase (NAD)

Arguments Keq_r_0661, Vmax_r_0661, vol (intracellular), kmp_s_1082r_0661, kmp_s_1379r_0661, kms_s_0118r_0661, kms_s_0763_br_0661, kms_s_1087r_0661, [s_0118], [s_0763_b], [s_1082], [s_1087], [s_1379]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0661} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0118r\_0661}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0661}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0661}}\right)^{1} \cdot \left([\mathrm{s\_0118}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1379}]^{1}}{\mathrm{Keq\_r\_0661}}\right)}{\left(1+\frac{[\mathrm{s\_0118}]}{\mathrm{kms\_s\_0118r\_0661}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0661}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0661}}\right) + \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0661}}\right) \cdot \left(1+\frac{[\mathrm{s\_1379}]}{\mathrm{kmp\_s\_1379r\_0661}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{174}$$

5.175 Function definition `function_177`

Name Function for L-threonine deaminase

Arguments Keq_r_0667, Vmax_r_0667, vol (intracellular), kmp_s_0183r_0667, kmp_s_0430r_0667, kms_s_0949r_0667, [s_0183], [s_0430], [s_0949]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0667} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0949r\_0667}}\right)^{1} \cdot \left([\mathrm{s\_0949}]^{1} - \frac{[\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0430}]^{1}}{\mathrm{Keq\_r\_0667}}\right)}{1+\frac{[\mathrm{s\_0949}]}{\mathrm{kms\_s\_0949r\_0667}} + \left(1+\frac{[\mathrm{s\_0183}]}{\mathrm{kmp\_s\_0183r\_0667}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0667}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{175}$$

5.176 Function definition `function_178`

Name Function for lanosterol synthase

Arguments Keq_r_0673, Vmax_r_0673, vol (intracellular), kmp_s_0963r_0673, kms_s_0040r_0673, [s_0040], [s_0963]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0673} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0040r\_0673}}\right)^{1} \cdot \left([\mathrm{s\_0040}]^{1} - \frac{[\mathrm{s\_0963}]^{1}}{\mathrm{Keq\_r\_0673}}\right)}{1+\frac{[\mathrm{s\_0040}]}{\mathrm{kms\_s\_0040r\_0673}} + 1 + \frac{[\mathrm{s\_0963}]}{\mathrm{kmp\_s\_0963r\_0673}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{176}$$

5.177 Function definition `function_179`

Name Function for leucine transaminase

Arguments Keq_r_0674, Vmax_r_0674, vol (intracellular), kmp_s_0185r_0674, kmp_s_0925r_0674, kms_s_0297r_0674, kms_s_0899r_0674, [s_0185], [s_0297], [s_0899], [s_0925]

Mathematical Expression

$$\mathrm{Vmax\_r\_0674} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0297r\_0674}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0674}}\right)^{1} \cdot \left([\mathrm{s\_0297}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0925}]^{1}}{\mathrm{Keq\_r\_0674}}\right)}{\left(1+\frac{[\mathrm{s\_0297}]}{\mathrm{kms\_s\_0297r\_0674}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0674}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0674}}\right) \cdot \left(1+\frac{[\mathrm{s\_0925}]}{\mathrm{kmp\_s\_0925r\_0674}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (177)$$

5.178 Function definition function_180

Name Function for malate dehydrogenase

Arguments Keq_r_0688, Vmax_r_0688, vol (intracellular), kmp_s_0069r_0688, kmp_s_1082r_0688, kms_s_0763_br_0688, kms_s_1087r_0688, kms_s_1156r_0688, [s_0069], [s_0763_b], [s_1082], [s_1087], [s_1156]

Mathematical Expression

$$\mathrm{Vmax\_r\_0688} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0688}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0688}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1156r\_0688}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} \cdot [\mathrm{s\_1156}]^{1} - \frac{[\mathrm{s\_0069}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0688}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0688}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0688}}\right) \cdot \left(1+\frac{[\mathrm{s\_1156}]}{\mathrm{kms\_s\_1156r\_0688}}\right) + \left(1+\frac{[\mathrm{s\_0069}]}{\mathrm{kmp\_s\_0069r\_0688}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0688}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (178)$$

5.179 Function definition function_181

Name Function for mannose-1-phosphate guanylyltransferase

Arguments Keq_r_0697, Vmax_r_0697, vol (intracellular), kmp_s_0605r_0697, kmp_s_0710r_0697, kms_s_0553r_0697, kms_s_0755r_0697, kms_s_0763_br_0697, [s_0553], [s_0605], [s_0710], [s_0755], [s_0763_b]

Mathematical Expression

$$\mathrm{Vmax\_r\_0697} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0553r\_0697}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0755r\_0697}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0697}}\right)^{1} \cdot \left([\mathrm{s\_0553}]^{1} \cdot [\mathrm{s\_0755}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0710}]^{1}}{\mathrm{Keq\_r\_0697}}\right)}{\left(1+\frac{[\mathrm{s\_0553}]}{\mathrm{kms\_s\_0553r\_0697}}\right) \cdot \left(1+\frac{[\mathrm{s\_0755}]}{\mathrm{kms\_s\_0755r\_0697}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0697}}\right) + \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0697}}\right) \cdot \left(1+\frac{[\mathrm{s\_0710}]}{\mathrm{kmp\_s\_0710r\_0697}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (179)$$

5.180 Function definition function_182

Name Function for mannose-6-phosphate isomerase

Arguments Keq_r_0698, Vmax_r_0698, vol (intracellular), kmp_s_0554r_0698, kms_s_0539r_0698, [s_0539], [s_0554]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0698} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0539r\_0698}}\right)^{1} \cdot \left([\mathrm{s\_0539}]^{1} - \frac{[\mathrm{s\_0554}]^{1}}{\mathrm{Keq\_r\_0698}}\right)}{1+\frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_0698}}+1+\frac{[\mathrm{s\_0554}]}{\mathrm{kmp\_s\_0554r\_0698}}-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{180}$$

5.181 Function definition `function_183`

Name Function for methenyltetrahydrifikate cyclohydrolase

Arguments Keq_r_0699, Vmax_r_0699, vol (intracellular), kmp_s_0122r_0699, kmp_s_0763_br_0699, kms_s_0015r_0699, kms_s_1434_br_0699, [s_0015], [s_0122], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0699} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0015r\_0699}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0699}}\right)^{1} \cdot \left([\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0699}}\right)}{\left(1+\frac{[\mathrm{s\_0015}]}{\mathrm{kms\_s\_0015r\_0699}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0699}}\right)+\left(1+\frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0699}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0699}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{181}$$

5.182 Function definition `function_184`

Name Function for methionine adenosyltransferase

Arguments Keq_r_0701, Vmax_r_0701, vol (intracellular), kmp_s_0605r_0701, kmp_s_1207r_0701, kmp_s_1293r_0701, kms_s_0446r_0701, kms_s_0933r_0701, kms_s_1434_br_0701, [s_0446], [s_0605], [s_0933], [s_1207], [s_1293], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0701} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0933r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0701}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0933}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1293}]^{1}}{\mathrm{Keq\_r\_0701}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0701}}\right) \cdot \left(1+\frac{[\mathrm{s\_0933}]}{\mathrm{kms\_s\_0933r\_0701}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0701}}\right)+\left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0701}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0701}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kmp\_s\_1293r\_0701}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{182}$$

5.183 Function definition `function_185`

Name Function for methionine synthase

Arguments Keq_r_0702, Vmax_r_0702, vol (intracellular), kmp_s_0309r_0702, kmp_s_0763_br_0702, kmp_s_0933r_0702, kms_s_0328r_0702, kms_s_0917r_0702, [s_0309], [s_0328], [s_0763_b], [s_0917], [s_0933]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0702} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0328r\_0702}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0917r\_0702}}\right)^{1} \cdot \left([\mathrm{s\_0328}]^{1} \cdot [\mathrm{s\_0917}]^{1} - \frac{[\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0933}]^{1}}{\mathrm{Keq\_r\_0702}}\right)}{\left(1+\frac{[\mathrm{s\_0328}]}{\mathrm{kms\_s\_0328r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kms\_s\_0917r\_0702}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0933}]}{\mathrm{kmp\_s\_0933r\_0702}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{183}$$

5.184 Function definition function_186

Name Function for methylenetetrahydrofolate dehydrogenase (NADP)

Arguments Keq_r_0707, Vmax_r_0707, vol (intracellular), kmp_s_0015r_0707, kmp_s_1096r_0707, kms_s_0307r_0707, kms_s_1091r_0707, [s_0015], [s_0307], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0707} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0707}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0707}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0707}}\right)}{\left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0707}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0707}}\right) + \left(1+\frac{[\mathrm{s\_0015}]}{\mathrm{kmp\_s\_0015r\_0707}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0707}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{184}$$

5.185 Function definition function_187

Name Function for mevalonate kinase (ctp)

Arguments Keq_r_0712, Vmax_r_0712, vol (intracellular), kmp_s_0022r_0712, kmp_s_0481r_0712, kmp_s_0763_br_0712, kms_s_0031r_0712, kms_s_0521r_0712, [s_0022], [s_0031], [s_0481], [s_0521], [s_0763_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0712} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0031r\_0712}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0521r\_0712}}\right)^{1} \cdot \left([\mathrm{s\_0031}]^{1} \cdot [\mathrm{s\_0521}]^{1} - \frac{[\mathrm{s\_0022}]^{1} \cdot [\mathrm{s\_0481}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0712}}\right)}{\left(1+\frac{[\mathrm{s\_0031}]}{\mathrm{kms\_s\_0031r\_0712}}\right) \cdot \left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0712}}\right) + \left(1+\frac{[\mathrm{s\_0022}]}{\mathrm{kmp\_s\_0022r\_0712}}\right) \cdot \left(1+\frac{[\mathrm{s\_0481}]}{\mathrm{kmp\_s\_0481r\_0712}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0712}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{185}$$

5.186 Function definition function_188

Name Function for mevalonate pyrophoshate decarboxylase

Arguments Keq_r_0715, Vmax_r_0715, vol (intracellular), kmp_s_0400r_0715, kmp_s_0470r_0715, kmp_s_0850r_0715, kmp_s_1207r_0715, kms_s_0021r_0715, kms_s_0446r_0715, [s_0021], [s_0400], [s_0446], [s_0470], [s_0850], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0715} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0021r\_0715}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0715}}\right)^{1} \cdot \left([\mathrm{s\_0021}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_0850}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0715}}\right)}{\left(1+\frac{[\mathrm{s\_0021}]}{\mathrm{kms\_s\_0021r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0715}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0850}]}{\mathrm{kmp\_s\_0850r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0715}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{186}$$

5.187 Function definition `function_189`

Name Function for microsomal beta-keto-reductase

Arguments Keq_r_0719, Vmax_r_0719, vol (intracellular), kmp_s_0247r_0719, kmp_s_0763_br_0719, kmp_s_1096r_0719, kms_s_0046r_0719, kms_s_1091r_0719, [s_0046], [s_0247], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0719} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0046r\_0719}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0719}}\right)^{1} \cdot \left([\mathrm{s\_0046}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0247}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0719}}\right)}{\left(1+\frac{[\mathrm{s\_0046}]}{\mathrm{kms\_s\_0046r\_0719}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0719}}\right) + \left(1+\frac{[\mathrm{s\_0247}]}{\mathrm{kmp\_s\_0247r\_0719}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0719}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0719}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{187}$$

5.188 Function definition `function_190`

Name Function for microsomal beta-keto-reductase_2

Arguments Keq_r_0720, Vmax_r_0720, vol (intracellular), kmp_s_0257r_0720, kmp_s_0763_br_0720, kmp_s_1096r_0720, kms_s_0052r_0720, kms_s_1091r_0720, [s_0052], [s_0257], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0720} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0052r\_0720}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0720}}\right)^{1} \cdot \left([\mathrm{s\_0052}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0257}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0720}}\right)}{\left(1+\frac{[\mathrm{s\_0052}]}{\mathrm{kms\_s\_0052r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0720}}\right) + \left(1+\frac{[\mathrm{s\_0257}]}{\mathrm{kmp\_s\_0257r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0720}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{188}$$

5.189 Function definition `function_191`

Name Function for microsomal beta-keto-reductase_3

Arguments Keq_r_0721, Vmax_r_0721, vol (intracellular), kmp_s_0254r_0721, kmp_s_0763_br_0721, kmp_s_1096r_0721, kms_s_0234r_0721, kms_s_1091r_0721, [s_0234], [s_0254], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0721} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0234r\_0721}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0721}}\right)^1 \cdot \left([\text{s\_0234}]^1 \cdot [\text{s\_1091}]^1 - \frac{[\text{s\_0254}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0721}}\right)}{\left(1+\frac{[\text{s\_0234}]}{\text{kms\_s\_0234r\_0721}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0721}}\right) + \left(1+\frac{[\text{s\_0254}]}{\text{kmp\_s\_0254r\_0721}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0721}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0721}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{189}$$

5.190 Function definition `function_192`

Name Function for microsomal beta-keto-reductase_4

Arguments Keq_r_0722, Vmax_r_0722, vol (intracellular), kmp_s_0261r_0722, kmp_s_0763_br_0722, kmp_s_1096r_0722, kms_s_0055r_0722, kms_s_1091r_0722, [s_0055], [s_0261], [s_0763_b], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0722} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0055r\_0722}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0722}}\right)^1 \cdot \left([\text{s\_0055}]^1 \cdot [\text{s\_1091}]^1 - \frac{[\text{s\_0261}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0722}}\right)}{\left(1+\frac{[\text{s\_0055}]}{\text{kms\_s\_0055r\_0722}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0722}}\right) + \left(1+\frac{[\text{s\_0261}]}{\text{kmp\_s\_0261r\_0722}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0722}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0722}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{190}$$

5.191 Function definition `function_193`

Name Function for MIPC synthase

Arguments Keq_r_0723, Vmax_r_0723, vol (intracellular), kmp_s_1013r_0723, kms_s_0710r_0723, kms_s_0828r_0723, [s_0710], [s_0828], [s_1013]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0723} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0710r\_0723}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0828r\_0723}}\right)^1 \cdot \left([\text{s\_0710}]^1 \cdot [\text{s\_0828}]^1 - \frac{[\text{s\_1013}]^1}{\text{Keq\_r\_0723}}\right)}{\left(1+\frac{[\text{s\_0710}]}{\text{kms\_s\_0710r\_0723}}\right) \cdot \left(1+\frac{[\text{s\_0828}]}{\text{kms\_s\_0828r\_0723}}\right) + 1 + \frac{[\text{s\_1013}]}{\text{kmp\_s\_1013r\_0723}} - 1}}{\text{vol}\,(\text{intracellular})} \tag{191}$$

5.192 Function definition `function_194`

Name Function for myo-inositol 1-phosphatase

Arguments Keq_r_0725, Vmax_r_0725, vol (intracellular), kmp_s_1020r_0725, kmp_s_1207r_0725, kms_s_0128r_0725, kms_s_1434_br_0725, [s_0128], [s_1020], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0725} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0128r\_0725}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0725}}\right)^1 \cdot \left([\text{s\_0128}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_1020}]^1 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_0725}}\right)}{\left(1+\frac{[\text{s\_0128}]}{\text{kms\_s\_0128r\_0725}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0725}}\right) + \left(1+\frac{[\text{s\_1020}]}{\text{kmp\_s\_1020r\_0725}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0725}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{192}$$

5.193 Function definition function_195

Name Function for myo-inositol-1-phosphate synthase

Arguments Keq_r_0726, Vmax_r_0726, vol (intracellular), kmp_s_0128r_0726, kms_s_0410r_0726, [s_0128], [s_0410]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0726} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0726}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} - \frac{[\mathrm{s\_0128}]^{1}}{\mathrm{Keq\_r\_0726}}\right)}{1+\frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0726}}+1+\frac{[\mathrm{s\_0128}]}{\mathrm{kmp\_s\_0128r\_0726}}-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{193}$$

5.194 Function definition function_196

Name Function for N-acetyl-g-glutamyl-phosphate reductase

Arguments Keq_r_0728, Vmax_r_0728, vol (intracellular), kmp_s_0149r_0728, kmp_s_1091r_0728, kmp_s_1207r_0728, kms_s_0763_br_0728, kms_s_1070r_0728, kms_s_1096r_0728, [s_0149], [s_0763_b], [s_1070], [s_1091], [s_1096], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0728} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0728}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1070r\_0728}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0728}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1070}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0149}]^{1} \cdot [\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0728}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1070}]}{\mathrm{kms\_s\_1070r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0728}}\right)+\left(1+\frac{[\mathrm{s\_0149}]}{\mathrm{kmp\_s\_0149r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0728}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{194}$$

5.195 Function definition function_197

Name Function for non-enzymatic reaction

Arguments Keq_r_0765, Vmax_r_0765, vol (intracellular), kmp_s_0181r_0765, kmp_s_0470r_0765, kms_s_0180r_0765, kms_s_0763_br_0765, [s_0180], [s_0181], [s_0470], [s_0763_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0765} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0180r\_0765}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0765}}\right)^{1} \cdot \left([\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0181}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0765}}\right)}{\left(1+\frac{[\mathrm{s\_0180}]}{\mathrm{kms\_s\_0180r\_0765}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0765}}\right)+\left(1+\frac{[\mathrm{s\_0181}]}{\mathrm{kmp\_s\_0181r\_0765}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0765}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{195}$$

5.196 Function definition function_198

Name Function for nucleoside-diphosphate kinase (ATP:CDP)

Arguments Keq_r_0771, Vmax_r_0771, vol (intracellular), kmp_s_0446r_0771, kmp_s_0481r_0771, kms_s_0400r_0771, kms_s_0521r_0771, [s_0400], [s_0446], [s_0481], [s_0521]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0771} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0771}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0521r\_0771}}\right)^1 \cdot \left([\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0521}]^1 - \frac{[\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0481}]^1}{\mathrm{Keq\_r\_0771}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0771}}\right) \cdot \left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0771}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0771}}\right) \cdot \left(1+\frac{[\mathrm{s\_0481}]}{\mathrm{kmp\_s\_0481r\_0771}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{196}$$

5.197 Function definition function_199

Name Function for nucleoside-diphosphate kinase (ATP:UDP)

Arguments Keq_r_0779, Vmax_r_0779, vol (intracellular), kmp_s_0400r_0779, kmp_s_1430r_0779, kms_s_0446r_0779, kms_s_1411r_0779, [s_0400], [s_0446], [s_1411], [s_1430]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0779} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0779}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1411r\_0779}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1411}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_1430}]^1}{\mathrm{Keq\_r\_0779}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0779}}\right) \cdot \left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kms\_s\_1411r\_0779}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0779}}\right) \cdot \left(1+\frac{[\mathrm{s\_1430}]}{\mathrm{kmp\_s\_1430r\_0779}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{197}$$

5.198 Function definition function_200

Name Function for O-acetylhomoserine (thiol)-lyase

Arguments Keq_r_0783, Vmax_r_0783, vol (intracellular), kmp_s_0369r_0783, kmp_s_0763_br_0783, kmp_s_0917r_0783, kms_s_0805r_0783, kms_s_1117r_0783, [s_0369], [s_0763_b], [s_0805], [s_0917], [s_1117]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0783} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0805r\_0783}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1117r\_0783}}\right)^1 \cdot \left([\mathrm{s\_0805}]^1 \cdot [\mathrm{s\_1117}]^1 - \frac{[\mathrm{s\_0369}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_0917}]^1}{\mathrm{Keq\_r\_0783}}\right)}{\left(1+\frac{[\mathrm{s\_0805}]}{\mathrm{kms\_s\_0805r\_0783}}\right) \cdot \left(1+\frac{[\mathrm{s\_1117}]}{\mathrm{kms\_s\_1117r\_0783}}\right) + \left(1+\frac{[\mathrm{s\_0369}]}{\mathrm{kmp\_s\_0369r\_0783}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0783}}\right) \cdot \left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kmp\_s\_0917r\_0783}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{198}$$

5.199 Function definition function_201

Name Function for ornithine carbamoyltransferase

Arguments Keq_r_0789, Vmax_r_0789, vol (intracellular), kmp_s_0763_br_0789, kmp_s_0887r_0789, kmp_s_1207r_0789, kms_s_0469r_0789, kms_s_1151r_0789, [s_0469], [s_0763_b], [s_0887], [s_1151], [s_1207]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0789} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0469r\_0789}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1151r\_0789}}\right)^{1} \cdot \left([\text{s\_0469}]^{1} \cdot [\text{s\_1151}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_0887}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0789}}\right)}{\left(1+\frac{[\text{s\_0469}]}{\text{kms\_s\_0469r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1151}]}{\text{kms\_s\_1151r\_0789}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0789}}\right) \cdot \left(1+\frac{[\text{s\_0887}]}{\text{kmp\_s\_0887r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0789}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (199)$$

5.200 Function definition function_202

Name Function for ornithine transacetylase

Arguments Keq_r_0791, Vmax_r_0791, vol (intracellular), kmp_s_1071r_0791, kmp_s_1151r_0791, kms_s_0899r_0791, kms_s_1051r_0791, [s_0899], [s_1051], [s_1071], [s_1151]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0791} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0899r\_0791}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1051r\_0791}}\right)^{1} \cdot \left([\text{s\_0899}]^{1} \cdot [\text{s\_1051}]^{1} - \frac{[\text{s\_1071}]^{1} \cdot [\text{s\_1151}]^{1}}{\text{Keq\_r\_0791}}\right)}{\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0791}}\right) \cdot \left(1+\frac{[\text{s\_1051}]}{\text{kms\_s\_1051r\_0791}}\right) + \left(1+\frac{[\text{s\_1071}]}{\text{kmp\_s\_1071r\_0791}}\right) \cdot \left(1+\frac{[\text{s\_1151}]}{\text{kmp\_s\_1151r\_0791}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (200)$$

5.201 Function definition function_203

Name Function for orotate phosphoribosyltransferase

Arguments Keq_r_0793, Vmax_r_0793, vol (intracellular), kmp_s_0605r_0793, kmp_s_1155r_0793, kms_s_0331r_0793, kms_s_1154r_0793, [s_0331], [s_0605], [s_1154], [s_1155]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0793} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0331r\_0793}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1154r\_0793}}\right)^{1} \cdot \left([\text{s\_0331}]^{1} \cdot [\text{s\_1154}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_1155}]^{1}}{\text{Keq\_r\_0793}}\right)}{\left(1+\frac{[\text{s\_0331}]}{\text{kms\_s\_0331r\_0793}}\right) \cdot \left(1+\frac{[\text{s\_1154}]}{\text{kms\_s\_1154r\_0793}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0793}}\right) \cdot \left(1+\frac{[\text{s\_1155}]}{\text{kmp\_s\_1155r\_0793}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \quad (201)$$

5.202 Function definition function_204

Name Function for orotidine-5'-phosphate decarboxylase

Arguments Keq_r_0794, Vmax_r_0794, vol (intracellular), kmp_s_0470r_0794, kmp_s_1417r_0794, kms_s_0763_br_0794, kms_s_1155r_0794, [s_0470], [s_0763_b], [s_1155], [s_1417]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0794} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0794}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1155r\_0794}}\right)^1 \cdot \left([\text{s\_0763\_b}]^1 \cdot [\text{s\_1155}]^1 - \frac{[\text{s\_0470}]^1 \cdot [\text{s\_1417}]^1}{\text{Keq\_r\_0794}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1155}]}{\text{kms\_s\_1155r\_0794}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1417}]}{\text{kmp\_s\_1417r\_0794}}\right) - 1}}{\text{vol (intracellular)}} \tag{202}$$

5.203 Function definition function_205

Name Function for phenylalanine transaminase

Arguments Keq_r_0825, Vmax_r_0825, vol (intracellular), kmp_s_0185r_0825, kmp_s_0936r_0825, kms_s_0859r_0825, kms_s_0899r_0825, [s_0185], [s_0859], [s_0899], [s_0936]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0825} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0859r\_0825}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0825}}\right)^1 \cdot \left([\text{s\_0859}]^1 \cdot [\text{s\_0899}]^1 - \frac{[\text{s\_0185}]^1 \cdot [\text{s\_0936}]^1}{\text{Keq\_r\_0825}}\right)}{\left(1+\frac{[\text{s\_0859}]}{\text{kms\_s\_0859r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0825}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0936}]}{\text{kmp\_s\_0936r\_0825}}\right) - 1}}{\text{vol (intracellular)}} \tag{203}$$

5.204 Function definition function_206

Name Function for phosphatidylethanolamine methyltransferase

Arguments Keq_r_0831, Vmax_r_0831, vol (intracellular), kmp_s_0763_br_0831, kmp_s_1226r_0831, kmp_s_1290r_0831, kms_s_1233r_0831, kms_s_1293r_0831, [s_0763_b], [s_1226], [s_1233], [s_1290], [s_1293]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0831} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1233r\_0831}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0831}}\right)^1 \cdot \left([\text{s\_1233}]^1 \cdot [\text{s\_1293}]^1 - \frac{[\text{s\_0763\_b}]^1 \cdot [\text{s\_1226}]^1 \cdot [\text{s\_1290}]^1}{\text{Keq\_r\_0831}}\right)}{\left(1+\frac{[\text{s\_1233}]}{\text{kms\_s\_1233r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0831}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1226}]}{\text{kmp\_s\_1226r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0831}}\right) - 1}}{\text{vol (intracellular)}} \tag{204}$$

5.205 Function definition function_207

Name Function for phosphatidylinositol synthase

Arguments Keq_r_0847, Vmax_r_0847, vol (intracellular), kmp_s_0090r_0847, kmp_s_0511r_0847, kmp_s_0763_br_0847, kms_s_0485r_0847, kms_s_1020r_0847, [s_0090], [s_0485], [s_0511], [s_0763_b], [s_1020]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0847} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0485r\_0847}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1020r\_0847}}\right)^1 \cdot \left([\text{s\_0485}]^1 \cdot [\text{s\_1020}]^1 - \frac{[\text{s\_0090}]^1 \cdot [\text{s\_0511}]^1 \cdot [\text{s\_0763\_b}]^2}{\text{Keq\_r\_0847}}\right)}{\left(1+\frac{[\text{s\_0485}]}{\text{kms\_s\_0485r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_1020}]}{\text{kms\_s\_1020r\_0847}}\right) + \left(1+\frac{[\text{s\_0090}]}{\text{kmp\_s\_0090r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0847}}\right) - 1}}{\text{vol (intracellular)}} \tag{205}$$

5.206 Function definition function_208

Name Function for phosphatidylserine decarboxylase

Arguments Keq_r_0850, Vmax_r_0850, vol (intracellular), kmp_s_0470r_0850, kmp_s_1233r_0850, kms_s_1219r_0850, [s_0470], [s_1219], [s_1233]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0850} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1219r\_0850}}\right)^1 \cdot \left([\text{s\_1219}]^1 - \frac{[\text{s\_0470}]^1 \cdot [\text{s\_1233}]^1}{\text{Keq\_r\_0850}}\right)}{1+\frac{[\text{s\_1219}]}{\text{kms\_s\_1219r\_0850}} + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0850}}\right) \cdot \left(1+\frac{[\text{s\_1233}]}{\text{kmp\_s\_1233r\_0850}}\right) - 1}}{\text{vol (intracellular)}} \tag{206}$$

5.207 Function definition function_209

Name Function for phosphatidylserine synthase

Arguments Keq_r_0853, Vmax_r_0853, vol (intracellular), kmp_s_0511r_0853, kmp_s_0763_br_0853, kmp_s_1219r_0853, kms_s_0485r_0853, kms_s_0943r_0853, [s_0485], [s_0511], [s_0763_b], [s_0943], [s_1219]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0853} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0485r\_0853}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0943r\_0853}}\right)^1 \cdot \left([\text{s\_0485}]^1 \cdot [\text{s\_0943}]^1 - \frac{[\text{s\_0511}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1219}]^1}{\text{Keq\_r\_0853}}\right)}{\left(1+\frac{[\text{s\_0485}]}{\text{kms\_s\_0485r\_0853}}\right) \cdot \left(1+\frac{[\text{s\_0943}]}{\text{kms\_s\_0943r\_0853}}\right) + \left(1+\frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0853}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0853}}\right) \cdot \left(1+\frac{[\text{s\_1219}]}{\text{kmp\_s\_1219r\_0853}}\right) - 1}}{\text{vol (intracellular)}} \tag{207}$$

5.208 Function definition function_210

Name Function for phosphoadenylyl-sulfate reductase (thioredoxin)

Arguments Keq_r_0856, Vmax_r_0856, vol (intracellular), kmp_s_0397r_0856, kmp_s_0763_br_0856, kmp_s_1349r_0856, kmp_s_1517r_0856, kms_s_0206r_0856, kms_s_1521r_0856, [s_0206], [s_0397], [s_0763_b], [s_1349], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0856} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0206r\_0856}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0856}}\right)^1 \cdot \left([\text{s\_0206}]^1 \cdot [\text{s\_1521}]^1 - \frac{[\text{s\_0397}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1349}]^1 \cdot [\text{s\_1517}]^1}{\text{Keq\_r\_0856}}\right)}{\left(1+\frac{[\text{s\_0206}]}{\text{kms\_s\_0206r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0856}}\right) + \left(1+\frac{[\text{s\_0397}]}{\text{kmp\_s\_0397r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1349}]}{\text{kmp\_s\_1349r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0856}}\right) - 1}}{\text{vol (intracellular)}} \tag{208}$$

5.209 Function definition function_212

Name Function for phosphoglucomutase

Arguments Keq_r_0861, Vmax_r_0861, vol (intracellular), kmp_s_0549r_0861, kms_s_0410r_0861, [s_0410], [s_0549]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0861} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0410r\_0861}}\right)^1 \cdot \left([\text{s\_0410}]^1 - \frac{[\text{s\_0549}]^1}{\text{Keq\_r\_0861}}\right)}{1+\frac{[\text{s\_0410}]}{\text{kms\_s\_0410r\_0861}} + 1 + \frac{[\text{s\_0549}]}{\text{kmp\_s\_0549r\_0861}} - 1}}{\text{vol (intracellular)}} \tag{209}$$

5.210 Function definition function_215

Name Function for phospholipid methyltransferase

Arguments Keq_r_0873, Vmax_r_0873, vol (intracellular), kmp_s_1228r_0873, kmp_s_1290r_0873, kms_s_1225r_0873, kms_s_1293r_0873, [s_1225], [s_1228], [s_1290], [s_1293]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0873} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1225r\_0873}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0873}}\right)^1 \cdot \left([\text{s\_1225}]^1 \cdot [\text{s\_1293}]^1 - \frac{[\text{s\_1228}]^1 \cdot [\text{s\_1290}]^1}{\text{Keq\_r\_0873}}\right)}{\left(1+\frac{[\text{s\_1225}]}{\text{kms\_s\_1225r\_0873}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0873}}\right) + \left(1+\frac{[\text{s\_1228}]}{\text{kmp\_s\_1228r\_0873}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0873}}\right) - 1}}{\text{vol (intracellular)}} \tag{210}$$

5.211 Function definition function_216

Name Function for phospholipid methyltransferase_2

Arguments Keq_r_0874, Vmax_r_0874, vol (intracellular), kmp_s_0763_br_0874, kmp_s_1225r_0874, kmp_s_1290r_0874, kms_s_1226r_0874, kms_s_1293r_0874, [s_0763_b], [s_1225], [s_1226], [s_1290], [s_1293]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0874} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1226r\_0874}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0874}}\right)^1 \cdot \left([\text{s\_1226}]^1 \cdot [\text{s\_1293}]^1 - \frac{[\text{s\_0763\_b}]^1 \cdot [\text{s\_1225}]^1 \cdot [\text{s\_1290}]^1}{\text{Keq\_r\_0874}}\right)}{\left(1+\frac{[\text{s\_1226}]}{\text{kms\_s\_1226r\_0874}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0874}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0874}}\right) \cdot \left(1+\frac{[\text{s\_1225}]}{\text{kmp\_s\_1225r\_0874}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0874}}\right) - 1}}{\text{vol}(\text{intracellular})} \quad (211)$$

5.212 Function definition function_217

Name Function for phosphomannomutase

Arguments Keq_r_0875, Vmax_r_0875, vol (intracellular), kmp_s_0553r_0875, kms_s_0554r_0875, [s_0553], [s_0554]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0875} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0554r\_0875}}\right)^1 \cdot \left([\text{s\_0554}]^1 - \frac{[\text{s\_0553}]^1}{\text{Keq\_r\_0875}}\right)}{1+\frac{[\text{s\_0554}]}{\text{kms\_s\_0554r\_0875}} + 1 + \frac{[\text{s\_0553}]}{\text{kmp\_s\_0553r\_0875}} - 1}}{\text{vol}(\text{intracellular})} \quad (212)$$

5.213 Function definition function_218

Name Function for phosphomevalonate kinase

Arguments Keq_r_0877, Vmax_r_0877, vol (intracellular), kmp_s_0021r_0877, kmp_s_0400r_0877, kms_s_0022r_0877, kms_s_0446r_0877, [s_0021], [s_0022], [s_0400], [s_0446]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0877} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0022r\_0877}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0877}}\right)^1 \cdot \left([\text{s\_0022}]^1 \cdot [\text{s\_0446}]^1 - \frac{[\text{s\_0021}]^1 \cdot [\text{s\_0400}]^1}{\text{Keq\_r\_0877}}\right)}{\left(1+\frac{[\text{s\_0022}]}{\text{kms\_s\_0022r\_0877}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0877}}\right) + \left(1+\frac{[\text{s\_0021}]}{\text{kmp\_s\_0021r\_0877}}\right) \cdot \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0877}}\right) - 1}}{\text{vol}(\text{intracellular})} \quad (213)$$

5.214 Function definition function_219

Name Function for phosphoribosyl-AMP cyclohydrolase

Arguments Keq_r_0881, Vmax_r_0881, vol (intracellular), kmp_s_0079r_0881, kms_s_0080r_0881, kms_s_1434_br_0881, [s_0079], [s_0080], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0881} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0080r\_0881}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0881}}\right)^{1} \cdot \left([\text{s\_0080}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0079}]^{1}}{\text{Keq\_r\_0881}}\right)}{\left(1+\frac{[\text{s\_0080}]}{\text{kms\_s\_0080r\_0881}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0881}}\right) + 1 + \frac{[\text{s\_0079}]}{\text{kmp\_s\_0079r\_0881}} - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{214}$$

5.215 Function definition function_220

Name Function for phosphoribosyl-ATP pyrophosphatase

Arguments Keq_r_0882, Vmax_r_0882, vol (intracellular), kmp_s_0080r_0882, kmp_s_0605r_0882, kmp_s_0763_br_0882, kms_s_0334r_0882, kms_s_1434_br_0882, [s_0080], [s_0334], [s_0605], [s_0763_b], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0882} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0334r\_0882}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0882}}\right)^{1} \cdot \left([\text{s\_0334}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0080}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0882}}\right)}{\left(1+\frac{[\text{s\_0334}]}{\text{kms\_s\_0334r\_0882}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0882}}\right) + \left(1+\frac{[\text{s\_0080}]}{\text{kmp\_s\_0080r\_0882}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0882}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0882}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{215}$$

5.216 Function definition function_221

Name Function for phosphoribosylaminoimidazole carboxylase

Arguments Keq_r_0883, Vmax_r_0883, vol (intracellular), kmp_s_0318r_0883, kmp_s_0763_br_0883, kms_s_0316r_0883, kms_s_0470r_0883, [s_0316], [s_0318], [s_0470], [s_0763_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0883} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0316r\_0883}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0470r\_0883}}\right)^{1} \cdot \left([\text{s\_0316}]^{1} \cdot [\text{s\_0470}]^{1} - \frac{[\text{s\_0318}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0883}}\right)}{\left(1+\frac{[\text{s\_0316}]}{\text{kms\_s\_0316r\_0883}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kms\_s\_0470r\_0883}}\right) + \left(1+\frac{[\text{s\_0318}]}{\text{kmp\_s\_0318r\_0883}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0883}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{216}$$

5.217 Function definition `function_222`

Name Function for phosphoribosylaminoimidazole synthase

Arguments Keq_r_0884, Vmax_r_0884, vol (intracellular), kmp_s_0316r_0884, kmp_s_0400r_0884, kmp_s_0763_br_0884, kmp_s_1207r_0884, kms_s_0158r_0884, kms_s_0446r_0884, [s_0158], [s_0316], [s_0400], [s_0446], [s_0763_b], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0884} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0158r\_0884}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0884}}\right)^{1} \cdot \left([\mathrm{s\_0158}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0316}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0884}}\right)}{\left(1+\frac{[\mathrm{s\_0158}]}{\mathrm{kms\_s\_0158r\_0884}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0884}}\right) + \left(1+\frac{[\mathrm{s\_0316}]}{\mathrm{kmp\_s\_0316r\_0884}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0884}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0884}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0884}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{217}$$

5.218 Function definition `function_223`

Name Function for phosphoribosylaminoimidazolecarboxamide formyltransferase

Arguments Keq_r_0885, Vmax_r_0885, vol (intracellular), kmp_s_0309r_0885, kmp_s_0325r_0885, kms_s_0122r_0885, kms_s_0317r_0885, [s_0122], [s_0309], [s_0317], [s_0325]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0885} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0122r\_0885}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0317r\_0885}}\right)^{1} \cdot \left([\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0317}]^{1} - \frac{[\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0325}]^{1}}{\mathrm{Keq\_r\_0885}}\right)}{\left(1+\frac{[\mathrm{s\_0122}]}{\mathrm{kms\_s\_0122r\_0885}}\right) \cdot \left(1+\frac{[\mathrm{s\_0317}]}{\mathrm{kms\_s\_0317r\_0885}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0885}}\right) \cdot \left(1+\frac{[\mathrm{s\_0325}]}{\mathrm{kmp\_s\_0325r\_0885}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{218}$$

5.219 Function definition `function_224`

Name Function for phosphoribosylaminoimidazolesuccinocarboxamide synthase

Arguments Keq_r_0886, Vmax_r_0886, vol (intracellular), kmp_s_0009r_0886, kmp_s_0400r_0886, kmp_s_0763_br_0886, kmp_s_1207r_0886, kms_s_0318r_0886, kms_s_0446r_0886, kms_s_0881r_0886, [s_0009], [s_0318], [s_0400], [s_0446], [s_0763_b], [s_0881], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0886} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0318r\_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0886}}\right)^{1} \cdot \left([\mathrm{s\_0318}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0009}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_120}}{\mathrm{Keq\_r\_0886}}\right.}{\left(1+\frac{[\mathrm{s\_0318}]}{\mathrm{kms\_s\_0318r\_0886}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0886}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0886}}\right) + \left(1+\frac{[\mathrm{s\_0009}]}{\mathrm{kmp\_s\_0009r\_0886}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0886}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0886}}\right) \cdot \left(1 \right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{219}$$

5.220 Function definition function_225

Name Function for phosphoribosylanthranilate isomerase

Arguments Keq_r_0887, Vmax_r_0887, vol (intracellular), kmp_s_0078r_0887, kms_s_1066r_0887, [s_0078], [s_1066]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0887} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1066r\_0887}}\right)^{1} \cdot \left([\text{s\_1066}]^{1} - \frac{[\text{s\_0078}]^{1}}{\text{Keq\_r\_0887}}\right)}{1+\frac{[\text{s\_1066}]}{\text{kms\_s\_1066r\_0887}}+1+\frac{[\text{s\_0078}]}{\text{kmp\_s\_0078r\_0887}}-1}}{\text{vol}\,(\text{intracellular})} \tag{220}$$

5.221 Function definition function_226

Name Function for phosphoribosylformylglycinamidine synthase

Arguments Keq_r_0888, Vmax_r_0888, vol (intracellular), kmp_s_0158r_0888, kmp_s_0400r_0888, kmp_s_0763_br_0888, kmp_s_0899r_0888, kmp_s_1207r_0888, kms_s_0446r_0888, kms_s_0907r_0888, kms_s_1052r_0888, kms_s_1434_br_0888, [s_0158], [s_0400], [s_0446], [s_0763_b], [s_0899], [s_0907], [s_1052], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0888} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0907r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1052r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0888}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0907}]^{1} \cdot [\text{s\_1052}]^{1} \cdot [\text{s\_1434\_}\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_1052}]}{\text{kms\_s\_1052r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0888}}\right) + \left(1+\frac{[\text{s\_0158}]}{\text{kmp\_s\_0158r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0888}}\right) \cdot \left(1-\right.}}{\text{vol}\,(\text{intracellular})} \tag{221}$$

5.222 Function definition function_227

Name Function for phosphoribosylglycinamide formyltransferase

Arguments Keq_r_0889, Vmax_r_0889, vol (intracellular), kmp_s_0309r_0889, kmp_s_0763_br_0889, kmp_s_1052r_0889, kms_s_0122r_0889, kms_s_1048r_0889, [s_0122], [s_0309], [s_0763_b], [s_1048], [s_1052]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0889} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0122r\_0889}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1048r\_0889}}\right)^{1} \cdot \left([\text{s\_0122}]^{1} \cdot [\text{s\_1048}]^{1} - \frac{[\text{s\_0309}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1052}]^{1}}{\text{Keq\_r\_0889}}\right)}{\left(1+\frac{[\text{s\_0122}]}{\text{kms\_s\_0122r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1048}]}{\text{kms\_s\_1048r\_0889}}\right) + \left(1+\frac{[\text{s\_0309}]}{\text{kmp\_s\_0309r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1052}]}{\text{kmp\_s\_1052r\_0889}}\right) - 1}}{\text{vol}\,(\text{intracellular})} \tag{222}$$

5.223 Function definition `function_228`

Name Function for phosphoribosylglycinamide synthase

Arguments Keq_r_0890, Vmax_r_0890, vol (intracellular), kmp_s_0400r_0890, kmp_s_0763_br_0890, kmp_s_1048r_0890, kmp_s_1207r_0890, kms_s_0333r_0890, kms_s_0446r_0890, kms_s_0740r_0890, [s_0333], [s_0400], [s_0446], [s_0740], [s_0763_b], [s_1048], [s_1207]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0890} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0333r\_0890}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0890}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0890}}\right)^{1} \cdot \left([\mathrm{s\_0333}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0740}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1048}]^{1} \cdot [\mathrm{s\_120}}{\mathrm{Keq\_r\_0890}}\right.}{\left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kms\_s\_0333r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0890}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_1048}]}{\mathrm{kmp\_s\_1048r\_0890}}\right) \cdot \left(1-\right.}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{223}$$

5.224 Function definition `function_229`

Name Function for phosphoribosylpyrophosphate synthetase

Arguments Keq_r_0891, Vmax_r_0891, vol (intracellular), kmp_s_0331r_0891, kmp_s_0434r_0891, kmp_s_0763_br_0891, kms_s_0427r_0891, kms_s_0446r_0891, [s_0331], [s_0427], [s_0434], [s_0446], [s_0763_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0891} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0427r\_0891}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0891}}\right)^{1} \cdot \left([\mathrm{s\_0427}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0891}}\right)}{\left(1+\frac{[\mathrm{s\_0427}]}{\mathrm{kms\_s\_0427r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0891}}\right) + \left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kmp\_s\_0331r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0891}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{224}$$

5.225 Function definition `function_230`

Name Function for prephenate dehydratase

Arguments Keq_r_0911, Vmax_r_0911, vol (intracellular), kmp_s_0470r_0911, kmp_s_0859r_0911, kmp_s_1434_br_0911, kms_s_0763_br_0911, kms_s_1258r_0911, [s_0470], [s_0763_b], [s_0859], [s_1258], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0911} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0911}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1258r\_0911}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1258}]^{1} - \frac{[\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_0859}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0911}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1258}]}{\mathrm{kms\_s\_1258r\_0911}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_0859}]}{\mathrm{kmp\_s\_0859r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0911}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{225}$$

5.226 Function definition function_231

Name Function for prephenate dehydrogenase (NADP)

Arguments Keq_r_0913, Vmax_r_0913, vol (intracellular), kmp_s_0209r_0913, kmp_s_0470r_0913, kmp_s_1096r_0913, kms_s_1091r_0913, kms_s_1258r_0913, [s_0209], [s_0470], [s_1091], [s_1096], [s_1258]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0913} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1091r\_0913}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1258r\_0913}}\right)^1 \cdot \left([\text{s\_1091}]^1 \cdot [\text{s\_1258}]^1 - \frac{[\text{s\_0209}]^1 \cdot [\text{s\_0470}]^1 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0913}}\right)}{\left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0913}}\right) \cdot \left(1+\frac{[\text{s\_1258}]}{\text{kms\_s\_1258r\_0913}}\right) + \left(1+\frac{[\text{s\_0209}]}{\text{kmp\_s\_0209r\_0913}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0913}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0913}}\right) - 1}}{\text{vol (intracellular)}} \tag{226}$$

5.227 Function definition function_232

Name Function for pyrimidine phosphatase

Arguments Keq_r_0934, Vmax_r_0934, vol (intracellular), kmp_s_0320r_0934, kmp_s_1207r_0934, kms_s_0319r_0934, kms_s_1434_br_0934, [s_0319], [s_0320], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0934} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0319r\_0934}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0934}}\right)^1 \cdot \left([\text{s\_0319}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0320}]^1 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_0934}}\right)}{\left(1+\frac{[\text{s\_0319}]}{\text{kms\_s\_0319r\_0934}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0934}}\right) + \left(1+\frac{[\text{s\_0320}]}{\text{kmp\_s\_0320r\_0934}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0934}}\right) - 1}}{\text{vol (intracellular)}} \tag{227}$$

5.228 Function definition function_233

Name Function for pyrroline-5-carboxylate reductase

Arguments Keq_r_0936, Vmax_r_0936, vol (intracellular), kmp_s_0939r_0936, kmp_s_1091r_0936, kms_s_0120r_0936, kms_s_0763_br_0936, kms_s_1096r_0936, [s_0120], [s_0763_b], [s_0939], [s_1091], [s_1096]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0936} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0120r\_0936}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0936}}\right)^2 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0936}}\right)^1 \cdot \left([\text{s\_0120}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1096}]^1 - \frac{[\text{s\_0939}]^1 \cdot [\text{s\_1091}]^1}{\text{Keq\_r\_0936}}\right)}{\left(1+\frac{[\text{s\_0120}]}{\text{kms\_s\_0120r\_0936}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0936}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0936}}\right) + \left(1+\frac{[\text{s\_0939}]}{\text{kmp\_s\_0939r\_0936}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0936}}\right) - 1}}{\text{vol (intracellular)}} \tag{228}$$

5.229 Function definition function_234

Name Function for pyruvate carboxylase

Arguments Keq_r_0937, Vmax_r_0937, vol (intracellular), kmp_s_0400r_0937, kmp_s_0763_br_0937, kmp_s_1156r_0937, kmp_s_1207r_0937, kms_s_0446r_0937, kms_s_0458r_0937, kms_s_1277r_0937, [s_0400], [s_0446], [s_0458], [s_0763_b], [s_1156], [s_1207], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0937} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0937}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1156}]^{1} \cdot [\mathrm{s\_120}}{\mathrm{Keq\_r\_0937}}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0937}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1156}]}{\mathrm{kmp\_s\_1156r\_0937}}\right) \cdot (1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (229)$$

5.230 Function definition function_236

Name Function for pyruvate dehydrogenase

Arguments Keq_r_0940, Vmax_r_0940, vol (intracellular), kmp_s_0380r_0940, kmp_s_0470r_0940, kmp_s_1087r_0940, kms_s_0514r_0940, kms_s_1082r_0940, kms_s_1277r_0940, [s_0380], [s_0470], [s_0514], [s_1082], [s_1087], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0940} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0514r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0940}}\right)^{1} \cdot \left([\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0940}}\right)}{\left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0940}}\right) + \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kmp\_s\_0380r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0940}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (230)$$

5.231 Function definition function_237

Name Function for pyruvate kinase

Arguments Keq_r_0941, Vmax_r_0941, vol (intracellular), kmp_s_0446r_0941, kmp_s_1277r_0941, kms_s_0400r_0941, kms_s_0763_br_0941, kms_s_1243r_0941, [s_0400], [s_0446], [s_0763_b], [s_1243], [s_1277]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0941} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0941}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1243}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0941}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0941}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0941}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (231)$$

5.232 Function definition function_238

Name Function for riboflavin synthase

Arguments Keq_r_0948, Vmax_r_0948, vol (intracellular), kmp_s_0335r_0948, kmp_s_1207r_0948, kmp_s_1434_br_0948, kms_s_0163r_0948, kms_s_0320r_0948, [s_0163], [s_0320], [s_0335], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0948} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0163r\_0948}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0320r\_0948}}\right)^{1} \cdot \left([\mathrm{s\_0163}]^{1} \cdot [\mathrm{s\_0320}]^{1} - \frac{[\mathrm{s\_0335}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0948}}\right)}{\left(1+\frac{[\mathrm{s\_0163}]}{\mathrm{kms\_s\_0163r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kms\_s\_0320r\_0948}}\right) + \left(1+\frac{[\mathrm{s\_0335}]}{\mathrm{kmp\_s\_0335r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0948}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{232}$$

5.233 Function definition function_239

Name Function for riboflavin synthase_2

Arguments Keq_r_0949, Vmax_r_0949, vol (intracellular), kmp_s_0320r_0949, kmp_s_1283r_0949, kms_s_0335r_0949, [s_0320], [s_0335], [s_1283]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0949} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0335r\_0949}}\right)^{2} \cdot \left([\mathrm{s\_0335}]^{2} - \frac{[\mathrm{s\_0320}]^{1} \cdot [\mathrm{s\_1283}]^{1}}{\mathrm{Keq\_r\_0949}}\right)}{1+\frac{[\mathrm{s\_0335}]}{\mathrm{kms\_s\_0335r\_0949}} + \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kmp\_s\_0320r\_0949}}\right) \cdot \left(1+\frac{[\mathrm{s\_1283}]}{\mathrm{kmp\_s\_1283r\_0949}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{233}$$

5.234 Function definition function_240

Name Function for ribonucleoside-diphosphate reductase

Arguments Keq_r_0951, Vmax_r_0951, vol (intracellular), kmp_s_0562r_0951, kmp_s_1434_br_0951, kmp_s_1517r_0951, kms_s_0400r_0951, kms_s_1521r_0951, [s_0400], [s_0562], [s_1434_b], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0951} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0951}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0951}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1521}]^{1} - \frac{[\mathrm{s\_0562}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} \cdot [\mathrm{s\_1517}]^{1}}{\mathrm{Keq\_r\_0951}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0951}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0951}}\right) + \left(1+\frac{[\mathrm{s\_0562}]}{\mathrm{kmp\_s\_0562r\_0951}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0951}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0951}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{234}$$

5.235 Function definition function_241

Name Function for ribonucleoside-diphosphate reductase (GDP)

Arguments Keq_r_0955, Vmax_r_0955, vol (intracellular), kmp_s_0591r_0955, kmp_s_1434_br_0955, kmp_s_1517r_0955, kms_s_0706r_0955, kms_s_1521r_0955, [s_0591], [s_0706], [s_1434_b], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0955} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0706r\_0955}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0955}}\right)^1 \cdot \left([\text{s\_0706}]^1 \cdot [\text{s\_1521}]^1 - \frac{[\text{s\_0591}]^1 \cdot [\text{s\_1434\_b}]^1 \cdot [\text{s\_1517}]^1}{\text{Keq\_r\_0955}}\right)}{\left(1+\frac{[\text{s\_0706}]}{\text{kms\_s\_0706r\_0955}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0955}}\right) + \left(1+\frac{[\text{s\_0591}]}{\text{kmp\_s\_0591r\_0955}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0955}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0955}}\right) - 1}}{\text{vol (intracellular)}} \tag{235}$$

5.236 Function definition function_242

Name Function for ribonucleoside-diphosphate reductase (UDP)

Arguments Keq_r_0957, Vmax_r_0957, vol (intracellular), kmp_s_0622r_0957, kmp_s_1434_br_0957, kmp_s_1517r_0957, kms_s_1411r_0957, kms_s_1521r_0957, [s_0622], [s_1411], [s_1434_b], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0957} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1411r\_0957}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0957}}\right)^1 \cdot \left([\text{s\_1411}]^1 \cdot [\text{s\_1521}]^1 - \frac{[\text{s\_0622}]^1 \cdot [\text{s\_1434\_b}]^1 \cdot [\text{s\_1517}]^1}{\text{Keq\_r\_0957}}\right)}{\left(1+\frac{[\text{s\_1411}]}{\text{kms\_s\_1411r\_0957}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0957}}\right) + \left(1+\frac{[\text{s\_0622}]}{\text{kmp\_s\_0622r\_0957}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0957}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0957}}\right) - 1}}{\text{vol (intracellular)}} \tag{236}$$

5.237 Function definition function_243

Name Function for ribonucleoside-triphosphate reductase (ATP)

Arguments Keq_r_0959, Vmax_r_0959, vol (intracellular), kmp_s_0566r_0959, kmp_s_1434_br_0959, kmp_s_1517r_0959, kms_s_0446r_0959, kms_s_1521r_0959, [s_0446], [s_0566], [s_1434_b], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0959} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0959}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0959}}\right)^1 \cdot \left([\text{s\_0446}]^1 \cdot [\text{s\_1521}]^1 - \frac{[\text{s\_0566}]^1 \cdot [\text{s\_1434\_b}]^1 \cdot [\text{s\_1517}]^1}{\text{Keq\_r\_0959}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0959}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0959}}\right) + \left(1+\frac{[\text{s\_0566}]}{\text{kmp\_s\_0566r\_0959}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0959}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0959}}\right) - 1}}{\text{vol (intracellular)}} \tag{237}$$

5.238 Function definition function_244

Name Function for ribose-5-phosphate isomerase

Arguments Keq_r_0963, Vmax_r_0963, vol (intracellular), kmp_s_0427r_0963, kms_s_0557r_0963, [s_0427], [s_0557]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0963} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0557r\_0963}}\right)^{1} \cdot \left([\text{s\_0557}]^{1} - \frac{[\text{s\_0427}]^{1}}{\text{Keq\_r\_0963}}\right)}{1 + \frac{[\text{s\_0557}]}{\text{kms\_s\_0557r\_0963}} + 1 + \frac{[\text{s\_0427}]}{\text{kmp\_s\_0427r\_0963}} - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{238}$$

5.239 Function definition function_245

Name Function for ribulose 5-phosphate 3-epimerase

Arguments Keq_r_0965, Vmax_r_0965, vol (intracellular), kmp_s_0557r_0965, kms_s_0561r_0965, [s_0557], [s_0561]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0965} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0561r\_0965}}\right)^{1} \cdot \left([\text{s\_0561}]^{1} - \frac{[\text{s\_0557}]^{1}}{\text{Keq\_r\_0965}}\right)}{1 + \frac{[\text{s\_0561}]}{\text{kms\_s\_0561r\_0965}} + 1 + \frac{[\text{s\_0557}]}{\text{kmp\_s\_0557r\_0965}} - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{239}$$

5.240 Function definition function_246

Name Function for S-adenosyl-methionine delta-24-sterol-c-methyltransferase

Arguments Keq_r_0967, Vmax_r_0967, vol (intracellular), kmp_s_0669r_0967, kmp_s_0763_br_0967, kmp_s_1290r_0967, kms_s_1293r_0967, kms_s_1447r_0967, [s_0669], [s_0763_b], [s_1290], [s_1293], [s_1447]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0967} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1293r\_0967}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1447r\_0967}}\right)^{1} \cdot \left([\text{s\_1293}]^{1} \cdot [\text{s\_1447}]^{1} - \frac{[\text{s\_0669}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1290}]^{1}}{\text{Keq\_r\_0967}}\right)}{\left(1 + \frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0967}}\right) \cdot \left(1 + \frac{[\text{s\_1447}]}{\text{kms\_s\_1447r\_0967}}\right) + \left(1 + \frac{[\text{s\_0669}]}{\text{kmp\_s\_0669r\_0967}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0967}}\right) \cdot \left(1 + \frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0967}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{240}$$

5.241 Function definition function_247

Name Function for saccharopine dehydrogenase (NAD, L-lysine forming)

Arguments Keq_r_0969, Vmax_r_0969, vol (intracellular), kmp_s_0185r_0969, kmp_s_0763_br_0969, kmp_s_0929r_0969, kmp_s_1087r_0969, kms_s_0942r_0969, kms_s_1082r_0969, kms_s_1434_br_0969, [s_0185], [s_0763_b], [s_0929], [s_0942], [s_1082], [s_1087], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0969} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0942r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0969}}\right)^{1} \cdot \left([\text{s\_0942}]^{1} \cdot [\text{s\_1082}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0929}]^{1} \cdot [\text{s\_} \cdots}{\text{Keq\_r\_0969}} \cdots\right.}{\left(1+\frac{[\text{s\_0942}]}{\text{kms\_s\_0942r\_0969}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0969}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0969}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0969}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0969}}\right) \cdot \left(1+\frac{[\text{s\_0929}]}{\text{kmp\_s\_0929r\_0969}}\right) \cdot \left(\cdots \right.}}{\text{vol}\left(\text{intracellular}\right)} \quad (241)$$

5.242 Function definition function_248

Name Function for saccharopine dehydrogenase (NADP, L-glutamate forming)

Arguments Keq_r_0970, Vmax_r_0970, vol (intracellular), kmp_s_0942r_0970, kmp_s_1091r_0970, kmp_s_1434_br_0970, kms_s_0763_br_0970, kms_s_0867r_0970, kms_s_0899r_0970, kms_s_1096r_0970, [s_0763_b], [s_0867], [s_0899], [s_0942], [s_1091], [s_1096], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0970} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0970}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0867r\_0970}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0970}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0970}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_0867}]^{1} \cdot [\text{s\_0899}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0942}]^{1} \cdot [\cdots}{\cdots} \cdots\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0970}}\right) \cdot \left(1+\frac{[\text{s\_0867}]}{\text{kms\_s\_0867r\_0970}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0970}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0970}}\right) + \left(1+\frac{[\text{s\_0942}]}{\text{kmp\_s\_0942r\_0970}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0970}}\right) \cdot \left(1 \cdots \right.}}{\text{vol}\left(\text{intracellular}\right)} \quad (242)$$

5.243 Function definition function_249

Name Function for serine C-palmitoyltransferase

Arguments Keq_r_0972, Vmax_r_0972, vol (intracellular), kmp_s_0218r_0972, kmp_s_0470r_0972, kmp_s_0514r_0972, kms_s_0943r_0972, kms_s_1187r_0972, [s_0218], [s_0470], [s_0514], [s_0943], [s_1187]

Mathematical Expression

$$\frac{\text{Vmax\_r\_0972} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0943r\_0972}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1187r\_0972}}\right)^{1} \cdot \left([\text{s\_0943}]^{1} \cdot [\text{s\_1187}]^{1} - \frac{[\text{s\_0218}]^{1} \cdot [\text{s\_0470}]^{1} \cdot [\text{s\_0514}]^{1}}{\text{Keq\_r\_0972}}\right)}{\left(1+\frac{[\text{s\_0943}]}{\text{kms\_s\_0943r\_0972}}\right) \cdot \left(1+\frac{[\text{s\_1187}]}{\text{kms\_s\_1187r\_0972}}\right) + \left(1+\frac{[\text{s\_0218}]}{\text{kmp\_s\_0218r\_0972}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0972}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0972}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (243)$$

5.244 Function definition function_250

Name Function for shikimate dehydrogenase

Arguments Keq_r_0976, Vmax_r_0976, vol (intracellular), kmp_s_1091r_0976, kmp_s_1306r_0976, kms_s_0217r_0976, kms_s_0763_br_0976, kms_s_1096r_0976, [s_0217], [s_0763_b], [s_1091], [s_1096], [s_1306]

Mathematical Expression

$$\mathrm{Vmax\_r\_0976} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0217r\_0976}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0976}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0976}}\right)^1 \cdot \left([\mathrm{s\_0217}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1306}]^1}{\mathrm{Keq\_r\_0976}}\right)}{\left(1+\frac{[\mathrm{s\_0217}]}{\mathrm{kms\_s\_0217r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0976}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kmp\_s\_1306r\_0976}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{244}$$

5.245 Function definition function_251

Name Function for shikimate kinase

Arguments Keq_r_0977, Vmax_r_0977, vol (intracellular), kmp_s_0267r_0977, kmp_s_0400r_0977, kmp_s_0763_br_0977, kms_s_0446r_0977, kms_s_1306r_0977, [s_0267], [s_0400], [s_0446], [s_0763_b], [s_1306]

Mathematical Expression

$$\mathrm{Vmax\_r\_0977} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0977}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1306r\_0977}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1306}]^1 - \frac{[\mathrm{s\_0267}]^1 \cdot [\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0977}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kms\_s\_1306r\_0977}}\right) + \left(1+\frac{[\mathrm{s\_0267}]}{\mathrm{kmp\_s\_0267r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0977}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{245}$$

5.246 Function definition function_252

Name Function for squalene epoxidase (NAD)

Arguments Keq_r_0991, Vmax_r_0991, vol (intracellular), kmp_s_0040r_0991, kmp_s_1082r_0991, kmp_s_1434_br_0991, kms_s_0763_br_0991, kms_s_1087r_0991, kms_s_1160r_0991, kms_s_1327r_0991, [s_0040], [s_0763_b], [s_1082], [s_1087], [s_1160], [s_1327], [s_1434_b]

Mathematical Expression

$$\mathrm{Vmax\_r\_0991} \cdot \frac{\frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0991}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0991}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0991}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1327r\_0991}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1 \cdot [\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1327}]^1 - \frac{[\mathrm{s\_0040}]^1 \cdot \ldots}{\ldots}\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0991}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0991}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0991}}\right) \cdot \left(1+\frac{[\mathrm{s\_1327}]}{\mathrm{kms\_s\_1327r\_0991}}\right) + \left(1+\frac{[\mathrm{s\_0040}]}{\mathrm{kmp\_s\_0040r\_0991}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0991}}\right) \cdot \left(1+ \ldots\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{246}$$

5.247 Function definition function_253

Name Function for squalene synthase

Arguments Keq_r_0993, Vmax_r_0993, vol (intracellular), kmp_s_0605r_0993, kmp_s_1091r_0993, kmp_s_1327r_0993, kms_s_0195r_0993, kms_s_0763_br_0993, kms_s_1096r_0993, [s_0195], [s_0605], [s_0763_b], [s_1091], [s_1096], [s_1327]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0993} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0195r\_0993}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0993}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0993}}\right)^{1} \cdot \left([\mathrm{s\_0195}]^{2} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0605}]^{2} \cdot [\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1327}]^{1}}{\mathrm{Keq\_r\_0993}}\right)}{\left(1+\frac{[\mathrm{s\_0195}]}{\mathrm{kms\_s\_0195r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0993}}\right) + \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1327}]}{\mathrm{kmp\_s\_1327r\_0993}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{247}$$

5.248 Function definition function_254

Name Function for steryl ester hydrolase

Arguments Keq_r_0995, Vmax_r_0995, vol (intracellular), kmp_s_0641r_0995, kmp_s_1434_br_0995, kms_s_0635r_0995, kms_s_0663r_0995, [s_0635], [s_0641], [s_0663], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0995} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0635r\_0995}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0663r\_0995}}\right)^{1} \cdot \left([\mathrm{s\_0635}]^{1} \cdot [\mathrm{s\_0663}]^{1} - \frac{[\mathrm{s\_0641}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0995}}\right)}{\left(1+\frac{[\mathrm{s\_0635}]}{\mathrm{kms\_s\_0635r\_0995}}\right) \cdot \left(1+\frac{[\mathrm{s\_0663}]}{\mathrm{kms\_s\_0663r\_0995}}\right) + \left(1+\frac{[\mathrm{s\_0641}]}{\mathrm{kmp\_s\_0641r\_0995}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0995}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{248}$$

5.249 Function definition function_255

Name Function for succinate-CoA ligase (ADP-forming)

Arguments Keq_r_1003, Vmax_r_1003, vol (intracellular), kmp_s_0400r_1003, kmp_s_1207r_1003, kmp_s_1342r_1003, kms_s_0446r_1003, kms_s_0514r_1003, kms_s_1338r_1003, [s_0400], [s_0446], [s_0514], [s_1207], [s_1338], [s_1342]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1003} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_1003}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0514r\_1003}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1338r\_1003}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1338}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1342}]^{1}}{\mathrm{Keq\_r\_1003}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1338}]}{\mathrm{kms\_s\_1338r\_1003}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1342}]}{\mathrm{kmp\_s\_1342r\_1003}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{249}$$

5.250 Function definition function_256

Name Function for sulfate adenylyltransferase (ADP)

Arguments Keq_r_1007, Vmax_r_1007, vol (intracellular), kmp_s_0304r_1007, kmp_s_1207r_1007, kms_s_0400r_1007, kms_s_0763_br_1007, kms_s_1347r_1007, [s_0304], [s_0400], [s_0763_b], [s_1207], [s_1347]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1007} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_1007}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_1007}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1347r\_1007}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1347}]^{1} - \frac{[\text{s\_0304}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_1007}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_1007}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1007}}\right) \cdot \left(1+\frac{[\text{s\_1347}]}{\text{kms\_s\_1347r\_1007}}\right) + \left(1+\frac{[\text{s\_0304}]}{\text{kmp\_s\_0304r\_1007}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1007}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{250}$$

5.251 Function definition function_257

Name Function for sulfite reductase (NADPH2)

Arguments Keq_r_1008, Vmax_r_1008, vol (intracellular), kmp_s_0805r_1008, kmp_s_1091r_1008, kmp_s_1434_br_1008, kms_s_0763_br_1008, kms_s_1096r_1008, kms_s_1349r_1008, [s_0763_b], [s_0805], [s_1091], [s_1096], [s_1349], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1008} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_1008}}\right)^{5} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_1008}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1349r\_1008}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{5} \cdot [\text{s\_1096}]^{3} \cdot [\text{s\_1349}]^{1} - \frac{[\text{s\_0805}]^{1} \cdot [\text{s\_1091}]^{3} \cdot [\text{s\_1434\_b}]^{3}}{\text{Keq\_r\_1008}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1008}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_1008}}\right) \cdot \left(1+\frac{[\text{s\_1349}]}{\text{kms\_s\_1349r\_1008}}\right) + \left(1+\frac{[\text{s\_0805}]}{\text{kmp\_s\_0805r\_1008}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_1008}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_1008}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{251}$$

5.252 Function definition function_258

Name Function for thioredoxin reductase (NADPH)

Arguments Keq_r_1024, Vmax_r_1024, vol (intracellular), kmp_s_1091r_1024, kmp_s_1521r_1024, kms_s_0763_br_1024, kms_s_1096r_1024, kms_s_1517r_1024, [s_0763_b], [s_1091], [s_1096], [s_1517], [s_1521]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1024} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_1024}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_1024}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1517r\_1024}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1517}]^{1} - \frac{[\text{s\_1091}]^{1} \cdot [\text{s\_1521}]^{1}}{\text{Keq\_r\_1024}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kms\_s\_1517r\_1024}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kmp\_s\_1521r\_1024}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{252}$$

5.253 Function definition function_259

Name Function for threonine aldolase

Arguments Keq_r_1026, Vmax_r_1026, vol (intracellular), kmp_s_0366r_1026, kmp_s_0740r_1026, kms_s_0949r_1026, [s_0366], [s_0740], [s_0949]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1026} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0949r\_1026}}\right)^{1} \cdot \left([\text{s\_0949}]^{1} - \frac{[\text{s\_0366}]^{1} \cdot [\text{s\_0740}]^{1}}{\text{Keq\_r\_1026}}\right)}{1+\frac{[\text{s\_0949}]}{\text{kms\_s\_0949r\_1026}} + \left(1+\frac{[\text{s\_0366}]}{\text{kmp\_s\_0366r\_1026}}\right) \cdot \left(1+\frac{[\text{s\_0740}]}{\text{kmp\_s\_0740r\_1026}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{253}$$

5.254 Function definition function_260

Name Function for threonine synthase

Arguments Keq_r_1027, Vmax_r_1027, vol (intracellular), kmp_s_0949r_1027, kmp_s_1207r_1027, kms_s_1122r_1027, kms_s_1434_br_1027, [s_0949], [s_1122], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1027} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1122r\_1027}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_1027}}\right)^{1} \cdot \left([\text{s\_1122}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0949}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_1027}}\right)}{\left(1+\frac{[\text{s\_1122}]}{\text{kms\_s\_1122r\_1027}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_1027}}\right) + \left(1+\frac{[\text{s\_0949}]}{\text{kmp\_s\_0949r\_1027}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1027}}\right) - 1}}{\text{vol (intracellular)}} \tag{254}$$

5.255 Function definition function_261

Name Function for thymidylate synthase

Arguments Keq_r_1032, Vmax_r_1032, vol (intracellular), kmp_s_0601r_1032, kmp_s_0619r_1032, kms_s_0307r_1032, kms_s_0624r_1032, [s_0307], [s_0601], [s_0619], [s_0624]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1032} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0307r\_1032}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0624r\_1032}}\right)^{1} \cdot \left([\text{s\_0307}]^{1} \cdot [\text{s\_0624}]^{1} - \frac{[\text{s\_0601}]^{1} \cdot [\text{s\_0619}]^{1}}{\text{Keq\_r\_1032}}\right)}{\left(1+\frac{[\text{s\_0307}]}{\text{kms\_s\_0307r\_1032}}\right) \cdot \left(1+\frac{[\text{s\_0624}]}{\text{kms\_s\_0624r\_1032}}\right) + \left(1+\frac{[\text{s\_0601}]}{\text{kmp\_s\_0601r\_1032}}\right) \cdot \left(1+\frac{[\text{s\_0619}]}{\text{kmp\_s\_0619r\_1032}}\right) - 1}}{\text{vol (intracellular)}} \tag{255}$$

5.256 Function definition function_262

Name Function for transaldolase

Arguments Keq_r_1035, Vmax_r_1035, vol (intracellular), kmp_s_0731r_1035, kmp_s_1304r_1035, kms_s_0533r_1035, kms_s_0539r_1035, [s_0533], [s_0539], [s_0731], [s_1304]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1035} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0533r\_1035}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0539r\_1035}}\right)^{1} \cdot \left([\text{s\_0533}]^{1} \cdot [\text{s\_0539}]^{1} - \frac{[\text{s\_0731}]^{1} \cdot [\text{s\_1304}]^{1}}{\text{Keq\_r\_1035}}\right)}{\left(1+\frac{[\text{s\_0533}]}{\text{kms\_s\_0533r\_1035}}\right) \cdot \left(1+\frac{[\text{s\_0539}]}{\text{kms\_s\_0539r\_1035}}\right) + \left(1+\frac{[\text{s\_0731}]}{\text{kmp\_s\_0731r\_1035}}\right) \cdot \left(1+\frac{[\text{s\_1304}]}{\text{kmp\_s\_1304r\_1035}}\right) - 1}}{\text{vol (intracellular)}} \tag{256}$$

5.257 Function definition function_263

Name Function for transketolase

Arguments Keq_r_1036, Vmax_r_1036, vol (intracellular), kmp_s_0427r_1036, kmp_s_0561r_1036, kms_s_0731r_1036, kms_s_1304r_1036, [s_0427], [s_0561], [s_0731], [s_1304]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1036} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0731r\_1036}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1304r\_1036}}\right)^{1} \cdot \left([\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_1304}]^{1} - \frac{[\mathrm{s\_0427}]^{1} \cdot [\mathrm{s\_0561}]^{1}}{\mathrm{Keq\_r\_1036}}\right)}{\left(1+\frac{[\mathrm{s\_0731}]}{\mathrm{kms\_s\_0731r\_1036}}\right) \cdot \left(1+\frac{[\mathrm{s\_1304}]}{\mathrm{kms\_s\_1304r\_1036}}\right) + \left(1+\frac{[\mathrm{s\_0427}]}{\mathrm{kmp\_s\_0427r\_1036}}\right) \cdot \left(1+\frac{[\mathrm{s\_0561}]}{\mathrm{kmp\_s\_0561r\_1036}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{257}$$

5.258 Function definition function_264

Name Function for transketolase_2

Arguments Keq_r_1037, Vmax_r_1037, vol (intracellular), kmp_s_0533r_1037, kmp_s_0561r_1037, kms_s_0539r_1037, kms_s_0731r_1037, [s_0533], [s_0539], [s_0561], [s_0731]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1037} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0539r\_1037}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0731r\_1037}}\right)^{1} \cdot \left([\mathrm{s\_0539}]^{1} \cdot [\mathrm{s\_0731}]^{1} - \frac{[\mathrm{s\_0533}]^{1} \cdot [\mathrm{s\_0561}]^{1}}{\mathrm{Keq\_r\_1037}}\right)}{\left(1+\frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_1037}}\right) \cdot \left(1+\frac{[\mathrm{s\_0731}]}{\mathrm{kms\_s\_0731r\_1037}}\right) + \left(1+\frac{[\mathrm{s\_0533}]}{\mathrm{kmp\_s\_0533r\_1037}}\right) \cdot \left(1+\frac{[\mathrm{s\_0561}]}{\mathrm{kmp\_s\_0561r\_1037}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{258}$$

5.259 Function definition function_265

Name Function for trehalose-phosphatase

Arguments Keq_r_1038, Vmax_r_1038, vol (intracellular), kmp_s_0416r_1038, kmp_s_1207r_1038, kms_s_0419r_1038, kms_s_1434_br_1038, [s_0416], [s_0419], [s_1207], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1038} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0419r\_1038}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1038}}\right)^{1} \cdot \left([\mathrm{s\_0419}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0416}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1038}}\right)}{\left(1+\frac{[\mathrm{s\_0419}]}{\mathrm{kms\_s\_0419r\_1038}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1038}}\right) + \left(1+\frac{[\mathrm{s\_0416}]}{\mathrm{kmp\_s\_0416r\_1038}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1038}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{259}$$

5.260 Function definition function_266

Name Function for triacylglycerol lipase

Arguments Keq_r_1040, Vmax_r_1040, vol (intracellular), kmp_s_0596r_1040, kmp_s_0663r_1040, kms_s_1399r_1040, kms_s_1434_br_1040, [s_0596], [s_0663], [s_1399], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1040} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1399r\_1040}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1040}}\right)^{1} \cdot \left([\mathrm{s\_1399}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0596}]^{1} \cdot [\mathrm{s\_0663}]^{1}}{\mathrm{Keq\_r\_1040}}\right)}{\left(1+\frac{[\mathrm{s\_1399}]}{\mathrm{kms\_s\_1399r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1040}}\right)+\left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kmp\_s\_0596r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_0663}]}{\mathrm{kmp\_s\_0663r\_1040}}\right)-1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{260}$$

5.261 Function definition function_267

Name Function for triose-phosphate isomerase

Arguments Keq_r_1041, Vmax_r_1041, vol (intracellular), kmp_s_0731r_1041, kms_s_0735r_1041, [s_0731], [s_0735]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1041} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0735r\_1041}}\right)^{1} \cdot \left([\mathrm{s\_0735}]^{1} - \frac{[\mathrm{s\_0731}]^{1}}{\mathrm{Keq\_r\_1041}}\right)}{1+\frac{[\mathrm{s\_0735}]}{\mathrm{kms\_s\_0735r\_1041}}+1+\frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1041}}-1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{261}$$

5.262 Function definition function_268

Name Function for tryptophan synthase (indoleglycerol phosphate)

Arguments Keq_r_1042, Vmax_r_1042, vol (intracellular), kmp_s_0731r_1042, kmp_s_0952r_1042, kmp_s_1434_br_1042, kms_s_0088r_1042, kms_s_0943r_1042, [s_0088], [s_0731], [s_0943], [s_0952], [s_1434_b]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1042} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0088r\_1042}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0943r\_1042}}\right)^{1} \cdot \left([\mathrm{s\_0088}]^{1} \cdot [\mathrm{s\_0943}]^{1} - \frac{[\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_0952}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_1042}}\right)}{\left(1+\frac{[\mathrm{s\_0088}]}{\mathrm{kms\_s\_0088r\_1042}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_1042}}\right)+\left(1+\frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1042}}\right) \cdot \left(1+\frac{[\mathrm{s\_0952}]}{\mathrm{kmp\_s\_0952r\_1042}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_1042}}\right)-1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{262}$$

5.263 Function definition function_269

Name Function for tyrosine transaminase

Arguments Keq_r_1050, Vmax_r_1050, vol (intracellular), kmp_s_0185r_1050, kmp_s_0955r_1050, kms_s_0209r_1050, kms_s_0899r_1050, [s_0185], [s_0209], [s_0899], [s_0955]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1050} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0209r\_1050}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_1050}}\right)^{1} \cdot \left([\text{s\_0209}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0955}]^{1}}{\text{Keq\_r\_1050}}\right)}{\left(1+\frac{[\text{s\_0209}]}{\text{kms\_s\_0209r\_1050}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_1050}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_1050}}\right) \cdot \left(1+\frac{[\text{s\_0955}]}{\text{kmp\_s\_0955r\_1050}}\right) - 1}}{\text{vol (intracellular)}} \tag{263}$$

5.264 Function definition function_270

Name Function for UMP kinase

Arguments Keq_r_1059, Vmax_r_1059, vol (intracellular), kmp_s_0400r_1059, kmp_s_1411r_1059, kms_s_0446r_1059, kms_s_1417r_1059, [s_0400], [s_0446], [s_1411], [s_1417]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1059} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_1059}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1417r\_1059}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_1417}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_1411}]^{1}}{\text{Keq\_r\_1059}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_1059}}\right) \cdot \left(1+\frac{[\text{s\_1417}]}{\text{kms\_s\_1417r\_1059}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_1059}}\right) \cdot \left(1+\frac{[\text{s\_1411}]}{\text{kmp\_s\_1411r\_1059}}\right) - 1}}{\text{vol (intracellular)}} \tag{264}$$

5.265 Function definition function_271

Name Function for uridylate kinase (dUMP)

Arguments Keq_r_1066, Vmax_r_1066, vol (intracellular), kmp_s_0446r_1066, kmp_s_0624r_1066, kms_s_0400r_1066, kms_s_0622r_1066, [s_0400], [s_0446], [s_0622], [s_0624]

Mathematical Expression

$$\frac{\text{Vmax\_r\_1066} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_1066}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0622r\_1066}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0622}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0624}]^{1}}{\text{Keq\_r\_1066}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0622}]}{\text{kms\_s\_0622r\_1066}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0624}]}{\text{kmp\_s\_0624r\_1066}}\right) - 1}}{\text{vol (intracellular)}} \tag{265}$$

5.266 Function definition function_272

Name Function for UTP-glucose-1-phosphate uridylyltransferase

Arguments Keq_r_1072, Vmax_r_1072, vol (intracellular), kmp_s_0605r_1072, kmp_s_1415r_1072, kms_s_0549r_1072, kms_s_0763_br_1072, kms_s_1430r_1072, [s_0549], [s_0605], [s_0763_b], [s_1415], [s_1430]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1072} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0549r\_1072}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_1072}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1430r\_1072}}\right)^1 \cdot \left([\mathrm{s\_0549}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1430}]^1 - \frac{[\mathrm{s\_0605}]^1 \cdot [\mathrm{s\_1415}]^1}{\mathrm{Keq\_r\_1072}}\right)}{\left(1+\frac{[\mathrm{s\_0549}]}{\mathrm{kms\_s\_0549r\_1072}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_1072}}\right) \cdot \left(1+\frac{[\mathrm{s\_1430}]}{\mathrm{kms\_s\_1430r\_1072}}\right) + \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_1072}}\right) \cdot \left(1+\frac{[\mathrm{s\_1415}]}{\mathrm{kmp\_s\_1415r\_1072}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{266}$$

5.267 Function definition function_273

Name Function for valine transaminase

Arguments Keq_r_1073, Vmax_r_1073, vol (intracellular), kmp_s_0185r_1073, kmp_s_0960r_1073, kms_s_0238r_1073, kms_s_0899r_1073, [s_0185], [s_0238], [s_0899], [s_0960]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1073} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0238r\_1073}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_1073}}\right)^1 \cdot \left([\mathrm{s\_0238}]^1 \cdot [\mathrm{s\_0899}]^1 - \frac{[\mathrm{s\_0185}]^1 \cdot [\mathrm{s\_0960}]^1}{\mathrm{Keq\_r\_1073}}\right)}{\left(1+\frac{[\mathrm{s\_0238}]}{\mathrm{kms\_s\_0238r\_1073}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_1073}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_1073}}\right) \cdot \left(1+\frac{[\mathrm{s\_0960}]}{\mathrm{kmp\_s\_0960r\_1073}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{267}$$

5.268 Function definition function_274

Name Function for ammonia transport

Arguments Keq_r_1157, Vmax_r_1157, kmp_s_0430r_1157, kms_s_0431_br_1157, [s_0430], [s_0431_b]

Mathematical Expression

$$\mathrm{Vmax\_r\_1157} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0431\_br\_1157}}\right)^1 \cdot \left([\mathrm{s\_0431\_b}]^1 - \frac{[\mathrm{s\_0430}]^1}{\mathrm{Keq\_r\_1157}}\right)}{1 + \frac{[\mathrm{s\_0431\_b}]}{\mathrm{kms\_s\_0431\_br\_1157}} + 1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_1157}} - 1} \tag{268}$$

5.269 Function definition function_275

Name Function for CO2 transport

Arguments Keq_r_1194, Vmax_r_1194, kmp_s_0472_br_1194, kms_s_0470r_1194, [s_0470], [s_0472_b]

Mathematical Expression

$$\text{Vmax\_r\_1194} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0470r\_1194}}\right)^1 \cdot \left([\text{s\_0470}]^1 - \frac{[\text{s\_0472\_b}]^1}{\text{Keq\_r\_1194}}\right)}{1 + \frac{[\text{s\_0470}]}{\text{kms\_s\_0470r\_1194}} + 1 + \frac{[\text{s\_0472\_b}]}{\text{kmp\_s\_0472\_br\_1194}} - 1} \tag{269}$$

5.270 Function definition function_276

Name Function for ethanol transport

Arguments Keq_r_1247, Vmax_r_1247, kmp_s_0651_br_1247, kms_s_0650r_1247, [s_0650], [s_0651_b]

Mathematical Expression

$$\text{Vmax\_r\_1247} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0650r\_1247}}\right)^1 \cdot \left([\text{s\_0650}]^1 - \frac{[\text{s\_0651\_b}]^1}{\text{Keq\_r\_1247}}\right)}{1 + \frac{[\text{s\_0650}]}{\text{kms\_s\_0650r\_1247}} + 1 + \frac{[\text{s\_0651\_b}]}{\text{kmp\_s\_0651\_br\_1247}} - 1} \tag{270}$$

5.271 Function definition function_277

Name Function for glucose transport

Arguments Keq_r_1293, Vmax_r_1293, kmp_s_0545r_1293, kms_s_0547_br_1293, [s_0545], [s_0547_b]

Mathematical Expression

$$\text{Vmax\_r\_1293} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0547\_br\_1293}}\right)^1 \cdot \left([\text{s\_0547\_b}]^1 - \frac{[\text{s\_0545}]^1}{\text{Keq\_r\_1293}}\right)}{1 + \frac{[\text{s\_0547\_b}]}{\text{kms\_s\_0547\_br\_1293}} + 1 + \frac{[\text{s\_0545}]}{\text{kmp\_s\_0545r\_1293}} - 1} \tag{271}$$

5.272 Function definition function_278

Name Function for O2 transport

Arguments Keq_r_1435, Vmax_r_1435, kmp_s_1160r_1435, kms_s_1162_br_1435, [s_1160], [s_1162_b]

Mathematical Expression

$$\text{Vmax\_r\_1435} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1162\_br\_1435}}\right)^1 \cdot \left([\text{s\_1162\_b}]^1 - \frac{[\text{s\_1160}]^1}{\text{Keq\_r\_1435}}\right)}{1 + \frac{[\text{s\_1162\_b}]}{\text{kms\_s\_1162\_br\_1435}} + 1 + \frac{[\text{s\_1160}]}{\text{kmp\_s\_1160r\_1435}} - 1} \tag{272}$$

5.273 Function definition function_279

Name Function for phosphate transport

Arguments Keq_r_1461, Vmax_r_1461, kmp_s_0763_br_1461, kmp_s_1207r_1461, kms_s_0766_br_1461, kms_s_1209_br_1461, [s_0763_b], [s_0766_b], [s_1207], [s_1209_b]

Mathematical Expression

$$\text{Vmax\_r\_1461} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0766\_br\_1461}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1209\_br\_1461}}\right)^{1} \cdot \left([\text{s\_0766\_b}]^{1} \cdot [\text{s\_1209\_b}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_1461}}\right)}{\left(1 + \frac{[\text{s\_0766\_b}]}{\text{kms\_s\_0766\_br\_1461}}\right) \cdot \left(1 + \frac{[\text{s\_1209\_b}]}{\text{kms\_s\_1209\_br\_1461}}\right) + \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_1461}}\right) \cdot \left(1 + \frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1461}}\right) - 1} \quad (273)$$

5.274 Function definition function_280

Name Function for succinate transport

Arguments Keq_r_1503, Vmax_r_1503, kmp_s_0766_br_1503, kmp_s_1339_br_1503, kms_s_0763_br_1503, kms_s_1338r_1503, [s_0763_b], [s_0766_b], [s_1338], [s_1339_b]

Mathematical Expression

$$\text{Vmax\_r\_1503} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_1503}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1338r\_1503}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1338}]^{1} - \frac{[\text{s\_0766\_b}]^{1} \cdot [\text{s\_1339\_b}]^{1}}{\text{Keq\_r\_1503}}\right)}{\left(1 + \frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1503}}\right) \cdot \left(1 + \frac{[\text{s\_1338}]}{\text{kms\_s\_1338r\_1503}}\right) + \left(1 + \frac{[\text{s\_0766\_b}]}{\text{kmp\_s\_0766\_br\_1503}}\right) \cdot \left(1 + \frac{[\text{s\_1339\_b}]}{\text{kmp\_s\_1339\_br\_1503}}\right) - 1} \quad (274)$$

5.275 Function definition function_281

Name Function for sulfate uniport

Arguments Keq_r_1507, Vmax_r_1507, kmp_s_1347r_1507, kms_s_1348_br_1507, [s_1347], [s_1348_b]

Mathematical Expression

$$\text{Vmax\_r\_1507} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1348\_br\_1507}}\right)^{1} \cdot \left([\text{s\_1348\_b}]^{1} - \frac{[\text{s\_1347}]^{1}}{\text{Keq\_r\_1507}}\right)}{1 + \frac{[\text{s\_1348\_b}]}{\text{kms\_s\_1348\_br\_1507}} + 1 + \frac{[\text{s\_1347}]}{\text{kmp\_s\_1347r\_1507}} - 1} \quad (275)$$

5.276 Function definition function_282

Name Function for isa acyl-CoA

Arguments Keq_r_1672, Vmax_r_1672, vol (intracellular), kmp_s_0386r_1672, kms_s_1342r_1672, [s_0386], [s_1342]

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_1672} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1342r\_1672}}\right)^{1} \cdot \left([\mathrm{s\_1342}]^{1} - \frac{[\mathrm{s\_0386}]^{1}}{\mathrm{Keq\_r\_1672}}\right)}{1+\frac{[\mathrm{s\_1342}]}{\mathrm{kms\_s\_1342r\_1672}}+1+\frac{[\mathrm{s\_0386}]}{\mathrm{kmp\_s\_0386r\_1672}}-1}}{\mathrm{vol}\,(\mathrm{intracellular})} \tag{276}$$

5.277 Function definition function_283

Name Function for biomass production

Arguments V_o, a_s_0001r_1812, a_s_0416r_1812, a_s_0434r_1812, a_s_0446r_1812, a_s_0511r_1812, a_s_0564r_1812, a_s_0569r_1812, a_s_0593r_1812, a_s_0619r_1812, a_s_0740r_1812, a_s_0743r_1812, a_s_0752r_1812, a_s_0863r_1812, a_s_0873r_1812, a_s_0877r_1812, a_s_0881r_1812, a_s_0889r_1812, a_s_0899r_1812, a_s_0907r_1812, a_s_0911r_1812, a_s_0920r_1812, a_s_0925r_1812, a_s_0929r_1812, a_s_0933r_1812, a_s_0936r_1812, a_s_0939r_1812, a_s_0943r_1812, a_s_0949r_1812, a_s_0952r_1812, a_s_0955r_1812, a_s_0960r_1812, a_s_1000r_1812, a_s_1011r_1812, a_s_1283r_1812, a_s_1347r_1812, a_s_1417r_1812, vol (intracellular), [s_0001], s_0001_or_1812, [s_0416], s_0416_or_1812, [s_0434], s_0434_or_1812, [s_0446], s_0446_or_1812, [s_0511], s_0511_or_1812, [s_0564], s_0564_or_1812, [s_0569], s_0569_or_1812, [s_0593], s_0593_or_1812, [s_0619], s_0619_or_1812, [s_0740], s_0740_or_1812, [s_0743], s_0743_or_1812, [s_0752], s_0752_or_1812, [s_0863], s_0863_or_1812, [s_0873], s_0873_or_1812, [s_0877], s_0877_or_1812, [s_0881], s_0881_or_1812, [s_0889], s_0889_or_1812, [s_0899], s_0899_or_1812, [s_0907], s_0907_or_1812, [s_0911], s_0911_or_1812, [s_0920], s_0920_or_1812, [s_0925], s_0925_or_1812, [s_0929], s_0929_or_1812, [s_0933], s_0933_or_1812, [s_0936], s_0936_or_1812, [s_0939], s_0939_or_1812, [s_0943], s_0943_or_1812, [s_0949], s_0949_or_1812, [s_0952], s_0952_or_1812, [s_0955], s_0955_or_1812, [s_0960], s_0960_or_1812, [s_1000], s_1000_or_1812, [s_1011], s_1011_or_1812, [s_1283], s_1283_or_1812, [s_1347], s_1347_or_1812, [s_1417], s_1417_or_1812, zero_flux

Mathematical Expression

$$\mathrm{MAX}\left(\frac{}{+\mathrm{a\_s\_0416r\_1812} \cdot \left(\frac{[\mathrm{s\_0416}]}{\mathrm{s\_0416\_or\_1812}}\right) + \mathrm{a\_s\_0434r\_1812} \cdot \left(\frac{[\mathrm{s\_0434}]}{\mathrm{s\_0434\_or\_1812}}\right) + \mathrm{a\_s\_0446r\_1812} \cdot \left(\frac{[\mathrm{s\_0446}]}{\mathrm{s\_0446\_or\_1812}}\right) +\right. \tag{277}$$

zero_fluxvol (intracellular)

5.278 Function definition function_284

Name Function for growth_1

Arguments V_o, a_s_0463r_1814, [s_0463], s_0463_or_1814, zero_flux

Mathematical Expression

$$\mathrm{MAX}\left(\mathrm{V\_o} \cdot \left(1+\mathrm{a\_s\_0463r\_1814} \cdot \left(\frac{[\mathrm{s\_0463}]}{\mathrm{s\_0463\_or\_1814}}\right)\right), \mathrm{zero\_flux}\right) \tag{278}$$

5.279 Function definition function_285

Name Function for lipid production_1

Arguments V_o, a_s_0090r_1816, a_s_0124r_1816, a_s_0627r_1816, a_s_0632r_1816, a_s_0635r_1816, a_s_0641r_1816, a_s_0663r_1816, a_s_0669r_1816, a_s_0824r_1816, a_s_0963r_1816, a_s_1219r_1816, a_s_1228r_1816, a_s_1233r_1816, a_s_1399r_1816, a_s_1447r_1816, vol (intracellular), [s_0090], s_0090_or_1816, [s_0124], s_0124_or_1816, [s_0627], s_0627_or_1816, [s_0632], s_0632_or_1816, [s_0635], s_0635_or_1816, [s_0641], s_0641_or_1816, [s_0663], s_0663_or_1816, [s_0669], s_0669_or_1816, [s_0824], s_0824_or_1816, [s_0963], s_0963_or_1816, [s_1219], s_1219_or_1816, [s_1228], s_1228_or_1816, [s_1233], s_1233_or_1816, [s_1399], s_1399_or_1816, [s_1447], s_1447_or_1816, zero_flux

Mathematical Expression

$$\mathrm{MAX}\left(\frac{}{+\mathrm{a\_s\_0124r\_1816}\cdot\left(\frac{[\mathrm{s\_0124}]}{\mathrm{s\_0124\_or\_1816}}\right)+\mathrm{a\_s\_0627r\_1816}\cdot\left(\frac{[\mathrm{s\_0627}]}{\mathrm{s\_0627\_or\_1816}}\right)+\mathrm{a\_s\_0632r\_1816}\cdot\left(\frac{[\mathrm{s\_0632}]}{\mathrm{s\_0632\_or\_1816}}\right)+\right. \tag{279}$$

zero_fluxvol (intracellular)

5.280 Function definition function_211

Name function for phosphofructokinase regulation

Arguments Vmax_r_0859, kms_s_0446r_0859, kms_s_0539r_0859, [s_0446], [s_0539], [s_0400], [s_0537], [s_0763_b], Keq_r_0859, kmp_s_0400r_0859, kmp_s_0537r_0859, kmp_s_0763_br_0859, s_0446m, kmI_s_0446mr_0859, vol (intracellular)

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0859}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0859}}\right)^{1}\cdot\left(\frac{1}{\mathrm{kms\_s\_0539r\_0859}}\right)^{1}\cdot\left([\mathrm{s\_0446}]^{1}\cdot[\mathrm{s\_0539}]^{1}-\frac{[\mathrm{s\_0400}]^{1}\cdot[\mathrm{s\_0537}]^{1}\cdot[\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0859}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0859}}\right)\cdot\left(1+\frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_0859}}\right)+\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0859}}\right)\cdot\left(1+\frac{[\mathrm{s\_0537}]}{\mathrm{kmp\_s\_0537r\_0859}}\right)\cdot\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0859}}\right)+\left(1+\frac{\mathrm{s\_0446m}}{\mathrm{kmI\_s\_0446mr\_0859}}-1\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{280}$$

5.281 Function definition function_126

Name function for glucose6phosphateisomerase regulation

Arguments Vmax_r_0504, kms_s_0455r_0504, [s_0455], [s_0539], Keq_r_0504, kmp_s_0539r_0504, vol (intracellular), s_0455m, kmI_s_0455mr_0504, s_0glum, kmI_s_0glumr_0504

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0504}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0455r\_0504}}\right)^{1}\cdot\left([\mathrm{s\_0455}]^{1}-\frac{[\mathrm{s\_0539}]^{1}}{\mathrm{Keq\_r\_0504}}\right)}{1+\frac{[\mathrm{s\_0455}]}{\mathrm{kms\_s\_0455r\_0504}}+1+\frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0504}}+\left(1+\frac{\mathrm{s\_0455m}}{\mathrm{kmI\_s\_0455mr\_0504}}\right)\cdot\left(1+\frac{\mathrm{s\_0glum}}{\mathrm{kmI\_s\_0glumr\_0504}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{281}$$

5.282 Function definition function_213

Name function for phosphoglycerate kinase regulation

Arguments Vmax_r_0865, kms_s_0265r_0865, kms_s_0400r_0865, [s_0265], [s_0400], [s_0264], [s_0446], Keq_r_0865, kmp_s_0264r_0865, kmp_s_0446r_0865, s_0446m, kmI_s_0446mr_0865, vol (intracellular)

Mathematical Expression

$$\frac{\text{Vmax\_r\_0865}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0265r\_0865}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0400r\_0865}}\right)^{1}\cdot\left([\text{s\_0265}]^{1}\cdot[\text{s\_0400}]^{1}-\frac{[\text{s\_0264}]^{1}\cdot[\text{s\_0446}]^{1}}{\text{Keq\_r\_0865}}\right)}{\left(1+\frac{[\text{s\_0265}]}{\text{kms\_s\_0265r\_0865}}\right)\cdot\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0865}}\right)+\left(1+\frac{[\text{s\_0264}]}{\text{kmp\_s\_0264r\_0865}}\right)\cdot\left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0865}}\right)+1+\frac{\text{s\_0446m}}{\text{kmI\_s\_0446mr\_0865}}-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (282)$$

5.283 Function definition function_235

Name function for pyruvate decarboxylase regulation

Arguments Vmax_r_0938, kms_s_0763_br_0938, kms_s_1277r_0938, [s_0763_b], [s_1277], [s_0366], [s_0470], Keq_r_0938, kmp_s_0366r_0938, kmp_s_0470r_0938, s_1277m, kmI_s_1277mr_0938, vol (intracellular)

Mathematical Expression

$$\frac{\text{Vmax\_r\_0938}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0938}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1277r\_0938}}\right)^{1}\cdot\left([\text{s\_0763\_b}]^{1}\cdot[\text{s\_1277}]^{1}-\frac{[\text{s\_0366}]^{1}\cdot[\text{s\_0470}]^{1}}{\text{Keq\_r\_0938}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0938}}\right)\cdot\left(1+\frac{[\text{s\_1277}]}{\text{kms\_s\_1277r\_0938}}\right)+\left(1+\frac{[\text{s\_0366}]}{\text{kmp\_s\_0366r\_0938}}\right)\cdot\left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0938}}\right)+1+\frac{\text{s\_1277m}}{\text{kmI\_s\_1277mr\_0938}}-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (283)$$

5.284 Function definition function_214

Name function for phosphoglycerate mutase regulation

Arguments Vmax_r_0866, kms_s_0264r_0866, [s_0264], [s_0193], Keq_r_0866, kmp_s_0193r_0866, s_0193m, kmI_s_0193mr_0866, vol (intracellular)

Mathematical Expression

$$\frac{\text{Vmax\_r\_0866}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0264r\_0866}}\right)^{1}\cdot\left([\text{s\_0264}]^{1}-\frac{[\text{s\_0193}]^{1}}{\text{Keq\_r\_0866}}\right)}{1+\frac{[\text{s\_0264}]}{\text{kms\_s\_0264r\_0866}}+1+\frac{[\text{s\_0193}]}{\text{kmp\_s\_0193r\_0866}}+1+\frac{\text{s\_0193m}}{\text{kmI\_s\_0193mr\_0866}}-1}}{\text{vol}\left(\text{intracellular}\right)} \quad (284)$$

5.285 Function definition `function_134`

Name function for glyceraldehyde 3 phosphate dehydrogenase regulation

Arguments Vmax_r_0525, kms_s_0731r_0525, kms_s_1082r_0525, kms_s_1207r_0525, [s_0731], [s_1082], [s_1207], [s_0265], [s_0763_b], [s_1087], Keq_r_0525, kmp_s_0265r_0525, kmp_s_0763_br_0525, kmp_s_1087r_0525, s_0731m, kmI_s_0731mr_0525, vol (intracellular)

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0525} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0731r\_0525}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0525}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1207r\_0525}}\right)^1 \cdot \left([\mathrm{s\_0731}]^1 \cdot [\mathrm{s\_1082}]^1 \cdot [\mathrm{s\_1207}]^1 - \frac{[\mathrm{s\_0265}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1}{\mathrm{Keq\_r\_0525}}\right)}{\left(1+\frac{[\mathrm{s\_0731}]}{\mathrm{kms\_s\_0731r\_0525}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0525}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kms\_s\_1207r\_0525}}\right) + \left(1+\frac{[\mathrm{s\_0265}]}{\mathrm{kmp\_s\_0265r\_0525}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0525}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0525}}\right) + 1 + \cdots}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (285)$$

5.286 Function definition `function_46`

Name function for alpha alpha trehalose phosphate synthase regulation

Arguments Vmax_r_0213, kms_s_0410r_0213, kms_s_1415r_0213, [s_0410], [s_1415], [s_0419], [s_0763_b], [s_1411], Keq_r_0213, kmp_s_0419r_0213, kmp_s_0763_br_0213, kmp_s_1411r_0213, s_1415m, kmI_s_1415rm_0213, vol (intracellular)

Mathematical Expression

$$\frac{\mathrm{Vmax\_r\_0213} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0213}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1415r\_0213}}\right)^1 \cdot \left([\mathrm{s\_0410}]^1 \cdot [\mathrm{s\_1415}]^1 - \frac{[\mathrm{s\_0419}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1411}]^1}{\mathrm{Keq\_r\_0213}}\right)}{\left(1+\frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0213}}\right) + \left(1+\frac{[\mathrm{s\_0419}]}{\mathrm{kmp\_s\_0419r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0213}}\right) + 1 + \frac{\mathrm{s\_1415m}}{\mathrm{kmI\_s\_1415rm\_0213}} - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (286)$$

6 Event

This is an overview of one event. Each event is initiated whenever its trigger condition switches from `false` to `true`. A delay function postpones the effects of an event to a later time point. At the time of execution, an event can assign values to species, parameters or compartments if these are not set to constant.

6.1 Event `event_1`

Name event_1

Trigger condition

$$\mathrm{time} > 1000 \quad (287)$$

Assignment

$$\mathrm{s\_0547\_b} = 7.77 \quad (288)$$

7 Reactions

This model contains 285 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 4: Overview of all reactions

№	Id	Name	Reaction Equation	SBO
1	r_0005	1,3-beta-glucan synthase	s_1415 $\xrightleftharpoons{\text{s\_0001, s\_0763\_b, s\_1411, s\_1415}}$ s_0001 + s_0763_b + s_1411	
2	r_0006	1,4-alpha-glucan branching enzyme	s_0438 $\xrightleftharpoons{\text{s\_0438, s\_0743, s\_1434\_b}}$ s_0743 + s_1434_b	
3	r_0008	1-(5-phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino)imidazole-4-carboxamide isomerase	s_0079 $\xrightleftharpoons{\text{s\_0079, s\_0315}}$ s_0315	
4	r_0009	1-acyl-sn-gylcerol-3-phosphate acyltransferase	s_0083 + s_0386 $\xrightleftharpoons{\text{s\_0083, s\_0386, s\_0514, s\_0763\_b, s\_1215}}$ s_0514 + 4 s_0763_b + s_1215	
5	r_0014	2,5-diamino-6-ribitylamino-4(3H)-pyrimidinone 5'-phosphate deaminase	s_0146 + s_0763_b + s_1434_b $\xrightleftharpoons{\text{s\_0146, s\_0319, s\_0430, s\_0763\_b, s\_1434\_b}}$ s_0319 + s_0430	
6	r_0015	2,5-diamino-6-ribosylamino-4(3H)-pyrimidinone 5'-phosphate reductase (NADPH)	s_0145 + s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0145, s\_0146, s\_0763\_b, s\_1091, s\_1096}}$ s_0146 + s_1091	
7	r_0016	2-aceto-2-hydroxybutanoate synthase	s_0183 + s_0763_b + s_1277 $\xrightleftharpoons{\text{s\_0042, s\_0183, s\_0470, s\_0763\_b, s\_1277}}$ s_0042 + s_0470	

№	Id	Name	Reaction Equation	SBO
8	r_0018	2-aminoadipate transaminase	$\mathrm{s\_0181} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0181,\ s\_0185,\ s\_0861,\ s\_0899}} \mathrm{s\_0185} + \mathrm{s\_0861}$	
9	r_0021	2-deoxy-D-arabino-heptulosonate 7-phosphate synthetase	$\mathrm{s\_0533} + \mathrm{s\_1243} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0356,\ s\_0533,\ s\_1207,\ s\_1243,\ s\_1434\_b}} \mathrm{s\_0356} + \mathrm{s\_1207}$	
10	r_0025	2-isopropylmalate hydratase	$\mathrm{s\_0167} \xrightleftharpoons{\mathrm{s\_0167,\ s\_0170,\ s\_1434\_b}} \mathrm{s\_0170} + \mathrm{s\_1434\_b}$	
11	r_0026	2-isopropylmalate synthase	$\mathrm{s\_0238} + \mathrm{s\_0380} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0167,\ s\_0238,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0167} + \mathrm{s\_0514} + \mathrm{s\_0763\_b}$	
12	r_0029	2-methylcitrate dehydratase	$\mathrm{s\_0798} \xrightleftharpoons{\mathrm{s\_0468,\ s\_0798,\ s\_1434\_b}} \mathrm{s\_0468} + \mathrm{s\_1434\_b}$	
13	r_0031	2-oxo-4-methyl-3-carboxypentanoate decarboxylation	$\mathrm{s\_0010} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0010,\ s\_0297,\ s\_0470,\ s\_0763\_b}} \mathrm{s\_0297} + \mathrm{s\_0470}$	
14	r_0034	3',5'-bisphosphate nucleotidase	$\mathrm{s\_0397} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0397,\ s\_0434,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0434} + \mathrm{s\_1207}$	
15	r_0040	3,4-dihydroxy-2-butanone-4-phosphate synthase	$\mathrm{s\_0557} \xrightleftharpoons{\mathrm{s\_0163,\ s\_0557,\ s\_0689,\ s\_0763\_b}} \mathrm{s\_0163} + \mathrm{s\_0689} + \mathrm{s\_0763\_b}$	
16	r_0042	3-dehydroquinate dehydratase	$\mathrm{s\_0216} \xrightleftharpoons{\mathrm{s\_0216,\ s\_0217,\ s\_1434\_b}} \mathrm{s\_0217} + \mathrm{s\_1434\_b}$	
17	r_0043	3-dehydroquinate synthase	$\mathrm{s\_0356} \xrightleftharpoons{\mathrm{s\_0216,\ s\_0356,\ s\_1207}} \mathrm{s\_0216} + \mathrm{s\_1207}$	
18	r_0044	3-dehydrosphinganine reductase	$\mathrm{s\_0218} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0218,\ s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1325}} \mathrm{s\_1091} + \mathrm{s\_1325}$	

№	Id	Name	Reaction Equation	SBO
19	`r_0057`	3-hydroxyacyl-CoA dehydrogenase (3-oxohexacosyl-CoA)	s_0247 + s_0763_b + s_1087 $\xrightleftharpoons{\text{s\_0046, s\_0247, s\_0763\_b, s\_1082, s\_1087}}$ s_0046 + s_1082	
20	`r_0058`	3-hydroxyacyl-CoA dehydrogenase (3-oxohexadecanoyl-CoA)	s_0257 + s_0763_b + s_1087 $\xrightleftharpoons{\text{s\_0052, s\_0257, s\_0763\_b, s\_1082, s\_1087}}$ s_0052 + s_1082	
21	`r_0059`	3-hydroxyacyl-CoA dehydrogenase (3-oxooctadecanoyl-CoA)	s_0254 + s_0763_b + s_1087 $\xrightleftharpoons{\text{s\_0234, s\_0254, s\_0763\_b, s\_1082, s\_1087}}$ s_0234 + s_1082	
22	`r_0060`	3-hydroxyacyl-CoA dehydrogenase (3-oxotetradecanoyl-CoA)	s_0261 + s_0763_b + s_1087 $\xrightleftharpoons{\text{s\_0055, s\_0261, s\_0763\_b, s\_1082, s\_1087}}$ s_0055 + s_1082	
23	`r_0063`	3-isopropylmalate dehydratase	s_0170 + s_1434_b $\xrightleftharpoons{\text{s\_0008, s\_0170, s\_1434\_b}}$ s_0008	
24	`r_0064`	3-isopropylmalate dehydrogenase	s_0008 + s_1082 $\xrightleftharpoons{\text{s\_0008, s\_0010, s\_0763\_b, s\_1082, s\_1087}}$ s_0010 + s_0763_b + s_1087	
25	`r_0068`	3-phosphoshikimate 1-carboxyvinyltransferase	s_0267 + s_1243 $\xrightleftharpoons{\text{s\_0267, s\_0330, s\_1207, s\_1243}}$ s_0330 + s_1207	
26	`r_0093`	5,10-methylenetetrahydrofolatereductase (NADPH)	s_0307 + 2 s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0307, s\_0328, s\_0763\_b, s\_1091, s\_1096}}$ s_0328 + s_1091	
27	`r_0111`	acetohydroxy acid isomeroreductase	s_0150 + s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0018, s\_0150, s\_0763\_b, s\_1091, s\_1096}}$ s_0018 + s_1091	
28	`r_0112`	acetolactate synthase	s_0763_b + 2 s_1277 $\xrightleftharpoons{\text{s\_0150, s\_0470, s\_0763\_b, s\_1277}}$ s_0150 + s_0470	

№	Id	Name	Reaction Equation	SBO
29	`r_0118`	acetyl-CoA C-acetyltransferase	$2\,\mathrm{s\_0380} \xrightleftharpoons{\mathrm{s\_0374,\ s\_0380,\ s\_0514}} \mathrm{s\_0374} + \mathrm{s\_0514}$	
30	`r_0123`	acetyl-Coa carboxylase	$\mathrm{s\_0380} + \mathrm{s\_0446} + \mathrm{s\_0458} \xrightleftharpoons{\mathrm{s\_0380,\ s\_0400,\ s\_0446,\ s\_0458,\ s\_0763\_b,\ s\_1005,\ s\_1207}} \mathrm{s\_0400} + \mathrm{s\_0763\_b} + \mathrm{s\_1005} + \mathrm{s\_1207}$	
31	`r_0125`	acetyl-CoA hydrolase	$\mathrm{s\_0369} + \mathrm{s\_0514} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0369,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0380} + \mathrm{s\_1434\_b}$	
32	`r_0127`	acetyl-CoA synthetase	$\mathrm{s\_0380} + \mathrm{s\_0434} + \mathrm{s\_0605} \xrightleftharpoons{\mathrm{s\_0369,\ s\_0380,\ s\_0434,\ s\_0446,\ s\_0514,\ s\_0605}} \mathrm{s\_0369} + \mathrm{s\_0446} + \mathrm{s\_0514}$	
33	`r_0130`	acetylglutamate kinase	$\mathrm{s\_0446} + \mathrm{s\_1071} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_1070,\ s\_1071}} \mathrm{s\_0400} + \mathrm{s\_1070}$	
34	`r_0133`	acteylornithine transaminase	$\mathrm{s\_0149} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0149,\ s\_0185,\ s\_0899,\ s\_1051}} \mathrm{s\_0185} + \mathrm{s\_1051}$	
35	`r_0157`	adenosine kinase	$\mathrm{s\_0393} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0393,\ s\_0400,\ s\_0434,\ s\_0446,\ s\_0763\_b}} \mathrm{s\_0400} + \mathrm{s\_0434} + \mathrm{s\_0763\_b}$	
36	`r_0159`	adenosylhomocysteinase	$\mathrm{s\_1290} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0393,\ s\_0917,\ s\_1290,\ s\_1434\_b}} \mathrm{s\_0393} + \mathrm{s\_0917}$	
37	`r_0163`	adenylate kinase	$2\,\mathrm{s\_0400} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0434,\ s\_0446}} \mathrm{s\_0434} + \mathrm{s\_0446}$	
38	`r_0165`	adenylate kinase (GTP)	$\mathrm{s\_0400} + \mathrm{s\_0706} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0434,\ s\_0706,\ s\_0755}} \mathrm{s\_0434} + \mathrm{s\_0755}$	
39	`r_0169`	adenylosuccinate lyase	$\mathrm{s\_0009} \xrightleftharpoons{\mathrm{s\_0009,\ s\_0317,\ s\_0692}} \mathrm{s\_0317} + \mathrm{s\_0692}$	

№	Id	Name	Reaction Equation	SBO
40	`r_0170`	adenylosuccinate synthase	$\text{s\_0755} + \text{s\_0816} + \text{s\_0881} \xrightleftharpoons{\text{s\_0706, s\_0755, s\_0763\_b, s\_0816, s\_0881, s\_1053, s\_1207}} \text{s\_0706} + 2\,\text{s\_0763\_b} + \text{s\_1053} + \text{s\_1207}$	
41	`r_0171`	adenylsuccinate lyase	$\text{s\_1053} \xrightleftharpoons{\text{s\_0434, s\_0692, s\_1053}} \text{s\_0434} + \text{s\_0692}$	
42	`r_0172`	adenylyl-sulfate kinase	$\text{s\_0304} + \text{s\_0446} \xrightleftharpoons{\text{s\_0206, s\_0304, s\_0400, s\_0446, s\_0763\_b}} \text{s\_0206} + \text{s\_0400} + \text{s\_0763\_b}$	
43	`r_0174`	alanine glyoxylate aminotransferase	$\text{s\_0749} + \text{s\_0863} \xrightleftharpoons{\text{s\_0740, s\_0749, s\_0863, s\_1277}} \text{s\_0740} + \text{s\_1277}$	
44	`r_0183`	alcohol dehydrogenase, reverse rxn (acetaldehyde -> ethanol)	$\text{s\_0366} + \text{s\_0763\_b} + \text{s\_1087} \xrightleftharpoons{\text{s\_0366, s\_0650, s\_0763\_b, s\_1082, s\_1087}} \text{s\_0650} + \text{s\_1082}$	
45	`r_0191`	aldehyde dehydrogenase (acetaldehyde, NADP)	$\text{s\_0366} + \text{s\_1091} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0366, s\_0369, s\_0763\_b, s\_1091, s\_1096, s\_1434\_b}} \text{s\_0369} + 2\,\text{s\_0763\_b} + \text{s\_1096}$	
46	`r_0213`	alpha,alpha-trehalose-phosphate synthase (UDP-forming)	$\text{s\_0410} + \text{s\_1415} \xrightleftharpoons{\text{s\_1415, s\_0410, s\_1415, s\_0419, s\_0763\_b, s\_1411}} \text{s\_0419} + \text{s\_0763\_b} + \text{s\_1411}$	
47	`r_0220`	anthranilate phosphoribosyltransferase	$\text{s\_0331} + \text{s\_0439} \xrightleftharpoons{\text{s\_0331, s\_0439, s\_0605, s\_1066}} \text{s\_0605} + \text{s\_1066}$	
48	`r_0221`	anthranilate synthase	$\text{s\_0500} + \text{s\_0907} \xrightleftharpoons{\text{s\_0439, s\_0500, s\_0763\_b, s\_0899, s\_0907, s\_1277}} \text{s\_0439} + \text{s\_0763\_b} + \text{s\_0899} + \text{s\_1277}$	
49	`r_0225`	argininosuccinate lyase	$\text{s\_0017} \xrightleftharpoons{\text{s\_0017, s\_0692, s\_0873}} \text{s\_0692} + \text{s\_0873}$	
50	`r_0226`	argininosuccinate synthase	$\text{s\_0446} + \text{s\_0881} + \text{s\_0887} \xrightleftharpoons{\text{s\_0017, s\_0434, s\_0446, s\_0605, s\_0763\_b, s\_0881, s\_0887}} \text{s\_0017} + \text{s\_0434} + \text{s\_0605} + \text{s\_0763\_b}$	

№	Id	Name	Reaction Equation	SBO
51	`r_0229`	asparagine synthase (glutamine-hydrolysing)	$\mathrm{s\_0446} + \mathrm{s\_0881} + \mathrm{s\_0907} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0434,\ s\_0446,\ s\_0605,\ s\_0763\_b,\ s\_0877,\ s\_0881,\ s\_0899,\ s\_0907,\ s\_1434\_b}} \mathrm{s\_0605} + \mathrm{s\_0763\_b} + \mathrm{s\_0877} + \mathrm{s\_0899}$	
52	`r_0232`	aspartate carbamoyltransferase	$\mathrm{s\_0469} + \mathrm{s\_0881} \xrightleftharpoons{\mathrm{s\_0469,\ s\_0763\_b,\ s\_0881,\ s\_1073,\ s\_1207}} \mathrm{s\_0763\_b} + \mathrm{s\_1073} + \mathrm{s\_1207}$	
53	`r_0233`	aspartate kinase	$\mathrm{s\_0446} + \mathrm{s\_0881} \xrightleftharpoons{\mathrm{s\_0301,\ s\_0400,\ s\_0446,\ s\_0881}} \mathrm{s\_0301} + \mathrm{s\_0400}$	
54	`r_0235`	aspartate transaminase	$\mathrm{s\_0899} + \mathrm{s\_1156} \xrightleftharpoons{\mathrm{s\_0185,\ s\_0881,\ s\_0899,\ s\_1156}} \mathrm{s\_0185} + \mathrm{s\_0881}$	
55	`r_0238`	aspartate-semialdehyde dehydrogenase	$\mathrm{s\_0301} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0301,\ s\_0763\_b,\ s\_0886,\ s\_1091,\ s\_1096,\ s\_1207}} \mathrm{s\_0886} + \mathrm{s\_1091} + \mathrm{s\_1207}$	
56	`r_0245`	ATP phosphoribosyltransferase	$\mathrm{s\_0331} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0331,\ s\_0334,\ s\_0446,\ s\_0605}} \mathrm{s\_0334} + \mathrm{s\_0605}$	
57	`r_0246`	ATP synthase	$\mathrm{s\_0400} + 3\,\mathrm{s\_0763\_b} + \mathrm{s\_1207} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0446} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1434\_b}$	
58	`r_0249`	ATPase, cytosolic	$\mathrm{s\_0446} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0766\_b,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0400} + \mathrm{s\_0766\_b} + \mathrm{s\_1207}$	
59	`r_0251`	bicarbonate formation	$\mathrm{s\_0470} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0458,\ s\_0470,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0458} + \mathrm{s\_0763\_b}$	
60	`r_0258`	C-14 sterol reductase	$\mathrm{s\_0268} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0124,\ s\_0268,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0124} + \mathrm{s\_1091}$	

№	Id	Name	Reaction Equation	SBO
61	`r_0261`	C-3 sterol dehydrogenase	s_1091 + s_1457 $\xrightleftharpoons{\text{s\_0470, s\_0763\_b, s\_1091, s\_1096, s\_1457, s\_1458}}$ s_0470 + s_0763_b + s_1096 + s_1458	
62	`r_0262`	C-3 sterol dehydrogenase (4-methylzymosterol)	s_0303 + s_1082 $\xrightleftharpoons{\text{s\_0215, s\_0303, s\_0470, s\_0763\_b, s\_1082, s\_1087}}$ s_0215 + s_0470 + s_0763_b + s_1087	
63	`r_0263`	C-3 sterol keto reductase (4-methylzymosterol)	s_0215 + s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0215, s\_0302, s\_0763\_b, s\_1091, s\_1096}}$ s_0302 + s_1091	
64	`r_0264`	C-3 sterol keto reductase (zymosterol)	s_0763_b + s_1096 + s_1458 $\xrightleftharpoons{\text{s\_0763\_b, s\_1091, s\_1096, s\_1447, s\_1458}}$ s_1091 + s_1447	
65	`r_0265`	C-4 methyl sterol oxidase	s_0302 + s_0763_b + s_1096 + s_1160 $\xrightleftharpoons{\text{s\_0302, s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b, s\_1455}}$ s_1091 + s_1434_b + s_1455	
66	`r_0266`	C-4 methyl sterol oxidase_2	s_0763_b + s_1096 + s_1160 + s_1455 $\xrightleftharpoons{\text{s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b, s\_1455, s\_1456}}$ s_1091 + 2 s_1434_b + s_1456	
67	`r_0267`	C-4 methyl sterol oxidase_3	s_0763_b + s_1096 + s_1160 + s_1456 $\xrightleftharpoons{\text{s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b, s\_1456, s\_1457}}$ s_1091 + s_1434_b + s_1457	
68	`r_0268`	C-4 sterol methyl oxidase (4,4-dimethylzymosterol)	s_0124 + 3 s_0763_b + 3 s_1096 + 3 s_1160 $\xrightleftharpoons{\text{s\_0124, s\_0303, s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b}}$ s_0303 + 3 s_1091 + 4 s_1434_b	
69	`r_0270`	C-8 sterol isomerase	s_0669 $\xrightleftharpoons{\text{s\_0627, s\_0669}}$ s_0627	

№	Id	Name	Reaction Equation	SBO
70	`r_0271`	C-s24 sterol reductase	$s\_0632 + s\_0763\_b + s\_1096 \xrightleftharpoons{s\_0632,\ s\_0635,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0635 + s\_1091$	
71	`r_0277`	carbamoyl-phosphate synthase (glutamine-hydrolysing)	$2\,s\_0446 + s\_0458 + s\_0907 + s\_1434\_b \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0458,\ s\_0469,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1207,\ s\_1434\_b}$ $s\_0469 + 2\,s\_0763\_b + s\_0899 + s\_1207$	
72	`r_0282`	catalase	$2\,s\_0801 \xrightleftharpoons{s\_0801,\ s\_1160,\ s\_1434\_b} s\_1160 + 2\,s\_1434\_b$	
73	`r_0284`	CDP-diacylglycerol synthase	$s\_0521 + s\_0763\_b + s\_1215 \xrightleftharpoons{s\_0485,\ s\_0521,\ s\_0605,\ s\_0763\_b,\ s\_1215} s\_0485 + s\_0605$	
74	`r_0287`	ceramide-1 hydroxylase (24C)	$s\_0763\_b + s\_1080 + s\_1096 + s\_1160 \xrightleftharpoons{s\_0763\_b,\ s\_1060,\ s\_1080,\ s\_1091,\ s\_1096,\ s\_1160,\ s\_1434\_b} s\_1060 + s\_1091 + s\_1434\_b$	
75	`r_0290`	ceramide-1 synthase (24C)	$s\_1325 + s\_1355 \xrightleftharpoons{s\_0514,\ s\_0763\_b,\ s\_1080,\ s\_1325,\ s\_1355} s\_0514 + s\_0763\_b + s\_1080$	
76	`r_0298`	cholestenol delta-isomerase, lumped reaction	$s\_1160 + s\_1293 + s\_1447 \xrightleftharpoons{s\_0632,\ s\_0763\_b,\ s\_1160,\ s\_1290,\ s\_1293,\ s\_1434\_b,\ s\_1447} s\_0632 + s\_0763\_b + s\_1290 + 2\,s\_1434\_b$	
77	`r_0304`	chorismate mutase	$s\_0500 \xrightleftharpoons{s\_0500,\ s\_1258} s\_1258$	
78	`r_0306`	chorismate synthase	$s\_0330 \xrightleftharpoons{s\_0330,\ s\_0500,\ s\_1207} s\_0500 + s\_1207$	
79	`r_0307`	cis-aconitate(3-) to isocitrate	$s\_0501 + s\_1434\_b \xrightleftharpoons{s\_0501,\ s\_0847,\ s\_1434\_b} s\_0847$	

№	Id	Name	Reaction Equation	SBO
80	r_0328	citrate synthase	s_0380 + s_1156 + s_1434_b $\xrightleftharpoons{\text{s\_0380, s\_0507, s\_0514, s\_0763\_b, s\_1156, s\_1434\_b}}$ s_0507 + s_0514 + s_0763_b	
81	r_0330	citrate to cis-aconitate(3-)	s_0507 $\xrightleftharpoons{\text{s\_0501, s\_0507, s\_1434\_b}}$ s_0501 + s_1434_b	
82	r_0336	CTP synthase (NH3)	s_0430 + s_0446 + s_1430 $\xrightleftharpoons{\text{s\_0400, s\_0430, s\_0446, s\_0521, s\_0763\_b, s\_1207, s\_1430}}$ s_0400 + s_0521 + 2 s_0763_b + s_1207	
83	r_0338	cystathionine beta-synthase	s_0917 + s_0943 $\xrightleftharpoons{\text{s\_0888, s\_0917, s\_0943, s\_1434\_b}}$ s_0888 + s_1434_b	
84	r_0339	cystathionine g-lyase	s_0888 + s_1434_b $\xrightleftharpoons{\text{s\_0183, s\_0430, s\_0888, s\_0889, s\_1434\_b}}$ s_0183 + s_0430 + s_0889	
85	r_0340	cystathionine gamma-synthase	s_0889 + s_1117 $\xrightleftharpoons{\text{s\_0369, s\_0763\_b, s\_0888, s\_0889, s\_1117}}$ s_0369 + s_0763_b + s_0888	
86	r_0345	cytidylate kinase (CMP)	s_0400 + s_0481 $\xrightleftharpoons{\text{s\_0400, s\_0446, s\_0481, s\_0511}}$ s_0446 + s_0511	
87	r_0347	cytochrome P450 lanosterol 14-alpha-demethylase (NAD)	2 s_0763_b + s_0963 + 3 s_1087 + 3 s_1160 $\xrightleftharpoons{\text{s\_0268, s\_0689, s\_0763\_b, s\_0963, s\_1082, s\_1087, s\_1160, s\_1434\_b}}$ s_0268 s_0689 + 3 s_1082 + 4 s_1434_b	
88	r_0351	D-arabinose 1-dehydrogenase (NAD)	s_0529 + s_0763_b + s_1087 $\xrightleftharpoons{\text{s\_0529, s\_0530, s\_0763\_b, s\_1082, s\_1087}}$ s_0530 + s_1082	
89	r_0352	D-arabinose 1-dehydrogenase (NADP)	s_0530 + s_1091 $\xrightleftharpoons{\text{s\_0529, s\_0530, s\_0763\_b, s\_1091, s\_1096}}$ s_0529 + s_0763_b + s_1096	

№	Id	Name	Reaction Equation	SBO
90	`r_0357`	dCMP deaminase	$\text{s\_0430} + \text{s\_0624} \xrightleftharpoons{\text{s\_0430, s\_0569, s\_0624, s\_0763\_b, s\_1434\_b}} \text{s\_0569} + \text{s\_0763\_b} + \text{s\_1434\_b}$	
91	`r_0360`	deoxyadenylate kinase	$\text{s\_0400} + \text{s\_0562} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0562, s\_0564}} \text{s\_0446} + \text{s\_0564}$	
92	`r_0362`	deoxyguanylate kinase (dGMP:ATP)	$\text{s\_0400} + \text{s\_0591} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0591, s\_0593}} \text{s\_0446} + \text{s\_0593}$	
93	`r_0370`	diacylglycerol acyltransferase	$\text{s\_0386} + \text{s\_0596} \xrightleftharpoons{\text{s\_0386, s\_0514, s\_0596, s\_0763\_b, s\_1399}} \text{s\_0514} + 4\,\text{s\_0763\_b} + \text{s\_1399}$	
94	`r_0371`	diacylglycerol pyrophosphate phosphatase	$\text{s\_1215} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0596, s\_0763\_b, s\_1207, s\_1215, s\_1434\_b}} \text{s\_0596} + 2\,\text{s\_0763\_b} + \text{s\_1207}$	
95	`r_0374`	dihydoorotic acid dehydrogenase	$\text{s\_0064} + \text{s\_1160} \xrightleftharpoons{\text{s\_0064, s\_0801, s\_1154, s\_1160}} \text{s\_0801} + \text{s\_1154}$	
96	`r_0375`	dihydrofolate reductase	$\text{s\_0601} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0309, s\_0601, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0309} + \text{s\_1091}$	
97	`r_0381`	dihydroorotase	$\text{s\_0763\_b} + \text{s\_1073} \xrightleftharpoons{\text{s\_0064, s\_0763\_b, s\_1073, s\_1434\_b}} \text{s\_0064} + \text{s\_1434\_b}$	
98	`r_0384`	dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylbutanoate)	$\text{s\_0018} \xrightleftharpoons{\text{s\_0018, s\_0238, s\_1434\_b}} \text{s\_0238} + \text{s\_1434\_b}$	
99	`r_0385`	dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylpentanoate)	$\text{s\_0007} \xrightleftharpoons{\text{s\_0007, s\_0058, s\_1434\_b}} \text{s\_0058} + \text{s\_1434\_b}$	
100	`r_0386`	dihydroxyacetone kinase	$\text{s\_0446} + \text{s\_0734} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0734, s\_0735, s\_0763\_b}} \text{s\_0400} + \text{s\_0735} + \text{s\_0763\_b}$	

№	Id	Name	Reaction Equation	SBO
101	`r_0387`	dimethylallyltranstransferase	s_0850 + s_1257 $\xrightleftharpoons{\text{s\_0605, s\_0712, s\_0850, s\_1257}}$ s_0605 + s_0712	
102	`r_0393`	dolichyl-phosphate D-mannosyltransferase	s_0616 + s_0710 $\xrightleftharpoons{\text{s\_0615, s\_0616, s\_0706, s\_0710}}$ s_0615 + s_0706	
103	`r_0394`	dolichyl-phosphate-mannose–protein mannosyltransferase	s_0615 $\xrightleftharpoons{\text{s\_0615, s\_0616, s\_0763\_b, s\_1011}}$ s_0616 + s_0763_b + s_1011	
104	`r_0398`	enolase	s_0193 $\xrightleftharpoons{\text{s\_0193, s\_1243, s\_1434\_b}}$ s_1243 + s_1434_b	
105	`r_0417`	fatty acid synthase (n-C10:0)	3 s_0763_b + s_1005 + 2 s_1096 + s_1132 $\xrightleftharpoons{\text{s\_0470, s\_0514, s\_0574, s\_0763\_b, s\_1005, s\_1091, s\_1096, s\_1132, s\_1434\_b}}$ s s_0514 + s_0574 + 2 s_1091 + s_1434_b	
106	`r_0418`	fatty acid synthase (n-C12:0)	s_0574 + 3 s_0763_b + s_1005 + 2 s_1096 $\xrightleftharpoons{\text{s\_0470, s\_0514, s\_0574, s\_0763\_b, s\_0968, s\_1005, s\_1091, s\_1096, s\_1434\_b}}$ s_0514 + s_0968 + 2 s_1091 + s_1434_b	
107	`r_0419`	fatty acid synthase (n-C14:0)	3 s_0763_b + s_0968 + s_1005 + 2 s_1096 $\xrightleftharpoons{\text{s\_0470, s\_0514, s\_0763\_b, s\_0968, s\_1005, s\_1028, s\_1091, s\_1096, s\_1434\_b}}$ s_0514 + s_1028 + 2 s_1091 + s_1434_b	
108	`r_0421`	fatty acid synthase (n-C16:0)	3 s_0763_b + s_1005 + s_1028 + 2 s_1096 $\xrightleftharpoons{\text{s\_0470, s\_0514, s\_0763\_b, s\_1005, s\_1028, s\_1091, s\_1096, s\_1170, s\_1434\_b}}$ s_0514 + 2 s_1091 + s_1170 + s_1434_b	
109	`r_0423`	fatty acid synthase (n-C18:0)	3 s_0763_b + s_1005 + 2 s_1096 + s_1170 $\xrightleftharpoons{\text{s\_0470, s\_0514, s\_0763\_b, s\_1005, s\_1091, s\_1096, s\_1170, s\_1329, s\_1434\_b}}$ s s_0514 + 2 s_1091 + s_1329 + s_1434_b	

№	Id	Name	Reaction Equation	SBO
110	`r_0425`	fatty acid synthase (n-C24:0), lumped reaction	$9\,\mathrm{s\_0763\_b} + 3\,\mathrm{s\_1005} + 6\,\mathrm{s\_1096} + \mathrm{s\_1329} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_0987,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1329,\ s\_1434\_b}} 3\,\mathrm{s\_0514} + \mathrm{s\_0987} + 6\,\mathrm{s\_1091} + 3\,\mathrm{s\_1434\_b}$	
111	`r_0429`	fatty acyl-CoA synthase (n-C10:0CoA)	$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} + \mathrm{s\_1140} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0582,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1140,\ s\_1434\_b}} \mathrm{s\_0514} + \mathrm{s\_0582} + 2\,\mathrm{s\_1091} + \mathrm{s\_1434\_b}$	
112	`r_0430`	fatty acyl-CoA synthase (n-C8:0CoA), lumped reaction	$\mathrm{s\_0380} + 9\,\mathrm{s\_0763\_b} + 3\,\mathrm{s\_1005} + 6\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0380,\ s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1140,\ s\_1434\_b}} 3\,\mathrm{s\_0514} + 6\,\mathrm{s\_1091} + \mathrm{s\_1140} + 3\,\mathrm{s\_1434\_b}$	
113	`r_0437`	fatty-acid–CoA ligase (n-C24:0)	$\mathrm{s\_0446} + \mathrm{s\_0514} + \mathrm{s\_0987} \xrightleftharpoons{\mathrm{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_0987,\ s\_1355}} \mathrm{s\_0434} + \mathrm{s\_0605} + \mathrm{s\_1355}$	
114	`r_0439`	fatty-acid–CoA ligase (octadecanoate)	$\mathrm{s\_0434} + \mathrm{s\_0605} + \mathrm{s\_1334} \xrightleftharpoons{\mathrm{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_1329,\ s\_1334}} \mathrm{s\_0446} + \mathrm{s\_0514} + \mathrm{s\_1329}$	
115	`r_0442`	fatty-acid–CoA ligase (octanoate)	$\mathrm{s\_0434} + \mathrm{s\_0605} + \mathrm{s\_1140} \xrightleftharpoons{\mathrm{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_1132,\ s\_1140}} \mathrm{s\_0446} + \mathrm{s\_0514} + \mathrm{s\_1132}$	
116	`r_0464`	fatty-acyl-CoA synthase (n-C12:0CoA)	$\mathrm{s\_0582} + 3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0582,\ s\_0763\_b,\ s\_0977,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1434\_b}} \mathrm{s\_0514} + \mathrm{s\_0977} + 2\,\mathrm{s\_1091} + \mathrm{s\_1434\_b}$	
117	`r_0465`	fatty-acyl-CoA synthase (n-C14:0CoA)	$3\,\mathrm{s\_0763\_b} + \mathrm{s\_0977} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_0977,\ s\_1005,\ s\_1044,\ s\_1091,\ s\_1096,\ s\_1434\_b}} \mathrm{s\_0514} + \mathrm{s\_1044} + 2\,\mathrm{s\_1091} + \mathrm{s\_1434\_b}$	

№	Id	Name	Reaction Equation	SBO
118	`r_0466`	fatty-acyl-CoA synthase (n-C16:0CoA)	$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + \mathrm{s\_1044} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1044,\ s\_1091,\ s\_1096,\ s\_1187,\ s\_1434\_b}}$ $\mathrm{s\_0514} + 2\,\mathrm{s\_1091} + \mathrm{s\_1187} + \mathrm{s\_1434\_b}$	
119	`r_0467`	fatty-acyl-CoA synthase (n-C18:0CoA)	$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} + \mathrm{s\_1187} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1187,\ s\_1334,\ s\_1434\_b}}$ s $\mathrm{s\_0514} + 2\,\mathrm{s\_1091} + \mathrm{s\_1334} + \mathrm{s\_1434\_b}$	
120	`r_0479`	formate-tetrahydrofolate ligase	$\mathrm{s\_0309} + \mathrm{s\_0446} + \mathrm{s\_0689} \xrightleftharpoons{\mathrm{s\_0122,\ s\_0309,\ s\_0400,\ s\_0446,\ s\_0689,\ s\_1207}} \mathrm{s\_0122} + \mathrm{s\_0400} + \mathrm{s\_1207}$	
121	`r_0484`	fructose-bisphosphate aldolase	$\mathrm{s\_0537} \xrightleftharpoons{\mathrm{s\_0537,\ s\_0731,\ s\_0735}} \mathrm{s\_0731} + \mathrm{s\_0735}$	
122	`r_0485`	fumarase	$\mathrm{s\_0069} \xrightleftharpoons{\mathrm{s\_0069,\ s\_0692,\ s\_1434\_b}} \mathrm{s\_0692} + \mathrm{s\_1434\_b}$	
123	`r_0488`	fumarate reductase	$\mathrm{s\_0659} + \mathrm{s\_0692} \xrightleftharpoons{\mathrm{s\_0657,\ s\_0659,\ s\_0692,\ s\_1338}} \mathrm{s\_0657} + \mathrm{s\_1338}$	
124	`r_0496`	geranyltranstransferase	$\mathrm{s\_0712} + \mathrm{s\_0850} \xrightleftharpoons{\mathrm{s\_0195,\ s\_0605,\ s\_0712,\ s\_0850}} \mathrm{s\_0195} + \mathrm{s\_0605}$	
125	`r_0499`	glucokinase	$\mathrm{s\_0446} + \mathrm{s\_0545} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0455,\ s\_0545,\ s\_0763\_b}} \mathrm{s\_0400} + \mathrm{s\_0455} + \mathrm{s\_0763\_b}$	
126	`r_0504`	glucose-6-phosphate isomerase	$\mathrm{s\_0455} \xrightleftharpoons{\mathrm{s\_0455,\ s\_0545,\ s\_0455,\ s\_0539,\ s\_0545}} \mathrm{s\_0539}$	
127	`r_0505`	glucose-6-phosphate isomerase_2	$\mathrm{s\_0410} \xrightleftharpoons{\mathrm{s\_0410,\ s\_0539}} \mathrm{s\_0539}$	
128	`r_0506`	glutamate 5-kinase	$\mathrm{s\_0446} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0894,\ s\_0899}} \mathrm{s\_0400} + \mathrm{s\_0894}$	

№	Id	Name	Reaction Equation	SBO
129	r_0509	glutamate dehydrogenase (NADP)	s_0185 + s_0430 + s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0185, s\_0430, s\_0763\_b, s\_0899, s\_1091, s\_1096, s\_1434\_b}}$ s_0899 + s_1091 + s_1434_b	
130	r_0510	glutamate synthase (NADH2)	s_0185 + s_0763_b + s_0907 + s_1087 $\xrightleftharpoons{\text{s\_0185, s\_0763\_b, s\_0899, s\_0907, s\_1082, s\_1087}}$ 2 s_0899 + s_1082	
131	r_0512	glutamate-5-semialdehyde dehydrogenase	s_0763_b + s_0894 + s_1087 $\xrightleftharpoons{\text{s\_0763\_b, s\_0894, s\_0905, s\_1082, s\_1087, s\_1207}}$ s_0905 + s_1082 + s_1207	
132	r_0514	glutamine phosphoribosyldiphosphate amidotransferase	s_0331 + s_0907 + s_1434_b $\xrightleftharpoons{\text{s\_0331, s\_0333, s\_0605, s\_0899, s\_0907, s\_1434\_b}}$ s_0333 + s_0605 + s_0899	
133	r_0515	glutamine synthetase	s_0430 + s_0446 + s_0899 $\xrightleftharpoons{\text{s\_0400, s\_0430, s\_0446, s\_0763\_b, s\_0899, s\_0907, s\_1207}}$ s_0400 + s_0763_b + s_0907 + s_1207	
134	r_0525	glyceraldehyde-3-phosphate dehydrogenase	s_0731 + s_1082 + s_1207 $\xrightleftharpoons{\text{s\_0731, s\_0731, s\_1082, s\_1207, s\_0265, s\_0763\_b, s\_1087}}$ s_0265 + s_0763_b + s_1087	
135	r_0526	glycerol dehydrogenase (NADP-dependent)	s_0732 + s_1091 $\xrightleftharpoons{\text{s\_0732, s\_0734, s\_0763\_b, s\_1091, s\_1096}}$ s_0734 + s_0763_b + s_1096	
136	r_0528	glycerol-3-phosphatase	s_1315 + s_1434_b $\xrightleftharpoons{\text{s\_0732, s\_1207, s\_1315, s\_1434\_b}}$ s_0732 + s_1207	
137	r_0529	glycerol-3-phosphate dehydrogenase (fad)	s_0657 + s_1315 $\xrightleftharpoons{\text{s\_0657, s\_0659, s\_0735, s\_1315}}$ s_0659 + s_0735	

№	Id	Name	Reaction Equation	SBO
138	`r_0530`	glycerol-3-phosphate dehydrogenase (NAD)	$\text{s\_0735} + \text{s\_0763\_b} + \text{s\_1087} \xrightleftharpoons{\text{s\_0735, s\_0763\_b, s\_1082, s\_1087, s\_1315}} \text{s\_1082} + \text{s\_1315}$	
139	`r_0534`	glycerol-3-phosphate/dihydroxyacetone phosphate acyltransferase	$\text{s\_0386} + \text{s\_1315} \xrightleftharpoons{\text{s\_0083, s\_0386, s\_0514, s\_0763\_b, s\_1315}} \text{s\_0083} + \text{s\_0514} + 2\,\text{s\_0763\_b}$	
140	`r_0538`	glycine cleavage system	$\text{s\_0309} + \text{s\_0740} + \text{s\_1082} \xrightleftharpoons{\text{s\_0307, s\_0309, s\_0430, s\_0470, s\_0740, s\_1082, s\_1087}} \text{s\_0307} + \text{s\_0430} + \text{s\_0470} + \text{s\_1087}$	
141	`r_0539`	glycine hydroxymethyltransferase	$\text{s\_0307} + \text{s\_0740} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0307, s\_0309, s\_0740, s\_0943, s\_1434\_b}} \text{s\_0309} + \text{s\_0943}$	
142	`r_0547`	glycogen (starch) synthase	$\text{s\_1415} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0438, s\_0763\_b, s\_1411, s\_1415, s\_1434\_b}} \text{s\_0438} + \text{s\_0763\_b} + \text{s\_1411}$	
143	`r_0551`	GMP synthase	$\text{s\_0306} + \text{s\_0446} + \text{s\_0907} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0306, s\_0434, s\_0446, s\_0605, s\_0752, s\_0763\_b, s\_0899, s\_0907, s\_1434\_b}}$ $\text{s\_0605} + \text{s\_0752} + 2\,\text{s\_0763\_b} + \text{s\_0899}$	
144	`r_0562`	GTP cyclohydrolase II	$\text{s\_0755} + 3\,\text{s\_1434\_b} \xrightleftharpoons{\text{s\_0145, s\_0605, s\_0689, s\_0755, s\_0763\_b, s\_1434\_b}} \text{s\_0145} + \text{s\_0605} + \text{s\_0689} + 2\,\text{s\_0763\_b}$	
145	`r_0567`	guanylate kinase (GMP:ATP)	$\text{s\_0446} + \text{s\_0752} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0706, s\_0752}} \text{s\_0400} + \text{s\_0706}$	
146	`r_0568`	guanylate kinase (GMP:dATP)	$\text{s\_0566} + \text{s\_0752} \xrightleftharpoons{\text{s\_0562, s\_0566, s\_0706, s\_0752}} \text{s\_0562} + \text{s\_0706}$	
147	`r_0573`	hexokinase (D-glucose:ATP)	$\text{s\_0446} + \text{s\_0545} \xrightleftharpoons{\text{s\_0400, s\_0410, s\_0446, s\_0545, s\_0763\_b}} \text{s\_0400} + \text{s\_0410} + \text{s\_0763\_b}$	

№	Id	Name	Reaction Equation	SBO
148	r_0575	histidinol dehydrogenase	$\mathrm{s\_0915} + 2\,\mathrm{s\_1082} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0763\_b,\ s\_0911,\ s\_0915,\ s\_1082,\ s\_1087,\ s\_1434\_b}} 3\,\mathrm{s\_0763\_b} + \mathrm{s\_0911} + 2\,\mathrm{s\_1087}$	
149	r_0576	histidinol-phosphatase	$\mathrm{s\_0916} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0915,\ s\_0916,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0915} + \mathrm{s\_1207}$	
150	r_0577	histidinol-phosphate transaminase	$\mathrm{s\_0212} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0185,\ s\_0212,\ s\_0899,\ s\_0916}} \mathrm{s\_0185} + \mathrm{s\_0916}$	
151	r_0581	homoacontinate hydratase	$\mathrm{s\_0468} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0468,\ s\_0800,\ s\_1434\_b}} \mathrm{s\_0800}$	
152	r_0582	homocitrate synthase	$\mathrm{s\_0185} + \mathrm{s\_0380} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0185,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_0798,\ s\_1434\_b}} \mathrm{s\_0514} + \mathrm{s\_0763\_b} + \mathrm{s\_0798}$	
153	r_0585	homoisocitrate dehydrogenase	$\mathrm{s\_0800} + \mathrm{s\_1082} \xrightleftharpoons{\mathrm{s\_0180,\ s\_0763\_b,\ s\_0800,\ s\_1082,\ s\_1087}} \mathrm{s\_0180} + \mathrm{s\_0763\_b} + \mathrm{s\_1087}$	
154	r_0586	homoserine dehydrogenase (NADH)	$\mathrm{s\_0763\_b} + \mathrm{s\_0886} + \mathrm{s\_1087} \xrightleftharpoons{\mathrm{s\_0763\_b,\ s\_0886,\ s\_0919,\ s\_1082,\ s\_1087}} \mathrm{s\_0919} + \mathrm{s\_1082}$	
155	r_0588	homoserine kinase	$\mathrm{s\_0446} + \mathrm{s\_0919} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_0919,\ s\_1122}} \mathrm{s\_0400} + \mathrm{s\_0763\_b} + \mathrm{s\_1122}$	
156	r_0589	homoserine O-trans-acetylase	$\mathrm{s\_0380} + \mathrm{s\_0919} \xrightleftharpoons{\mathrm{s\_0380,\ s\_0514,\ s\_0919,\ s\_1117}} \mathrm{s\_0514} + \mathrm{s\_1117}$	
157	r_0598	hydroxymethylglutaryl CoA reductase	$\mathrm{s\_0225} + 2\,\mathrm{s\_0763\_b} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0031,\ s\_0225,\ s\_0514,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0031} + \mathrm{s\_0514} + 2\,\mathrm{s\_1091}$	

№	Id	Name	Reaction Equation	SBO
158	`r_0599`	hydroxymethylglutaryl CoA synthase	$\mathrm{s\_0374} + \mathrm{s\_0380} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0225,\ s\_0374,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0225} + \mathrm{s\_0514} + \mathrm{s\_0763\_b}$	
159	`r_0604`	Imidazole-glycerol-3-phosphate synthase	$\mathrm{s\_0315} + \mathrm{s\_0907} \xrightleftharpoons{\mathrm{s\_0315,\ s\_0317,\ s\_0532,\ s\_0763\_b,\ s\_0899,\ s\_0907}} \mathrm{s\_0317} + \mathrm{s\_0532} + \mathrm{s\_0763\_b} + \mathrm{s\_0899}$	
160	`r_0605`	imidazoleglycerol-phosphate dehydratase	$\mathrm{s\_0532} \xrightleftharpoons{\mathrm{s\_0212,\ s\_0532,\ s\_1434\_b}} \mathrm{s\_0212} + \mathrm{s\_1434\_b}$	
161	`r_0606`	IMP cyclohydrolase	$\mathrm{s\_0325} \xrightleftharpoons{\mathrm{s\_0325,\ s\_0816,\ s\_1434\_b}} \mathrm{s\_0816} + \mathrm{s\_1434\_b}$	
162	`r_0607`	IMP dehydrogenase	$\mathrm{s\_0816} + \mathrm{s\_1082} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0306,\ s\_0763\_b,\ s\_0816,\ s\_1082,\ s\_1087,\ s\_1434\_b}} \mathrm{s\_0306} + \mathrm{s\_0763\_b} + \mathrm{s\_1087}$	
163	`r_0608`	indole-3-glycerol-phosphate synthase	$\mathrm{s\_0078} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0078,\ s\_0088,\ s\_0470,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0088} + \mathrm{s\_0470} + \mathrm{s\_1434\_b}$	
164	`r_0610`	inorganic diphosphatase	$\mathrm{s\_0605} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0605,\ s\_0763\_b,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0763\_b} + 2\,\mathrm{s\_1207}$	
165	`r_0618`	inositolphosphotransferase	$\mathrm{s\_0128} + \mathrm{s\_1013} \xrightleftharpoons{\mathrm{s\_0128,\ s\_0824,\ s\_1013}} \mathrm{s\_0824}$	
166	`r_0621`	IPC synthase	$\mathrm{s\_0128} + \mathrm{s\_1060} \xrightleftharpoons{\mathrm{s\_0128,\ s\_0828,\ s\_1060}} \mathrm{s\_0828}$	
167	`r_0630`	isocitrate dehydrogenase (NADP)	$\mathrm{s\_0847} + \mathrm{s\_1091} \xrightleftharpoons{\mathrm{s\_0185,\ s\_0470,\ s\_0847,\ s\_1091,\ s\_1096}} \mathrm{s\_0185} + \mathrm{s\_0470} + \mathrm{s\_1096}$	
168	`r_0633`	isocitrate lyase	$\mathrm{s\_0847} \xrightleftharpoons{\mathrm{s\_0749,\ s\_0847,\ s\_1338}} \mathrm{s\_0749} + \mathrm{s\_1338}$	
169	`r_0634`	isoleucine transaminase	$\mathrm{s\_0058} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0058,\ s\_0185,\ s\_0899,\ s\_0920}} \mathrm{s\_0185} + \mathrm{s\_0920}$	

№	Id	Name	Reaction Equation	SBO
170	`r_0638`	isopentenyl-diphosphate D-isomerase	$\text{s\_0850} \xrightleftharpoons{\text{s\_0850, s\_1257}} \text{s\_1257}$	
171	`r_0640`	ketol-acid reductoisomerase (2-aceto-2-hydroxybutanoate)	$\text{s\_0042} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0007, s\_0042, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0007} + \text{s\_1091}$	
172	`r_0647`	L-alanine transaminase	$\text{s\_0899} + \text{s\_1277} \xrightleftharpoons{\text{s\_0185, s\_0863, s\_0899, s\_1277}} \text{s\_0185} + \text{s\_0863}$	
173	`r_0650`	L-aminoadipate-semialdehyde dehydrogenase (NADH)	$\text{s\_0446} + \text{s\_0763\_b} + \text{s\_0861} + \text{s\_1087} \xrightleftharpoons{\text{s\_0434, s\_0446, s\_0605, s\_0763\_b, s\_0861, s\_0867, s\_1082, s\_1087}} \text{s\_0434} + \text{s\_0605} + \text{s\_0867} + \text{s\_1082}$	
174	`r_0657`	L-glutamate 5-semialdehyde dehydratase	$\text{s\_0905} \xrightleftharpoons{\text{s\_0120, s\_0763\_b, s\_0905, s\_1434\_b}} \text{s\_0120} + \text{s\_0763\_b} + \text{s\_1434\_b}$	
175	`r_0660`	L-hydroxyproline dehydrogenase (NADP)	$\text{s\_1091} + \text{s\_1379} \xrightleftharpoons{\text{s\_0118, s\_0763\_b, s\_1091, s\_1096, s\_1379}} \text{s\_0118} + 2\,\text{s\_0763\_b} + \text{s\_1096}$	
176	`r_0661`	L-hydroxyproline reductase (NAD)	$\text{s\_0118} + 2\,\text{s\_0763\_b} + \text{s\_1087} \xrightleftharpoons{\text{s\_0118, s\_0763\_b, s\_1082, s\_1087, s\_1379}} \text{s\_1082} + \text{s\_1379}$	
177	`r_0667`	L-threonine deaminase	$\text{s\_0949} \xrightleftharpoons{\text{s\_0183, s\_0430, s\_0949}} \text{s\_0183} + \text{s\_0430}$	
178	`r_0673`	lanosterol synthase	$\text{s\_0040} \xrightleftharpoons{\text{s\_0040, s\_0963}} \text{s\_0963}$	
179	`r_0674`	leucine transaminase	$\text{s\_0297} + \text{s\_0899} \xrightleftharpoons{\text{s\_0185, s\_0297, s\_0899, s\_0925}} \text{s\_0185} + \text{s\_0925}$	
180	`r_0688`	malate dehydrogenase	$\text{s\_0763\_b} + \text{s\_1087} + \text{s\_1156} \xrightleftharpoons{\text{s\_0069, s\_0763\_b, s\_1082, s\_1087, s\_1156}} \text{s\_0069} + \text{s\_1082}$	

№	Id	Name	Reaction Equation	SBO
181	r_0697	mannose-1-phosphate guanylyltransferase	s_0553 + s_0755 + s_0763_b $\xrightleftharpoons{\text{s\_0553, s\_0605, s\_0710, s\_0755, s\_0763\_b}}$ s_0605 + s_0710	
182	r_0698	mannose-6-phosphate isomerase	s_0539 $\xrightleftharpoons{\text{s\_0539, s\_0554}}$ s_0554	
183	r_0699	methenyltetrahydrifikate cyclohydrolase	s_0015 + s_1434_b $\xrightleftharpoons{\text{s\_0015, s\_0122, s\_0763\_b, s\_1434\_b}}$ s_0122 + s_0763_b	
184	r_0701	methionine adenosyltransferase	s_0446 + s_0933 + s_1434_b $\xrightleftharpoons{\text{s\_0446, s\_0605, s\_0933, s\_1207, s\_1293, s\_1434\_b}}$ s_0605 + s_1207 + s_1293	
185	r_0702	methionine synthase	s_0328 + s_0917 $\xrightleftharpoons{\text{s\_0309, s\_0328, s\_0763\_b, s\_0917, s\_0933}}$ s_0309 + s_0763_b + s_0933	
186	r_0707	methylenetetrahydrofolate dehydrogenase (NADP)	s_0307 + s_1091 $\xrightleftharpoons{\text{s\_0015, s\_0307, s\_1091, s\_1096}}$ s_0015 + s_1096	
187	r_0712	mevalonate kinase (ctp)	s_0031 + s_0521 $\xrightleftharpoons{\text{s\_0022, s\_0031, s\_0481, s\_0521, s\_0763\_b}}$ s_0022 + s_0481 + s_0763_b	
188	r_0715	mevalonate pyrophoshate decarboxylase	s_0021 + s_0446 $\xrightleftharpoons{\text{s\_0021, s\_0400, s\_0446, s\_0470, s\_0850, s\_1207}}$ s_0400 + s_0470 + s_0850 + s_1207	
189	r_0719	microsomal beta-keto-reductase	s_0046 + s_1091 $\xrightleftharpoons{\text{s\_0046, s\_0247, s\_0763\_b, s\_1091, s\_1096}}$ s_0247 + s_0763_b + s_1096	
190	r_0720	microsomal beta-keto-reductase_2	s_0052 + s_1091 $\xrightleftharpoons{\text{s\_0052, s\_0257, s\_0763\_b, s\_1091, s\_1096}}$ s_0257 + s_0763_b + s_1096	
191	r_0721	microsomal beta-keto-reductase_3	s_0234 + s_1091 $\xrightleftharpoons{\text{s\_0234, s\_0254, s\_0763\_b, s\_1091, s\_1096}}$ s_0254 + s_0763_b + s_1096	

№	Id	Name	Reaction Equation	SBO
192	`r_0722`	microsomal beta-keto-reductase_4	$\mathrm{s\_0055} + \mathrm{s\_1091} \xrightleftharpoons{\mathrm{s\_0055,\ s\_0261,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0261} + \mathrm{s\_0763\_b} + \mathrm{s\_1096}$	
193	`r_0723`	MIPC synthase	$\mathrm{s\_0710} + \mathrm{s\_0828} \xrightleftharpoons{\mathrm{s\_0710,\ s\_0828,\ s\_1013}} \mathrm{s\_1013}$	
194	`r_0725`	myo-inositol 1-phosphatase	$\mathrm{s\_0128} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0128,\ s\_1020,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_1020} + \mathrm{s\_1207}$	
195	`r_0726`	myo-inositol-1-phosphate synthase	$\mathrm{s\_0410} \xrightleftharpoons{\mathrm{s\_0128,\ s\_0410}} \mathrm{s\_0128}$	
196	`r_0728`	N-acetyl-g-glutamyl-phosphate reductase	$\mathrm{s\_0763\_b} + \mathrm{s\_1070} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0149,\ s\_0763\_b,\ s\_1070,\ s\_1091,\ s\_1096,\ s\_1207}} \mathrm{s\_0149} + \mathrm{s\_1091} + \mathrm{s\_1207}$	
197	`r_0765`	non-enzymatic reaction	$\mathrm{s\_0180} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0180,\ s\_0181,\ s\_0470,\ s\_0763\_b}} \mathrm{s\_0181} + \mathrm{s\_0470}$	
198	`r_0771`	nucleoside-diphosphate kinase (ATP:CDP)	$\mathrm{s\_0400} + \mathrm{s\_0521} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0481,\ s\_0521}} \mathrm{s\_0446} + \mathrm{s\_0481}$	
199	`r_0779`	nucleoside-diphosphate kinase (ATP:UDP)	$\mathrm{s\_0446} + \mathrm{s\_1411} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_1411,\ s\_1430}} \mathrm{s\_0400} + \mathrm{s\_1430}$	
200	`r_0783`	O-acetylhomoserine (thiol)-lyase	$\mathrm{s\_0805} + \mathrm{s\_1117} \xrightleftharpoons{\mathrm{s\_0369,\ s\_0763\_b,\ s\_0805,\ s\_0917,\ s\_1117}} \mathrm{s\_0369} + \mathrm{s\_0763\_b} + \mathrm{s\_0917}$	
201	`r_0789`	ornithine carbamoyltransferase	$\mathrm{s\_0469} + \mathrm{s\_1151} \xrightleftharpoons{\mathrm{s\_0469,\ s\_0763\_b,\ s\_0887,\ s\_1151,\ s\_1207}} \mathrm{s\_0763\_b} + \mathrm{s\_0887} + \mathrm{s\_1207}$	
202	`r_0791`	ornithine transacetylase	$\mathrm{s\_0899} + \mathrm{s\_1051} \xrightleftharpoons{\mathrm{s\_0899,\ s\_1051,\ s\_1071,\ s\_1151}} \mathrm{s\_1071} + \mathrm{s\_1151}$	
203	`r_0793`	orotate phosphoribosyltransferase	$\mathrm{s\_0331} + \mathrm{s\_1154} \xrightleftharpoons{\mathrm{s\_0331,\ s\_0605,\ s\_1154,\ s\_1155}} \mathrm{s\_0605} + \mathrm{s\_1155}$	

№	Id	Name	Reaction Equation	SBO
204	r_0794	orotidine-5'-phosphate decarboxylase	$s\_0763\_b + s\_1155 \xrightleftharpoons{s\_0470,\ s\_0763\_b,\ s\_1155,\ s\_1417} s\_0470 + s\_1417$	
205	r_0825	phenylalanine transaminase	$s\_0859 + s\_0899 \xrightleftharpoons{s\_0185,\ s\_0859,\ s\_0899,\ s\_0936} s\_0185 + s\_0936$	
206	r_0831	phosphatidylethanolamine methyltransferase	$s\_1233 + s\_1293 \xrightleftharpoons{s\_0763\_b,\ s\_1226,\ s\_1233,\ s\_1290,\ s\_1293} s\_0763\_b + s\_1226 + s\_1290$	
207	r_0847	phosphatidylinositol synthase	$s\_0485 + s\_1020 \xrightleftharpoons{s\_0090,\ s\_0485,\ s\_0511,\ s\_0763\_b,\ s\_1020} s\_0090 + s\_0511 + 2\,s\_0763\_b$	
208	r_0850	phosphatidylserine decarboxylase	$s\_1219 \xrightleftharpoons{s\_0470,\ s\_1219,\ s\_1233} s\_0470 + s\_1233$	
209	r_0853	phosphatidylserine synthase	$s\_0485 + s\_0943 \xrightleftharpoons{s\_0485,\ s\_0511,\ s\_0763\_b,\ s\_0943,\ s\_1219} s\_0511 + 2\,s\_0763\_b + s\_1219$	
210	r_0856	phosphoadenylyl-sulfate reductase (thioredoxin)	$s\_0206 + s\_1521 \xrightleftharpoons{s\_0206,\ s\_0397,\ s\_0763\_b,\ s\_1349,\ s\_1517,\ s\_1521} s\_0397 + 2\,s\_0763\_b + s\_1349 + s\_1517$	
211	r_0859	phosphofructokinase	$s\_0446 + s\_0539 \xrightleftharpoons{s\_0446,\ s\_0446,\ s\_0539,\ s\_0400,\ s\_0537,\ s\_0763\_b} s\_0400 + s\_0537 + s\_0763\_b$	
212	r_0861	phosphoglucomutase	$s\_0410 \xrightleftharpoons{s\_0410,\ s\_0549} s\_0549$	
213	r_0865	phosphoglycerate kinase	$s\_0265 + s\_0400 \xrightleftharpoons{s\_0446,\ s\_0265,\ s\_0400,\ s\_0264,\ s\_0446} s\_0264 + s\_0446$	
214	r_0866	phosphoglycerate mutase	$s\_0264 \xrightleftharpoons{s\_0193,\ s\_0264,\ s\_0193} s\_0193$	
215	r_0873	phospholipid methyltransferase	$s\_1225 + s\_1293 \xrightleftharpoons{s\_1225,\ s\_1228,\ s\_1290,\ s\_1293} s\_1228 + s\_1290$	
216	r_0874	phospholipid methyltransferase_2	$s\_1226 + s\_1293 \xrightleftharpoons{s\_0763\_b,\ s\_1225,\ s\_1226,\ s\_1290,\ s\_1293} s\_0763\_b + s\_1225 + s\_1290$	

№	Id	Name	Reaction Equation	SBO
217	r_0875	phosphomannomutase	$\mathrm{s\_0554} \xrightleftharpoons{\mathrm{s\_0553,\ s\_0554}} \mathrm{s\_0553}$	
218	r_0877	phosphomevalonate kinase	$\mathrm{s\_0022} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0021,\ s\_0022,\ s\_0400,\ s\_0446}} \mathrm{s\_0021} + \mathrm{s\_0400}$	
219	r_0881	phosphoribosyl-AMP cyclohydrolase	$\mathrm{s\_0080} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0079,\ s\_0080,\ s\_1434\_b}} \mathrm{s\_0079}$	
220	r_0882	phosphoribosyl-ATP pyrophosphatase	$\mathrm{s\_0334} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0080,\ s\_0334,\ s\_0605,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0080} + \mathrm{s\_0605} + \mathrm{s\_0763\_b}$	
221	r_0883	phosphoribosylaminoimidazole carboxylase	$\mathrm{s\_0316} + \mathrm{s\_0470} \xrightleftharpoons{\mathrm{s\_0316,\ s\_0318,\ s\_0470,\ s\_0763\_b}} \mathrm{s\_0318} + \mathrm{s\_0763\_b}$	
222	r_0884	phosphoribosylaminoimidazole synthase	$\mathrm{s\_0158} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0158,\ s\_0316,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1207}} \mathrm{s\_0316} + \mathrm{s\_0400} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1207}$	
223	r_0885	phosphoribosylaminoimidazolecarboxamide formyltransferase	$\mathrm{s\_0122} + \mathrm{s\_0317} \xrightleftharpoons{\mathrm{s\_0122,\ s\_0309,\ s\_0317,\ s\_0325}} \mathrm{s\_0309} + \mathrm{s\_0325}$	
224	r_0886	phosphoribosylaminoimidazolesuccinocarboxamide synthase	$\mathrm{s\_0318} + \mathrm{s\_0446} + \mathrm{s\_0881} \xrightleftharpoons{\mathrm{s\_0009,\ s\_0318,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_0881,\ s\_1207}} \mathrm{s\_0009} + \mathrm{s\_0400} + \mathrm{s\_0763\_b} + \mathrm{s\_1207}$	
225	r_0887	phosphoribosylanthranilate isomerase	$\mathrm{s\_1066} \xrightleftharpoons{\mathrm{s\_0078,\ s\_1066}} \mathrm{s\_0078}$	
226	r_0888	phosphoribosylformylglycinamidine synthase	$\mathrm{s\_0446} + \mathrm{s\_0907} + \mathrm{s\_1052} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0158,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1052,\ s\_1207,\ s\_1434\_b}}$ $\mathrm{s\_0400} + \mathrm{s\_0763\_b} + \mathrm{s\_0899} + \mathrm{s\_1207}$	
227	r_0889	phosphoribosylglycinamide formyltransferase	$\mathrm{s\_0122} + \mathrm{s\_1048} \xrightleftharpoons{\mathrm{s\_0122,\ s\_0309,\ s\_0763\_b,\ s\_1048,\ s\_1052}} \mathrm{s\_0309} + \mathrm{s\_0763\_b} + \mathrm{s\_1052}$	

№	Id	Name	Reaction Equation	SBO
228	`r_0890`	phosphoribosylglycinamide synthase	s_0333 + s_0446 + s_0740 $\xrightleftharpoons{\text{s\_0333, s\_0400, s\_0446, s\_0740, s\_0763\_b, s\_1048, s\_1207}}$ s_0400 + s_0763_b + s_1048 + s_1207	
229	`r_0891`	phosphoribosylpyrophosphate synthetase	s_0427 + s_0446 $\xrightleftharpoons{\text{s\_0331, s\_0427, s\_0434, s\_0446, s\_0763\_b}}$ s_0331 + s_0434 + s_0763_b	
230	`r_0911`	prephenate dehydratase	s_0763_b + s_1258 $\xrightleftharpoons{\text{s\_0470, s\_0763\_b, s\_0859, s\_1258, s\_1434\_b}}$ s_0470 + s_0859 + s_1434_b	
231	`r_0913`	prephenate dehydrogenase (NADP)	s_1091 + s_1258 $\xrightleftharpoons{\text{s\_0209, s\_0470, s\_1091, s\_1096, s\_1258}}$ s_0209 + s_0470 + s_1096	
232	`r_0934`	pyrimidine phosphatase	s_0319 + s_1434_b $\xrightleftharpoons{\text{s\_0319, s\_0320, s\_1207, s\_1434\_b}}$ s_0320 + s_1207	
233	`r_0936`	pyrroline-5-carboxylate reductase	s_0120 + 2 s_0763_b + s_1096 $\xrightleftharpoons{\text{s\_0120, s\_0763\_b, s\_0939, s\_1091, s\_1096}}$ s_0939 + s_1091	
234	`r_0937`	pyruvate carboxylase	s_0446 + s_0458 + s_1277 $\xrightleftharpoons{\text{s\_0400, s\_0446, s\_0458, s\_0763\_b, s\_1156, s\_1207, s\_1277}}$ s_0400 + s_0763_b + s_1156 + s_1207	
235	`r_0938`	pyruvate decarboxylase	s_0763_b + s_1277 $\xrightleftharpoons{\text{s\_1277, s\_0763\_b, s\_1277, s\_0366, s\_0470}}$ s_0366 + s_0470	
236	`r_0940`	pyruvate dehydrogenase	s_0514 + s_1082 + s_1277 $\xrightleftharpoons{\text{s\_0380, s\_0470, s\_0514, s\_1082, s\_1087, s\_1277}}$ s_0380 + s_0470 + s_1087	
237	`r_0941`	pyruvate kinase	s_0400 + s_0763_b + s_1243 $\xrightleftharpoons{\text{s\_0400, s\_0446, s\_0763\_b, s\_1243, s\_1277}}$ s_0446 + s_1277	

№	Id	Name	Reaction Equation	SBO
238	`r_0948`	riboflavin synthase	s_0163 + s_0320 $\xrightleftharpoons{\text{s\_0163, s\_0320, s\_0335, s\_1207, s\_1434\_b}}$ s_0335 + s_1207 + 2 s_1434_b	
239	`r_0949`	riboflavin synthase_2	2 s_0335 $\xrightleftharpoons{\text{s\_0320, s\_0335, s\_1283}}$ s_0320 + s_1283	
240	`r_0951`	ribonucleoside-diphosphate reductase	s_0400 + s_1521 $\xrightleftharpoons{\text{s\_0400, s\_0562, s\_1434\_b, s\_1517, s\_1521}}$ s_0562 + s_1434_b + s_1517	
241	`r_0955`	ribonucleoside-diphosphate reductase (GDP)	s_0706 + s_1521 $\xrightleftharpoons{\text{s\_0591, s\_0706, s\_1434\_b, s\_1517, s\_1521}}$ s_0591 + s_1434_b + s_1517	
242	`r_0957`	ribonucleoside-diphosphate reductase (UDP)	s_1411 + s_1521 $\xrightleftharpoons{\text{s\_0622, s\_1411, s\_1434\_b, s\_1517, s\_1521}}$ s_0622 + s_1434_b + s_1517	
243	`r_0959`	ribonucleoside-triphosphate reductase (ATP)	s_0446 + s_1521 $\xrightleftharpoons{\text{s\_0446, s\_0566, s\_1434\_b, s\_1517, s\_1521}}$ s_0566 + s_1434_b + s_1517	
244	`r_0963`	ribose-5-phosphate isomerase	s_0557 $\xrightleftharpoons{\text{s\_0427, s\_0557}}$ s_0427	
245	`r_0965`	ribulose 5-phosphate 3-epimerase	s_0561 $\xrightleftharpoons{\text{s\_0557, s\_0561}}$ s_0557	
246	`r_0967`	S-adenosyl-methionine delta-24-sterol-c-methyltransferase	s_1293 + s_1447 $\xrightleftharpoons{\text{s\_0669, s\_0763\_b, s\_1290, s\_1293, s\_1447}}$ s_0669 + s_0763_b + s_1290	
247	`r_0969`	saccharopine dehydrogenase (NAD, L-lysine forming)	s_0942 + s_1082 + s_1434_b $\xrightleftharpoons{\text{s\_0185, s\_0763\_b, s\_0929, s\_0942, s\_1082, s\_1087, s\_1434\_b}}$ s_0185 + s_0763_b + s_0929 + s_1087	
248	`r_0970`	saccharopine dehydrogenase (NADP, L-glutamate forming)	s_0763_b + s_0867 + s_0899 + s_1096 $\xrightleftharpoons{\text{s\_0763\_b, s\_0867, s\_0899, s\_0942, s\_1091, s\_1096, s\_1434\_b}}$ s_0942 + s_1091 + s_1434_b	
249	`r_0972`	serine C-palmitoyltransferase	s_0943 + s_1187 $\xrightleftharpoons{\text{s\_0218, s\_0470, s\_0514, s\_0943, s\_1187}}$ s_0218 + s_0470 + s_0514	

№	Id	Name	Reaction Equation	SBO
250	`r_0976`	shikimate dehydrogenase	$\mathrm{s\_0217} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0217,\ s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1306}} \mathrm{s\_1091} + \mathrm{s\_1306}$	
251	`r_0977`	shikimate kinase	$\mathrm{s\_0446} + \mathrm{s\_1306} \xrightleftharpoons{\mathrm{s\_0267,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1306}} \mathrm{s\_0267} + \mathrm{s\_0400} + \mathrm{s\_0763\_b}$	
252	`r_0991`	squalene epoxidase (NAD)	$\mathrm{s\_0763\_b} + \mathrm{s\_1087} + \mathrm{s\_1160} + \mathrm{s\_1327} \xrightleftharpoons{\mathrm{s\_0040,\ s\_0763\_b,\ s\_1082,\ s\_1087,\ s\_1160,\ s\_1327,\ s\_1434\_b}} \mathrm{s\_0040} + \mathrm{s\_1082} + \mathrm{s\_1434\_b}$	
253	`r_0993`	squalene synthase	$2\,\mathrm{s\_0195} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0195,\ s\_0605,\ s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1327}} 2\,\mathrm{s\_0605} + \mathrm{s\_1091} + \mathrm{s\_1327}$	
254	`r_0995`	steryl ester hydrolase	$\mathrm{s\_0635} + \mathrm{s\_0663} \xrightleftharpoons{\mathrm{s\_0635,\ s\_0641,\ s\_0663,\ s\_1434\_b}} \mathrm{s\_0641} + \mathrm{s\_1434\_b}$	
255	`r_1003`	succinate-CoA ligase (ADP-forming)	$\mathrm{s\_0446} + \mathrm{s\_0514} + \mathrm{s\_1338} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0514,\ s\_1207,\ s\_1338,\ s\_1342}} \mathrm{s\_0400} + \mathrm{s\_1207} + \mathrm{s\_1342}$	
256	`r_1007`	sulfate adenylyltransferase (ADP)	$\mathrm{s\_0400} + \mathrm{s\_0763\_b} + \mathrm{s\_1347} \xrightleftharpoons{\mathrm{s\_0304,\ s\_0400,\ s\_0763\_b,\ s\_1207,\ s\_1347}} \mathrm{s\_0304} + \mathrm{s\_1207}$	
257	`r_1008`	sulfite reductase (NADPH2)	$5\,\mathrm{s\_0763\_b} + 3\,\mathrm{s\_1096} + \mathrm{s\_1349} \xrightleftharpoons{\mathrm{s\_0763\_b,\ s\_0805,\ s\_1091,\ s\_1096,\ s\_1349,\ s\_1434\_b}} \mathrm{s\_0805} + 3\,\mathrm{s\_1091} + 3\,\mathrm{s\_1434\_b}$	
258	`r_1024`	thioredoxin reductase (NADPH)	$\mathrm{s\_0763\_b} + \mathrm{s\_1096} + \mathrm{s\_1517} \xrightleftharpoons{\mathrm{s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1517,\ s\_1521}} \mathrm{s\_1091} + \mathrm{s\_1521}$	

№	Id	Name	Reaction Equation	SBO
259	`r_1026`	threonine aldolase	$\text{s\_0949} \xrightleftharpoons{\text{s\_0366, s\_0740, s\_0949}} \text{s\_0366} + \text{s\_0740}$	
260	`r_1027`	threonine synthase	$\text{s\_1122} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0949, s\_1122, s\_1207, s\_1434\_b}} \text{s\_0949} + \text{s\_1207}$	
261	`r_1032`	thymidylate synthase	$\text{s\_0307} + \text{s\_0624} \xrightleftharpoons{\text{s\_0307, s\_0601, s\_0619, s\_0624}} \text{s\_0601} + \text{s\_0619}$	
262	`r_1035`	transaldolase	$\text{s\_0533} + \text{s\_0539} \xrightleftharpoons{\text{s\_0533, s\_0539, s\_0731, s\_1304}} \text{s\_0731} + \text{s\_1304}$	
263	`r_1036`	transketolase	$\text{s\_0731} + \text{s\_1304} \xrightleftharpoons{\text{s\_0427, s\_0561, s\_0731, s\_1304}} \text{s\_0427} + \text{s\_0561}$	
264	`r_1037`	transketolase_2	$\text{s\_0539} + \text{s\_0731} \xrightleftharpoons{\text{s\_0533, s\_0539, s\_0561, s\_0731}} \text{s\_0533} + \text{s\_0561}$	
265	`r_1038`	trehalose-phosphatase	$\text{s\_0419} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0416, s\_0419, s\_1207, s\_1434\_b}} \text{s\_0416} + \text{s\_1207}$	
266	`r_1040`	triacylglycerol lipase	$\text{s\_1399} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0596, s\_0663, s\_1399, s\_1434\_b}} \text{s\_0596} + \text{s\_0663}$	
267	`r_1041`	triose-phosphate isomerase	$\text{s\_0735} \xrightleftharpoons{\text{s\_0731, s\_0735}} \text{s\_0731}$	
268	`r_1042`	tryptophan synthase (indoleglycerol phosphate)	$\text{s\_0088} + \text{s\_0943} \xrightleftharpoons{\text{s\_0088, s\_0731, s\_0943, s\_0952, s\_1434\_b}} \text{s\_0731} + \text{s\_0952} + \text{s\_1434\_b}$	
269	`r_1050`	tyrosine transaminase	$\text{s\_0209} + \text{s\_0899} \xrightleftharpoons{\text{s\_0185, s\_0209, s\_0899, s\_0955}} \text{s\_0185} + \text{s\_0955}$	
270	`r_1059`	UMP kinase	$\text{s\_0446} + \text{s\_1417} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_1411, s\_1417}} \text{s\_0400} + \text{s\_1411}$	

№	Id	Name	Reaction Equation	SBO
271	r_1066	uridylate kinase (dUMP)	s_0400 + s_0622 $\xrightleftharpoons{\text{s\_0400, s\_0446, s\_0622, s\_0624}}$ s_0446 + s_0624	
272	r_1072	UTP-glucose-1-phosphate uridylyltransferase	s_0549 + s_0763_b + s_1430 $\xrightleftharpoons{\text{s\_0549, s\_0605, s\_0763\_b, s\_1415, s\_1430}}$ s_0605 + s_1415	
273	r_1073	valine transaminase	s_0238 + s_0899 $\xrightleftharpoons{\text{s\_0185, s\_0238, s\_0899, s\_0960}}$ s_0185 + s_0960	
274	r_1157	ammonia transport	s_0431_b $\xrightleftharpoons{\text{s\_0430, s\_0431\_b}}$ s_0430	
275	r_1194	CO2 transport	s_0470 $\xrightleftharpoons{\text{s\_0470, s\_0472\_b}}$ s_0472_b	
276	r_1247	ethanol transport	s_0650 $\xrightleftharpoons{\text{s\_0650, s\_0651\_b}}$ s_0651_b	
277	r_1293	glucose transport	s_0547_b $\xrightleftharpoons{\text{s\_0545, s\_0547\_b}}$ s_0545	
278	r_1435	O2 transport	s_1162_b $\xrightleftharpoons{\text{s\_1160, s\_1162\_b}}$ s_1160	
279	r_1461	phosphate transport	s_0766_b + s_1209_b $\xrightleftharpoons{\text{s\_0763\_b, s\_0766\_b, s\_1207, s\_1209\_b}}$ s_0763_b + s_1207	
280	r_1503	succinate transport	s_0763_b + s_1338 $\xrightleftharpoons{\text{s\_0763\_b, s\_0766\_b, s\_1338, s\_1339\_b}}$ s_0766_b + s_1339_b	
281	r_1507	sulfate uniport	s_1348_b $\xrightleftharpoons{\text{s\_1347, s\_1348\_b}}$ s_1347	
282	r_1672	isa acyl-CoA	s_1342 $\xrightarrow{\text{s\_0386, s\_1342}}$ s_0386	

№	Id	Name	Reaction Equation	SBO
283	`r_1812`	biomass production	$1 \cdot 1358\,\mathrm{s\_0001} + 0 \cdot 023371\,\mathrm{s\_0416} + 0 \cdot 051\,\mathrm{s\_0434} + 59 \cdot 276\,\mathrm{s\_0446} + 0 \cdot 05\,\mathrm{s\_0511} + 0 \cdot 003587\,\mathrm{s\_0564} + 0 \cdot 002432\,\mathrm{s\_0569} + 0 \cdot 002432\,\mathrm{s\_0593} + 0 \cdot 003587\,\mathrm{s\_0619} + 0 \cdot 32518\,\mathrm{s\_0740} + 0 \cdot 51852\,\mathrm{s\_0743} + 0 \cdot 051\,\mathrm{s\_0752} + 0 \cdot 35734\,\mathrm{s\_0863} + 0 \cdot 13579\,\mathrm{s\_0873} + 0 \cdot 17152\,\mathrm{s\_0877} + 0 \cdot 17152\,\mathrm{s\_0881} + 0 \cdot 04288\,\mathrm{s\_0889} + 0 \cdot 268\,\mathrm{s\_0899} + 0 \cdot 268\,\mathrm{s\_0907} + 0 \cdot 075041\,\mathrm{s\_0911} + 0 \cdot 17152\,\mathrm{s\_0920} + 0 \cdot 25014\,\mathrm{s\_0925} + 0 \cdot 23942\,\mathrm{s\_0929} + 0 \cdot 050027\,\mathrm{s\_0933} + 0 \cdot 11435\,\mathrm{s\_0936} + 0 \cdot 12864\,\mathrm{s\_0939} + 0 \cdot 25371\,\mathrm{s\_0943} + 0 \cdot 19653\,\mathrm{s\_0949} + 0 \cdot 028\,\mathrm{s\_0952} + 0 \cdot 096481\,\mathrm{s\_0955} + 0 \cdot 25728\,\mathrm{s\_0960} + \mathrm{s\_1000} + 0 \cdot 82099\,\mathrm{s\_1011} + 0 \cdot 02\,\mathrm{s\_1347} + 0 \cdot 067\,\mathrm{s\_1417} + 9 \cdot 10^{-4}\mathrm{s\_1283} \xrightarrow{\mathrm{s\_0547\_b,\ s\_0001,\ s\_0416,\ s\_0434,\ s\_0446,\ s\_0511,\ s\_0564,\ s\_0569,\ s\_0}}$ $\mathrm{s\_0463} + 59 \cdot 305\,\mathrm{s\_1207}$	
284	`r_1814`	growth	$\mathrm{s\_0463} \xrightarrow{\mathrm{s\_0547\_b,\ s\_0463}} \mathrm{s\_0464\_b}$	
285	`r_1816`	lipid production	$0 \cdot 001531\,\mathrm{s\_0090} + 5.6 \cdot 10^{-5}\mathrm{s\_0124} + 9.6 \cdot 10^{-5}\mathrm{s\_0627} + 1.25 \cdot 10^{-4}\mathrm{s\_0632} + 0 \cdot 005603\,\mathrm{s\_0635} + 8.12 \cdot 10^{-4}\mathrm{s\_0641} + 2.06 \cdot 10^{-4}\mathrm{s\_0663} + 1.14 \cdot 10^{-4}\mathrm{s\_0669} + 4.17 \cdot 10^{-4}\mathrm{s\_0824} + 3.2 \cdot 10^{-5}\mathrm{s\_0963} + 3.73 \cdot 10^{-4}\mathrm{s\_1219} + 0 \cdot 002884\,\mathrm{s\_1228} + 6.97 \cdot 10^{-4}\mathrm{s\_1233} + 7.81 \cdot 10^{-4}\mathrm{s\_1399} + 1.5 \cdot 10^{-5}\mathrm{s\_1447} \xrightarrow{\mathrm{s\_0547\_b,\ s\_0090,\ s\_0124,\ s\_0627,\ s\_0632,\ s\_0635,\ s\_0641,\ s\_0663,\ s}}$	

7.1 Reaction r_0005

This is a reversible reaction of one reactant forming three products influenced by four modifiers.

Name 1,3-beta-glucan synthase

Notes GENE_ASSOCIATION:(YGR032W or YLR342W)

Reaction equation

$$\text{s\_1415} \xrightleftharpoons{\text{s\_0001, s\_0763\_b, s\_1411, s\_1415}} \text{s\_0001} + \text{s\_0763\_b} + \text{s\_1411} \tag{289}$$

Reactant

Table 5: Properties of each reactant.

Id	Name	SBO
s_1415	UDP-D-glucose [intracellular]	

Modifiers

Table 6: Properties of each modifier.

Id	Name	SBO
s_0001	(1->3)-beta-D-glucan [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	
s_1415	UDP-D-glucose [intracellular]	

Products

Table 7: Properties of each product.

Id	Name	SBO
s_0001	(1->3)-beta-D-glucan [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_1}(\mathrm{Keq\_r\_0005}, \mathrm{Vmax\_r\_0005}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0001r\_0005}, \mathrm{kmp\_s\_0763\_br\_0005}, \mathrm{kmp\_s\_1411r\_0005}, \mathrm{kms\_s\_1415r\_0005}, [\mathrm{s\_0001}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}]) \quad (290)$$

$$\mathrm{function\_1}(\mathrm{Keq\_r\_0005}, \mathrm{Vmax\_r\_0005}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0001r\_0005}, \mathrm{kmp\_s\_0763\_br\_0005}, \mathrm{kmp\_s\_1411r\_0005}, \mathrm{kms\_s\_1415r\_0005}, [\mathrm{s\_0001}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}]) = \frac{\mathrm{Vmax\_r\_0005} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0005}}\right)^1 \cdot \left([\mathrm{s\_1415}]^1 - \frac{[\mathrm{s\_0001}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1411}]^1}{\mathrm{Keq\_r\_0005}}\right)}{1 + \frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0005}} + \left(1 + \frac{[\mathrm{s\_0001}]}{\mathrm{kmp\_s\_0001r\_0005}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0005}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0005}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (291)$$

$$\mathrm{function\_1}(\mathrm{Keq\_r\_0005}, \mathrm{Vmax\_r\_0005}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0001r\_0005}, \mathrm{kmp\_s\_0763\_br\_0005}, \mathrm{kmp\_s\_1411r\_0005}, \mathrm{kms\_s\_1415r\_0005}, [\mathrm{s\_0001}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}]) = \frac{\mathrm{Vmax\_r\_0005} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0005}}\right)^1 \cdot \left([\mathrm{s\_1415}]^1 - \frac{[\mathrm{s\_0001}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1411}]^1}{\mathrm{Keq\_r\_0005}}\right)}{1 + \frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0005}} + \left(1 + \frac{[\mathrm{s\_0001}]}{\mathrm{kmp\_s\_0001r\_0005}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0005}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0005}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (292)$$

Table 8: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0005	Keq_r_0005		0.332		☑
Vmax_r_0005	Vmax_r_0005		6.247		☑
kmp_s_0001r_0005	kmp_s_0001r_0005		0.549		☑
kmp_s_0763_br_0005	kmp_s_0763_br_0005		0.549		☑
kmp_s_1411r_0005	kmp_s_1411r_0005		0.549		☑
kms_s_1415r_0005	kms_s_1415r_0005		0.549		☑

7.2 Reaction r_0006

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name 1,4-alpha-glucan branching enzyme

Notes GENE_ASSOCIATION:YEL011W

Reaction equation

$$\text{s\_0438} \xrightleftharpoons{\text{s\_0438, s\_0743, s\_1434\_b}} \text{s\_0743} + \text{s\_1434\_b} \tag{293}$$

Reactant

Table 9: Properties of each reactant.

Id	Name	SBO
s_0438	amylose [intracellular]	

Modifiers

Table 10: Properties of each modifier.

Id	Name	SBO
s_0438	amylose [intracellular]	
s_0743	glycogen [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 11: Properties of each product.

Id	Name	SBO
s_0743	glycogen [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_2 = & \text{vol}(\text{intracellular}) \\ & \cdot \text{function\_2}(\text{Keq\_r\_0006}, \text{Vmax\_r\_0006}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0743r\_0006}, \\ & \text{kmp\_s\_1434\_br\_0006}, \text{kms\_s\_0438r\_0006}, [\text{s\_0438}], [\text{s\_0743}], [\text{s\_1434\_b}]) \end{aligned} \tag{294}$$

$$\text{function\_2}\left(\text{Keq\_r\_0006}, \text{Vmax\_r\_0006}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0743r\_0006}, \text{kmp\_s\_1434\_br\_0006}, \text{kms\_s\_0438r\_0006}, [\text{s\_0438}], [\text{s\_0743}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0006} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0438r\_0006}}\right)^1 \cdot \left([\text{s\_0438}]^1 - \frac{[\text{s\_0743}]^1 \cdot [\text{s\_1434\_b}]^1}{\text{Keq\_r\_0006}}\right)}{1 + \frac{[\text{s\_0438}]}{\text{kms\_s\_0438r\_0006}} + \left(1 + \frac{[\text{s\_0743}]}{\text{kmp\_s\_0743r\_0006}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0006}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{295}$$

$$\text{function\_2}\left(\text{Keq\_r\_0006}, \text{Vmax\_r\_0006}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0743r\_0006}, \text{kmp\_s\_1434\_br\_0006}, \text{kms\_s\_0438r\_0006}, [\text{s\_0438}], [\text{s\_0743}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0006} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0438r\_0006}}\right)^1 \cdot \left([\text{s\_0438}]^1 - \frac{[\text{s\_0743}]^1 \cdot [\text{s\_1434\_b}]^1}{\text{Keq\_r\_0006}}\right)}{1 + \frac{[\text{s\_0438}]}{\text{kms\_s\_0438r\_0006}} + \left(1 + \frac{[\text{s\_0743}]}{\text{kmp\_s\_0743r\_0006}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0006}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{296}$$

Table 12: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0006	Keq_r_0006		0.604		☑
Vmax_r_0006	Vmax_r_0006		1.584		☑
kmp_s_0743r-_0006	kmp_s_0743r_0006		0.549		☑
kmp_s_1434-_br_0006	kmp_s_1434_br-_0006		0.549		☑
kms_s_0438r-_0006	kms_s_0438r_0006		0.549		☑

7.3 Reaction r_0008

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name 1-(5-phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino)imidazole-4-carboxamide isomerase

Notes GENE_ASSOCIATION:YIL020C

Reaction equation

$$\text{s\_0079} \xrightleftharpoons{\text{s\_0079, s\_0315}} \text{s\_0315} \tag{297}$$

Reactant

Table 13: Properties of each reactant.

Id	Name
s_0079	1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide [i

Modifiers

Table 14: Properties of each modifier.

Id	Name
s_0079	1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide [i
s_0315	5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4-c

Product

Table 15: Properties of each product.

Id	Name
s_0315	5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4-c

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_3}(\mathrm{Keq\_r\_0008}, \mathrm{Vmax\_r\_0008}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0315r\_0008}, \mathrm{kms\_s\_0079r\_0008}, [\mathrm{s\_0079}], [\mathrm{s\_0315}]) \tag{298}$$

$$\mathrm{function\_3}(\mathrm{Keq\_r\_0008}, \mathrm{Vmax\_r\_0008}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0315r\_0008}, \mathrm{kms\_s\_0079r\_0008}, [\mathrm{s\_0079}], [\mathrm{s\_0315}]) = \frac{\mathrm{Vmax\_r\_0008} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0079r\_0008}}\right)^{1} \cdot \left([\mathrm{s\_0079}]^{1} - \frac{[\mathrm{s\_0315}]^{1}}{\mathrm{Keq\_r\_0008}}\right)}{1 + \frac{[\mathrm{s\_0079}]}{\mathrm{kms\_s\_0079r\_0008}} + 1 + \frac{[\mathrm{s\_0315}]}{\mathrm{kmp\_s\_0315r\_0008}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{299}$$

$$\mathrm{function\_3}(\mathrm{Keq\_r\_0008}, \mathrm{Vmax\_r\_0008}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0315r\_0008}, \mathrm{kms\_s\_0079r\_0008}, [\mathrm{s\_0079}], [\mathrm{s\_0315}]) = \frac{\mathrm{Vmax\_r\_0008} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0079r\_0008}}\right)^{1} \cdot \left([\mathrm{s\_0079}]^{1} - \frac{[\mathrm{s\_0315}]^{1}}{\mathrm{Keq\_r\_0008}}\right)}{1 + \frac{[\mathrm{s\_0079}]}{\mathrm{kms\_s\_0079r\_0008}} + 1 + \frac{[\mathrm{s\_0315}]}{\mathrm{kmp\_s\_0315r\_0008}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{300}$$

Table 16: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0008	Keq_r_0008		1.100		☑
Vmax_r_0008	Vmax_r_0008		0.138		☑
kmp_s_0315r-_0008	kmp_s_0315r_0008		0.549		☑
kms_s_0079r-_0008	kms_s_0079r_0008		0.549		☑

7.4 Reaction r_0009

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name 1-acyl-sn-gylcerol-3-phosphate acyltransferase

Notes GENE_ASSOCIATION:YDL052C

Reaction equation

$$\text{s\_0083} + \text{s\_0386} \xrightleftharpoons{\text{s\_0083, s\_0386, s\_0514, s\_0763\_b, s\_1215}} \text{s\_0514} + 4\,\text{s\_0763\_b} + \text{s\_1215} \tag{301}$$

Reactants

Table 17: Properties of each reactant.

Id	Name	SBO
s_0083	1-acyl-sn-glycerol 3-phosphate [intracellular]	
s_0386	acyl-CoA [intracellular]	

Modifiers

Table 18: Properties of each modifier.

Id	Name	SBO
s_0083	1-acyl-sn-glycerol 3-phosphate [intracellular]	
s_0386	acyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1215	phosphatidate [intracellular]	

Products

Table 19: Properties of each product.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1215	phosphatidate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_4}(\mathrm{Keq\_r\_0009}, \mathrm{Vmax\_r\_0009}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0009}, \mathrm{kmp\_s\_0763\_br\_0009}, \mathrm{kmp\_s\_1215r\_0009}, \mathrm{kms\_s\_0083r\_0009}, \mathrm{kms\_s\_0386r\_0009}, [\mathrm{s\_0083}], [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) \quad (302)$$

$$\mathrm{function\_4}(\mathrm{Keq\_r\_0009}, \mathrm{Vmax\_r\_0009}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0009}, \mathrm{kmp\_s\_0763\_br\_0009}, \mathrm{kmp\_s\_1215r\_0009}, \mathrm{kms\_s\_0083r\_0009}, \mathrm{kms\_s\_0386r\_0009}, [\mathrm{s\_0083}], [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) = \frac{\mathrm{Vmax\_r\_0009} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0083r\_0009}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0386r\_0009}}\right)^1 \cdot \left([\mathrm{s\_0083}]^1 \cdot [\mathrm{s\_0386}]^1 - \frac{[\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^4 \cdot [\mathrm{s\_1215}]^1}{\mathrm{Keq\_r\_0009}}\right)}{\left(1+\frac{[\mathrm{s\_0083}]}{\mathrm{kms\_s\_0083r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0386}]}{\mathrm{kms\_s\_0386r\_0009}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kmp\_s\_1215r\_0009}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (303)$$

$$\mathrm{function\_4}(\mathrm{Keq\_r\_0009}, \mathrm{Vmax\_r\_0009}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0009}, \mathrm{kmp\_s\_0763\_br\_0009}, \mathrm{kmp\_s\_1215r\_0009}, \mathrm{kms\_s\_0083r\_0009}, \mathrm{kms\_s\_0386r\_0009}, [\mathrm{s\_0083}], [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) = \frac{\mathrm{Vmax\_r\_0009} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0083r\_0009}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0386r\_0009}}\right)^1 \cdot \left([\mathrm{s\_0083}]^1 \cdot [\mathrm{s\_0386}]^1 - \frac{[\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^4 \cdot [\mathrm{s\_1215}]^1}{\mathrm{Keq\_r\_0009}}\right)}{\left(1+\frac{[\mathrm{s\_0083}]}{\mathrm{kms\_s\_0083r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0386}]}{\mathrm{kms\_s\_0386r\_0009}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0009}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kmp\_s\_1215r\_0009}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (304)$$

Table 20: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0009	Keq_r_0009		0.100		☑
Vmax_r_0009	Vmax_r_0009		0.042		☑
kmp_s_0514r-_0009	kmp_s_0514r_0009		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763-_br_0009	kmp_s_0763_br-_0009		0.549		☑
kmp_s_1215r-_0009	kmp_s_1215r_0009		0.549		☑
kms_s_0083r-_0009	kms_s_0083r_0009		0.549		☑
kms_s_0386r-_0009	kms_s_0386r_0009		0.549		☑

7.5 Reaction r_0014

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 2,5-diamino-6-ribitylamino-4(3H)-pyrimidinone 5'-phosphate deaminase

Notes GENE_ASSOCIATION:YOL066C

Reaction equation

$$\mathrm{s\_0146} + \mathrm{s\_0763\_b} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0146,\ s\_0319,\ s\_0430,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0319} + \mathrm{s\_0430} \tag{305}$$

Reactants

Table 21: Properties of each reactant.

Id	Name	SBO
s_0146	2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 22: Properties of each modifier.

Id	Name	SBO
s_0146	2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]	
s_0319	5-amino-6-(5-phosphoribitylamino)uracil [intracellular]	
s_0430	ammonium [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 23: Properties of each product.

Id	Name	SBO
s_0319	5-amino-6-(5-phosphoribitylamino)uracil [intracellular]	
s_0430	ammonium [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_5}(\mathrm{Keq\_r\_0014}, \mathrm{Vmax\_r\_0014}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0319r\_0014}, \mathrm{kmp\_s\_0430r\_0014}, \mathrm{kms\_s\_0146r\_0014}, \mathrm{kms\_s\_0763\_br\_0014}, \mathrm{kms\_s\_1434\_br\_0014}, [\mathrm{s\_0146}], [\mathrm{s\_0319}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) \quad (306)$$

$$\mathrm{function\_5}(\mathrm{Keq\_r\_0014}, \mathrm{Vmax\_r\_0014}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0319r\_0014}, \mathrm{kmp\_s\_0430r\_0014}, \mathrm{kms\_s\_0146r\_0014}, \mathrm{kms\_s\_0763\_br\_0014}, \mathrm{kms\_s\_1434\_br\_0014}, [\mathrm{s\_0146}], [\mathrm{s\_0319}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0014} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0146r\_0014}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0014}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0014}}\right)^1 \cdot \left([\mathrm{s\_0146}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0319}]^1 \cdot [\mathrm{s\_0430}]^1}{\mathrm{Keq\_r\_0014}}\right)}{\left(1+\frac{[\mathrm{s\_0146}]}{\mathrm{kms\_s\_0146r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0014}}\right) + \left(1+\frac{[\mathrm{s\_0319}]}{\mathrm{kmp\_s\_0319r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0014}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (307)$$

$$\mathrm{function\_5}(\mathrm{Keq\_r\_0014}, \mathrm{Vmax\_r\_0014}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0319r\_0014}, \mathrm{kmp\_s\_0430r\_0014}, \mathrm{kms\_s\_0146r\_0014}, \mathrm{kms\_s\_0763\_br\_0014}, \mathrm{kms\_s\_1434\_br\_0014}, [\mathrm{s\_0146}], [\mathrm{s\_0319}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0014} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0146r\_0014}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0014}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0014}}\right)^1 \cdot \left([\mathrm{s\_0146}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0319}]^1 \cdot [\mathrm{s\_0430}]^1}{\mathrm{Keq\_r\_0014}}\right)}{\left(1+\frac{[\mathrm{s\_0146}]}{\mathrm{kms\_s\_0146r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0014}}\right) + \left(1+\frac{[\mathrm{s\_0319}]}{\mathrm{kmp\_s\_0319r\_0014}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0014}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (308)$$

Table 24: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0014	Keq_r_0014		2.004		☑
Vmax_r_0014	Vmax_r_0014		0.006		☑
kmp_s_0319r-_0014	kmp_s_0319r_0014		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0430r-_0014	kmp_s_0430r_0014		0.549		☑
kms_s_0146r-_0014	kms_s_0146r_0014		0.549		☑
kms_s_0763-_br_0014	kms_s_0763_br-_0014		0.549		☑
kms_s_1434-_br_0014	kms_s_1434_br-_0014		0.549		☑

7.6 Reaction r_0015

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 2,5-diamino-6-ribosylamino-4(3H)-pyrimidinone 5'-phosphate reductase (NADPH)

Notes GENE_ASSOCIATION:YBR153W

Reaction equation

$$\text{s\_0145} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0145, s\_0146, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0146} + \text{s\_1091} \quad (309)$$

Reactants

Table 25: Properties of each reactant.

Id	Name	SBO
s_0145	2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 26: Properties of each modifier.

Id	Name	SBO
s_0145	2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]	
s_0146	2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 27: Properties of each product.

Id	Name	SBO
s_0146	2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_6}(\mathrm{Keq\_r\_0015}, \mathrm{Vmax\_r\_0015}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0146r\_0015}, \mathrm{kmp\_s\_1091r\_0015}, \mathrm{kms\_s\_0145r\_0015}, \mathrm{kms\_s\_0763\_br\_0015}, \mathrm{kms\_s\_1096r\_0015}, [\mathrm{s\_0145}], [\mathrm{s\_0146}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (310)$$

$$\mathrm{function\_6}(\mathrm{Keq\_r\_0015}, \mathrm{Vmax\_r\_0015}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0146r\_0015}, \mathrm{kmp\_s\_1091r\_0015}, \mathrm{kms\_s\_0145r\_0015}, \mathrm{kms\_s\_0763\_br\_0015}, \mathrm{kms\_s\_1096r\_0015}, [\mathrm{s\_0145}], [\mathrm{s\_0146}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0015} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0145r\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0015}}\right)^{1} \cdot \left([\mathrm{s\_0145}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0146}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0015}}\right)}{\left(1 + \frac{[\mathrm{s\_0145}]}{\mathrm{kms\_s\_0145r\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0015}}\right) + \left(1 + \frac{[\mathrm{s\_0146}]}{\mathrm{kmp\_s\_0146r\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0015}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (311)$$

$$\mathrm{function\_6}(\mathrm{Keq\_r\_0015}, \mathrm{Vmax\_r\_0015}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0146r\_0015}, \mathrm{kmp\_s\_1091r\_0015}, \mathrm{kms\_s\_0145r\_0015}, \mathrm{kms\_s\_0763\_br\_0015}, \mathrm{kms\_s\_1096r\_0015}, [\mathrm{s\_0145}], [\mathrm{s\_0146}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0015} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0145r\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0015}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0015}}\right)^{1} \cdot \left([\mathrm{s\_0145}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0146}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0015}}\right)}{\left(1 + \frac{[\mathrm{s\_0145}]}{\mathrm{kms\_s\_0145r\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0015}}\right) + \left(1 + \frac{[\mathrm{s\_0146}]}{\mathrm{kmp\_s\_0146r\_0015}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0015}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (312)$$

Table 28: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0015	Keq_r_0015		2.004		☑
Vmax_r_0015	Vmax_r_0015		0.006		☑
kmp_s_0146r-_0015	kmp_s_0146r_0015		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1091r-_0015	kmp_s_1091r_0015		0.549		☑
kms_s_0145r-_0015	kms_s_0145r_0015		0.549		☑
kms_s_0763-_br_0015	kms_s_0763_br-_0015		0.549		☑
kms_s_1096r-_0015	kms_s_1096r_0015		0.549		☑

7.7 Reaction r_0016

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 2-aceto-2-hydroxybutanoate synthase

Notes GENE_ASSOCIATION:(YCL009C and YMR108W)

Reaction equation

$$\text{s\_0183} + \text{s\_0763\_b} + \text{s\_1277} \xrightleftharpoons{\text{s\_0042, s\_0183, s\_0470, s\_0763\_b, s\_1277}} \text{s\_0042} + \text{s\_0470} \tag{313}$$

Reactants

Table 29: Properties of each reactant.

Id	Name	SBO
s_0183	2-oxobutanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 30: Properties of each modifier.

Id	Name	SBO
s_0042	(S)-2-acetyl-2-hydroxybutanoate [intracellular]	
s_0183	2-oxobutanoate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 31: Properties of each product.

Id	Name	SBO
s_0042	(S)-2-acetyl-2-hydroxybutanoate [intracellular]	
s_0470	carbon dioxide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_7}\left(\mathrm{Keq\_r\_0016}, \mathrm{Vmax\_r\_0016}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0042r\_0016}, \mathrm{kmp\_s\_0470r\_0016}, \mathrm{kms\_s\_0183r\_0016}, \mathrm{kms\_s\_0763\_br\_0016}, \mathrm{kms\_s\_1277r\_0016}, [\mathrm{s\_0042}], [\mathrm{s\_0183}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]\right) \tag{314}$$

$$\mathrm{function\_7}\left(\mathrm{Keq\_r\_0016}, \mathrm{Vmax\_r\_0016}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0042r\_0016}, \mathrm{kmp\_s\_0470r\_0016}, \mathrm{kms\_s\_0183r\_0016}, \mathrm{kms\_s\_0763\_br\_0016}, \mathrm{kms\_s\_1277r\_0016}, [\mathrm{s\_0042}], [\mathrm{s\_0183}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0016} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0183r\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0016}}\right)^{1} \cdot \left([\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0042}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0016}}\right)}{\left(1 + \frac{[\mathrm{s\_0183}]}{\mathrm{kms\_s\_0183r\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0016}}\right) + \left(1 + \frac{[\mathrm{s\_0042}]}{\mathrm{kmp\_s\_0042r\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0016}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{315}$$

$$\mathrm{function\_7}\left(\mathrm{Keq\_r\_0016}, \mathrm{Vmax\_r\_0016}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0042r\_0016}, \mathrm{kmp\_s\_0470r\_0016}, \mathrm{kms\_s\_0183r\_0016}, \mathrm{kms\_s\_0763\_br\_0016}, \mathrm{kms\_s\_1277r\_0016}, [\mathrm{s\_0042}], [\mathrm{s\_0183}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0016} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0183r\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0016}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0016}}\right)^{1} \cdot \left([\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0042}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0016}}\right)}{\left(1 + \frac{[\mathrm{s\_0183}]}{\mathrm{kms\_s\_0183r\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0016}}\right) + \left(1 + \frac{[\mathrm{s\_0042}]}{\mathrm{kmp\_s\_0042r\_0016}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0016}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{316}$$

Table 32: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0016	Keq_r_0016		33.069		☑
Vmax_r_0016	Vmax_r_0016		1.152		☑
kmp_s_0042r-_0016	kmp_s_0042r_0016		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0470r-_0016	kmp_s_0470r_0016		1.000		☑
kms_s_0183r-_0016	kms_s_0183r_0016		0.549		☑
kms_s_0763-_br_0016	kms_s_0763_br-_0016		0.549		☑
kms_s_1277r-_0016	kms_s_1277r_0016		0.061		☑

7.8 Reaction r_0018

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name 2-aminoadipate transaminase

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0181} + \text{s\_0899} \xrightleftharpoons{\text{s\_0181, s\_0185, s\_0861, s\_0899}} \text{s\_0185} + \text{s\_0861} \quad (317)$$

Reactants

Table 33: Properties of each reactant.

Id	Name	SBO
s_0181	2-oxoadipic acid [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 34: Properties of each modifier.

Id	Name	SBO
s_0181	2-oxoadipic acid [intracellular]	
s_0185	2-oxoglutarate [intracellular]	
s_0861	L-2-aminoadipate(2-) [intracellular]	
s_0899	L-glutamate [intracellular]	

Products

Table 35: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0861	L-2-aminoadipate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_8}(\mathrm{Keq\_r\_0018}, \mathrm{Vmax\_r\_0018}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0018}, \mathrm{kmp\_s\_0861r\_0018}, \mathrm{kms\_s\_0181r\_0018}, \mathrm{kms\_s\_0899r\_0018}, [\mathrm{s\_0181}], [\mathrm{s\_0185}], [\mathrm{s\_0861}], [\mathrm{s\_0899}]) \quad (318)$$

$$\mathrm{function\_8}(\mathrm{Keq\_r\_0018}, \mathrm{Vmax\_r\_0018}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0018}, \mathrm{kmp\_s\_0861r\_0018}, \mathrm{kms\_s\_0181r\_0018}, \mathrm{kms\_s\_0899r\_0018}, [\mathrm{s\_0181}], [\mathrm{s\_0185}], [\mathrm{s\_0861}], [\mathrm{s\_0899}]) = \frac{\mathrm{Vmax\_r\_0018} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0181r\_0018}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0018}}\right)^1 \cdot \left([\mathrm{s\_0181}]^1 \cdot [\mathrm{s\_0899}]^1 - \frac{[\mathrm{s\_0185}]^1 \cdot [\mathrm{s\_0861}]^1}{\mathrm{Keq\_r\_0018}}\right)}{\left(1+\frac{[\mathrm{s\_0181}]}{\mathrm{kms\_s\_0181r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0018}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0861}]}{\mathrm{kmp\_s\_0861r\_0018}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (319)$$

$$\mathrm{function\_8}(\mathrm{Keq\_r\_0018}, \mathrm{Vmax\_r\_0018}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0018}, \mathrm{kmp\_s\_0861r\_0018}, \mathrm{kms\_s\_0181r\_0018}, \mathrm{kms\_s\_0899r\_0018}, [\mathrm{s\_0181}], [\mathrm{s\_0185}], [\mathrm{s\_0861}], [\mathrm{s\_0899}]) = \frac{\mathrm{Vmax\_r\_0018} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0181r\_0018}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0018}}\right)^1 \cdot \left([\mathrm{s\_0181}]^1 \cdot [\mathrm{s\_0899}]^1 - \frac{[\mathrm{s\_0185}]^1 \cdot [\mathrm{s\_0861}]^1}{\mathrm{Keq\_r\_0018}}\right)}{\left(1+\frac{[\mathrm{s\_0181}]}{\mathrm{kms\_s\_0181r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0018}}\right) + \left(1+\frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0018}}\right) \cdot \left(1+\frac{[\mathrm{s\_0861}]}{\mathrm{kmp\_s\_0861r\_0018}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (320)$$

Table 36: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0018	Keq_r_0018		1.100		☑
Vmax_r_0018	Vmax_r_0018		1.024		☑
kmp_s_0185r-_0018	kmp_s_0185r_0018		0.549		☑
kmp_s_0861r-_0018	kmp_s_0861r_0018		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0181r-_0018	kms_s_0181r_0018		0.549		☑
kms_s_0899r-_0018	kms_s_0899r_0018		0.549		☑

7.9 Reaction r_0021

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 2-deoxy-D-arabino-heptulosonate 7-phosphate synthetase

Notes GENE_ASSOCIATION:YDR035W or (YBR249C or YDR035W)

Reaction equation

$$s\_0533 + s\_1243 + s\_1434\_b \xrightleftharpoons{s\_0356,\ s\_0533,\ s\_1207,\ s\_1243,\ s\_1434\_b} s\_0356 + s\_1207 \tag{321}$$

Reactants

Table 37: Properties of each reactant.

Id	Name	SBO
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 38: Properties of each modifier.

Id	Name	SBO
s_0356	7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]	
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_1207	phosphate [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 39: Properties of each product.

Id	Name	SBO
s_0356	7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_9}(\mathrm{Keq\_r\_0021}, \mathrm{Vmax\_r\_0021}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0356r\_0021}, \mathrm{kmp\_s\_1207r\_0021}, \mathrm{kms\_s\_0533r\_0021}, \mathrm{kms\_s\_1243r\_0021}, \mathrm{kms\_s\_1434\_br\_0021}, [\mathrm{s\_0356}], [\mathrm{s\_0533}], [\mathrm{s\_1207}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) \quad (322)$$

$$\mathrm{function\_9}(\mathrm{Keq\_r\_0021}, \mathrm{Vmax\_r\_0021}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0356r\_0021}, \mathrm{kmp\_s\_1207r\_0021}, \mathrm{kms\_s\_0533r\_0021}, \mathrm{kms\_s\_1243r\_0021}, \mathrm{kms\_s\_1434\_br\_0021}, [\mathrm{s\_0356}], [\mathrm{s\_0533}], [\mathrm{s\_1207}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0021} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0533r\_0021}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0021}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0021}}\right)^1 \cdot \left([\mathrm{s\_0533}]^1 \cdot [\mathrm{s\_1243}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0356}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0021}}\right)}{\left(1+\frac{[\mathrm{s\_0533}]}{\mathrm{kms\_s\_0533r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0021}}\right) + \left(1+\frac{[\mathrm{s\_0356}]}{\mathrm{kmp\_s\_0356r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0021}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (323)$$

$$\mathrm{function\_9}(\mathrm{Keq\_r\_0021}, \mathrm{Vmax\_r\_0021}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0356r\_0021}, \mathrm{kmp\_s\_1207r\_0021}, \mathrm{kms\_s\_0533r\_0021}, \mathrm{kms\_s\_1243r\_0021}, \mathrm{kms\_s\_1434\_br\_0021}, [\mathrm{s\_0356}], [\mathrm{s\_0533}], [\mathrm{s\_1207}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0021} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0533r\_0021}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0021}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0021}}\right)^1 \cdot \left([\mathrm{s\_0533}]^1 \cdot [\mathrm{s\_1243}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0356}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0021}}\right)}{\left(1+\frac{[\mathrm{s\_0533}]}{\mathrm{kms\_s\_0533r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0021}}\right) + \left(1+\frac{[\mathrm{s\_0356}]}{\mathrm{kmp\_s\_0356r\_0021}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0021}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (324)$$

Table 40: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0021	Keq_r_0021		40.577		☑
Vmax_r_0021	Vmax_r_0021		1.609		☑
kmp_s_0356r-_0021	kmp_s_0356r_0021		0.549		☑
kmp_s_1207r-_0021	kmp_s_1207r_0021		0.549		☑
kms_s_0533r-_0021	kms_s_0533r_0021		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_1243r_0021	kms_s_1243r_0021		0.027		☑
kms_s_1434_br_0021	kms_s_1434_br_0021		0.549		☑

7.10 Reaction r_0025

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name 2-isopropylmalate hydratase

Notes GENE_ASSOCIATION:YGL009C

Reaction equation

$$\text{s\_0167} \xrightleftharpoons{\text{s\_0167, s\_0170, s\_1434\_b}} \text{s\_0170} + \text{s\_1434\_b} \tag{325}$$

Reactant

Table 41: Properties of each reactant.

Id	Name	SBO
s_0167	2-isopropylmalate(2-) [intracellular]	

Modifiers

Table 42: Properties of each modifier.

Id	Name	SBO
s_0167	2-isopropylmalate(2-) [intracellular]	
s_0170	2-isopropylmaleic acid [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 43: Properties of each product.

Id	Name	SBO
s_0170	2-isopropylmaleic acid [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_10}\left(\mathrm{Keq\_r\_0025}, \mathrm{Vmax\_r\_0025}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0170r\_0025}, \mathrm{kmp\_s\_1434\_br\_0025}, \mathrm{kms\_s\_0167r\_0025}, [\mathrm{s\_0167}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) \quad (326)$$

$$\mathrm{function\_10}\left(\mathrm{Keq\_r\_0025}, \mathrm{Vmax\_r\_0025}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0170r\_0025}, \mathrm{kmp\_s\_1434\_br\_0025}, \mathrm{kms\_s\_0167r\_0025}, [\mathrm{s\_0167}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0025} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0167r\_0025}}\right)^{1} \cdot \left([\mathrm{s\_0167}]^{1} - \frac{[\mathrm{s\_0170}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0025}}\right)}{1 + \frac{[\mathrm{s\_0167}]}{\mathrm{kms\_s\_0167r\_0025}} + \left(1 + \frac{[\mathrm{s\_0170}]}{\mathrm{kmp\_s\_0170r\_0025}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0025}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (327)$$

$$\mathrm{function\_10}\left(\mathrm{Keq\_r\_0025}, \mathrm{Vmax\_r\_0025}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0170r\_0025}, \mathrm{kmp\_s\_1434\_br\_0025}, \mathrm{kms\_s\_0167r\_0025}, [\mathrm{s\_0167}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0025} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0167r\_0025}}\right)^{1} \cdot \left([\mathrm{s\_0167}]^{1} - \frac{[\mathrm{s\_0170}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0025}}\right)}{1 + \frac{[\mathrm{s\_0167}]}{\mathrm{kms\_s\_0167r\_0025}} + \left(1 + \frac{[\mathrm{s\_0170}]}{\mathrm{kmp\_s\_0170r\_0025}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0025}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (328)$$

Table 44: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0025	Keq_r_0025		0.604		☑
Vmax_r_0025	Vmax_r_0025		0.764		☑
kmp_s_0170r-_0025	kmp_s_0170r_0025		0.549		☑
kmp_s_1434-_br_0025	kmp_s_1434_br-_0025		0.549		☑
kms_s_0167r-_0025	kms_s_0167r_0025		0.549		☑

7.11 Reaction r_0026

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name 2-isopropylmalate synthase

Notes GENE_ASSOCIATION:(YNL104C or YOR108W) or YNL104C

Reaction equation

$$\mathrm{s\_0238} + \mathrm{s\_0380} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0167},\ \mathrm{s\_0238},\ \mathrm{s\_0380},\ \mathrm{s\_0514},\ \mathrm{s\_0763\_b},\ \mathrm{s\_1434\_b}} \mathrm{s\_0167} + \mathrm{s\_0514} + \mathrm{s\_0763\_b} \quad (329)$$

Reactants

Table 45: Properties of each reactant.

Id	Name	SBO
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 46: Properties of each modifier.

Id	Name	SBO
s_0167	2-isopropylmalate(2-) [intracellular]	
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 47: Properties of each product.

Id	Name	SBO
s_0167	2-isopropylmalate(2-) [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_11}\left(\mathrm{Keq\_r\_0026}, \mathrm{Vmax\_r\_0026}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0167r\_0026}, \mathrm{kmp\_s\_0514r\_0026}, \mathrm{kmp\_s\_0763\_br\_0026}, \mathrm{kms\_s\_0238r\_0026}, \mathrm{kms\_s\_0380r\_0026}, \mathrm{kms\_s\_1434\_br\_0026}, [\mathrm{s\_0167}], [\mathrm{s\_0238}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) \tag{330}$$

$$\mathrm{function\_11}\left(\mathrm{Keq\_r\_0026}, \mathrm{Vmax\_r\_0026}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0167r\_0026}, \mathrm{kmp\_s\_0514r\_0026}, \mathrm{kmp\_s\_0763\_br\_0026}, \mathrm{kms\_s\_0238r\_0026}, \mathrm{kms\_s\_0380r\_0026}, \mathrm{kms\_s\_1434\_br\_0026}, [\mathrm{s\_0167}], [\mathrm{s\_0238}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0026} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0238r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0026}}\right)^{1} \cdot \left([\mathrm{s\_0238}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0167}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0026}}\right)}{\left(1+\frac{[\mathrm{s\_0238}]}{\mathrm{kms\_s\_0238r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0026}}\right) + \left(1+\frac{[\mathrm{s\_0167}]}{\mathrm{kmp\_s\_0167r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0026}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{331}$$

$$\mathrm{function\_11}\left(\mathrm{Keq\_r\_0026}, \mathrm{Vmax\_r\_0026}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0167r\_0026}, \mathrm{kmp\_s\_0514r\_0026}, \mathrm{kmp\_s\_0763\_br\_0026}, \mathrm{kms\_s\_0238r\_0026}, \mathrm{kms\_s\_0380r\_0026}, \mathrm{kms\_s\_1434\_br\_0026}, [\mathrm{s\_0167}], [\mathrm{s\_0238}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0026} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0238r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0026}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0026}}\right)^{1} \cdot \left([\mathrm{s\_0238}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0167}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0026}}\right)}{\left(1+\frac{[\mathrm{s\_0238}]}{\mathrm{kms\_s\_0238r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0026}}\right) + \left(1+\frac{[\mathrm{s\_0167}]}{\mathrm{kmp\_s\_0167r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0026}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0026}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{332}$$

Table 48: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0026	Keq_r_0026		1.100		☑
Vmax_r_0026	Vmax_r_0026		2.294		☑
kmp_s_0167r_0026	kmp_s_0167r_0026		0.549		☑
kmp_s_0514r_0026	kmp_s_0514r_0026		0.549		☑
kmp_s_0763_br_0026	kmp_s_0763_br_0026		0.549		☑
kms_s_0238r_0026	kms_s_0238r_0026		0.549		☑
kms_s_0380r_0026	kms_s_0380r_0026		0.549		☑
kms_s_1434_br_0026	kms_s_1434_br_0026		0.549		☑

7.12 Reaction r_0029

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name 2-methylcitrate dehydratase

Notes GENE_ASSOCIATION:YDR234W

Reaction equation

$$\text{s\_0798} \xrightleftharpoons{\text{s\_0468, s\_0798, s\_1434\_b}} \text{s\_0468} + \text{s\_1434\_b} \tag{333}$$

Reactant

Table 49: Properties of each reactant.

Id	Name	SBO
s_0798	homocitrate(3-) [intracellular]	

Modifiers

Table 50: Properties of each modifier.

Id	Name	SBO
s_0468	but-1-ene-1,2,4-tricarboxylic acid [intracellular]	
s_0798	homocitrate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 51: Properties of each product.

Id	Name	SBO
s_0468	but-1-ene-1,2,4-tricarboxylic acid [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_12}(\mathrm{Keq\_r\_0029}, \mathrm{Vmax\_r\_0029}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0468r\_0029}, \mathrm{kmp\_s\_1434\_br\_0029}, \mathrm{kms\_s\_0798r\_0029}, [\mathrm{s\_0468}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]) \tag{334}$$

$$\mathrm{function\_12}(\mathrm{Keq\_r\_0029}, \mathrm{Vmax\_r\_0029}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0468r\_0029}, \mathrm{kmp\_s\_1434\_br\_0029}, \mathrm{kms\_s\_0798r\_0029}, [\mathrm{s\_0468}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0029} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0798r\_0029}}\right)^{1} \cdot \left([\mathrm{s\_0798}]^{1} - \frac{[\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0029}}\right)}{1 + \frac{[\mathrm{s\_0798}]}{\mathrm{kms\_s\_0798r\_0029}} + \left(1 + \frac{[\mathrm{s\_0468}]}{\mathrm{kmp\_s\_0468r\_0029}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0029}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{335}$$

$$\mathrm{function\_12}(\mathrm{Keq\_r\_0029}, \mathrm{Vmax\_r\_0029}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0468r\_0029}, \mathrm{kmp\_s\_1434\_br\_0029}, \mathrm{kms\_s\_0798r\_0029}, [\mathrm{s\_0468}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0029} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0798r\_0029}}\right)^{1} \cdot \left([\mathrm{s\_0798}]^{1} - \frac{[\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0029}}\right)}{1 + \frac{[\mathrm{s\_0798}]}{\mathrm{kms\_s\_0798r\_0029}} + \left(1 + \frac{[\mathrm{s\_0468}]}{\mathrm{kmp\_s\_0468r\_0029}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0029}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{336}$$

Table 52: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0029`	Keq_r_0029		0.604		☑
`Vmax_r_0029`	Vmax_r_0029		0.731		☑
`kmp_s_0468r_0029`	kmp_s_0468r_0029		0.549		☑
`kmp_s_1434_br_0029`	kmp_s_1434_br_0029		0.549		☑
`kms_s_0798r_0029`	kms_s_0798r_0029		0.549		☑

7.13 Reaction `r_0031`

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name 2-oxo-4-methyl-3-carboxypentanoate decarboxylation

Notes GENE_ASSOCIATION:YJR148W or YHR208W

Reaction equation

$$\mathrm{s\_0010} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0010,\ s\_0297,\ s\_0470,\ s\_0763\_b}} \mathrm{s\_0297} + \mathrm{s\_0470} \tag{337}$$

Reactants

Table 53: Properties of each reactant.

Id	Name	SBO
s_0010	(2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	

Modifiers

Table 54: Properties of each modifier.

Id	Name	SBO
s_0010	(2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]	
s_0297	4-methyl-2-oxopentanoate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 55: Properties of each product.

Id	Name	SBO
s_0297	4-methyl-2-oxopentanoate [intracellular]	
s_0470	carbon dioxide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_13}(\mathrm{Keq\_r\_0031}, \mathrm{Vmax\_r\_0031}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0297r\_0031}, \mathrm{kmp\_s\_0470r\_0031}, \mathrm{kms\_s\_0010r\_0031}, \mathrm{kms\_s\_0763\_br\_0031}, [\mathrm{s\_0010}], [\mathrm{s\_0297}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) \quad (338)$$

$$\mathrm{function\_13}(\mathrm{Keq\_r\_0031}, \mathrm{Vmax\_r\_0031}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0297r\_0031}, \mathrm{kmp\_s\_0470r\_0031}, \mathrm{kms\_s\_0010r\_0031}, \mathrm{kms\_s\_0763\_br\_0031}, [\mathrm{s\_0010}], [\mathrm{s\_0297}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0031} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0010r\_0031}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0031}}\right)^1 \cdot \left([\mathrm{s\_0010}]^1 \cdot [\mathrm{s\_0763\_b}]^1 - \frac{[\mathrm{s\_0297}]^1 \cdot [\mathrm{s\_0470}]^1}{\mathrm{Keq\_r\_0031}}\right)}{\left(1+\frac{[\mathrm{s\_0010}]}{\mathrm{kms\_s\_0010r\_0031}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0031}}\right) + \left(1+\frac{[\mathrm{s\_0297}]}{\mathrm{kmp\_s\_0297r\_0031}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0031}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (339)$$

$$\begin{aligned}&\text{function\_13}\left(\text{Keq\_r\_0031}, \text{Vmax\_r\_0031}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0297r\_0031}, \text{kmp\_s\_0470r\_0031}, \text{kms\_s\_0010r\_0031},\\&\quad\quad\left.\text{kms\_s\_0763\_br\_0031}, [\text{s\_0010}], [\text{s\_0297}], [\text{s\_0470}], [\text{s\_0763\_b}]\right)\\&= \frac{\text{Vmax\_r\_0031} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0010r\_0031}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0031}}\right)^{1} \cdot \left([\text{s\_0010}]^{1} \cdot [\text{s\_0763\_b}]^{1} - \frac{[\text{s\_0297}]^{1} \cdot [\text{s\_0470}]^{1}}{\text{Keq\_r\_0031}}\right)}{\left(1+\frac{[\text{s\_0010}]}{\text{kms\_s\_0010r\_0031}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0031}}\right) + \left(1+\frac{[\text{s\_0297}]}{\text{kmp\_s\_0297r\_0031}}\right) \cdot \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0031}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{340}$$

Table 56: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0031	Keq_r_0031		2.004		☑
Vmax_r_0031	Vmax_r_0031		1.070		☑
kmp_s_0297r-_0031	kmp_s_0297r_0031		0.549		☑
kmp_s_0470r-_0031	kmp_s_0470r_0031		1.000		☑
kms_s_0010r-_0031	kms_s_0010r_0031		0.549		☑
kms_s_0763-_br_0031	kms_s_0763_br-_0031		0.549		☑

7.14 Reaction r_0034

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name 3',5'-bisphosphate nucleotidase

Notes GENE_ASSOCIATION:YOL064C

Reaction equation

$$\text{s\_0397} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0397, s\_0434, s\_1207, s\_1434\_b}} \text{s\_0434} + \text{s\_1207} \tag{341}$$

Reactants

Table 57: Properties of each reactant.

Id	Name	SBO
s_0397	adenosine 3',5'-bismonophosphate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 58: Properties of each modifier.

Id	Name	SBO
s_0397	adenosine 3',5'-bismonophosphate [intracellular]	
s_0434	AMP [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 59: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_14}\left(\mathrm{Keq\_r\_0034}, \mathrm{Vmax\_r\_0034}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0034}, \mathrm{kmp\_s\_1207r\_0034}, \mathrm{kms\_s\_0397r\_0034}, \mathrm{kms\_s\_1434\_br\_0034}, [\mathrm{s\_0397}], [\mathrm{s\_0434}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \tag{342}$$

$$\mathrm{function\_14}\left(\mathrm{Keq\_r\_0034}, \mathrm{Vmax\_r\_0034}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0034}, \mathrm{kmp\_s\_1207r\_0034}, \mathrm{kms\_s\_0397r\_0034}, \mathrm{kms\_s\_1434\_br\_0034}, [\mathrm{s\_0397}], [\mathrm{s\_0434}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0034} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0397r\_0034}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0034}}\right)^{1} \cdot \left([\mathrm{s\_0397}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0034}}\right)}{\left(1 + \frac{[\mathrm{s\_0397}]}{\mathrm{kms\_s\_0397r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0034}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0034}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{343}$$

$$\mathrm{function\_14}\left(\mathrm{Keq\_r\_0034}, \mathrm{Vmax\_r\_0034}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0034}, \mathrm{kmp\_s\_1207r\_0034}, \mathrm{kms\_s\_0397r\_0034}, \mathrm{kms\_s\_1434\_br\_0034}, [\mathrm{s\_0397}], [\mathrm{s\_0434}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0034} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0397r\_0034}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0034}}\right)^{1} \cdot \left([\mathrm{s\_0397}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0034}}\right)}{\left(1 + \frac{[\mathrm{s\_0397}]}{\mathrm{kms\_s\_0397r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0034}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0034}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0034}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{344}$$

Table 60: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0034	Keq_r_0034		2.524		☑
Vmax_r_0034	Vmax_r_0034		0.397		☑
kmp_s_0434r-_0034	kmp_s_0434r_0034		1.260		☑
kmp_s_1207r-_0034	kmp_s_1207r_0034		0.549		☑
kms_s_0397r-_0034	kms_s_0397r_0034		0.549		☑
kms_s_1434-_br_0034	kms_s_1434_br-_0034		0.549		☑

7.15 Reaction r_0040

This is a reversible reaction of one reactant forming three products influenced by four modifiers.

Name 3,4-dihydroxy-2-butanone-4-phosphate synthase

Notes GENE_ASSOCIATION:YDR487C

Reaction equation

$$\mathrm{s\_0557} \xrightleftharpoons{\mathrm{s\_0163,\ s\_0557,\ s\_0689,\ s\_0763\_b}} \mathrm{s\_0163} + \mathrm{s\_0689} + \mathrm{s\_0763\_b} \tag{345}$$

Reactant

Table 61: Properties of each reactant.

Id	Name	SBO
s_0557	D-ribulose 5-phosphate [intracellular]	

Modifiers

Table 62: Properties of each modifier.

Id	Name	SBO
s_0163	2-hydroxy-3-oxobutyl phosphate [intracellular]	
s_0557	D-ribulose 5-phosphate [intracellular]	
s_0689	formate [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 63: Properties of each product.

Id	Name	SBO
s_0163	2-hydroxy-3-oxobutyl phosphate [intracellular]	
s_0689	formate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_15}\left(\mathrm{Keq\_r\_0040}, \mathrm{Vmax\_r\_0040}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0163r\_0040}, \mathrm{kmp\_s\_0689r\_0040}, \mathrm{kmp\_s\_0763\_br\_0040}, \mathrm{kms\_s\_0557r\_0040}, [\mathrm{s\_0163}], [\mathrm{s\_0557}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}]\right) \tag{346}$$

$$\mathrm{function\_15}\left(\mathrm{Keq\_r\_0040}, \mathrm{Vmax\_r\_0040}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0163r\_0040}, \mathrm{kmp\_s\_0689r\_0040}, \mathrm{kmp\_s\_0763\_br\_0040}, \mathrm{kms\_s\_0557r\_0040}, [\mathrm{s\_0163}], [\mathrm{s\_0557}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}]\right) = \frac{\mathrm{Vmax\_r\_0040} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0557r\_0040}}\right)^{1} \cdot \left([\mathrm{s\_0557}]^{1} - \frac{[\mathrm{s\_0163}]^{1} \cdot [\mathrm{s\_0689}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0040}}\right)}{1 + \frac{[\mathrm{s\_0557}]}{\mathrm{kms\_s\_0557r\_0040}} + \left(1 + \frac{[\mathrm{s\_0163}]}{\mathrm{kmp\_s\_0163r\_0040}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0040}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0040}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{347}$$

$$\mathrm{function\_15}\left(\mathrm{Keq\_r\_0040}, \mathrm{Vmax\_r\_0040}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0163r\_0040}, \mathrm{kmp\_s\_0689r\_0040}, \mathrm{kmp\_s\_0763\_br\_0040}, \mathrm{kms\_s\_0557r\_0040}, [\mathrm{s\_0163}], [\mathrm{s\_0557}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}]\right) = \frac{\mathrm{Vmax\_r\_0040} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0557r\_0040}}\right)^{1} \cdot \left([\mathrm{s\_0557}]^{1} - \frac{[\mathrm{s\_0163}]^{1} \cdot [\mathrm{s\_0689}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0040}}\right)}{1 + \frac{[\mathrm{s\_0557}]}{\mathrm{kms\_s\_0557r\_0040}} + \left(1 + \frac{[\mathrm{s\_0163}]}{\mathrm{kmp\_s\_0163r\_0040}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0040}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0040}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{348}$$

Table 64: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0040	Keq_r_0040		0.332		☑
Vmax_r_0040	Vmax_r_0040		0.010		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0163r-_0040	kmp_s_0163r_0040		0.549		☑
kmp_s_0689r-_0040	kmp_s_0689r_0040		0.549		☑
kmp_s_0763-_br_0040	kmp_s_0763_br-_0040		0.549		☑
kms_s_0557r-_0040	kms_s_0557r_0040		0.549		☑

7.16 Reaction r_0042

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name 3-dehydroquinate dehydratase

Notes GENE_ASSOCIATION:YDR127W

Reaction equation

$$\text{s\_0216} \xrightleftharpoons{\text{s\_0216, s\_0217, s\_1434\_b}} \text{s\_0217} + \text{s\_1434\_b} \tag{349}$$

Reactant

Table 65: Properties of each reactant.

Id	Name	SBO
s_0216	3-dehydroquinate [intracellular]	

Modifiers

Table 66: Properties of each modifier.

Id	Name	SBO
s_0216	3-dehydroquinate [intracellular]	
s_0217	3-dehydroshikimate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 67: Properties of each product.

Id	Name	SBO
s_0217	3-dehydroshikimate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_16}(\mathrm{Keq\_r\_0042}, \mathrm{Vmax\_r\_0042}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0217r\_0042}, \mathrm{kmp\_s\_1434\_br\_0042}, \mathrm{kms\_s\_0216r\_0042}, [\mathrm{s\_0216}], [\mathrm{s\_0217}], [\mathrm{s\_1434\_b}]) \quad (350)$$

$$\mathrm{function\_16}(\mathrm{Keq\_r\_0042}, \mathrm{Vmax\_r\_0042}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0217r\_0042}, \mathrm{kmp\_s\_1434\_br\_0042}, \mathrm{kms\_s\_0216r\_0042}, [\mathrm{s\_0216}], [\mathrm{s\_0217}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0042} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0216r\_0042}}\right)^1 \cdot \left([\mathrm{s\_0216}]^1 - \frac{[\mathrm{s\_0217}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0042}}\right)}{1 + \frac{[\mathrm{s\_0216}]}{\mathrm{kms\_s\_0216r\_0042}} + \left(1 + \frac{[\mathrm{s\_0217}]}{\mathrm{kmp\_s\_0217r\_0042}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0042}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (351)$$

$$\mathrm{function\_16}(\mathrm{Keq\_r\_0042}, \mathrm{Vmax\_r\_0042}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0217r\_0042}, \mathrm{kmp\_s\_1434\_br\_0042}, \mathrm{kms\_s\_0216r\_0042}, [\mathrm{s\_0216}], [\mathrm{s\_0217}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0042} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0216r\_0042}}\right)^1 \cdot \left([\mathrm{s\_0216}]^1 - \frac{[\mathrm{s\_0217}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0042}}\right)}{1 + \frac{[\mathrm{s\_0216}]}{\mathrm{kms\_s\_0216r\_0042}} + \left(1 + \frac{[\mathrm{s\_0217}]}{\mathrm{kmp\_s\_0217r\_0042}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0042}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (352)$$

Table 68: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0042	Keq_r_0042		0.604		☑
Vmax_r_0042	Vmax_r_0042		0.731		☑
kmp_s_0217r-_0042	kmp_s_0217r_0042		0.549		☑
kmp_s_1434-_br_0042	kmp_s_1434_br-_0042		0.549		☑
kms_s_0216r-_0042	kms_s_0216r_0042		0.549		☑

7.17 Reaction r_0043

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name 3-dehydroquinate synthase

Notes GENE_ASSOCIATION:YDR127W

Reaction equation

$$s\_0356 \xrightleftharpoons{s\_0216,\ s\_0356,\ s\_1207} s\_0216 + s\_1207 \tag{353}$$

Reactant

Table 69: Properties of each reactant.

Id	Name	SBO
s_0356	7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]	

Modifiers

Table 70: Properties of each modifier.

Id	Name	SBO
s_0216	3-dehydroquinate [intracellular]	
s_0356	7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 71: Properties of each product.

Id	Name	SBO
s_0216	3-dehydroquinate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{17} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_17}\left(\mathrm{Keq\_r\_0043}, \mathrm{Vmax\_r\_0043}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \\ & \left.\mathrm{kmp\_s\_0216r\_0043}, \mathrm{kmp\_s\_1207r\_0043}, \mathrm{kms\_s\_0356r\_0043}, [\mathrm{s\_0216}], [\mathrm{s\_0356}], [\mathrm{s\_1207}]\right) \end{aligned} \tag{354}$$

$$
\begin{aligned}
&\text{function\_17}\left(\text{Keq\_r\_0043}, \text{Vmax\_r\_0043}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0216r\_0043},\right.\\
&\quad \text{kmp\_s\_1207r\_0043}, \text{kms\_s\_0356r\_0043}, [\text{s\_0216}], [\text{s\_0356}],\\
&\quad \left.[\text{s\_1207}]\right) = \frac{\text{Vmax\_r\_0043} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0356r\_0043}}\right)^1 \cdot \left([\text{s\_0356}]^1 - \frac{[\text{s\_0216}]^1 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_0043}}\right)}{1+\frac{[\text{s\_0356}]}{\text{kms\_s\_0356r\_0043}}+\left(1+\frac{[\text{s\_0216}]}{\text{kmp\_s\_0216r\_0043}}\right)\cdot\left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0043}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{355}
$$

$$
\begin{aligned}
&\text{function\_17}\left(\text{Keq\_r\_0043}, \text{Vmax\_r\_0043}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0216r\_0043},\right.\\
&\quad \text{kmp\_s\_1207r\_0043}, \text{kms\_s\_0356r\_0043}, [\text{s\_0216}], [\text{s\_0356}],\\
&\quad \left.[\text{s\_1207}]\right) = \frac{\text{Vmax\_r\_0043} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0356r\_0043}}\right)^1 \cdot \left([\text{s\_0356}]^1 - \frac{[\text{s\_0216}]^1 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_0043}}\right)}{1+\frac{[\text{s\_0356}]}{\text{kms\_s\_0356r\_0043}}+\left(1+\frac{[\text{s\_0216}]}{\text{kmp\_s\_0216r\_0043}}\right)\cdot\left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0043}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{356}
$$

Table 72: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0043`	Keq_r_0043		0.604		☑
`Vmax_r_0043`	Vmax_r_0043		0.731		☑
`kmp_s_0216r-_0043`	kmp_s_0216r_0043		0.549		☑
`kmp_s_1207r-_0043`	kmp_s_1207r_0043		0.549		☑
`kms_s_0356r-_0043`	kms_s_0356r_0043		0.549		☑

7.18 Reaction `r_0044`

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 3-dehydrosphinganine reductase

Notes GENE_ASSOCIATION:YBR265W

Reaction equation

$$
\text{s\_0218} + 2\,\text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0218, s\_0763\_b, s\_1091, s\_1096, s\_1325}} \text{s\_1091} + \text{s\_1325} \tag{357}
$$

Reactants

Table 73: Properties of each reactant.

Id	Name	SBO
s_0218	3-dehydrosphinganine [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 74: Properties of each modifier.

Id	Name	SBO
s_0218	3-dehydrosphinganine [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1325	sphinganine [intracellular]	

Products

Table 75: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1325	sphinganine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_18}(\mathrm{Keq\_r\_0044}, \mathrm{Vmax\_r\_0044}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_0044}, \mathrm{kmp\_s\_1325r\_0044}, \mathrm{kms\_s\_0218r\_0044}, \mathrm{kms\_s\_0763\_br\_0044}, \mathrm{kms\_s\_1096r\_0044}, [\mathrm{s\_0218}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1325}]) \tag{358}$$

$$\mathrm{function\_18}(\mathrm{Keq\_r\_0044}, \mathrm{Vmax\_r\_0044}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_0044}, \mathrm{kmp\_s\_1325r\_0044}, \mathrm{kms\_s\_0218r\_0044}, \mathrm{kms\_s\_0763\_br\_0044}, \mathrm{kms\_s\_1096r\_0044}, [\mathrm{s\_0218}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1325}]) = \frac{\mathrm{Vmax\_r\_0044} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0218r\_0044}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0044}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0044}}\right)^{1} \cdot \left([\mathrm{s\_0218}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1325}]^{1}}{\mathrm{Keq\_r\_0044}}\right)}{\left(1+\frac{[\mathrm{s\_0218}]}{\mathrm{kms\_s\_0218r\_0044}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0044}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0044}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0044}}\right) \cdot \left(1+\frac{[\mathrm{s\_1325}]}{\mathrm{kmp\_s\_1325r\_0044}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{359}$$

$$\text{function\_18}(\text{Keq\_r\_0044}, \text{Vmax\_r\_0044}, \text{vol}(\text{intracellular}), \text{kmp\_s\_1091r\_0044}, \text{kmp\_s\_1325r\_0044}, \text{kms\_s\_0218r\_0044}, \text{kms\_s\_0763\_br\_0044}, \text{kms\_s\_1096r\_0044}, [\text{s\_0218}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1325}]) = \frac{\text{Vmax\_r\_0044} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0218r\_0044}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0044}}\right)^2 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0044}}\right)^1 \cdot \left([\text{s\_0218}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1096}]^1 - \frac{[\text{s\_1091}]^1 \cdot [\text{s\_1325}]^1}{\text{Keq\_r\_0044}}\right)}{\left(1+\frac{[\text{s\_0218}]}{\text{kms\_s\_0218r\_0044}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0044}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0044}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0044}}\right) \cdot \left(1+\frac{[\text{s\_1325}]}{\text{kmp\_s\_1325r\_0044}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{360}$$

Table 76: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0044	Keq_r_0044		3.650		☑
Vmax_r_0044	Vmax_r_0044		0.003		☑
kmp_s_1091r_0044	kmp_s_1091r_0044		0.549		☑
kmp_s_1325r_0044	kmp_s_1325r_0044		0.549		☑
kms_s_0218r_0044	kms_s_0218r_0044		0.549		☑
kms_s_0763_br_0044	kms_s_0763_br_0044		0.549		☑
kms_s_1096r_0044	kms_s_1096r_0044		0.549		☑

7.19 Reaction r_0057

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 3-hydroxyacyl-CoA dehydrogenase (3-oxohexacosyl-CoA)

Notes GENE_ASSOCIATION:YKR009C

Reaction equation

$$\text{s\_0247} + \text{s\_0763\_b} + \text{s\_1087} \xrightleftharpoons{\text{s\_0046, s\_0247, s\_0763\_b, s\_1082, s\_1087}} \text{s\_0046} + \text{s\_1082} \tag{361}$$

Reactants

Table 77: Properties of each reactant.

Id	Name	SBO
s_0247	3-oxohexacosanoyl-CoA [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 78: Properties of each modifier.

Id	Name	SBO
s_0046	(S)-3-hydroxyhexacosanoyl-CoA [intracellular]	
s_0247	3-oxohexacosanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 79: Properties of each product.

Id	Name	SBO
s_0046	(S)-3-hydroxyhexacosanoyl-CoA [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_19}(\mathrm{Keq\_r\_0057}, \mathrm{Vmax\_r\_0057}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0046r\_0057}, \mathrm{kmp\_s\_1082r\_0057}, \mathrm{kms\_s\_0247r\_0057}, \mathrm{kms\_s\_0763\_br\_0057}, \mathrm{kms\_s\_1087r\_0057}, [\mathrm{s\_0046}], [\mathrm{s\_0247}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) \tag{362}$$

$$\mathrm{function\_19}(\mathrm{Keq\_r\_0057}, \mathrm{Vmax\_r\_0057}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0046r\_0057}, \mathrm{kmp\_s\_1082r\_0057}, \mathrm{kms\_s\_0247r\_0057}, \mathrm{kms\_s\_0763\_br\_0057}, \mathrm{kms\_s\_1087r\_0057}, [\mathrm{s\_0046}], [\mathrm{s\_0247}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0057} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0247r\_0057}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0057}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0057}}\right)^{1} \cdot \left([\mathrm{s\_0247}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0046}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0057}}\right)}{\left(1 + \frac{[\mathrm{s\_0247}]}{\mathrm{kms\_s\_0247r\_0057}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0057}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0057}}\right) + \left(1 + \frac{[\mathrm{s\_0046}]}{\mathrm{kmp\_s\_0046r\_0057}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0057}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{363}$$

$$\begin{aligned}&\text{function\_19}\left(\text{Keq\_r\_0057}, \text{Vmax\_r\_0057}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0046r\_0057},\right.\\&\text{kmp\_s\_1082r\_0057}, \text{kms\_s\_0247r\_0057}, \text{kms\_s\_0763\_br\_0057},\\&\left.\text{kms\_s\_1087r\_0057}, [\text{s\_0046}], [\text{s\_0247}], [\text{s\_0763\_b}], [\text{s\_1082}], [\text{s\_1087}]\right)\\&= \frac{\text{Vmax\_r\_0057} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0247r\_0057}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0057}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0057}}\right)^{1} \cdot \left([\text{s\_0247}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1087}]^{1} - \frac{[\text{s\_0046}]^{1} \cdot [\text{s\_1082}]^{1}}{\text{Keq\_r\_0057}}\right)}{\left(1+\frac{[\text{s\_0247}]}{\text{kms\_s\_0247r\_0057}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0057}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0057}}\right) + \left(1+\frac{[\text{s\_0046}]}{\text{kmp\_s\_0046r\_0057}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0057}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{364}$$

Table 80: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0057	Keq_r_0057		34.726		☑
Vmax_r_0057	Vmax_r_0057		3.303		☑
kmp_s_0046r-_0057	kmp_s_0046r_0057		0.549		☑
kmp_s_1082r-_0057	kmp_s_1082r_0057		1.503		☑
kms_s_0247r-_0057	kms_s_0247r_0057		0.549		☑
kms_s_0763-_br_0057	kms_s_0763_br-_0057		0.549		☑
kms_s_1087r-_0057	kms_s_1087r_0057		0.087		☑

7.20 Reaction r_0058

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 3-hydroxyacyl-CoA dehydrogenase (3-oxohexadecanoyl-CoA)

Notes GENE_ASSOCIATION:YKR009C

Reaction equation

$$\text{s\_0257} + \text{s\_0763\_b} + \text{s\_1087} \xrightleftharpoons{\text{s\_0052, s\_0257, s\_0763\_b, s\_1082, s\_1087}} \text{s\_0052} + \text{s\_1082} \tag{365}$$

Reactants

Table 81: Properties of each reactant.

Id	Name	SBO
s_0257	3-oxopalmitoyl-CoA [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 82: Properties of each modifier.

Id	Name	SBO
s_0052	(S)-3-hydroxypalmitoyl-CoA [intracellular]	
s_0257	3-oxopalmitoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 83: Properties of each product.

Id	Name	SBO
s_0052	(S)-3-hydroxypalmitoyl-CoA [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_20}\left(\mathrm{Keq\_r\_0058}, \mathrm{Vmax\_r\_0058}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0052r\_0058}, \mathrm{kmp\_s\_1082r\_0058}, \mathrm{kms\_s\_0257r\_0058}, \mathrm{kms\_s\_0763\_br\_0058}, \mathrm{kms\_s\_1087r\_0058}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \tag{366}$$

$$\mathrm{function\_20}\left(\mathrm{Keq\_r\_0058}, \mathrm{Vmax\_r\_0058}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0052r\_0058}, \mathrm{kmp\_s\_1082r\_0058}, \mathrm{kms\_s\_0257r\_0058}, \mathrm{kms\_s\_0763\_br\_0058}, \mathrm{kms\_s\_1087r\_0058}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0058} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0257r\_0058}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0058}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0058}}\right)^{1} \cdot \left([\mathrm{s\_0257}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0052}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0058}}\right)}{\left(1 + \frac{[\mathrm{s\_0257}]}{\mathrm{kms\_s\_0257r\_0058}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0058}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0058}}\right) + \left(1 + \frac{[\mathrm{s\_0052}]}{\mathrm{kmp\_s\_0052r\_0058}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0058}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{367}$$

$$\begin{aligned}&\mathrm{function\_20}\left(\mathrm{Keq\_r\_0058}, \mathrm{Vmax\_r\_0058}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0052r\_0058},\right.\\&\mathrm{kmp\_s\_1082r\_0058}, \mathrm{kms\_s\_0257r\_0058}, \mathrm{kms\_s\_0763\_br\_0058},\\&\left.\mathrm{kms\_s\_1087r\_0058}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right)\\&= \frac{\mathrm{Vmax\_r\_0058} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0257r\_0058}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0058}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0058}}\right)^{1} \cdot \left([\mathrm{s\_0257}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0052}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0058}}\right)}{\left(1+\frac{[\mathrm{s\_0257}]}{\mathrm{kms\_s\_0257r\_0058}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0058}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0058}}\right) + \left(1+\frac{[\mathrm{s\_0052}]}{\mathrm{kmp\_s\_0052r\_0058}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0058}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{368}$$

Table 84: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0058	Keq_r_0058		34.726		☑
Vmax_r_0058	Vmax_r_0058		3.303		☑
kmp_s_0052r_0058	kmp_s_0052r_0058		0.549		☑
kmp_s_1082r_0058	kmp_s_1082r_0058		1.503		☑
kms_s_0257r_0058	kms_s_0257r_0058		0.549		☑
kms_s_0763_br_0058	kms_s_0763_br_0058		0.549		☑
kms_s_1087r_0058	kms_s_1087r_0058		0.087		☑

7.21 Reaction r_0059

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 3-hydroxyacyl-CoA dehydrogenase (3-oxooctadecanoyl-CoA)

Notes GENE_ASSOCIATION:YKR009C

Reaction equation

$$\mathrm{s\_0254} + \mathrm{s\_0763\_b} + \mathrm{s\_1087} \xrightleftharpoons{\mathrm{s\_0234,\ s\_0254,\ s\_0763\_b,\ s\_1082,\ s\_1087}} \mathrm{s\_0234} + \mathrm{s\_1082} \tag{369}$$

Reactants

Table 85: Properties of each reactant.

Id	Name	SBO
s_0254	3-oxooctadecanoyl-CoA [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 86: Properties of each modifier.

Id	Name	SBO
s_0234	3-hydroxyoctadecanoyl-CoA [intracellular]	
s_0254	3-oxooctadecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 87: Properties of each product.

Id	Name	SBO
s_0234	3-hydroxyoctadecanoyl-CoA [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_21}\left(\mathrm{Keq\_r\_0059}, \mathrm{Vmax\_r\_0059}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0234r\_0059}, \mathrm{kmp\_s\_1082r\_0059}, \mathrm{kms\_s\_0254r\_0059}, \mathrm{kms\_s\_0763\_br\_0059}, \mathrm{kms\_s\_1087r\_0059}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \tag{370}$$

$$\mathrm{function\_21}\left(\mathrm{Keq\_r\_0059}, \mathrm{Vmax\_r\_0059}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0234r\_0059}, \mathrm{kmp\_s\_1082r\_0059}, \mathrm{kms\_s\_0254r\_0059}, \mathrm{kms\_s\_0763\_br\_0059}, \mathrm{kms\_s\_1087r\_0059}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0059} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0254r\_0059}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0059}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0059}}\right)^{1} \cdot \left([\mathrm{s\_0254}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0234}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0059}}\right)}{\left(1 + \frac{[\mathrm{s\_0254}]}{\mathrm{kms\_s\_0254r\_0059}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0059}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0059}}\right) + \left(1 + \frac{[\mathrm{s\_0234}]}{\mathrm{kmp\_s\_0234r\_0059}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0059}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{371}$$

$$
\begin{aligned}
&\mathrm{function\_21}\left(\mathrm{Keq\_r\_0059}, \mathrm{Vmax\_r\_0059}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0234r\_0059},\right.\\
&\mathrm{kmp\_s\_1082r\_0059}, \mathrm{kms\_s\_0254r\_0059}, \mathrm{kms\_s\_0763\_br\_0059},\\
&\left.\mathrm{kms\_s\_1087r\_0059}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right)\\
&= \frac{\mathrm{Vmax\_r\_0059} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0254r\_0059}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0059}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0059}}\right)^{1} \cdot \left([\mathrm{s\_0254}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0234}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0059}}\right)}{\left(1+\frac{[\mathrm{s\_0254}]}{\mathrm{kms\_s\_0254r\_0059}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0059}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0059}}\right) + \left(1+\frac{[\mathrm{s\_0234}]}{\mathrm{kmp\_s\_0234r\_0059}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0059}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{372}
$$

Table 88: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0059	Keq_r_0059		34.726		☑
Vmax_r_0059	Vmax_r_0059		3.303		☑
kmp_s_0234r-_0059	kmp_s_0234r_0059		0.549		☑
kmp_s_1082r-_0059	kmp_s_1082r_0059		1.503		☑
kms_s_0254r-_0059	kms_s_0254r_0059		0.549		☑
kms_s_0763-_br_0059	kms_s_0763_br-_0059		0.549		☑
kms_s_1087r-_0059	kms_s_1087r_0059		0.087		☑

7.22 Reaction r_0060

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 3-hydroxyacyl-CoA dehydrogenase (3-oxotetradecanoyl-CoA)

Notes GENE_ASSOCIATION:YKR009C

Reaction equation

$$
\mathrm{s\_0261} + \mathrm{s\_0763\_b} + \mathrm{s\_1087} \xrightleftharpoons{\mathrm{s\_0055},\ \mathrm{s\_0261},\ \mathrm{s\_0763\_b},\ \mathrm{s\_1082},\ \mathrm{s\_1087}} \mathrm{s\_0055} + \mathrm{s\_1082}
\tag{373}
$$

Reactants

Table 89: Properties of each reactant.

Id	Name	SBO
s_0261	3-oxotetradecanoyl-CoA [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 90: Properties of each modifier.

Id	Name	SBO
s_0055	(S)-3-hydroxytetradecanoyl-CoA [intracellular]	
s_0261	3-oxotetradecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 91: Properties of each product.

Id	Name	SBO
s_0055	(S)-3-hydroxytetradecanoyl-CoA [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_22}\left(\mathrm{Keq\_r\_0060}, \mathrm{Vmax\_r\_0060}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0055r\_0060}, \mathrm{kmp\_s\_1082r\_0060}, \mathrm{kms\_s\_0261r\_0060}, \mathrm{kms\_s\_0763\_br\_0060}, \mathrm{kms\_s\_1087r\_0060}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \tag{374}$$

$$\mathrm{function\_22}\left(\mathrm{Keq\_r\_0060}, \mathrm{Vmax\_r\_0060}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0055r\_0060}, \mathrm{kmp\_s\_1082r\_0060}, \mathrm{kms\_s\_0261r\_0060}, \mathrm{kms\_s\_0763\_br\_0060}, \mathrm{kms\_s\_1087r\_0060}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0060} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0261r\_0060}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0060}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0060}}\right)^{1} \cdot \left([\mathrm{s\_0261}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0055}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0060}}\right)}{\left(1+\frac{[\mathrm{s\_0261}]}{\mathrm{kms\_s\_0261r\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0060}}\right) + \left(1+\frac{[\mathrm{s\_0055}]}{\mathrm{kmp\_s\_0055r\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0060}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{375}$$

$$\begin{aligned}&\mathrm{function\_22}\left(\mathrm{Keq\_r\_0060}, \mathrm{Vmax\_r\_0060}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0055r\_0060}, \right.\\&\mathrm{kmp\_s\_1082r\_0060}, \mathrm{kms\_s\_0261r\_0060}, \mathrm{kms\_s\_0763\_br\_0060},\\&\left.\mathrm{kms\_s\_1087r\_0060}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right)\\&= \frac{\mathrm{Vmax\_r\_0060} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0261r\_0060}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0060}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0060}}\right)^{1} \cdot \left([\mathrm{s\_0261}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0055}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0060}}\right)}{\left(1+\frac{[\mathrm{s\_0261}]}{\mathrm{kms\_s\_0261r\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0060}}\right) + \left(1+\frac{[\mathrm{s\_0055}]}{\mathrm{kmp\_s\_0055r\_0060}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0060}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \quad (376)$$

Table 92: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0060	Keq_r_0060		34.726		☑
Vmax_r_0060	Vmax_r_0060		3.303		☑
kmp_s_0055r-_0060	kmp_s_0055r_0060		0.549		☑
kmp_s_1082r-_0060	kmp_s_1082r_0060		1.503		☑
kms_s_0261r-_0060	kms_s_0261r_0060		0.549		☑
kms_s_0763-_br_0060	kms_s_0763_br-_0060		0.549		☑
kms_s_1087r-_0060	kms_s_1087r_0060		0.087		☑

7.23 Reaction r_0063

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name 3-isopropylmalate dehydratase

Notes GENE_ASSOCIATION:YGL009C

Reaction equation

$$\mathrm{s\_0170} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0008},\ \mathrm{s\_0170},\ \mathrm{s\_1434\_b}} \mathrm{s\_0008} \quad (377)$$

Reactants

Table 93: Properties of each reactant.

Id	Name	SBO
s_0170	2-isopropylmaleic acid [intracellular]	

Id	Name	SBO
s_1434_b	water [intracellular]	

Modifiers

Table 94: Properties of each modifier.

Id	Name	SBO
s_0008	(2R,3S)-3-isopropylmalate(2-) [intracellular]	
s_0170	2-isopropylmaleic acid [intracellular]	
s_1434_b	water [intracellular]	

Product

Table 95: Properties of each product.

Id	Name	SBO
s_0008	(2R,3S)-3-isopropylmalate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_23}\left(\mathrm{Keq\_r\_0063}, \mathrm{Vmax\_r\_0063}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0008r\_0063}, \mathrm{kms\_s\_0170r\_0063}, \mathrm{kms\_s\_1434\_br\_0063}, [\mathrm{s\_0008}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) \quad (378)$$

$$\mathrm{function\_23}\left(\mathrm{Keq\_r\_0063}, \mathrm{Vmax\_r\_0063}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0008r\_0063}, \mathrm{kms\_s\_0170r\_0063}, \mathrm{kms\_s\_1434\_br\_0063}, [\mathrm{s\_0008}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0063} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0170r\_0063}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0063}}\right)^{1} \cdot \left([\mathrm{s\_0170}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0008}]^{1}}{\mathrm{Keq\_r\_0063}}\right)}{\left(1 + \frac{[\mathrm{s\_0170}]}{\mathrm{kms\_s\_0170r\_0063}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0063}}\right) + 1 + \frac{[\mathrm{s\_0008}]}{\mathrm{kmp\_s\_0008r\_0063}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (379)$$

$$\mathrm{function\_23}\left(\mathrm{Keq\_r\_0063}, \mathrm{Vmax\_r\_0063}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0008r\_0063}, \mathrm{kms\_s\_0170r\_0063}, \mathrm{kms\_s\_1434\_br\_0063}, [\mathrm{s\_0008}], [\mathrm{s\_0170}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0063} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0170r\_0063}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0063}}\right)^{1} \cdot \left([\mathrm{s\_0170}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0008}]^{1}}{\mathrm{Keq\_r\_0063}}\right)}{\left(1 + \frac{[\mathrm{s\_0170}]}{\mathrm{kms\_s\_0170r\_0063}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0063}}\right) + 1 + \frac{[\mathrm{s\_0008}]}{\mathrm{kmp\_s\_0008r\_0063}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (380)$$

Table 96: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0063	Keq_r_0063		2.004		☑
Vmax_r_0063	Vmax_r_0063		0.765		☑
kmp_s_0008r-_0063	kmp_s_0008r_0063		0.549		☑
kms_s_0170r-_0063	kms_s_0170r_0063		0.549		☑
kms_s_1434-_br_0063	kms_s_1434_br-_0063		0.549		☑

7.24 Reaction r_0064

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name 3-isopropylmalate dehydrogenase

Notes GENE_ASSOCIATION:YCL018W

Reaction equation

$$\mathrm{s\_0008} + \mathrm{s\_1082} \xrightleftharpoons{\mathrm{s\_0008,\ s\_0010,\ s\_0763\_b,\ s\_1082,\ s\_1087}} \mathrm{s\_0010} + \mathrm{s\_0763\_b} + \mathrm{s\_1087} \quad (381)$$

Reactants

Table 97: Properties of each reactant.

Id	Name	SBO
s_0008	(2R,3S)-3-isopropylmalate(2-) [intracellular]	
s_1082	NAD(+) [intracellular]	

Modifiers

Table 98: Properties of each modifier.

Id	Name	SBO
s_0008	(2R,3S)-3-isopropylmalate(2-) [intracellular]	
s_0010	(2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	

Id	Name	SBO
s_1087	NADH [intracellular]	

Products

Table 99: Properties of each product.

Id	Name	SBO
s_0010	(2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_24}\left(\mathrm{Keq\_r\_0064}, \mathrm{Vmax\_r\_0064}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0010r\_0064}, \mathrm{kmp\_s\_0763\_br\_0064}, \mathrm{kmp\_s\_1087r\_0064}, \mathrm{kms\_s\_0008r\_0064}, \mathrm{kms\_s\_1082r\_0064}, [\mathrm{s\_0008}], [\mathrm{s\_0010}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \tag{382}$$

$$\mathrm{function\_24}\left(\mathrm{Keq\_r\_0064}, \mathrm{Vmax\_r\_0064}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0010r\_0064}, \mathrm{kmp\_s\_0763\_br\_0064}, \mathrm{kmp\_s\_1087r\_0064}, \mathrm{kms\_s\_0008r\_0064}, \mathrm{kms\_s\_1082r\_0064}, [\mathrm{s\_0008}], [\mathrm{s\_0010}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0064} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0008r\_0064}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0064}}\right)^{1} \cdot \left([\mathrm{s\_0008}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0010}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0064}}\right)}{\left(1 + \frac{[\mathrm{s\_0008}]}{\mathrm{kms\_s\_0008r\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0064}}\right) + \left(1 + \frac{[\mathrm{s\_0010}]}{\mathrm{kmp\_s\_0010r\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0064}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{383}$$

$$\mathrm{function\_24}\left(\mathrm{Keq\_r\_0064}, \mathrm{Vmax\_r\_0064}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0010r\_0064}, \mathrm{kmp\_s\_0763\_br\_0064}, \mathrm{kmp\_s\_1087r\_0064}, \mathrm{kms\_s\_0008r\_0064}, \mathrm{kms\_s\_1082r\_0064}, [\mathrm{s\_0008}], [\mathrm{s\_0010}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0064} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0008r\_0064}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0064}}\right)^{1} \cdot \left([\mathrm{s\_0008}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0010}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0064}}\right)}{\left(1 + \frac{[\mathrm{s\_0008}]}{\mathrm{kms\_s\_0008r\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0064}}\right) + \left(1 + \frac{[\mathrm{s\_0010}]}{\mathrm{kmp\_s\_0010r\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0064}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0064}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{384}$$

Table 100: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0064	Keq_r_0064		0.035		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0064	Vmax_r_0064		1.682		☑
kmp_s_0010r-_0064	kmp_s_0010r_0064		0.549		☑
kmp_s_0763-_br_0064	kmp_s_0763_br-_0064		0.549		☑
kmp_s_1087r-_0064	kmp_s_1087r_0064		0.087		☑
kms_s_0008r-_0064	kms_s_0008r_0064		0.549		☑
kms_s_1082r-_0064	kms_s_1082r_0064		1.503		☑

7.25 Reaction r_0068

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name 3-phosphoshikimate 1-carboxyvinyltransferase

Notes GENE_ASSOCIATION:YDR127W

Reaction equation

$$s\_0267 + s\_1243 \xrightleftharpoons{s\_0267,\ s\_0330,\ s\_1207,\ s\_1243} s\_0330 + s\_1207 \tag{385}$$

Reactants

Table 101: Properties of each reactant.

Id	Name	SBO
s_0267	3-phosphoshikimic acid [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	

Modifiers

Table 102: Properties of each modifier.

Id	Name	SBO
s_0267	3-phosphoshikimic acid [intracellular]	
s_0330	5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]	
s_1207	phosphate [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	

Products

Table 103: Properties of each product.

Id	Name	SBO
s_0330	5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_25}(\mathrm{Keq\_r\_0068}, \mathrm{Vmax\_r\_0068}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0330r\_0068}, \mathrm{kmp\_s\_1207r\_0068}, \mathrm{kms\_s\_0267r\_0068}, \mathrm{kms\_s\_1243r\_0068}, [\mathrm{s\_0267}], [\mathrm{s\_0330}], [\mathrm{s\_1207}], [\mathrm{s\_1243}]) \quad (386)$$

$$\mathrm{function\_25}(\mathrm{Keq\_r\_0068}, \mathrm{Vmax\_r\_0068}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0330r\_0068}, \mathrm{kmp\_s\_1207r\_0068}, \mathrm{kms\_s\_0267r\_0068}, \mathrm{kms\_s\_1243r\_0068}, [\mathrm{s\_0267}], [\mathrm{s\_0330}], [\mathrm{s\_1207}], [\mathrm{s\_1243}]) = \frac{\mathrm{Vmax\_r\_0068} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0267r\_0068}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0068}}\right)^{1} \cdot \left([\mathrm{s\_0267}]^{1} \cdot [\mathrm{s\_1243}]^{1} - \frac{[\mathrm{s\_0330}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0068}}\right)}{\left(1 + \frac{[\mathrm{s\_0267}]}{\mathrm{kms\_s\_0267r\_0068}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0068}}\right) + \left(1 + \frac{[\mathrm{s\_0330}]}{\mathrm{kmp\_s\_0330r\_0068}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0068}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (387)$$

$$\mathrm{function\_25}(\mathrm{Keq\_r\_0068}, \mathrm{Vmax\_r\_0068}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0330r\_0068}, \mathrm{kmp\_s\_1207r\_0068}, \mathrm{kms\_s\_0267r\_0068}, \mathrm{kms\_s\_1243r\_0068}, [\mathrm{s\_0267}], [\mathrm{s\_0330}], [\mathrm{s\_1207}], [\mathrm{s\_1243}]) = \frac{\mathrm{Vmax\_r\_0068} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0267r\_0068}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0068}}\right)^{1} \cdot \left([\mathrm{s\_0267}]^{1} \cdot [\mathrm{s\_1243}]^{1} - \frac{[\mathrm{s\_0330}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0068}}\right)}{\left(1 + \frac{[\mathrm{s\_0267}]}{\mathrm{kms\_s\_0267r\_0068}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0068}}\right) + \left(1 + \frac{[\mathrm{s\_0330}]}{\mathrm{kmp\_s\_0330r\_0068}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0068}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (388)$$

Table 104: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0068	Keq_r_0068		22.277		☑
Vmax_r_0068	Vmax_r_0068		1.024		☑
kmp_s_0330r-_0068	kmp_s_0330r_0068		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1207r-_0068	kmp_s_1207r_0068		0.549		☑
kms_s_0267r-_0068	kms_s_0267r_0068		0.549		☑
kms_s_1243r-_0068	kms_s_1243r_0068		0.027		☑

7.26 Reaction r_0093

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name 5,10-methylenetetrahydrofolatereductase (NADPH)

Notes GENE_ASSOCIATION:YGL125W

Reaction equation

$$\text{s\_0307} + 2\,\text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0307, s\_0328, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0328} + \text{s\_1091} \tag{389}$$

Reactants

Table 105: Properties of each reactant.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 106: Properties of each modifier.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0328	5-methyltetrahydrofolate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 107: Properties of each product.

Id	Name	SBO
s_0328	5-methyltetrahydrofolate(2-) [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_26}\left(\mathrm{Keq\_r\_0093}, \mathrm{Vmax\_r\_0093}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0328r\_0093}, \mathrm{kmp\_s\_1091r\_0093}, \mathrm{kms\_s\_0307r\_0093}, \mathrm{kms\_s\_0763\_br\_0093}, \mathrm{kms\_s\_1096r\_0093}, [\mathrm{s\_0307}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \tag{390}$$

$$\mathrm{function\_26}\left(\mathrm{Keq\_r\_0093}, \mathrm{Vmax\_r\_0093}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0328r\_0093}, \mathrm{kmp\_s\_1091r\_0093}, \mathrm{kms\_s\_0307r\_0093}, \mathrm{kms\_s\_0763\_br\_0093}, \mathrm{kms\_s\_1096r\_0093}, [\mathrm{s\_0307}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0093} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0093}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0093}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0093}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0328}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0093}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0093}}\right) + \left(1 + \frac{[\mathrm{s\_0328}]}{\mathrm{kmp\_s\_0328r\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0093}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{391}$$

$$\mathrm{function\_26}\left(\mathrm{Keq\_r\_0093}, \mathrm{Vmax\_r\_0093}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0328r\_0093}, \mathrm{kmp\_s\_1091r\_0093}, \mathrm{kms\_s\_0307r\_0093}, \mathrm{kms\_s\_0763\_br\_0093}, \mathrm{kms\_s\_1096r\_0093}, [\mathrm{s\_0307}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0093} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0093}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0093}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0093}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0328}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0093}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0093}}\right) + \left(1 + \frac{[\mathrm{s\_0328}]}{\mathrm{kmp\_s\_0328r\_0093}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0093}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{392}$$

Table 108: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0093	Keq_r_0093		3.650		☑
Vmax_r_0093	Vmax_r_0093		0.439		☑
kmp_s_0328r_0093	kmp_s_0328r_0093		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1091r-_0093	kmp_s_1091r_0093		0.549		☑
kms_s_0307r-_0093	kms_s_0307r_0093		0.549		☑
kms_s_0763-_br_0093	kms_s_0763_br-_0093		0.549		☑
kms_s_1096r-_0093	kms_s_1096r_0093		0.549		☑

7.27 Reaction r_0111

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name acetohydroxy acid isomeroreductase

Notes GENE_ASSOCIATION:YLR355C

Reaction equation

$$\mathrm{s\_0150} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0018,\ s\_0150,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0018} + \mathrm{s\_1091} \tag{393}$$

Reactants

Table 109: Properties of each reactant.

Id	Name	SBO
s_0150	2-acetyllactic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 110: Properties of each modifier.

Id	Name	SBO
s_0018	(R)-2,3-dihydroxy-3-methylbutanoate [intracellular]	
s_0150	2-acetyllactic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 111: Properties of each product.

Id	Name	SBO
s_0018	(R)-2,3-dihydroxy-3-methylbutanoate [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_27}(\mathrm{Keq\_r\_0111}, \mathrm{Vmax\_r\_0111}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0018r\_0111}, \mathrm{kmp\_s\_1091r\_0111}, \mathrm{kms\_s\_0150r\_0111}, \mathrm{kms\_s\_0763\_br\_0111}, \mathrm{kms\_s\_1096r\_0111}, [\mathrm{s\_0018}], [\mathrm{s\_0150}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{394}$$

$$\mathrm{function\_27}(\mathrm{Keq\_r\_0111}, \mathrm{Vmax\_r\_0111}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0018r\_0111}, \mathrm{kmp\_s\_1091r\_0111}, \mathrm{kms\_s\_0150r\_0111}, \mathrm{kms\_s\_0763\_br\_0111}, \mathrm{kms\_s\_1096r\_0111}, [\mathrm{s\_0018}], [\mathrm{s\_0150}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0111} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0150r\_0111}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0111}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0111}}\right)^1 \cdot \left([\mathrm{s\_0150}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0018}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0111}}\right)}{\left(1+\frac{[\mathrm{s\_0150}]}{\mathrm{kms\_s\_0150r\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0111}}\right) + \left(1+\frac{[\mathrm{s\_0018}]}{\mathrm{kmp\_s\_0018r\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0111}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{395}$$

$$\mathrm{function\_27}(\mathrm{Keq\_r\_0111}, \mathrm{Vmax\_r\_0111}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0018r\_0111}, \mathrm{kmp\_s\_1091r\_0111}, \mathrm{kms\_s\_0150r\_0111}, \mathrm{kms\_s\_0763\_br\_0111}, \mathrm{kms\_s\_1096r\_0111}, [\mathrm{s\_0018}], [\mathrm{s\_0150}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0111} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0150r\_0111}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0111}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0111}}\right)^1 \cdot \left([\mathrm{s\_0150}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0018}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0111}}\right)}{\left(1+\frac{[\mathrm{s\_0150}]}{\mathrm{kms\_s\_0150r\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0111}}\right) + \left(1+\frac{[\mathrm{s\_0018}]}{\mathrm{kmp\_s\_0018r\_0111}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0111}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{396}$$

Table 112: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0111	Keq_r_0111		2.004		☑
Vmax_r_0111	Vmax_r_0111		3.412		☑
kmp_s_0018r-_0111	kmp_s_0018r_0111		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1091r-_0111	kmp_s_1091r_0111		0.549		☑
kms_s_0150r-_0111	kms_s_0150r_0111		0.549		☑
kms_s_0763-_br_0111	kms_s_0763_br-_0111		0.549		☑
kms_s_1096r-_0111	kms_s_1096r_0111		0.549		☑

7.28 Reaction r_0112

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name acetolactate synthase

Notes GENE_ASSOCIATION:(YCL009C and YMR108W)

Reaction equation

$$\mathrm{s\_0763\_b} + 2\,\mathrm{s\_1277} \xrightleftharpoons{\mathrm{s\_0150,\ s\_0470,\ s\_0763\_b,\ s\_1277}} \mathrm{s\_0150} + \mathrm{s\_0470} \tag{397}$$

Reactants

Table 113: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 114: Properties of each modifier.

Id	Name	SBO
s_0150	2-acetyllactic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 115: Properties of each product.

Id	Name	SBO
s_0150	2-acetyllactic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_28}(\mathrm{Keq\_r\_0112}, \mathrm{Vmax\_r\_0112}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0150r\_0112}, \mathrm{kmp\_s\_0470r\_0112}, \mathrm{kms\_s\_0763\_br\_0112}, \mathrm{kms\_s\_1277r\_0112}, [\mathrm{s\_0150}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]) \tag{398}$$

$$\mathrm{function\_28}(\mathrm{Keq\_r\_0112}, \mathrm{Vmax\_r\_0112}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0150r\_0112}, \mathrm{kmp\_s\_0470r\_0112}, \mathrm{kms\_s\_0763\_br\_0112}, \mathrm{kms\_s\_1277r\_0112}, [\mathrm{s\_0150}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]) = \frac{\mathrm{Vmax\_r\_0112} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0112}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0112}}\right)^2 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1277}]^2 - \frac{[\mathrm{s\_0150}]^1 \cdot [\mathrm{s\_0470}]^1}{\mathrm{Keq\_r\_0112}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0112}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0112}}\right) + \left(1+\frac{[\mathrm{s\_0150}]}{\mathrm{kmp\_s\_0150r\_0112}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0112}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{399}$$

$$\mathrm{function\_28}(\mathrm{Keq\_r\_0112}, \mathrm{Vmax\_r\_0112}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0150r\_0112}, \mathrm{kmp\_s\_0470r\_0112}, \mathrm{kms\_s\_0763\_br\_0112}, \mathrm{kms\_s\_1277r\_0112}, [\mathrm{s\_0150}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1277}]) = \frac{\mathrm{Vmax\_r\_0112} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0112}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0112}}\right)^2 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1277}]^2 - \frac{[\mathrm{s\_0150}]^1 \cdot [\mathrm{s\_0470}]^1}{\mathrm{Keq\_r\_0112}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0112}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0112}}\right) + \left(1+\frac{[\mathrm{s\_0150}]}{\mathrm{kmp\_s\_0150r\_0112}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0112}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{400}$$

Table 116: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0112	Keq_r_0112		299.629		☑
Vmax_r_0112	Vmax_r_0112		2.171		☑
kmp_s_0150r-_0112	kmp_s_0150r_0112		0.549		☑
kmp_s_0470r-_0112	kmp_s_0470r_0112		1.000		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0763-_br_0112	kms_s_0763_br-_0112		0.549		☑
kms_s_1277r-_0112	kms_s_1277r_0112		0.061		☑

7.29 Reaction r_0118

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name acetyl-CoA C-acetyltransferase

Notes GENE_ASSOCIATION:YPL028W

Reaction equation

$$2\,\mathrm{s\_0380} \xrightleftharpoons{\mathrm{s\_0374,\ s\_0380,\ s\_0514}} \mathrm{s\_0374} + \mathrm{s\_0514} \quad (401)$$

Reactant

Table 117: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	

Modifiers

Table 118: Properties of each modifier.

Id	Name	SBO
s_0374	acetoacetyl-CoA [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	

Products

Table 119: Properties of each product.

Id	Name	SBO
s_0374	acetoacetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_29}(\mathrm{Keq\_r\_0118}, \mathrm{Vmax\_r\_0118}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0374r\_0118}, \mathrm{kmp\_s\_0514r\_0118}, \mathrm{kms\_s\_0380r\_0118}, [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}]) \quad (402)$$

$$\mathrm{function\_29}(\mathrm{Keq\_r\_0118}, \mathrm{Vmax\_r\_0118}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0374r\_0118}, \mathrm{kmp\_s\_0514r\_0118}, \mathrm{kms\_s\_0380r\_0118}, [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}]) = \frac{\mathrm{Vmax\_r\_0118} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0118}}\right)^2 \cdot \left([\mathrm{s\_0380}]^2 - \frac{[\mathrm{s\_0374}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0118}}\right)}{1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0118}} + \left(1 + \frac{[\mathrm{s\_0374}]}{\mathrm{kmp\_s\_0374r\_0118}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0118}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (403)$$

$$\mathrm{function\_29}(\mathrm{Keq\_r\_0118}, \mathrm{Vmax\_r\_0118}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0374r\_0118}, \mathrm{kmp\_s\_0514r\_0118}, \mathrm{kms\_s\_0380r\_0118}, [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}]) = \frac{\mathrm{Vmax\_r\_0118} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0118}}\right)^2 \cdot \left([\mathrm{s\_0380}]^2 - \frac{[\mathrm{s\_0374}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0118}}\right)}{1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0118}} + \left(1 + \frac{[\mathrm{s\_0374}]}{\mathrm{kmp\_s\_0374r\_0118}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0118}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (404)$$

Table 120: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0118	Keq_r_0118		1.100		☑
Vmax_r_0118	Vmax_r_0118		0.125		☑
kmp_s_0374r-_0118	kmp_s_0374r_0118		0.549		☑
kmp_s_0514r-_0118	kmp_s_0514r_0118		0.549		☑
kms_s_0380r-_0118	kms_s_0380r_0118		0.549		☑

7.30 Reaction r_0123

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name acetyl-Coa carboxylase

Notes GENE_ASSOCIATION:YMR207C or YNR016C

Reaction equation

$$s\_0380 + s\_0446 + s\_0458 \xrightleftharpoons{s\_0380,\ s\_0400,\ s\_0446,\ s\_0458,\ s\_0763\_b,\ s\_1005,\ s\_1207} s\_0400 + s\_0763\_b + s\_1005 + \tag{405}$$

Reactants

Table 121: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	

Modifiers

Table 122: Properties of each modifier.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 123: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_30}\left(\mathrm{Keq\_r\_0123}, \mathrm{Vmax\_r\_0123}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0123}, \mathrm{kmp\_s\_0763\_br\_0123}, \mathrm{kmp\_s\_1005r\_0123}, \mathrm{kmp\_s\_1207r\_0123}, \mathrm{kms\_s\_0380r\_0123}, \mathrm{kms\_s\_0446r\_0123}, \mathrm{kms\_s\_0458r\_0123}, [\mathrm{s\_0380}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1207}]\right) \tag{406}$$

$$\mathrm{function\_30}\left(\mathrm{Keq\_r\_0123}, \mathrm{Vmax\_r\_0123}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0123}, \mathrm{kmp\_s\_0763\_br\_0123}, \mathrm{kmp\_s\_1005r\_0123}, \mathrm{kmp\_s\_1207r\_0123}, \mathrm{kms\_s\_0380r\_0123}, \mathrm{kms\_s\_0446r\_0123}, \mathrm{kms\_s\_0458r\_0123}, [\mathrm{s\_0380}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0123} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0123}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0123}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0123}}\right)^{1} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0458}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0123}}\right.}{\left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0123}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1005}]}{\mathrm{kmp\_s\_1005r\_0123}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{407}$$

$$\mathrm{function\_30}\left(\mathrm{Keq\_r\_0123}, \mathrm{Vmax\_r\_0123}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0123}, \mathrm{kmp\_s\_0763\_br\_0123}, \mathrm{kmp\_s\_1005r\_0123}, \mathrm{kmp\_s\_1207r\_0123}, \mathrm{kms\_s\_0380r\_0123}, \mathrm{kms\_s\_0446r\_0123}, \mathrm{kms\_s\_0458r\_0123}, [\mathrm{s\_0380}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0123} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0123}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0123}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0123}}\right)^{1} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0458}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0123}}\right.}{\left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0123}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0123}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1005}]}{\mathrm{kmp\_s\_1005r\_0123}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{408}$$

Table 124: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0123`	Keq_r_0123		0.951		☑
`Vmax_r_0123`	Vmax_r_0123		0.106		☑
`kmp_s_0400r_0123`	kmp_s_0400r_0123		1.719		☑
`kmp_s_0763_br_0123`	kmp_s_0763_br_0123		0.549		☑
`kmp_s_1005r_0123`	kmp_s_1005r_0123		0.549		☑
`kmp_s_1207r_0123`	kmp_s_1207r_0123		0.549		☑
`kms_s_0380r_0123`	kms_s_0380r_0123		0.549		☑
`kms_s_0446r_0123`	kms_s_0446r_0123		1.092		☑
`kms_s_0458r_0123`	kms_s_0458r_0123		0.549		☑

7.31 Reaction r_0125

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name acetyl-CoA hydrolase

Notes GENE_ASSOCIATION:YBL015W

Reaction equation

$$s\_0369 + s\_0514 + s\_0763\_b \xrightleftharpoons{s\_0369,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_1434\_b} s\_0380 + s\_1434\_b \quad (409)$$

Reactants

Table 125: Properties of each reactant.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	

Modifiers

Table 126: Properties of each modifier.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 127: Properties of each product.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_31}(\mathrm{Keq\_r\_0125}, \mathrm{Vmax\_r\_0125}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0380r\_0125}, \mathrm{kmp\_s\_1434\_br\_0125}, \mathrm{kms\_s\_0369r\_0125}, \mathrm{kms\_s\_0514r\_0125}, \mathrm{kms\_s\_0763\_br\_0125}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) \tag{410}$$

$$\mathrm{function\_31}(\mathrm{Keq\_r\_0125}, \mathrm{Vmax\_r\_0125}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0380r\_0125}, \mathrm{kmp\_s\_1434\_br\_0125}, \mathrm{kms\_s\_0369r\_0125}, \mathrm{kms\_s\_0514r\_0125}, \mathrm{kms\_s\_0763\_br\_0125}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0125} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0369r\_0125}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0514r\_0125}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0125}}\right)^1 \cdot \left([\mathrm{s\_0369}]^1 \cdot [\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^1 - \frac{[\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0125}}\right)}{\left(1+\frac{[\mathrm{s\_0369}]}{\mathrm{kms\_s\_0369r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0125}}\right) + \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kmp\_s\_0380r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0125}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{411}$$

$$\mathrm{function\_31}(\mathrm{Keq\_r\_0125}, \mathrm{Vmax\_r\_0125}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0380r\_0125}, \mathrm{kmp\_s\_1434\_br\_0125}, \mathrm{kms\_s\_0369r\_0125}, \mathrm{kms\_s\_0514r\_0125}, \mathrm{kms\_s\_0763\_br\_0125}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0125} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0369r\_0125}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0514r\_0125}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0125}}\right)^1 \cdot \left([\mathrm{s\_0369}]^1 \cdot [\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^1 - \frac{[\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0125}}\right)}{\left(1+\frac{[\mathrm{s\_0369}]}{\mathrm{kms\_s\_0369r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0125}}\right) + \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kmp\_s\_0380r\_0125}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0125}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{412}$$

Table 128: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0125	Keq_r_0125		2.004		☑
Vmax_r_0125	Vmax_r_0125		26.983		☑
kmp_s_0380r_0125	kmp_s_0380r_0125		0.549		☑
kmp_s_1434_br_0125	kmp_s_1434_br_0125		0.549		☑
kms_s_0369r_0125	kms_s_0369r_0125		0.549		☑
kms_s_0514r_0125	kms_s_0514r_0125		0.549		☑
kms_s_0763_br_0125	kms_s_0763_br_0125		0.549		☑

7.32 Reaction r_0127

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name acetyl-CoA synthetase

Notes GENE_ASSOCIATION:(YAL054C or YLR153C) or YAL054C or YLR153C

Reaction equation

$$\text{s\_0380} + \text{s\_0434} + \text{s\_0605} \xrightleftharpoons{\text{s\_0369, s\_0380, s\_0434, s\_0446, s\_0514, s\_0605}} \text{s\_0369} + \text{s\_0446} + \text{s\_0514} \quad (413)$$

Reactants

Table 129: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	

Modifiers

Table 130: Properties of each modifier.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0605	diphosphate [intracellular]	

Products

Table 131: Properties of each product.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{32} = & \operatorname{vol}(\mathrm{intracellular}) \\ & \cdot \mathrm{function\_32}(\mathrm{Keq\_r\_0127}, \mathrm{Vmax\_r\_0127}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0369r\_0127}, \\ & \mathrm{kmp\_s\_0446r\_0127}, \mathrm{kmp\_s\_0514r\_0127}, \mathrm{kms\_s\_0380r\_0127}, \mathrm{kms\_s\_0434r\_0127}, \\ & \mathrm{kms\_s\_0605r\_0127}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}]) \end{aligned} \tag{414}$$

$$\begin{aligned} & \mathrm{function\_32}(\mathrm{Keq\_r\_0127}, \mathrm{Vmax\_r\_0127}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0369r\_0127}, \\ & \mathrm{kmp\_s\_0446r\_0127}, \mathrm{kmp\_s\_0514r\_0127}, \mathrm{kms\_s\_0380r\_0127}, \mathrm{kms\_s\_0434r\_0127}, \\ & \mathrm{kms\_s\_0605r\_0127}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}]) \\ & = \frac{\mathrm{Vmax\_r\_0127} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0127}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0434r\_0127}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0127}}\right)^1 \cdot \left([\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_0434}]^1 \cdot [\mathrm{s\_0605}]^1 - \frac{[\mathrm{s\_0369}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0127}}\right)}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0127}}\right) + \left(1+\frac{[\mathrm{s\_0369}]}{\mathrm{kmp\_s\_0369r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0127}}\right) - 1}}{\operatorname{vol}(\mathrm{intracellular})} \end{aligned} \tag{415}$$

$$\begin{aligned} & \mathrm{function\_32}(\mathrm{Keq\_r\_0127}, \mathrm{Vmax\_r\_0127}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0369r\_0127}, \\ & \mathrm{kmp\_s\_0446r\_0127}, \mathrm{kmp\_s\_0514r\_0127}, \mathrm{kms\_s\_0380r\_0127}, \mathrm{kms\_s\_0434r\_0127}, \\ & \mathrm{kms\_s\_0605r\_0127}, [\mathrm{s\_0369}], [\mathrm{s\_0380}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}]) \\ & = \frac{\mathrm{Vmax\_r\_0127} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0127}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0434r\_0127}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0127}}\right)^1 \cdot \left([\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_0434}]^1 \cdot [\mathrm{s\_0605}]^1 - \frac{[\mathrm{s\_0369}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0127}}\right)}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0127}}\right) + \left(1+\frac{[\mathrm{s\_0369}]}{\mathrm{kmp\_s\_0369r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0127}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0127}}\right) - 1}}{\operatorname{vol}(\mathrm{intracellular})} \end{aligned} \tag{416}$$

Table 132: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0127	Keq_r_0127		0.954		☑
Vmax_r_0127	Vmax_r_0127		25.905		☑
kmp_s_0369r_0127	kmp_s_0369r_0127		0.549		☑
kmp_s_0446r_0127	kmp_s_0446r_0127		1.092		☑
kmp_s_0514r_0127	kmp_s_0514r_0127		0.549		☑
kms_s_0380r_0127	kms_s_0380r_0127		0.549		☑
kms_s_0434r_0127	kms_s_0434r_0127		1.260		☑
kms_s_0605r_0127	kms_s_0605r_0127		0.549		☑

7.33 Reaction r_0130

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name acetylglutamate kinase

Notes GENE_ASSOCIATION:YER069W

Reaction equation

$$s\_0446 + s\_1071 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_1070,\ s\_1071} s\_0400 + s\_1070 \tag{417}$$

Reactants

Table 133: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1071	N-acetyl-L-glutamate(2-) [intracellular]	

Modifiers

Table 134: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_1070	N-acetyl-L-gamma-glutamyl phosphate [intracellular]	
s_1071	N-acetyl-L-glutamate(2-) [intracellular]	

Products

Table 135: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_1070	N-acetyl-L-gamma-glutamyl phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_33}\left(\mathrm{Keq\_r\_0130}, \mathrm{Vmax\_r\_0130}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0130}, \mathrm{kmp\_s\_1070r\_0130}, \mathrm{kms\_s\_0446r\_0130}, \mathrm{kms\_s\_1071r\_0130}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_1070}], [\mathrm{s\_1071}]\right) \quad (418)$$

$$\mathrm{function\_33}\left(\mathrm{Keq\_r\_0130}, \mathrm{Vmax\_r\_0130}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0130}, \mathrm{kmp\_s\_1070r\_0130}, \mathrm{kms\_s\_0446r\_0130}, \mathrm{kms\_s\_1071r\_0130}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_1070}], [\mathrm{s\_1071}]\right) = \frac{\mathrm{Vmax\_r\_0130} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0130}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1071r\_0130}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1071}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1070}]^{1}}{\mathrm{Keq\_r\_0130}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0130}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1071}]}{\mathrm{kms\_s\_1071r\_0130}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0130}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1070}]}{\mathrm{kmp\_s\_1070r\_0130}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (419)$$

$$\mathrm{function\_33}\left(\mathrm{Keq\_r\_0130}, \mathrm{Vmax\_r\_0130}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0130}, \mathrm{kmp\_s\_1070r\_0130}, \mathrm{kms\_s\_0446r\_0130}, \mathrm{kms\_s\_1071r\_0130}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_1070}], [\mathrm{s\_1071}]\right) = \frac{\mathrm{Vmax\_r\_0130} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0130}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1071r\_0130}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1071}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1070}]^{1}}{\mathrm{Keq\_r\_0130}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0130}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1071}]}{\mathrm{kms\_s\_1071r\_0130}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0130}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1070}]}{\mathrm{kmp\_s\_1070r\_0130}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (420)$$

Table 136: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0130`	Keq_r_0130		1.732		☑
`Vmax_r_0130`	Vmax_r_0130		0.581		☑
`kmp_s_0400r-_0130`	kmp_s_0400r_0130		1.719		☑
`kmp_s_1070r-_0130`	kmp_s_1070r_0130		0.549		☑
`kms_s_0446r-_0130`	kms_s_0446r_0130		1.092		☑
`kms_s_1071r-_0130`	kms_s_1071r_0130		0.549		☑

7.34 Reaction `r_0133`

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name acteylornithine transaminase

Notes GENE_ASSOCIATION:YOL140W

Reaction equation

$$s\_0149 + s\_0899 \xrightleftharpoons{s\_0149,\ s\_0185,\ s\_0899,\ s\_1051} s\_0185 + s\_1051 \quad (421)$$

Reactants

Table 137: Properties of each reactant.

Id	Name	SBO
s_0149	2-acetamido-5-oxopentanoate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 138: Properties of each modifier.

Id	Name	SBO
s_0149	2-acetamido-5-oxopentanoate [intracellular]	
s_0185	2-oxoglutarate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1051	N(2)-acetyl-L-ornithine [intracellular]	

Products

Table 139: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_1051	N(2)-acetyl-L-ornithine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_34}\left(\mathrm{Keq\_r\_0133}, \mathrm{Vmax\_r\_0133}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0133}, \mathrm{kmp\_s\_1051r\_0133}, \mathrm{kms\_s\_0149r\_0133}, \mathrm{kms\_s\_0899r\_0133}, [\mathrm{s\_0149}], [\mathrm{s\_0185}], [\mathrm{s\_0899}], [\mathrm{s\_1051}]\right) \quad (422)$$

$$\text{function\_34}\left(\text{Keq\_r\_0133}, \text{Vmax\_r\_0133}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0185r\_0133}, \text{kmp\_s\_1051r\_0133}, \text{kms\_s\_0149r\_0133}, \text{kms\_s\_0899r\_0133}, [\text{s\_0149}], [\text{s\_0185}], [\text{s\_0899}], [\text{s\_1051}]\right) = \frac{\text{Vmax\_r\_0133} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0149r\_0133}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0133}}\right)^{1} \cdot \left([\text{s\_0149}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_1051}]^{1}}{\text{Keq\_r\_0133}}\right)}{\left(1 + \frac{[\text{s\_0149}]}{\text{kms\_s\_0149r\_0133}}\right) \cdot \left(1 + \frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0133}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0133}}\right) \cdot \left(1 + \frac{[\text{s\_1051}]}{\text{kmp\_s\_1051r\_0133}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{423}$$

$$\text{function\_34}\left(\text{Keq\_r\_0133}, \text{Vmax\_r\_0133}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0185r\_0133}, \text{kmp\_s\_1051r\_0133}, \text{kms\_s\_0149r\_0133}, \text{kms\_s\_0899r\_0133}, [\text{s\_0149}], [\text{s\_0185}], [\text{s\_0899}], [\text{s\_1051}]\right) = \frac{\text{Vmax\_r\_0133} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0149r\_0133}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0133}}\right)^{1} \cdot \left([\text{s\_0149}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_1051}]^{1}}{\text{Keq\_r\_0133}}\right)}{\left(1 + \frac{[\text{s\_0149}]}{\text{kms\_s\_0149r\_0133}}\right) \cdot \left(1 + \frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0133}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0133}}\right) \cdot \left(1 + \frac{[\text{s\_1051}]}{\text{kmp\_s\_1051r\_0133}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{424}$$

Table 140: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0133	Keq_r_0133		1.100		☑
Vmax_r_0133	Vmax_r_0133		0.581		☑
kmp_s_0185r-_0133	kmp_s_0185r_0133		0.549		☑
kmp_s_1051r-_0133	kmp_s_1051r_0133		0.549		☑
kms_s_0149r-_0133	kms_s_0149r_0133		0.549		☑
kms_s_0899r-_0133	kms_s_0899r_0133		0.549		☑

7.35 Reaction r_0157

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name adenosine kinase

Notes GENE_ASSOCIATION:YJR105W

Reaction equation

$$\mathrm{s\_0393} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0393,\ s\_0400,\ s\_0434,\ s\_0446,\ s\_0763\_b}} \mathrm{s\_0400} + \mathrm{s\_0434} + \mathrm{s\_0763\_b} \tag{425}$$

Reactants

Table 141: Properties of each reactant.

Id	Name	SBO
s_0393	adenosine [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 142: Properties of each modifier.

Id	Name	SBO
s_0393	adenosine [intracellular]	
s_0400	ADP [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 143: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0434	AMP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{35} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_35}\left(\mathrm{Keq\_r\_0157}, \mathrm{Vmax\_r\_0157}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \\ & \mathrm{kmp\_s\_0400r\_0157}, \mathrm{kmp\_s\_0434r\_0157}, \mathrm{kmp\_s\_0763\_br\_0157}, \mathrm{kms\_s\_0393r\_0157}, \\ & \left.\mathrm{kms\_s\_0446r\_0157}, [\mathrm{s\_0393}], [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]\right) \end{aligned} \tag{426}$$

$$\begin{aligned}&\text{function\_35}\left(\text{Keq\_r\_0157}, \text{Vmax\_r\_0157}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0400r\_0157},\right.\\&\text{kmp\_s\_0434r\_0157}, \text{kmp\_s\_0763\_br\_0157}, \text{kms\_s\_0393r\_0157},\\&\left.\text{kms\_s\_0446r\_0157}, [\text{s\_0393}], [\text{s\_0400}], [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0763\_b}]\right)\\&= \frac{\text{Vmax\_r\_0157} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0393r\_0157}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0157}}\right)^{1} \cdot \left([\text{s\_0393}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0434}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0157}}\right)}{\left(1+\frac{[\text{s\_0393}]}{\text{kms\_s\_0393r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0157}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0157}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{427}$$

$$\begin{aligned}&\text{function\_35}\left(\text{Keq\_r\_0157}, \text{Vmax\_r\_0157}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0400r\_0157},\right.\\&\text{kmp\_s\_0434r\_0157}, \text{kmp\_s\_0763\_br\_0157}, \text{kms\_s\_0393r\_0157},\\&\left.\text{kms\_s\_0446r\_0157}, [\text{s\_0393}], [\text{s\_0400}], [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0763\_b}]\right)\\&= \frac{\text{Vmax\_r\_0157} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0393r\_0157}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0157}}\right)^{1} \cdot \left([\text{s\_0393}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0434}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0157}}\right)}{\left(1+\frac{[\text{s\_0393}]}{\text{kms\_s\_0393r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0157}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0157}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0157}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{428}$$

Table 144: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0157	Keq_r_0157		2.181		☑
Vmax_r_0157	Vmax_r_0157		0.103		☑
kmp_s_0400r-_0157	kmp_s_0400r_0157		1.719		☑
kmp_s_0434r-_0157	kmp_s_0434r_0157		1.260		☑
kmp_s_0763-_br_0157	kmp_s_0763_br-_0157		0.549		☑
kms_s_0393r-_0157	kms_s_0393r_0157		0.549		☑
kms_s_0446r-_0157	kms_s_0446r_0157		1.092		☑

7.36 Reaction r_0159

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name adenosylhomocysteinase

Notes GENE_ASSOCIATION:YER043C

Reaction equation

$$\text{s\_1290} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0393, s\_0917, s\_1290, s\_1434\_b}} \text{s\_0393} + \text{s\_0917} \tag{429}$$

Reactants

Table 145: Properties of each reactant.

Id	Name	SBO
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 146: Properties of each modifier.

Id	Name	SBO
s_0393	adenosine [intracellular]	
s_0917	L-homocysteine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 147: Properties of each product.

Id	Name	SBO
s_0393	adenosine [intracellular]	
s_0917	L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_36}\left(\mathrm{Keq\_r\_0159}, \mathrm{Vmax\_r\_0159}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0393r\_0159}, \mathrm{kmp\_s\_0917r\_0159}, \mathrm{kms\_s\_1290r\_0159}, \mathrm{kms\_s\_1434\_br\_0159}, [\mathrm{s\_0393}], [\mathrm{s\_0917}], [\mathrm{s\_1290}], [\mathrm{s\_1434\_b}]\right) \quad (430)$$

$$\mathrm{function\_36}\left(\mathrm{Keq\_r\_0159}, \mathrm{Vmax\_r\_0159}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0393r\_0159}, \mathrm{kmp\_s\_0917r\_0159}, \mathrm{kms\_s\_1290r\_0159}, \mathrm{kms\_s\_1434\_br\_0159}, [\mathrm{s\_0393}], [\mathrm{s\_0917}], [\mathrm{s\_1290}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0159} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1290r\_0159}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0159}}\right)^{1} \cdot \left([\mathrm{s\_1290}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0393}]^{1} \cdot [\mathrm{s\_0917}]^{1}}{\mathrm{Keq\_r\_0159}}\right)}{\left(1 + \frac{[\mathrm{s\_1290}]}{\mathrm{kms\_s\_1290r\_0159}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0159}}\right) + \left(1 + \frac{[\mathrm{s\_0393}]}{\mathrm{kmp\_s\_0393r\_0159}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0917}]}{\mathrm{kmp\_s\_0917r\_0159}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (431)$$

$$\begin{aligned}&\mathrm{function\_36}\left(\mathrm{Keq\_r\_0159}, \mathrm{Vmax\_r\_0159}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\&\quad \mathrm{kmp\_s\_0393r\_0159}, \mathrm{kmp\_s\_0917r\_0159}, \mathrm{kms\_s\_1290r\_0159},\\&\quad\quad \left.\mathrm{kms\_s\_1434\_br\_0159}, [\mathrm{s\_0393}], [\mathrm{s\_0917}], [\mathrm{s\_1290}], [\mathrm{s\_1434\_b}]\right)\\&\quad = \frac{\mathrm{Vmax\_r\_0159} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1290r\_0159}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0159}}\right)^{1} \cdot \left([\mathrm{s\_1290}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0393}]^{1} \cdot [\mathrm{s\_0917}]^{1}}{\mathrm{Keq\_r\_0159}}\right)}{\left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kms\_s\_1290r\_0159}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0159}}\right) + \left(1+\frac{[\mathrm{s\_0393}]}{\mathrm{kmp\_s\_0393r\_0159}}\right) \cdot \left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kmp\_s\_0917r\_0159}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{432}$$

Table 148: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0159	Keq_r_0159		1.100		☑
Vmax_r_0159	Vmax_r_0159		0.066		☑
kmp_s_0393r-_0159	kmp_s_0393r_0159		0.549		☑
kmp_s_0917r-_0159	kmp_s_0917r_0159		0.549		☑
kms_s_1290r-_0159	kms_s_1290r_0159		0.549		☑
kms_s_1434-_br_0159	kms_s_1434_br-_0159		0.549		☑

7.37 Reaction r_0163

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name adenylate kinase

Notes GENE_ASSOCIATION:YDR226W or YER170W

Reaction equation

$$2\,\mathrm{s\_0400} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0434,\ s\_0446}} \mathrm{s\_0434} + \mathrm{s\_0446} \tag{433}$$

Reactant

Table 149: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	

Modifiers

Table 150: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	

Products

Table 151: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_37}\left(\mathrm{Keq\_r\_0163}, \mathrm{Vmax\_r\_0163}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0163}, \mathrm{kmp\_s\_0446r\_0163}, \mathrm{kms\_s\_0400r\_0163}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0446}]\right) \quad (434)$$

$$\mathrm{function\_37}\left(\mathrm{Keq\_r\_0163}, \mathrm{Vmax\_r\_0163}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0163}, \mathrm{kmp\_s\_0446r\_0163}, \mathrm{kms\_s\_0400r\_0163}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0446}]\right) = \frac{\mathrm{Vmax\_r\_0163} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0163}}\right)^{2} \cdot \left([\mathrm{s\_0400}]^{2} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0446}]^{1}}{\mathrm{Keq\_r\_0163}}\right)}{1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0163}} + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0163}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0163}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (435)$$

$$\mathrm{function\_37}\left(\mathrm{Keq\_r\_0163}, \mathrm{Vmax\_r\_0163}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0163}, \mathrm{kmp\_s\_0446r\_0163}, \mathrm{kms\_s\_0400r\_0163}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0446}]\right) = \frac{\mathrm{Vmax\_r\_0163} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0163}}\right)^{2} \cdot \left([\mathrm{s\_0400}]^{2} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0446}]^{1}}{\mathrm{Keq\_r\_0163}}\right)}{1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0163}} + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0163}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0163}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (436)$$

Table 152: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0163	Keq_r_0163		0.512		☑
Vmax_r_0163	Vmax_r_0163		2.288		☑
kmp_s_0434r-_0163	kmp_s_0434r_0163		1.260		☑
kmp_s_0446r-_0163	kmp_s_0446r_0163		1.092		☑
kms_s_0400r-_0163	kms_s_0400r_0163		1.719		☑

7.38 Reaction r_0165

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name adenylate kinase (GTP)

Notes GENE_ASSOCIATION:YDR226W or YER170W

Reaction equation

$$\mathrm{s\_0400} + \mathrm{s\_0706} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0434,\ s\_0706,\ s\_0755}} \mathrm{s\_0434} + \mathrm{s\_0755} \tag{437}$$

Reactants

Table 153: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0706	GDP [intracellular]	

Modifiers

Table 154: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0434	AMP [intracellular]	
s_0706	GDP [intracellular]	
s_0755	GTP [intracellular]	

Products

Table 155: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0755	GTP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_38}\left(\mathrm{Keq\_r\_0165}, \mathrm{Vmax\_r\_0165}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0165}, \mathrm{kmp\_s\_0755r\_0165}, \mathrm{kms\_s\_0400r\_0165}, \mathrm{kms\_s\_0706r\_0165}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0706}], [\mathrm{s\_0755}]\right) \quad (438)$$

$$\mathrm{function\_38}\left(\mathrm{Keq\_r\_0165}, \mathrm{Vmax\_r\_0165}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0165}, \mathrm{kmp\_s\_0755r\_0165}, \mathrm{kms\_s\_0400r\_0165}, \mathrm{kms\_s\_0706r\_0165}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0706}], [\mathrm{s\_0755}]\right) = \frac{\mathrm{Vmax\_r\_0165} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0165}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0706r\_0165}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0706}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0755}]^{1}}{\mathrm{Keq\_r\_0165}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0165}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0706}]}{\mathrm{kms\_s\_0706r\_0165}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0165}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0755}]}{\mathrm{kmp\_s\_0755r\_0165}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (439)$$

$$\mathrm{function\_38}\left(\mathrm{Keq\_r\_0165}, \mathrm{Vmax\_r\_0165}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0165}, \mathrm{kmp\_s\_0755r\_0165}, \mathrm{kms\_s\_0400r\_0165}, \mathrm{kms\_s\_0706r\_0165}, [\mathrm{s\_0400}], [\mathrm{s\_0434}], [\mathrm{s\_0706}], [\mathrm{s\_0755}]\right) = \frac{\mathrm{Vmax\_r\_0165} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0165}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0706r\_0165}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0706}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0755}]^{1}}{\mathrm{Keq\_r\_0165}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0165}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0706}]}{\mathrm{kms\_s\_0706r\_0165}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0165}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0755}]}{\mathrm{kmp\_s\_0755r\_0165}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (440)$$

Table 156: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0165	Keq_r_0165		0.806		☑
Vmax_r_0165	Vmax_r_0165		4.066		☑
kmp_s_0434r-_0165	kmp_s_0434r_0165		1.260		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0755r-_0165	kmp_s_0755r_0165		0.549		☑
kms_s_0400r-_0165	kms_s_0400r_0165		1.719		☑
kms_s_0706r-_0165	kms_s_0706r_0165		0.549		☑

7.39 Reaction r_0169

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name adenylosuccinate lyase

Notes GENE_ASSOCIATION:YLR359W

Reaction equation

$$\text{s\_0009} \xrightleftharpoons{\text{s\_0009, s\_0317, s\_0692}} \text{s\_0317} + \text{s\_0692} \tag{441}$$

Reactant

Table 157: Properties of each reactant.

Id	Name	S
s_0009	(2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]	

Modifiers

Table 158: Properties of each modifier.

Id	Name	S
s_0009	(2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]	
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	
s_0692	fumarate(2-) [intracellular]	

Products

Table 159: Properties of each product.

Id	Name	SBO
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	
s_0692	fumarate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_39}(\mathrm{Keq\_r\_0169}, \mathrm{Vmax\_r\_0169}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0317r\_0169}, \mathrm{kmp\_s\_0692r\_0169}, \mathrm{kms\_s\_0009r\_0169}, [\mathrm{s\_0009}], [\mathrm{s\_0317}], [\mathrm{s\_0692}]) \quad (442)$$

$$\mathrm{function\_39}(\mathrm{Keq\_r\_0169}, \mathrm{Vmax\_r\_0169}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0317r\_0169}, \mathrm{kmp\_s\_0692r\_0169}, \mathrm{kms\_s\_0009r\_0169}, [\mathrm{s\_0009}], [\mathrm{s\_0317}], [\mathrm{s\_0692}]) = \frac{\mathrm{Vmax\_r\_0169} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0009r\_0169}}\right)^{1} \cdot \left([\mathrm{s\_0009}]^{1} - \frac{[\mathrm{s\_0317}]^{1} \cdot [\mathrm{s\_0692}]^{1}}{\mathrm{Keq\_r\_0169}}\right)}{1 + \frac{[\mathrm{s\_0009}]}{\mathrm{kms\_s\_0009r\_0169}} + \left(1 + \frac{[\mathrm{s\_0317}]}{\mathrm{kmp\_s\_0317r\_0169}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0169}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (443)$$

$$\mathrm{function\_39}(\mathrm{Keq\_r\_0169}, \mathrm{Vmax\_r\_0169}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0317r\_0169}, \mathrm{kmp\_s\_0692r\_0169}, \mathrm{kms\_s\_0009r\_0169}, [\mathrm{s\_0009}], [\mathrm{s\_0317}], [\mathrm{s\_0692}]) = \frac{\mathrm{Vmax\_r\_0169} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0009r\_0169}}\right)^{1} \cdot \left([\mathrm{s\_0009}]^{1} - \frac{[\mathrm{s\_0317}]^{1} \cdot [\mathrm{s\_0692}]^{1}}{\mathrm{Keq\_r\_0169}}\right)}{1 + \frac{[\mathrm{s\_0009}]}{\mathrm{kms\_s\_0009r\_0169}} + \left(1 + \frac{[\mathrm{s\_0317}]}{\mathrm{kmp\_s\_0317r\_0169}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0169}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (444)$$

Table 160: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0169	Keq_r_0169		0.604		☑
Vmax_r_0169	Vmax_r_0169		0.334		☑
kmp_s_0317r-_0169	kmp_s_0317r_0169		0.549		☑
kmp_s_0692r-_0169	kmp_s_0692r_0169		0.549		☑
kms_s_0009r-_0169	kms_s_0009r_0169		0.549		☑

7.40 Reaction r_0170

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name adenylosuccinate synthase

Notes GENE_ASSOCIATION:YNL220W

Reaction equation

$$s\_0755 + s\_0816 + s\_0881 \xrightleftharpoons[]{s\_0706,\ s\_0755,\ s\_0763\_b,\ s\_0816,\ s\_0881,\ s\_1053,\ s\_1207} s\_0706 + 2\,s\_0763\_b + s\_1053 \tag{445}$$

Reactants

Table 161: Properties of each reactant.

Id	Name	SBO
s_0755	GTP [intracellular]	
s_0816	IMP [intracellular]	
s_0881	L-aspartate [intracellular]	

Modifiers

Table 162: Properties of each modifier.

Id	Name	SBO
s_0706	GDP [intracellular]	
s_0755	GTP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0816	IMP [intracellular]	
s_0881	L-aspartate [intracellular]	
s_1053	N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 163: Properties of each product.

Id	Name	SBO
s_0706	GDP [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1053	N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_40}(\mathrm{Keq\_r\_0170}, \mathrm{Vmax\_r\_0170}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0706r\_0170}, \mathrm{kmp\_s\_0763\_br\_0170}, \mathrm{kmp\_s\_1053r\_0170}, \mathrm{kmp\_s\_1207r\_0170}, \mathrm{kms\_s\_0755r\_0170}, \mathrm{kms\_s\_0816r\_0170}, \mathrm{kms\_s\_0881r\_0170}, [\mathrm{s\_0706}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_0881}], [\mathrm{s\_1053}], [\mathrm{s\_1207}]) \tag{446}$$

$$\mathrm{function\_40}(\mathrm{Keq\_r\_0170}, \mathrm{Vmax\_r\_0170}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0706r\_0170}, \mathrm{kmp\_s\_0763\_br\_0170}, \mathrm{kmp\_s\_1053r\_0170}, \mathrm{kmp\_s\_1207r\_0170}, \mathrm{kms\_s\_0755r\_0170}, \mathrm{kms\_s\_0816r\_0170}, \mathrm{kms\_s\_0881r\_0170}, [\mathrm{s\_0706}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_0881}], [\mathrm{s\_1053}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0170} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0755r\_0170}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0816r\_0170}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0170}}\right)^1 \cdot \left([\mathrm{s\_0755}]^1 \cdot [\mathrm{s\_0816}]^1 \cdot [\mathrm{s\_0881}]^1 - \frac{[\mathrm{s\_0706}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1053}]^1 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0170}}\right.}{\left(1+\frac{[\mathrm{s\_0755}]}{\mathrm{kms\_s\_0755r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0816}]}{\mathrm{kms\_s\_0816r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0170}}\right) + \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_1053}]}{\mathrm{kmp\_s\_1053r\_0170}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{447}$$

$$\mathrm{function\_40}(\mathrm{Keq\_r\_0170}, \mathrm{Vmax\_r\_0170}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0706r\_0170}, \mathrm{kmp\_s\_0763\_br\_0170}, \mathrm{kmp\_s\_1053r\_0170}, \mathrm{kmp\_s\_1207r\_0170}, \mathrm{kms\_s\_0755r\_0170}, \mathrm{kms\_s\_0816r\_0170}, \mathrm{kms\_s\_0881r\_0170}, [\mathrm{s\_0706}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_0881}], [\mathrm{s\_1053}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0170} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0755r\_0170}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0816r\_0170}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0170}}\right)^1 \cdot \left([\mathrm{s\_0755}]^1 \cdot [\mathrm{s\_0816}]^1 \cdot [\mathrm{s\_0881}]^1 - \frac{[\mathrm{s\_0706}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1053}]^1 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0170}}\right.}{\left(1+\frac{[\mathrm{s\_0755}]}{\mathrm{kms\_s\_0755r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0816}]}{\mathrm{kms\_s\_0816r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0170}}\right) + \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0170}}\right) \cdot \left(1+\frac{[\mathrm{s\_1053}]}{\mathrm{kmp\_s\_1053r\_0170}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{448}$$

Table 164: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0170	Keq_r_0170		0.332		☑
Vmax_r_0170	Vmax_r_0170		1.822		☑
kmp_s_0706r-_0170	kmp_s_0706r_0170		0.549		☑
kmp_s_0763-_br_0170	kmp_s_0763_br-_0170		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1053r-_0170	kmp_s_1053r_0170		0.549		☑
kmp_s_1207r-_0170	kmp_s_1207r_0170		0.549		☑
kms_s_0755r-_0170	kms_s_0755r_0170		0.549		☑
kms_s_0816r-_0170	kms_s_0816r_0170		0.549		☑
kms_s_0881r-_0170	kms_s_0881r_0170		0.549		☑

7.41 Reaction r_0171

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name adenylsuccinate lyase

Notes GENE_ASSOCIATION:YLR359W

Reaction equation

$$\text{s\_1053} \xrightleftharpoons{\text{s\_0434, s\_0692, s\_1053}} \text{s\_0434} + \text{s\_0692} \tag{449}$$

Reactant

Table 165: Properties of each reactant.

Id	Name	SBO
s_1053	N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]	

Modifiers

Table 166: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0692	fumarate(2-) [intracellular]	
s_1053	N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]	

Products

Table 167: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0692	fumarate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_41}\left(\mathrm{Keq\_r\_0171}, \mathrm{Vmax\_r\_0171}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.$$
$$\left.\mathrm{kmp\_s\_0434r\_0171}, \mathrm{kmp\_s\_0692r\_0171}, \mathrm{kms\_s\_1053r\_0171}, [\mathrm{s\_0434}], [\mathrm{s\_0692}], [\mathrm{s\_1053}]\right) \quad (450)$$

$$\mathrm{function\_41}\left(\mathrm{Keq\_r\_0171}, \mathrm{Vmax\_r\_0171}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0171},\right.$$
$$\mathrm{kmp\_s\_0692r\_0171}, \mathrm{kms\_s\_1053r\_0171}, [\mathrm{s\_0434}], [\mathrm{s\_0692}],$$
$$\left.[\mathrm{s\_1053}]\right) = \frac{\mathrm{Vmax\_r\_0171} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1053r\_0171}}\right)^{1} \cdot \left([\mathrm{s\_1053}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0692}]^{1}}{\mathrm{Keq\_r\_0171}}\right)}{1 + \frac{[\mathrm{s\_1053}]}{\mathrm{kms\_s\_1053r\_0171}} + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0171}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0171}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (451)$$

$$\mathrm{function\_41}\left(\mathrm{Keq\_r\_0171}, \mathrm{Vmax\_r\_0171}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0171},\right.$$
$$\mathrm{kmp\_s\_0692r\_0171}, \mathrm{kms\_s\_1053r\_0171}, [\mathrm{s\_0434}], [\mathrm{s\_0692}],$$
$$\left.[\mathrm{s\_1053}]\right) = \frac{\mathrm{Vmax\_r\_0171} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1053r\_0171}}\right)^{1} \cdot \left([\mathrm{s\_1053}]^{1} - \frac{[\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0692}]^{1}}{\mathrm{Keq\_r\_0171}}\right)}{1 + \frac{[\mathrm{s\_1053}]}{\mathrm{kms\_s\_1053r\_0171}} + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0171}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0171}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (452)$$

Table 168: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0171	Keq_r_0171		1.386		☑
Vmax_r_0171	Vmax_r_0171		0.396		☑
kmp_s_0434r-_0171	kmp_s_0434r_0171		1.260		☑
kmp_s_0692r-_0171	kmp_s_0692r_0171		0.549		☑
kms_s_1053r-_0171	kms_s_1053r_0171		0.549		☑

7.42 Reaction r_0172

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name adenylyl-sulfate kinase

Notes GENE_ASSOCIATION:YKL001C

Reaction equation

$$s\_0304 + s\_0446 \xrightleftharpoons{s\_0206,\ s\_0304,\ s\_0400,\ s\_0446,\ s\_0763\_b} s\_0206 + s\_0400 + s\_0763\_b \quad (453)$$

Reactants

Table 169: Properties of each reactant.

Id	Name	SBO
s_0304	5'-adenylyl sulfate [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 170: Properties of each modifier.

Id	Name	SBO
s_0206	3'-phospho-5'-adenylyl sulfate [intracellular]	
s_0304	5'-adenylyl sulfate [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 171: Properties of each product.

Id	Name	SBO
s_0206	3'-phospho-5'-adenylyl sulfate [intracellular]	
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_42}(\mathrm{Keq\_r\_0172}, \mathrm{Vmax\_r\_0172}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0206r\_0172}, \mathrm{kmp\_s\_0400r\_0172}, \mathrm{kmp\_s\_0763\_br\_0172}, \mathrm{kms\_s\_0304r\_0172}, \mathrm{kms\_s\_0446r\_0172}, [\mathrm{s\_0206}], [\mathrm{s\_0304}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) \quad (454)$$

$$\mathrm{function\_42}(\mathrm{Keq\_r\_0172}, \mathrm{Vmax\_r\_0172}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0206r\_0172}, \mathrm{kmp\_s\_0400r\_0172}, \mathrm{kmp\_s\_0763\_br\_0172}, \mathrm{kms\_s\_0304r\_0172}, \mathrm{kms\_s\_0446r\_0172}, [\mathrm{s\_0206}], [\mathrm{s\_0304}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0172} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0304r\_0172}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0172}}\right)^1 \cdot \left([\mathrm{s\_0304}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0206}]^1 \cdot [\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0172}}\right)}{\left(1+\frac{[\mathrm{s\_0304}]}{\mathrm{kms\_s\_0304r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0172}}\right) + \left(1+\frac{[\mathrm{s\_0206}]}{\mathrm{kmp\_s\_0206r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0172}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (455)$$

$$\mathrm{function\_42}(\mathrm{Keq\_r\_0172}, \mathrm{Vmax\_r\_0172}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0206r\_0172}, \mathrm{kmp\_s\_0400r\_0172}, \mathrm{kmp\_s\_0763\_br\_0172}, \mathrm{kms\_s\_0304r\_0172}, \mathrm{kms\_s\_0446r\_0172}, [\mathrm{s\_0206}], [\mathrm{s\_0304}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0172} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0304r\_0172}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0172}}\right)^1 \cdot \left([\mathrm{s\_0304}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0206}]^1 \cdot [\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0172}}\right)}{\left(1+\frac{[\mathrm{s\_0304}]}{\mathrm{kms\_s\_0304r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0172}}\right) + \left(1+\frac{[\mathrm{s\_0206}]}{\mathrm{kmp\_s\_0206r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0172}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0172}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (456)$$

Table 172: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0172	Keq_r_0172		0.951		☑
Vmax_r_0172	Vmax_r_0172		0.624		☑
kmp_s_0206r-_0172	kmp_s_0206r_0172		0.549		☑
kmp_s_0400r-_0172	kmp_s_0400r_0172		1.719		☑
kmp_s_0763-_br_0172	kmp_s_0763_br-_0172		0.549		☑
kms_s_0304r-_0172	kms_s_0304r_0172		0.549		☑
kms_s_0446r-_0172	kms_s_0446r_0172		1.092		☑

7.43 Reaction r_0174

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name alanine glyoxylate aminotransferase

Notes GENE_ASSOCIATION:YFL030W

Reaction equation

$$\text{s\_0749} + \text{s\_0863} \xrightleftharpoons{\text{s\_0740, s\_0749, s\_0863, s\_1277}} \text{s\_0740} + \text{s\_1277} \tag{457}$$

Reactants

Table 173: Properties of each reactant.

Id	Name	SBO
s_0749	glyoxylate [intracellular]	
s_0863	L-alanine [intracellular]	

Modifiers

Table 174: Properties of each modifier.

Id	Name	SBO
s_0740	glycine [intracellular]	
s_0749	glyoxylate [intracellular]	
s_0863	L-alanine [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 175: Properties of each product.

Id	Name	SBO
s_0740	glycine [intracellular]	
s_1277	pyruvate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_43}(\mathrm{Keq\_r\_0174}, \mathrm{Vmax\_r\_0174}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0740r\_0174}, \mathrm{kmp\_s\_1277r\_0174}, \mathrm{kms\_s\_0749r\_0174}, \mathrm{kms\_s\_0863r\_0174}, [\mathrm{s\_0740}], [\mathrm{s\_0749}], [\mathrm{s\_0863}], [\mathrm{s\_1277}]) \quad (458)$$

$$\mathrm{function\_43}(\mathrm{Keq\_r\_0174}, \mathrm{Vmax\_r\_0174}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0740r\_0174}, \mathrm{kmp\_s\_1277r\_0174}, \mathrm{kms\_s\_0749r\_0174}, \mathrm{kms\_s\_0863r\_0174}, [\mathrm{s\_0740}], [\mathrm{s\_0749}], [\mathrm{s\_0863}], [\mathrm{s\_1277}]) = \frac{\mathrm{Vmax\_r\_0174} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0749r\_0174}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0863r\_0174}}\right)^1 \cdot \left([\mathrm{s\_0749}]^1 \cdot [\mathrm{s\_0863}]^1 - \frac{[\mathrm{s\_0740}]^1 \cdot [\mathrm{s\_1277}]^1}{\mathrm{Keq\_r\_0174}}\right)}{\left(1+\frac{[\mathrm{s\_0749}]}{\mathrm{kms\_s\_0749r\_0174}}\right) \cdot \left(1+\frac{[\mathrm{s\_0863}]}{\mathrm{kms\_s\_0863r\_0174}}\right) + \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kmp\_s\_0740r\_0174}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0174}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (459)$$

$$\mathrm{function\_43}(\mathrm{Keq\_r\_0174}, \mathrm{Vmax\_r\_0174}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0740r\_0174}, \mathrm{kmp\_s\_1277r\_0174}, \mathrm{kms\_s\_0749r\_0174}, \mathrm{kms\_s\_0863r\_0174}, [\mathrm{s\_0740}], [\mathrm{s\_0749}], [\mathrm{s\_0863}], [\mathrm{s\_1277}]) = \frac{\mathrm{Vmax\_r\_0174} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0749r\_0174}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0863r\_0174}}\right)^1 \cdot \left([\mathrm{s\_0749}]^1 \cdot [\mathrm{s\_0863}]^1 - \frac{[\mathrm{s\_0740}]^1 \cdot [\mathrm{s\_1277}]^1}{\mathrm{Keq\_r\_0174}}\right)}{\left(1+\frac{[\mathrm{s\_0749}]}{\mathrm{kms\_s\_0749r\_0174}}\right) \cdot \left(1+\frac{[\mathrm{s\_0863}]}{\mathrm{kms\_s\_0863r\_0174}}\right) + \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kmp\_s\_0740r\_0174}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0174}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (460)$$

Table 176: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0174	Keq_r_0174		0.121		☑
Vmax_r_0174	Vmax_r_0174		1.717		☑
kmp_s_0740r_0174	kmp_s_0740r_0174		0.549		☑
kmp_s_1277r_0174	kmp_s_1277r_0174		0.061		☑
kms_s_0749r_0174	kms_s_0749r_0174		0.549		☑
kms_s_0863r_0174	kms_s_0863r_0174		0.549		☑

7.44 Reaction r_0183

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name alcohol dehydrogenase, reverse rxn (acetaldehyde -> ethanol)

Notes GENE_ASSOCIATION:YMR083W

Reaction equation

$$s\_0366 + s\_0763\_b + s\_1087 \xrightleftharpoons{s\_0366,\ s\_0650,\ s\_0763\_b,\ s\_1082,\ s\_1087} s\_0650 + s\_1082 \quad (461)$$

Reactants

Table 177: Properties of each reactant.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 178: Properties of each modifier.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0650	ethanol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 179: Properties of each product.

Id	Name	SBO
s_0650	ethanol [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_44}(\mathrm{Keq\_r\_0183}, \mathrm{Vmax\_r\_0183}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0650r\_0183}, \mathrm{kmp\_s\_1082r\_0183}, \mathrm{kms\_s\_0366r\_0183}, \mathrm{kms\_s\_0763\_br\_0183}, \mathrm{kms\_s\_1087r\_0183}, [\mathrm{s\_0366}], [\mathrm{s\_0650}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) \quad (462)$$

$$\mathrm{function\_44}(\mathrm{Keq\_r\_0183}, \mathrm{Vmax\_r\_0183}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0650r\_0183}, \mathrm{kmp\_s\_1082r\_0183}, \mathrm{kms\_s\_0366r\_0183}, \mathrm{kms\_s\_0763\_br\_0183}, \mathrm{kms\_s\_1087r\_0183}, [\mathrm{s\_0366}], [\mathrm{s\_0650}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0183} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0366r\_0183}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0183}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0183}}\right)^{1} \cdot \left([\mathrm{s\_0366}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0650}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0183}}\right)}{\left(1+\frac{[\mathrm{s\_0366}]}{\mathrm{kms\_s\_0366r\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0183}}\right) + \left(1+\frac{[\mathrm{s\_0650}]}{\mathrm{kmp\_s\_0650r\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0183}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (463)$$

$$\mathrm{function\_44}(\mathrm{Keq\_r\_0183}, \mathrm{Vmax\_r\_0183}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0650r\_0183}, \mathrm{kmp\_s\_1082r\_0183}, \mathrm{kms\_s\_0366r\_0183}, \mathrm{kms\_s\_0763\_br\_0183}, \mathrm{kms\_s\_1087r\_0183}, [\mathrm{s\_0366}], [\mathrm{s\_0650}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0183} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0366r\_0183}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0183}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0183}}\right)^{1} \cdot \left([\mathrm{s\_0366}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0650}]^{1} \cdot [\mathrm{s\_1082}]^{1}}{\mathrm{Keq\_r\_0183}}\right)}{\left(1+\frac{[\mathrm{s\_0366}]}{\mathrm{kms\_s\_0366r\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0183}}\right) + \left(1+\frac{[\mathrm{s\_0650}]}{\mathrm{kmp\_s\_0650r\_0183}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0183}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (464)$$

Table 180: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0183	Keq_r_0183		14456.700		☑
Vmax_r_0183	Vmax_r_0183		99.100		☑
kmp_s_0650r_0183	kmp_s_0650r_0183		50.000		☑
kmp_s_1082r_0183	kmp_s_1082r_0183		1.503		☑
kms_s_0366r_0183	kms_s_0366r_0183		0.120		☑
kms_s_0763_br_0183	kms_s_0763_br_0183		0.549		☑
kms_s_1087r_0183	kms_s_1087r_0183		0.087		☑

7.45 Reaction r_0191

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name aldehyde dehydrogenase (acetaldehyde, NADP)

Notes GENE_ASSOCIATION:YPL061W or (YER073W or YOR374W)

Reaction equation

$$\mathrm{s\_0366} + \mathrm{s\_1091} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0366},\ \mathrm{s\_0369},\ \mathrm{s\_0763\_b},\ \mathrm{s\_1091},\ \mathrm{s\_1096},\ \mathrm{s\_1434\_b}} \mathrm{s\_0369} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1096} \tag{465}$$

Reactants

Table 181: Properties of each reactant.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 182: Properties of each modifier.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 183: Properties of each product.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{45} = & \text{vol}(\text{intracellular}) \\
& \cdot \text{function\_45}(\text{Keq\_r\_0191}, \text{Vmax\_r\_0191}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0191}, \\
& \text{kmp\_s\_0763\_br\_0191}, \text{kmp\_s\_1096r\_0191}, \text{kms\_s\_0366r\_0191}, \text{kms\_s\_1091r\_0191}, \\
& \text{kms\_s\_1434\_br\_0191}, [\text{s\_0366}], [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}])
\end{aligned} \tag{466}
$$

$$
\begin{aligned}
& \text{function\_45}(\text{Keq\_r\_0191}, \text{Vmax\_r\_0191}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0191}, \\
& \text{kmp\_s\_0763\_br\_0191}, \text{kmp\_s\_1096r\_0191}, \text{kms\_s\_0366r\_0191}, \text{kms\_s\_1091r\_0191}, \\
& \text{kms\_s\_1434\_br\_0191}, [\text{s\_0366}], [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]) \\
= & \frac{\text{Vmax\_r\_0191} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0366r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0191}}\right)^1 \cdot \left([\text{s\_0366}]^1 \cdot [\text{s\_1091}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0369}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0191}}\right)}{\left(1+\frac{[\text{s\_0366}]}{\text{kms\_s\_0366r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0191}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0191}}\right)}}{\text{vol}(\text{intracellular})}
\end{aligned} \tag{467}
$$

$$
\begin{aligned}
& \text{function\_45}(\text{Keq\_r\_0191}, \text{Vmax\_r\_0191}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0191}, \\
& \text{kmp\_s\_0763\_br\_0191}, \text{kmp\_s\_1096r\_0191}, \text{kms\_s\_0366r\_0191}, \text{kms\_s\_1091r\_0191}, \\
& \text{kms\_s\_1434\_br\_0191}, [\text{s\_0366}], [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]) \\
= & \frac{\text{Vmax\_r\_0191} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0366r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1091r\_0191}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0191}}\right)^1 \cdot \left([\text{s\_0366}]^1 \cdot [\text{s\_1091}]^1 \cdot [\text{s\_1434\_b}]^1 - \frac{[\text{s\_0369}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1096}]^1}{\text{Keq\_r\_0191}}\right)}{\left(1+\frac{[\text{s\_0366}]}{\text{kms\_s\_0366r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0191}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0191}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0191}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0191}}\right)}}{\text{vol}(\text{intracellular})}
\end{aligned} \tag{468}
$$

Table 184: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0191`	Keq_r_0191		2.760		☑
`Vmax_r_0191`	Vmax_r_0191		9.455		☑
`kmp_s_0369r_0191`	kmp_s_0369r_0191		0.549		☑
`kmp_s_0763_br_0191`	kmp_s_0763_br_0191		0.549		☑
`kmp_s_1096r_0191`	kmp_s_1096r_0191		0.549		☑
`kms_s_0366r_0191`	kms_s_0366r_0191		0.120		☑
`kms_s_1091r_0191`	kms_s_1091r_0191		0.549		☑
`kms_s_1434_br_0191`	kms_s_1434_br_0191		0.549		☑

7.46 Reaction r_0213

This is a reversible reaction of two reactants forming three products influenced by six modifiers.

Name alpha,alpha-trehalose-phosphate synthase (UDP-forming)

Notes GENE_ASSOCIATION:(YBR126C and YML100W and YMR261C)

Reaction equation

$$\text{s\_0410} + \text{s\_1415} \xrightleftharpoons[]{\text{s\_1415, s\_0410, s\_1415, s\_0419, s\_0763\_b, s\_1411}} \text{s\_0419} + \text{s\_0763\_b} + \text{s\_1411} \tag{469}$$

Reactants

Table 185: Properties of each reactant.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	
s_1415	UDP-D-glucose [intracellular]	

Modifiers

Table 186: Properties of each modifier.

Id	Name	SBO
s_1415	UDP-D-glucose [intracellular]	
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	
s_1415	UDP-D-glucose [intracellular]	
s_0419	alpha,alpha-trehalose 6-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	

Products

Table 187: Properties of each product.

Id	Name	SBO
s_0419	alpha,alpha-trehalose 6-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{46} = & \ \mathrm{vol}\left(\mathrm{intracellular}\right) \\
& \cdot \mathrm{function\_46}\left(\mathrm{Vmax\_r\_0213}, \mathrm{kms\_s\_0410r\_0213}, \mathrm{kms\_s\_1415r\_0213}, [\mathrm{s\_0410}], [\mathrm{s\_1415}],\right. \\
& [\mathrm{s\_0419}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], \mathrm{Keq\_r\_0213}, \mathrm{kmp\_s\_0419r\_0213}, \mathrm{kmp\_s\_0763\_br\_0213}, \\
& \left.\mathrm{kmp\_s\_1411r\_0213}, [\mathrm{s\_1415}], \mathrm{kmI\_s\_1415rm\_0213}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right)
\end{aligned} \tag{470}
$$

$$
\begin{aligned}
& \mathrm{function\_46}\left(\mathrm{Vmax\_r\_0213}, \mathrm{kms\_s\_0410r\_0213}, \mathrm{kms\_s\_1415r\_0213}, [\mathrm{s\_0410}], [\mathrm{s\_1415}],\right. \\
& [\mathrm{s\_0419}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], \mathrm{Keq\_r\_0213}, \mathrm{kmp\_s\_0419r\_0213}, \mathrm{kmp\_s\_0763\_br\_0213}, \\
& \left.\mathrm{kmp\_s\_1411r\_0213}, \mathrm{s\_1415m}, \mathrm{kmI\_s\_1415rm\_0213}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) \\
& = \frac{\mathrm{Vmax\_r\_0213} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0213}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1415r\_0213}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} \cdot [\mathrm{s\_1415}]^{1} - \frac{[\mathrm{s\_0419}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0213}}\right)}{\left(1+\frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0213}}\right) + \left(1+\frac{[\mathrm{s\_0419}]}{\mathrm{kmp\_s\_0419r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0213}}\right) + 1 + \frac{\mathrm{s\_1415m}}{\mathrm{kmI\_s\_1415rm\_0213}} -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{471}
$$

$$
\begin{aligned}
& \mathrm{function\_46}\left(\mathrm{Vmax\_r\_0213}, \mathrm{kms\_s\_0410r\_0213}, \mathrm{kms\_s\_1415r\_0213}, [\mathrm{s\_0410}], [\mathrm{s\_1415}],\right. \\
& [\mathrm{s\_0419}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], \mathrm{Keq\_r\_0213}, \mathrm{kmp\_s\_0419r\_0213}, \mathrm{kmp\_s\_0763\_br\_0213}, \\
& \left.\mathrm{kmp\_s\_1411r\_0213}, \mathrm{s\_1415m}, \mathrm{kmI\_s\_1415rm\_0213}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) \\
& = \frac{\mathrm{Vmax\_r\_0213} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0213}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1415r\_0213}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} \cdot [\mathrm{s\_1415}]^{1} - \frac{[\mathrm{s\_0419}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0213}}\right)}{\left(1+\frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0213}}\right) + \left(1+\frac{[\mathrm{s\_0419}]}{\mathrm{kmp\_s\_0419r\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0213}}\right) \cdot \left(1+\frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0213}}\right) + 1 + \frac{\mathrm{s\_1415m}}{\mathrm{kmI\_s\_1415rm\_0213}} -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{472}
$$

Table 188: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0213	Vmax_r_0213		0.175		☑
kms_s_0410r-_0213	kms_s_0410r_0213		0.549		☑
kms_s_1415r-_0213	kms_s_1415r_0213		0.549		☑
Keq_r_0213	Keq_r_0213		0.604		☑
kmp_s_0419r-_0213	kmp_s_0419r_0213		0.549		☑
kmp_s_0763-_br_0213	kmp_s_0763_br-_0213		0.549		☑
kmp_s_1411r-_0213	kmp_s_1411r_0213		0.549		☑
kmI_s-_1415rm_0213	kmI_s_1415rm-_0213		6.000		☑

7.47 Reaction r_0220

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name anthranilate phosphoribosyltransferase

Notes GENE_ASSOCIATION:YDR354W

Reaction equation

$$s\_0331 + s\_0439 \xrightleftharpoons{s\_0331,\ s\_0439,\ s\_0605,\ s\_1066} s\_0605 + s\_1066 \quad (473)$$

Reactants

Table 189: Properties of each reactant.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0439	anthranilate [intracellular]	

Modifiers

Table 190: Properties of each modifier.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0439	anthranilate [intracellular]	
s_0605	diphosphate [intracellular]	
s_1066	N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]	

Products

Table 191: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_1066	N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_47}\left(\mathrm{Keq\_r\_0220}, \mathrm{Vmax\_r\_0220}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0220}, \mathrm{kmp\_s\_1066r\_0220}, \mathrm{kms\_s\_0331r\_0220}, \mathrm{kms\_s\_0439r\_0220}, [\mathrm{s\_0331}], [\mathrm{s\_0439}], [\mathrm{s\_0605}], [\mathrm{s\_1066}]\right) \quad (474)$$

$$\mathrm{function\_47}\left(\mathrm{Keq\_r\_0220}, \mathrm{Vmax\_r\_0220}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0220}, \mathrm{kmp\_s\_1066r\_0220}, \mathrm{kms\_s\_0331r\_0220}, \mathrm{kms\_s\_0439r\_0220}, [\mathrm{s\_0331}], [\mathrm{s\_0439}], [\mathrm{s\_0605}], [\mathrm{s\_1066}]\right) = \frac{\mathrm{Vmax\_r\_0220} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0220}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0439r\_0220}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0439}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1066}]^{1}}{\mathrm{Keq\_r\_0220}}\right)}{\left(1 + \frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0220}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0439}]}{\mathrm{kms\_s\_0439r\_0220}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0220}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1066}]}{\mathrm{kmp\_s\_1066r\_0220}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (475)$$

$$\mathrm{function\_47}\left(\mathrm{Keq\_r\_0220}, \mathrm{Vmax\_r\_0220}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0220}, \mathrm{kmp\_s\_1066r\_0220}, \mathrm{kms\_s\_0331r\_0220}, \mathrm{kms\_s\_0439r\_0220}, [\mathrm{s\_0331}], [\mathrm{s\_0439}], [\mathrm{s\_0605}], [\mathrm{s\_1066}]\right) = \frac{\mathrm{Vmax\_r\_0220} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0220}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0439r\_0220}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0439}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1066}]^{1}}{\mathrm{Keq\_r\_0220}}\right)}{\left(1 + \frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0220}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0439}]}{\mathrm{kms\_s\_0439r\_0220}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0220}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1066}]}{\mathrm{kmp\_s\_1066r\_0220}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (476)$$

Table 192: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0220`	Keq_r_0220		1.100		☑
`Vmax_r_0220`	Vmax_r_0220		0.119		☑
`kmp_s_0605r_0220`	kmp_s_0605r_0220		0.549		☑
`kmp_s_1066r_0220`	kmp_s_1066r_0220		0.549		☑
`kms_s_0331r_0220`	kms_s_0331r_0220		0.549		☑
`kms_s_0439r_0220`	kms_s_0439r_0220		0.549		☑

7.48 Reaction `r_0221`

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name anthranilate synthase

Notes GENE_ASSOCIATION:(YER090W and YKL211C)

Reaction equation

$$s\_0500 + s\_0907 \xrightleftharpoons{s\_0439,\ s\_0500,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1277} s\_0439 + s\_0763\_b + s\_0899 + s\_1277 \tag{477}$$

Reactants

Table 193: Properties of each reactant.

Id	Name	SBO
s_0500	chorismate(2-) [intracellular]	
s_0907	L-glutamine [intracellular]	

Modifiers

Table 194: Properties of each modifier.

Id	Name	SBO
s_0439	anthranilate [intracellular]	
s_0500	chorismate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 195: Properties of each product.

Id	Name	SBO
s_0439	anthranilate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1277	pyruvate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_48}\left(\mathrm{Keq\_r\_0221}, \mathrm{Vmax\_r\_0221}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0439r\_0221}, \mathrm{kmp\_s\_0763\_br\_0221}, \mathrm{kmp\_s\_0899r\_0221}, \mathrm{kmp\_s\_1277r\_0221}, \mathrm{kms\_s\_0500r\_0221}, \mathrm{kms\_s\_0907r\_0221}, [\mathrm{s\_0439}], [\mathrm{s\_0500}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1277}]\right) \tag{478}$$

$$\mathrm{function\_48}\left(\mathrm{Keq\_r\_0221}, \mathrm{Vmax\_r\_0221}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0439r\_0221}, \mathrm{kmp\_s\_0763\_br\_0221}, \mathrm{kmp\_s\_0899r\_0221}, \mathrm{kmp\_s\_1277r\_0221}, \mathrm{kms\_s\_0500r\_0221}, \mathrm{kms\_s\_0907r\_0221}, [\mathrm{s\_0439}], [\mathrm{s\_0500}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0221} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0500r\_0221}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0221}}\right)^{1} \cdot \left([\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_0907}]^{1} - \frac{[\mathrm{s\_0439}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0221}}\right)}{\left(1+\frac{[\mathrm{s\_0500}]}{\mathrm{kms\_s\_0500r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0221}}\right) + \left(1+\frac{[\mathrm{s\_0439}]}{\mathrm{kmp\_s\_0439r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0221}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{479}$$

$$\mathrm{function\_48}\left(\mathrm{Keq\_r\_0221}, \mathrm{Vmax\_r\_0221}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0439r\_0221}, \mathrm{kmp\_s\_0763\_br\_0221}, \mathrm{kmp\_s\_0899r\_0221}, \mathrm{kmp\_s\_1277r\_0221}, \mathrm{kms\_s\_0500r\_0221}, \mathrm{kms\_s\_0907r\_0221}, [\mathrm{s\_0439}], [\mathrm{s\_0500}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0221} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0500r\_0221}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0221}}\right)^{1} \cdot \left([\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_0907}]^{1} - \frac{[\mathrm{s\_0439}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0221}}\right)}{\left(1+\frac{[\mathrm{s\_0500}]}{\mathrm{kms\_s\_0500r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0221}}\right) + \left(1+\frac{[\mathrm{s\_0439}]}{\mathrm{kmp\_s\_0439r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0221}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0221}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{480}$$

Table 196: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0221	Keq_r_0221		0.037		☑
Vmax_r_0221	Vmax_r_0221		0.324		☑
kmp_s_0439r_0221	kmp_s_0439r_0221		0.549		☑
kmp_s_0763_br_0221	kmp_s_0763_br_0221		0.549		☑
kmp_s_0899r_0221	kmp_s_0899r_0221		0.549		☑
kmp_s_1277r_0221	kmp_s_1277r_0221		0.061		☑
kms_s_0500r_0221	kms_s_0500r_0221		0.549		☑
kms_s_0907r_0221	kms_s_0907r_0221		0.549		☑

7.49 Reaction r_0225

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name argininosuccinate lyase

Notes GENE_ASSOCIATION:YHR018C

Reaction equation

$$\text{s\_0017} \xrightleftharpoons{\text{s\_0017, s\_0692, s\_0873}} \text{s\_0692} + \text{s\_0873} \tag{481}$$

Reactant

Table 197: Properties of each reactant.

Id	Name	SBO
s_0017	(N(omega)-L-arginino)succinic acid [intracellular]	

Modifiers

Table 198: Properties of each modifier.

Id	Name	SBO
s_0017	(N(omega)-L-arginino)succinic acid [intracellular]	
s_0692	fumarate(2-) [intracellular]	
s_0873	L-arginine [intracellular]	

Products

Table 199: Properties of each product.

Id	Name	SBO
s_0692	fumarate(2-) [intracellular]	
s_0873	L-arginine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \text{vol}(\text{intracellular}) \cdot \text{function\_49}(\text{Keq\_r\_0225}, \text{Vmax\_r\_0225}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0692r\_0225}, \text{kmp\_s\_0873r\_0225}, \text{kms\_s\_0017r\_0225}, [\text{s\_0017}], [\text{s\_0692}], [\text{s\_0873}]) \tag{482}$$

$$\begin{aligned}&\text{function\_49}\left(\text{Keq\_r\_0225}, \text{Vmax\_r\_0225}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0692r\_0225},\right.\\&\quad\text{kmp\_s\_0873r\_0225}, \text{kms\_s\_0017r\_0225}, [\text{s\_0017}], [\text{s\_0692}],\\&\quad\left.[\text{s\_0873}]\right) = \frac{\text{Vmax\_r\_0225} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0017r\_0225}}\right)^1 \cdot \left([\text{s\_0017}]^1 - \frac{[\text{s\_0692}]^1 \cdot [\text{s\_0873}]^1}{\text{Keq\_r\_0225}}\right)}{1+\frac{[\text{s\_0017}]}{\text{kms\_s\_0017r\_0225}}+\left(1+\frac{[\text{s\_0692}]}{\text{kmp\_s\_0692r\_0225}}\right)\cdot\left(1+\frac{[\text{s\_0873}]}{\text{kmp\_s\_0873r\_0225}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{483}$$

$$\begin{aligned}&\text{function\_49}\left(\text{Keq\_r\_0225}, \text{Vmax\_r\_0225}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0692r\_0225},\right.\\&\quad\text{kmp\_s\_0873r\_0225}, \text{kms\_s\_0017r\_0225}, [\text{s\_0017}], [\text{s\_0692}],\\&\quad\left.[\text{s\_0873}]\right) = \frac{\text{Vmax\_r\_0225} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0017r\_0225}}\right)^1 \cdot \left([\text{s\_0017}]^1 - \frac{[\text{s\_0692}]^1 \cdot [\text{s\_0873}]^1}{\text{Keq\_r\_0225}}\right)}{1+\frac{[\text{s\_0017}]}{\text{kms\_s\_0017r\_0225}}+\left(1+\frac{[\text{s\_0692}]}{\text{kmp\_s\_0692r\_0225}}\right)\cdot\left(1+\frac{[\text{s\_0873}]}{\text{kmp\_s\_0873r\_0225}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{484}$$

Table 200: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0225	Keq_r_0225		0.604		☑
Vmax_r_0225	Vmax_r_0225		0.415		☑
kmp_s_0692r-_0225	kmp_s_0692r_0225		0.549		☑
kmp_s_0873r-_0225	kmp_s_0873r_0225		0.549		☑
kms_s_0017r-_0225	kms_s_0017r_0225		0.549		☑

7.50 Reaction r_0226

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name argininosuccinate synthase

Notes GENE_ASSOCIATION:YOL058W

Reaction equation

$$\text{s\_0446} + \text{s\_0881} + \text{s\_0887} \xrightleftharpoons{\text{s\_0017, s\_0434, s\_0446, s\_0605, s\_0763\_b, s\_0881, s\_0887}} \text{s\_0017} + \text{s\_0434} + \text{s\_0605} + \text{s\_} \tag{485}$$

Reactants

Table 201: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0887	L-citrulline [intracellular]	

Modifiers

Table 202: Properties of each modifier.

Id	Name	SBO
s_0017	(N(omega)-L-arginino)succinic acid [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0887	L-citrulline [intracellular]	

Products

Table 203: Properties of each product.

Id	Name	SBO
s_0017	(N(omega)-L-arginino)succinic acid [intracellular]	
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_50}\left(\mathrm{Keq\_r\_0226}, \mathrm{Vmax\_r\_0226}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0017r\_0226}, \mathrm{kmp\_s\_0434r\_0226}, \mathrm{kmp\_s\_0605r\_0226}, \mathrm{kmp\_s\_0763\_br\_0226}, \mathrm{kms\_s\_0446r\_0226}, \mathrm{kms\_s\_0881r\_0226}, \mathrm{kms\_s\_0887r\_0226}, [\mathrm{s\_0017}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_0887}]\right) \tag{486}$$

$$\begin{aligned}&\text{function\_50}\left(\text{Keq\_r\_0226}, \text{Vmax\_r\_0226}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0017r\_0226},\right.\\&\text{kmp\_s\_0434r\_0226}, \text{kmp\_s\_0605r\_0226}, \text{kmp\_s\_0763\_br\_0226},\\&\text{kms\_s\_0446r\_0226}, \text{kms\_s\_0881r\_0226}, \text{kms\_s\_0887r\_0226},\\&\left.[\text{s\_0017}], [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_0881}], [\text{s\_0887}]\right)\\&= \frac{\text{Vmax\_r\_0226} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0226}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0881r\_0226}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0887r\_0226}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0881}]^{1} \cdot [\text{s\_0887}]^{1} - \frac{[\text{s\_0017}]^{1} \cdot [\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_0} \cdots}{\text{Keq\_r\_0226}} \cdots\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0881}]}{\text{kms\_s\_0881r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0887}]}{\text{kms\_s\_0887r\_0226}}\right) + \left(1+\frac{[\text{s\_0017}]}{\text{kmp\_s\_0017r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0226}}\right) \cdot \left(\cdots\right.}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{487}$$

$$\begin{aligned}&\text{function\_50}\left(\text{Keq\_r\_0226}, \text{Vmax\_r\_0226}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0017r\_0226},\right.\\&\text{kmp\_s\_0434r\_0226}, \text{kmp\_s\_0605r\_0226}, \text{kmp\_s\_0763\_br\_0226},\\&\text{kms\_s\_0446r\_0226}, \text{kms\_s\_0881r\_0226}, \text{kms\_s\_0887r\_0226},\\&\left.[\text{s\_0017}], [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_0881}], [\text{s\_0887}]\right)\\&= \frac{\text{Vmax\_r\_0226} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0226}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0881r\_0226}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0887r\_0226}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0881}]^{1} \cdot [\text{s\_0887}]^{1} - \frac{[\text{s\_0017}]^{1} \cdot [\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_0} \cdots}{\text{Keq\_r\_0226}} \cdots\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0881}]}{\text{kms\_s\_0881r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0887}]}{\text{kms\_s\_0887r\_0226}}\right) + \left(1+\frac{[\text{s\_0017}]}{\text{kmp\_s\_0017r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0226}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0226}}\right) \cdot \left(\cdots\right.}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{488}$$

Table 204: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0226`	Keq_r_0226		0.697		☑
`Vmax_r_0226`	Vmax_r_0226		1.908		☑
`kmp_s_0017r_0226`	kmp_s_0017r_0226		0.549		☑
`kmp_s_0434r_0226`	kmp_s_0434r_0226		1.260		☑
`kmp_s_0605r_0226`	kmp_s_0605r_0226		0.549		☑
`kmp_s_0763_br_0226`	kmp_s_0763_br_0226		0.549		☑
`kms_s_0446r_0226`	kms_s_0446r_0226		1.092		☑
`kms_s_0881r_0226`	kms_s_0881r_0226		0.549		☑
`kms_s_0887r_0226`	kms_s_0887r_0226		0.549		☑

7.51 Reaction `r_0229`

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name asparagine synthase (glutamine-hydrolysing)

Notes GENE_ASSOCIATION:(YGR124W or YPR145W)

Reaction equation

$$\text{s\_0446} + \text{s\_0881} + \text{s\_0907} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0434, s\_0446, s\_0605, s\_0763\_b, s\_0877, s\_0881, s\_0899, s\_0907, s\_1434\_b}} \tag{489}$$

Reactants

Table 205: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 206: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0877	L-asparagine [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 207: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0877	L-asparagine [intracellular]	
s_0899	L-glutamate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_51}\left(\mathrm{Keq\_r\_0229}, \mathrm{Vmax\_r\_0229}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0229}, \mathrm{kmp\_s\_0605r\_0229}, \mathrm{kmp\_s\_0763\_br\_0229}, \mathrm{kmp\_s\_0877r\_0229}, \mathrm{kmp\_s\_0899r\_0229}, \mathrm{kms\_s\_0446r\_0229}, \mathrm{kms\_s\_0881r\_0229}, \mathrm{kms\_s\_0907r\_0229}, \mathrm{kms\_s\_1434\_br\_0229}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0877}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) \quad (490)$$

$$\mathrm{function\_51}\left(\mathrm{Keq\_r\_0229}, \mathrm{Vmax\_r\_0229}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0229}, \mathrm{kmp\_s\_0605r\_0229}, \mathrm{kmp\_s\_0763\_br\_0229}, \mathrm{kmp\_s\_0877r\_0229}, \mathrm{kmp\_s\_0899r\_0229}, \mathrm{kms\_s\_0446r\_0229}, \mathrm{kms\_s\_0881r\_0229}, \mathrm{kms\_s\_0907r\_0229}, \mathrm{kms\_s\_1434\_br\_0229}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0877}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) \quad (491)$$

$$= \frac{\mathrm{Vmax\_r\_0229} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0229}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0881}]^1 \cdot [\mathrm{s\_0907}]^1 \cdot [\mathrm{s\_14}\ldots\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0229}}\right) + \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0229}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\mathrm{function\_51}\left(\mathrm{Keq\_r\_0229}, \mathrm{Vmax\_r\_0229}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0229}, \mathrm{kmp\_s\_0605r\_0229}, \mathrm{kmp\_s\_0763\_br\_0229}, \mathrm{kmp\_s\_0877r\_0229}, \mathrm{kmp\_s\_0899r\_0229}, \mathrm{kms\_s\_0446r\_0229}, \mathrm{kms\_s\_0881r\_0229}, \mathrm{kms\_s\_0907r\_0229}, \mathrm{kms\_s\_1434\_br\_0229}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0877}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) \quad (492)$$

$$= \frac{\mathrm{Vmax\_r\_0229} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0229}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0229}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0881}]^1 \cdot [\mathrm{s\_0907}]^1 \cdot [\mathrm{s\_14}\ldots\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0229}}\right) + \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0229}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0229}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

Table 208: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0229	Keq_r_0229		0.697		☑
Vmax_r_0229	Vmax_r_0229		4.922		☑
kmp_s_0434r_0229	kmp_s_0434r_0229		1.260		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0605r-_0229	kmp_s_0605r_0229		0.549		☑
kmp_s_0763-_br_0229	kmp_s_0763_br-_0229		0.549		☑
kmp_s_0877r-_0229	kmp_s_0877r_0229		0.549		☑
kmp_s_0899r-_0229	kmp_s_0899r_0229		0.549		☑
kms_s_0446r-_0229	kms_s_0446r_0229		1.092		☑
kms_s_0881r-_0229	kms_s_0881r_0229		0.549		☑
kms_s_0907r-_0229	kms_s_0907r_0229		0.549		☑
kms_s_1434-_br_0229	kms_s_1434_br-_0229		0.549		☑

7.52 Reaction r_0232

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name aspartate carbamoyltransferase

Notes GENE_ASSOCIATION:YJL130C

Reaction equation

$$\mathrm{s\_0469} + \mathrm{s\_0881} \xrightleftharpoons{\mathrm{s\_0469,\ s\_0763\_b,\ s\_0881,\ s\_1073,\ s\_1207}} \mathrm{s\_0763\_b} + \mathrm{s\_1073} + \mathrm{s\_1207} \tag{493}$$

Reactants

Table 209: Properties of each reactant.

Id	Name	SBO
s_0469	carbamoyl phosphate [intracellular]	
s_0881	L-aspartate [intracellular]	

Modifiers

Table 210: Properties of each modifier.

Id	Name	SBO
s_0469	carbamoyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0881	L-aspartate [intracellular]	
s_1073	N-carbamoyl-L-aspartate [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 211: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1073	N-carbamoyl-L-aspartate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_52}(\mathrm{Keq\_r\_0232}, \mathrm{Vmax\_r\_0232}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0232}, \mathrm{kmp\_s\_1073r\_0232}, \mathrm{kmp\_s\_1207r\_0232}, \mathrm{kms\_s\_0469r\_0232}, \mathrm{kms\_s\_0881r\_0232}, [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_1073}], [\mathrm{s\_1207}]) \tag{494}$$

$$\mathrm{function\_52}(\mathrm{Keq\_r\_0232}, \mathrm{Vmax\_r\_0232}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0232}, \mathrm{kmp\_s\_1073r\_0232}, \mathrm{kmp\_s\_1207r\_0232}, \mathrm{kms\_s\_0469r\_0232}, \mathrm{kms\_s\_0881r\_0232}, [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_1073}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0232} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0469r\_0232}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0232}}\right)^{1} \cdot \left([\mathrm{s\_0469}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1073}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0232}}\right)}{\left(1 + \frac{[\mathrm{s\_0469}]}{\mathrm{kms\_s\_0469r\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0232}}\right) + \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1073}]}{\mathrm{kmp\_s\_1073r\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0232}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{495}$$

$$\mathrm{function\_52}(\mathrm{Keq\_r\_0232}, \mathrm{Vmax\_r\_0232}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0232}, \mathrm{kmp\_s\_1073r\_0232}, \mathrm{kmp\_s\_1207r\_0232}, \mathrm{kms\_s\_0469r\_0232}, \mathrm{kms\_s\_0881r\_0232}, [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_1073}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0232} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0469r\_0232}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0232}}\right)^{1} \cdot \left([\mathrm{s\_0469}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1073}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0232}}\right)}{\left(1 + \frac{[\mathrm{s\_0469}]}{\mathrm{kms\_s\_0469r\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0232}}\right) + \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1073}]}{\mathrm{kmp\_s\_1073r\_0232}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0232}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{496}$$

Table 212: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0232	Keq_r_0232		0.604		☑
Vmax_r_0232	Vmax_r_0232		0.826		☑
kmp_s_0763-_br_0232	kmp_s_0763_br-_0232		0.549		☑
kmp_s_1073r-_0232	kmp_s_1073r_0232		0.549		☑
kmp_s_1207r-_0232	kmp_s_1207r_0232		0.549		☑
kms_s_0469r-_0232	kms_s_0469r_0232		0.549		☑
kms_s_0881r-_0232	kms_s_0881r_0232		0.549		☑

7.53 Reaction r_0233

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name aspartate kinase

Notes GENE_ASSOCIATION:YER052C

Reaction equation

$$\mathrm{s\_0446} + \mathrm{s\_0881} \xrightleftharpoons{\mathrm{s\_0301,\ s\_0400,\ s\_0446,\ s\_0881}} \mathrm{s\_0301} + \mathrm{s\_0400} \quad (497)$$

Reactants

Table 213: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0881	L-aspartate [intracellular]	

Modifiers

Table 214: Properties of each modifier.

Id	Name	SBO
s_0301	4-phospho-L-aspartate [intracellular]	

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0881	L-aspartate [intracellular]	

Products

Table 215: Properties of each product.

Id	Name	SBO
s_0301	4-phospho-L-aspartate [intracellular]	
s_0400	ADP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_53}\left(\mathrm{Keq\_r\_0233}, \mathrm{Vmax\_r\_0233}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0301r\_0233}, \mathrm{kmp\_s\_0400r\_0233}, \mathrm{kms\_s\_0446r\_0233}, \mathrm{kms\_s\_0881r\_0233}, [\mathrm{s\_0301}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0881}]\right) \quad (498)$$

$$\mathrm{function\_53}\left(\mathrm{Keq\_r\_0233}, \mathrm{Vmax\_r\_0233}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0301r\_0233}, \mathrm{kmp\_s\_0400r\_0233}, \mathrm{kms\_s\_0446r\_0233}, \mathrm{kms\_s\_0881r\_0233}, [\mathrm{s\_0301}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0881}]\right) = \frac{\mathrm{Vmax\_r\_0233} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0233}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0233}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0301}]^{1} \cdot [\mathrm{s\_0400}]^{1}}{\mathrm{Keq\_r\_0233}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0233}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0233}}\right) + \left(1 + \frac{[\mathrm{s\_0301}]}{\mathrm{kmp\_s\_0301r\_0233}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0233}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (499)$$

$$\mathrm{function\_53}\left(\mathrm{Keq\_r\_0233}, \mathrm{Vmax\_r\_0233}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0301r\_0233}, \mathrm{kmp\_s\_0400r\_0233}, \mathrm{kms\_s\_0446r\_0233}, \mathrm{kms\_s\_0881r\_0233}, [\mathrm{s\_0301}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0881}]\right) = \frac{\mathrm{Vmax\_r\_0233} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0233}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0233}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0301}]^{1} \cdot [\mathrm{s\_0400}]^{1}}{\mathrm{Keq\_r\_0233}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0233}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0233}}\right) + \left(1 + \frac{[\mathrm{s\_0301}]}{\mathrm{kmp\_s\_0301r\_0233}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0233}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (500)$$

Table 216: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0233	Keq_r_0233		1.732		☑
Vmax_r_0233	Vmax_r_0233		6.245		☑
kmp_s_0301r-_0233	kmp_s_0301r_0233		0.549		☑
kmp_s_0400r-_0233	kmp_s_0400r_0233		1.719		☑
kms_s_0446r-_0233	kms_s_0446r_0233		1.092		☑
kms_s_0881r-_0233	kms_s_0881r_0233		0.549		☑

7.54 Reaction r_0235

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name aspartate transaminase

Notes GENE_ASSOCIATION:YLR027C or YKL106W or YLR027C

Reaction equation

$$\text{s\_0899} + \text{s\_1156} \xrightleftharpoons{\text{s\_0185, s\_0881, s\_0899, s\_1156}} \text{s\_0185} + \text{s\_0881} \tag{501}$$

Reactants

Table 217: Properties of each reactant.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	

Modifiers

Table 218: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0899	L-glutamate [intracellular]	

Id	Name	SBO
s_1156	oxaloacetate(2-) [intracellular]	

Products

Table 219: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0881	L-aspartate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_54}\left(\mathrm{Keq\_r\_0235}, \mathrm{Vmax\_r\_0235}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0235}, \mathrm{kmp\_s\_0881r\_0235}, \mathrm{kms\_s\_0899r\_0235}, \mathrm{kms\_s\_1156r\_0235}, [\mathrm{s\_0185}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_1156}]\right) \tag{502}$$

$$\mathrm{function\_54}\left(\mathrm{Keq\_r\_0235}, \mathrm{Vmax\_r\_0235}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0235}, \mathrm{kmp\_s\_0881r\_0235}, \mathrm{kms\_s\_0899r\_0235}, \mathrm{kms\_s\_1156r\_0235}, [\mathrm{s\_0185}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_1156}]\right) = \frac{\mathrm{Vmax\_r\_0235} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0235}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1156r\_0235}}\right)^{1} \cdot \left([\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1156}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0881}]^{1}}{\mathrm{Keq\_r\_0235}}\right)}{\left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0235}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1156}]}{\mathrm{kms\_s\_1156r\_0235}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0235}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kmp\_s\_0881r\_0235}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{503}$$

$$\mathrm{function\_54}\left(\mathrm{Keq\_r\_0235}, \mathrm{Vmax\_r\_0235}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0235}, \mathrm{kmp\_s\_0881r\_0235}, \mathrm{kms\_s\_0899r\_0235}, \mathrm{kms\_s\_1156r\_0235}, [\mathrm{s\_0185}], [\mathrm{s\_0881}], [\mathrm{s\_0899}], [\mathrm{s\_1156}]\right) = \frac{\mathrm{Vmax\_r\_0235} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0235}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1156r\_0235}}\right)^{1} \cdot \left([\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1156}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0881}]^{1}}{\mathrm{Keq\_r\_0235}}\right)}{\left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0235}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1156}]}{\mathrm{kms\_s\_1156r\_0235}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0235}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kmp\_s\_0881r\_0235}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{504}$$

Table 220: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0235	Keq_r_0235		1.100		☑
Vmax_r_0235	Vmax_r_0235		9.856		☑
kmp_s_0185r-_0235	kmp_s_0185r_0235		0.549		☑
kmp_s_0881r-_0235	kmp_s_0881r_0235		0.549		☑
kms_s_0899r-_0235	kms_s_0899r_0235		0.549		☑
kms_s_1156r-_0235	kms_s_1156r_0235		0.549		☑

7.55 Reaction r_0238

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name aspartate-semialdehyde dehydrogenase

Notes GENE_ASSOCIATION:YDR158W

Reaction equation

$$\mathrm{s\_0301} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0301,\ s\_0763\_b,\ s\_0886,\ s\_1091,\ s\_1096,\ s\_1207}} \mathrm{s\_0886} + \mathrm{s\_1091} + \mathrm{s\_1207} \quad (505)$$

Reactants

Table 221: Properties of each reactant.

Id	Name	SBO
s_0301	4-phospho-L-aspartate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 222: Properties of each modifier.

Id	Name	SBO
s_0301	4-phospho-L-aspartate [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0886	L-aspartate 4-semialdehyde [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 223: Properties of each product.

Id	Name	SBO
s_0886	L-aspartate 4-semialdehyde [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_55}\left(\mathrm{Keq\_r\_0238}, \mathrm{Vmax\_r\_0238}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0886r\_0238}, \mathrm{kmp\_s\_1091r\_0238}, \mathrm{kmp\_s\_1207r\_0238}, \mathrm{kms\_s\_0301r\_0238}, \mathrm{kms\_s\_0763\_br\_0238}, \mathrm{kms\_s\_1096r\_0238}, [\mathrm{s\_0301}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]\right) \tag{506}$$

$$\mathrm{function\_55}\left(\mathrm{Keq\_r\_0238}, \mathrm{Vmax\_r\_0238}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0886r\_0238}, \mathrm{kmp\_s\_1091r\_0238}, \mathrm{kmp\_s\_1207r\_0238}, \mathrm{kms\_s\_0301r\_0238}, \mathrm{kms\_s\_0763\_br\_0238}, \mathrm{kms\_s\_1096r\_0238}, [\mathrm{s\_0301}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]\right) \tag{507}$$

$$= \frac{\mathrm{Vmax\_r\_0238} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0301r\_0238}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0238}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0238}}\right)^1 \cdot \left([\mathrm{s\_0301}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0886}]^1 \cdot [\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0238}}\right)}{\left(1+\frac{[\mathrm{s\_0301}]}{\mathrm{kms\_s\_0301r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0238}}\right) + \left(1+\frac{[\mathrm{s\_0886}]}{\mathrm{kmp\_s\_0886r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0238}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\mathrm{function\_55}\left(\mathrm{Keq\_r\_0238}, \mathrm{Vmax\_r\_0238}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0886r\_0238}, \mathrm{kmp\_s\_1091r\_0238}, \mathrm{kmp\_s\_1207r\_0238}, \mathrm{kms\_s\_0301r\_0238}, \mathrm{kms\_s\_0763\_br\_0238}, \mathrm{kms\_s\_1096r\_0238}, [\mathrm{s\_0301}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]\right) \tag{508}$$

$$= \frac{\mathrm{Vmax\_r\_0238} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0301r\_0238}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0238}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0238}}\right)^1 \cdot \left([\mathrm{s\_0301}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0886}]^1 \cdot [\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0238}}\right)}{\left(1+\frac{[\mathrm{s\_0301}]}{\mathrm{kms\_s\_0301r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0238}}\right) + \left(1+\frac{[\mathrm{s\_0886}]}{\mathrm{kmp\_s\_0886r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0238}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0238}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

Table 224: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0238	Keq_r_0238		1.100		☑
Vmax_r_0238	Vmax_r_0238		13.382		☑
kmp_s_0886r-_0238	kmp_s_0886r_0238		0.549		☑
kmp_s_1091r-_0238	kmp_s_1091r_0238		0.549		☑
kmp_s_1207r-_0238	kmp_s_1207r_0238		0.549		☑
kms_s_0301r-_0238	kms_s_0301r_0238		0.549		☑
kms_s_0763-_br_0238	kms_s_0763_br-_0238		0.549		☑
kms_s_1096r-_0238	kms_s_1096r_0238		0.549		☑

7.56 Reaction r_0245

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name ATP phosphoribosyltransferase

Notes GENE_ASSOCIATION:YER055C

Reaction equation

$$\mathrm{s\_0331} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0331,\ s\_0334,\ s\_0446,\ s\_0605}} \mathrm{s\_0334} + \mathrm{s\_0605} \quad (509)$$

Reactants

Table 225: Properties of each reactant.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 226: Properties of each modifier.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0334	5-phosphoribosyl-ATP [intracellular]	
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	

Products

Table 227: Properties of each product.

Id	Name	SBO
s_0334	5-phosphoribosyl-ATP [intracellular]	
s_0605	diphosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_56}(\mathrm{Keq\_r\_0245}, \mathrm{Vmax\_r\_0245}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0334r\_0245}, \mathrm{kmp\_s\_0605r\_0245}, \mathrm{kms\_s\_0331r\_0245}, \mathrm{kms\_s\_0446r\_0245}, [\mathrm{s\_0331}], [\mathrm{s\_0334}], [\mathrm{s\_0446}], [\mathrm{s\_0605}]) \tag{510}$$

$$\mathrm{function\_56}(\mathrm{Keq\_r\_0245}, \mathrm{Vmax\_r\_0245}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0334r\_0245}, \mathrm{kmp\_s\_0605r\_0245}, \mathrm{kms\_s\_0331r\_0245}, \mathrm{kms\_s\_0446r\_0245}, [\mathrm{s\_0331}], [\mathrm{s\_0334}], [\mathrm{s\_0446}], [\mathrm{s\_0605}]) = \frac{\mathrm{Vmax\_r\_0245} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0245}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0245}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0334}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0245}}\right)}{\left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0245}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0245}}\right) + \left(1+\frac{[\mathrm{s\_0334}]}{\mathrm{kmp\_s\_0334r\_0245}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0245}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{511}$$

$$\mathrm{function\_56}(\mathrm{Keq\_r\_0245}, \mathrm{Vmax\_r\_0245}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0334r\_0245}, \mathrm{kmp\_s\_0605r\_0245}, \mathrm{kms\_s\_0331r\_0245}, \mathrm{kms\_s\_0446r\_0245}, [\mathrm{s\_0331}], [\mathrm{s\_0334}], [\mathrm{s\_0446}], [\mathrm{s\_0605}]) = \frac{\mathrm{Vmax\_r\_0245} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0245}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0245}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0334}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0245}}\right)}{\left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0245}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0245}}\right) + \left(1+\frac{[\mathrm{s\_0334}]}{\mathrm{kmp\_s\_0334r\_0245}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0245}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{512}$$

Table 228: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0245	Keq_r_0245		0.553		☑
Vmax_r_0245	Vmax_r_0245		0.321		☑
kmp_s_0334r-_0245	kmp_s_0334r_0245		0.549		☑
kmp_s_0605r-_0245	kmp_s_0605r_0245		0.549		☑
kms_s_0331r-_0245	kms_s_0331r_0245		0.549		☑
kms_s_0446r-_0245	kms_s_0446r_0245		1.092		☑

7.57 Reaction r_0246

This is a reversible reaction of three reactants forming three products influenced by five modifiers.

Name ATP synthase

Notes GENE_ASSOCIATION:((Q0080 and Q0085 and Q0130 and YBL099W and YBR039W and YDL004W and YDR298C and YDR322C-A and YDR377W and YJR121W and YKL016C and YLR295C and YML081C-A and YPL078C and YPL271W) or (Q0080 and Q0085 and Q0130 and YBL099W and YBR039W and YDL004W and YDR298C and YDR377W and YJR121W and YKL016C and YLR295C and YML081C-A and YPL078C and YPL271W and YPR020W)) or (YBR127C and YDL185W and YEL027W and YEL051W and YGR020C and YHR026W and YHR039C-A and YKL080W and YLR447C and YMR054W and YOR332W and YPL234C and YPR036W) or (YBR127C and YDL185W and YEL027W and YEL051W and YGR020C and YHR026W and YHR039C-A and YKL080W and YLR447C and YOR270C and YOR332W and YPL234C and YPR036W)

Reaction equation

$$\mathrm{s\_0400} + 3\,\mathrm{s\_0763\_b} + \mathrm{s\_1207} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0446} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1434\_b} \quad (513)$$

Reactants

Table 229: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Modifiers

Table 230: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 231: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_57}\left(\mathrm{Keq\_r\_0246}, \mathrm{Vmax\_r\_0246}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0246}, \mathrm{kmp\_s\_0763\_br\_0246}, \mathrm{kmp\_s\_1434\_br\_0246}, \mathrm{kms\_s\_0400r\_0246}, \mathrm{kms\_s\_0763\_br\_0246}, \mathrm{kms\_s\_1207r\_0246}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \tag{514}$$

$$\mathrm{function\_57}\left(\mathrm{Keq\_r\_0246}, \mathrm{Vmax\_r\_0246}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0246}, \mathrm{kmp\_s\_0763\_br\_0246}, \mathrm{kmp\_s\_1434\_br\_0246}, \mathrm{kms\_s\_0400r\_0246}, \mathrm{kms\_s\_0763\_br\_0246}, \mathrm{kms\_s\_1207r\_0246}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \tag{515}$$

$$= \frac{\mathrm{Vmax\_r\_0246} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0246}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0246}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1207r\_0246}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1207}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0246}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0246}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0246}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kms\_s\_1207r\_0246}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0246}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0246}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0246}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\begin{aligned}&\text{function\_57}\left(\text{Keq\_r\_0246}, \text{Vmax\_r\_0246}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0446r\_0246},\right. \\ &\text{kmp\_s\_0763\_br\_0246}, \text{kmp\_s\_1434\_br\_0246}, \text{kms\_s\_0400r\_0246}, \text{kms\_s\_0763\_br\_0246}, \\ &\left.\text{kms\_s\_1207r\_0246}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0763\_b}], [\text{s\_1207}], [\text{s\_1434\_b}]\right) \\ &= \frac{\text{Vmax\_r\_0246} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0246}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0246}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1207r\_0246}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{3} \cdot [\text{s\_1207}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0246}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0246}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0246}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kms\_s\_1207r\_0246}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0246}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0246}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0246}}\right.}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{516}$$

Table 232: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0246	Keq_r_0246		3.476		☑
Vmax_r_0246	Vmax_r_0246		76.004		☑
kmp_s_0446r-_0246	kmp_s_0446r_0246		1.092		☑
kmp_s_0763-_br_0246	kmp_s_0763_br-_0246		0.549		☑
kmp_s_1434-_br_0246	kmp_s_1434_br-_0246		0.549		☑
kms_s_0400r-_0246	kms_s_0400r_0246		1.719		☑
kms_s_0763-_br_0246	kms_s_0763_br-_0246		0.549		☑
kms_s_1207r-_0246	kms_s_1207r_0246		0.549		☑

7.58 Reaction r_0249

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ATPase, cytosolic

Notes GENE_ASSOCIATION:((YCR024C-A and YEL017C-A and YGL008C) or (YCR024C-A and YEL017C-A and YPL036W))

Reaction equation

$$\text{s\_0446} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0766\_b, s\_1207, s\_1434\_b}} \text{s\_0400} + \text{s\_0766\_b} + \text{s\_1207} \tag{517}$$

Reactants

Table 233: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 234: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0766_b	H+ [extracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 235: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0766_b	H+ [extracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \mathrm{function\_58}\left(\mathrm{Keq\_r\_0249}, \mathrm{Vmax\_r\_0249}, \mathrm{kmp\_s\_0400r\_0249}, \mathrm{kmp\_s\_0766\_br\_0249}, \mathrm{kmp\_s\_1207r\_0249}, \mathrm{kms\_s\_0446r\_0249}, \mathrm{kms\_s\_1434\_br\_0249}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0766\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \tag{518}$$

$$\mathrm{function\_58}\left(\mathrm{Keq\_r\_0249}, \mathrm{Vmax\_r\_0249}, \mathrm{kmp\_s\_0400r\_0249}, \mathrm{kmp\_s\_0766\_br\_0249}, \mathrm{kmp\_s\_1207r\_0249}, \mathrm{kms\_s\_0446r\_0249}, \mathrm{kms\_s\_1434\_br\_0249}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0766\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \mathrm{Vmax\_r\_0249} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0249}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0249}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0766\_b}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0249}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0249}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0766\_b}]}{\mathrm{kmp\_s\_0766\_br\_0249}}\right) \cdot \left(1 + \frac{[\mathrm{s\_120}}{\mathrm{kmp\_s\_120}}\right.} \tag{519}$$

Table 236: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0249	Keq_r_0249		0.173		☑
Vmax_r_0249	Vmax_r_0249		50.457		☑
kmp_s_0400r-_0249	kmp_s_0400r_0249		1.719		☑
kmp_s_0766-_br_0249	kmp_s_0766_br-_0249		0.100		☑
kmp_s_1207r-_0249	kmp_s_1207r_0249		0.549		☑
kms_s_0446r-_0249	kms_s_0446r_0249		1.092		☑
kms_s_1434-_br_0249	kms_s_1434_br-_0249		0.549		☑

7.59 Reaction r_0251

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name bicarbonate formation

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0470} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0458, s\_0470, s\_0763\_b, s\_1434\_b}} \text{s\_0458} + \text{s\_0763\_b} \tag{520}$$

Reactants

Table 237: Properties of each reactant.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 238: Properties of each modifier.

Id	Name	SBO
s_0458	bicarbonate [intracellular]	

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 239: Properties of each product.

Id	Name	SBO
s_0458	bicarbonate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_59}\left(\mathrm{Keq\_r\_0251}, \mathrm{Vmax\_r\_0251}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0458r\_0251}, \mathrm{kmp\_s\_0763\_br\_0251}, \mathrm{kms\_s\_0470r\_0251}, \mathrm{kms\_s\_1434\_br\_0251}, [\mathrm{s\_0458}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) \tag{521}$$

$$\mathrm{function\_59}\left(\mathrm{Keq\_r\_0251}, \mathrm{Vmax\_r\_0251}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0458r\_0251}, \mathrm{kmp\_s\_0763\_br\_0251}, \mathrm{kms\_s\_0470r\_0251}, \mathrm{kms\_s\_1434\_br\_0251}, [\mathrm{s\_0458}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0251} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0470r\_0251}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0251}}\right)^{1} \cdot \left([\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0251}}\right)}{\left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kms\_s\_0470r\_0251}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0251}}\right) + \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kmp\_s\_0458r\_0251}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0251}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{522}$$

$$\mathrm{function\_59}\left(\mathrm{Keq\_r\_0251}, \mathrm{Vmax\_r\_0251}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0458r\_0251}, \mathrm{kmp\_s\_0763\_br\_0251}, \mathrm{kms\_s\_0470r\_0251}, \mathrm{kms\_s\_1434\_br\_0251}, [\mathrm{s\_0458}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0251} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0470r\_0251}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0251}}\right)^{1} \cdot \left([\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0251}}\right)}{\left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kms\_s\_0470r\_0251}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0251}}\right) + \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kmp\_s\_0458r\_0251}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0251}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{523}$$

Table 240: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0251	Keq_r_0251		0.604		☑
Vmax_r_0251	Vmax_r_0251		20.097		☑
kmp_s_0458r_0251	kmp_s_0458r_0251		0.549		☑
kmp_s_0763_br_0251	kmp_s_0763_br_0251		0.549		☑
kms_s_0470r_0251	kms_s_0470r_0251		1.000		☑
kms_s_1434_br_0251	kms_s_1434_br_0251		0.549		☑

7.60 Reaction r_0258

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name C-14 sterol reductase

Notes GENE_ASSOCIATION:YNL280C

Reaction equation

$$s\_0268 + s\_0763\_b + s\_1096 \xrightleftharpoons{s\_0124,\ s\_0268,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0124 + s\_1091 \quad (524)$$

Reactants

Table 241: Properties of each reactant.

Id	Name	SBO
s_0268	4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 242: Properties of each modifier.

Id	Name	SBO
s_0124	14-demethyllanosterol [intracellular]	

Id	Name	SBO
s_0268	4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 243: Properties of each product.

Id	Name	SBO
s_0124	14-demethyllanosterol [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_60}(\mathrm{Keq\_r\_0258}, \mathrm{Vmax\_r\_0258}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0124r\_0258}, \mathrm{kmp\_s\_1091r\_0258}, \mathrm{kms\_s\_0268r\_0258}, \mathrm{kms\_s\_0763\_br\_0258}, \mathrm{kms\_s\_1096r\_0258}, [\mathrm{s\_0124}], [\mathrm{s\_0268}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (525)$$

$$\mathrm{function\_60}(\mathrm{Keq\_r\_0258}, \mathrm{Vmax\_r\_0258}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0124r\_0258}, \mathrm{kmp\_s\_1091r\_0258}, \mathrm{kms\_s\_0268r\_0258}, \mathrm{kms\_s\_0763\_br\_0258}, \mathrm{kms\_s\_1096r\_0258}, [\mathrm{s\_0124}], [\mathrm{s\_0268}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0258} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0268r\_0258}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0258}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0258}}\right)^1 \cdot \left([\mathrm{s\_0268}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0124}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0258}}\right)}{\left(1+\frac{[\mathrm{s\_0268}]}{\mathrm{kms\_s\_0268r\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0258}}\right) + \left(1+\frac{[\mathrm{s\_0124}]}{\mathrm{kmp\_s\_0124r\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0258}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (526)$$

$$\mathrm{function\_60}(\mathrm{Keq\_r\_0258}, \mathrm{Vmax\_r\_0258}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0124r\_0258}, \mathrm{kmp\_s\_1091r\_0258}, \mathrm{kms\_s\_0268r\_0258}, \mathrm{kms\_s\_0763\_br\_0258}, \mathrm{kms\_s\_1096r\_0258}, [\mathrm{s\_0124}], [\mathrm{s\_0268}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0258} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0268r\_0258}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0258}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0258}}\right)^1 \cdot \left([\mathrm{s\_0268}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0124}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0258}}\right)}{\left(1+\frac{[\mathrm{s\_0268}]}{\mathrm{kms\_s\_0268r\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0258}}\right) + \left(1+\frac{[\mathrm{s\_0124}]}{\mathrm{kmp\_s\_0124r\_0258}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0258}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (527)$$

Table 244: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0258	Keq_r_0258		2.004		☑
Vmax_r_0258	Vmax_r_0258		0.046		☑
kmp_s_0124r-_0258	kmp_s_0124r_0258		0.549		☑
kmp_s_1091r-_0258	kmp_s_1091r_0258		0.549		☑
kms_s_0268r-_0258	kms_s_0268r_0258		0.549		☑
kms_s_0763-_br_0258	kms_s_0763_br-_0258		0.549		☑
kms_s_1096r-_0258	kms_s_1096r_0258		0.549		☑

7.61 Reaction r_0261

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name C-3 sterol dehydrogenase

Notes GENE_ASSOCIATION:YGL001C

Reaction equation

$$\text{s\_1091} + \text{s\_1457} \xrightleftharpoons{\text{s\_0470, s\_0763\_b, s\_1091, s\_1096, s\_1457, s\_1458}} \text{s\_0470} + \text{s\_0763\_b} + \text{s\_1096} + \text{s\_1458} \quad (528)$$

Reactants

Table 245: Properties of each reactant.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1457	zymosterol intermediate 1c [intracellular]	

Modifiers

Table 246: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1457	zymosterol intermediate 1c [intracellular]	
s_1458	zymosterol intermediate 2 [intracellular]	

Products

Table 247: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1458	zymosterol intermediate 2 [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{61} = & \text{vol}(\text{intracellular}) \\ & \cdot \text{function\_61}(\text{Keq\_r\_0261}, \text{Vmax\_r\_0261}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0261}, \\ & \text{kmp\_s\_0763\_br\_0261}, \text{kmp\_s\_1096r\_0261}, \text{kmp\_s\_1458r\_0261}, \text{kms\_s\_1091r\_0261}, \\ & \text{kms\_s\_1457r\_0261}, [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1457}], [\text{s\_1458}]) \end{aligned} \tag{529}$$

$$\begin{aligned} & \text{function\_61}(\text{Keq\_r\_0261}, \text{Vmax\_r\_0261}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0261}, \\ & \text{kmp\_s\_0763\_br\_0261}, \text{kmp\_s\_1096r\_0261}, \text{kmp\_s\_1458r\_0261}, \text{kms\_s\_1091r\_0261}, \\ & \text{kms\_s\_1457r\_0261}, [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1457}], [\text{s\_1458}]) \\ & = \frac{\text{Vmax\_r\_0261} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1091r\_0261}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1457r\_0261}}\right)^{1} \cdot \left([\text{s\_1091}]^{1} \cdot [\text{s\_1457}]^{1} - \frac{[\text{s\_0470}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1458}]^{1}}{\text{Keq\_r\_0261}}\right)}{\left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1457}]}{\text{kms\_s\_1457r\_0261}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1458}]}{\text{kmp\_s\_1458r\_0261}}\right)}}{\text{vol}(\text{intracellular})} \end{aligned} \tag{530}$$

$$\begin{aligned} & \text{function\_61}(\text{Keq\_r\_0261}, \text{Vmax\_r\_0261}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0261}, \\ & \text{kmp\_s\_0763\_br\_0261}, \text{kmp\_s\_1096r\_0261}, \text{kmp\_s\_1458r\_0261}, \text{kms\_s\_1091r\_0261}, \\ & \text{kms\_s\_1457r\_0261}, [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1457}], [\text{s\_1458}]) \\ & = \frac{\text{Vmax\_r\_0261} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1091r\_0261}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1457r\_0261}}\right)^{1} \cdot \left([\text{s\_1091}]^{1} \cdot [\text{s\_1457}]^{1} - \frac{[\text{s\_0470}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1458}]^{1}}{\text{Keq\_r\_0261}}\right)}{\left(1+\frac{[\text{s\_1091}]}{\text{kms\_s\_1091r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1457}]}{\text{kms\_s\_1457r\_0261}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kmp\_s\_1096r\_0261}}\right) \cdot \left(1+\frac{[\text{s\_1458}]}{\text{kmp\_s\_1458r\_0261}}\right)}}{\text{vol}(\text{intracellular})} \end{aligned} \tag{531}$$

Table 248: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0261	Keq_r_0261		0.604		☑
Vmax_r_0261	Vmax_r_0261		0.079		☑
kmp_s_0470r-_0261	kmp_s_0470r_0261		1.000		☑
kmp_s_0763-_br_0261	kmp_s_0763_br-_0261		0.549		☑
kmp_s_1096r-_0261	kmp_s_1096r_0261		0.549		☑
kmp_s_1458r-_0261	kmp_s_1458r_0261		0.549		☑
kms_s_1091r-_0261	kms_s_1091r_0261		0.549		☑
kms_s_1457r-_0261	kms_s_1457r_0261		0.549		☑

7.62 Reaction r_0262

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name C-3 sterol dehydrogenase (4-methylzymosterol)

Notes GENE_ASSOCIATION:YGL001C

Reaction equation

$$\text{s\_0303} + \text{s\_1082} \xrightleftharpoons[]{\text{s\_0215, s\_0303, s\_0470, s\_0763\_b, s\_1082, s\_1087}} \text{s\_0215} + \text{s\_0470} + \text{s\_0763\_b} + \text{s\_1087} \quad (532)$$

Reactants

Table 249: Properties of each reactant.

Id	Name	SBO
s_0303	4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]	
s_1082	NAD(+) [intracellular]	

Modifiers

Table 250: Properties of each modifier.

Id	Name	SBO
s_0215	3-dehydro-4-methylzymosterol [intracellular]	
s_0303	4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 251: Properties of each product.

Id	Name	SBO
s_0215	3-dehydro-4-methylzymosterol [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_62}(\mathrm{Keq\_r\_0262}, \mathrm{Vmax\_r\_0262}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0215r\_0262}, \mathrm{kmp\_s\_0470r\_0262}, \mathrm{kmp\_s\_0763\_br\_0262}, \mathrm{kmp\_s\_1087r\_0262}, \mathrm{kms\_s\_0303r\_0262}, \mathrm{kms\_s\_1082r\_0262}, [\mathrm{s\_0215}], [\mathrm{s\_0303}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) \tag{533}$$

$$\mathrm{function\_62}(\mathrm{Keq\_r\_0262}, \mathrm{Vmax\_r\_0262}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0215r\_0262}, \mathrm{kmp\_s\_0470r\_0262}, \mathrm{kmp\_s\_0763\_br\_0262}, \mathrm{kmp\_s\_1087r\_0262}, \mathrm{kms\_s\_0303r\_0262}, \mathrm{kms\_s\_1082r\_0262}, [\mathrm{s\_0215}], [\mathrm{s\_0303}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0262} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0303r\_0262}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0262}}\right)^1 \cdot \left([\mathrm{s\_0303}]^1 \cdot [\mathrm{s\_1082}]^1 - \frac{[\mathrm{s\_0215}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1}{\mathrm{Keq\_r\_0262}}\right)}{\left(1+\frac{[\mathrm{s\_0303}]}{\mathrm{kms\_s\_0303r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0262}}\right) + \left(1+\frac{[\mathrm{s\_0215}]}{\mathrm{kmp\_s\_0215r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0262}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{534}$$

$$\mathrm{function\_62}(\mathrm{Keq\_r\_0262}, \mathrm{Vmax\_r\_0262}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0215r\_0262}, \mathrm{kmp\_s\_0470r\_0262}, \mathrm{kmp\_s\_0763\_br\_0262}, \mathrm{kmp\_s\_1087r\_0262}, \mathrm{kms\_s\_0303r\_0262}, \mathrm{kms\_s\_1082r\_0262}, [\mathrm{s\_0215}], [\mathrm{s\_0303}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0262} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0303r\_0262}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0262}}\right)^1 \cdot \left([\mathrm{s\_0303}]^1 \cdot [\mathrm{s\_1082}]^1 - \frac{[\mathrm{s\_0215}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1}{\mathrm{Keq\_r\_0262}}\right)}{\left(1+\frac{[\mathrm{s\_0303}]}{\mathrm{kms\_s\_0303r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0262}}\right) + \left(1+\frac{[\mathrm{s\_0215}]}{\mathrm{kmp\_s\_0215r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0262}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0262}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{535}$$

Table 252: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0262	Keq_r_0262		0.035		☑
Vmax_r_0262	Vmax_r_0262		0.079		☑
kmp_s_0215r-_0262	kmp_s_0215r_0262		0.549		☑
kmp_s_0470r-_0262	kmp_s_0470r_0262		1.000		☑
kmp_s_0763-_br_0262	kmp_s_0763_br-_0262		0.549		☑
kmp_s_1087r-_0262	kmp_s_1087r_0262		0.087		☑
kms_s_0303r-_0262	kms_s_0303r_0262		0.549		☑
kms_s_1082r-_0262	kms_s_1082r_0262		1.503		☑

7.63 Reaction r_0263

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name C-3 sterol keto reductase (4-methylzymosterol)

Notes GENE_ASSOCIATION:YLR100W

Reaction equation

$$s\_0215 + s\_0763\_b + s\_1096 \xrightleftharpoons{s\_0215,\ s\_0302,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0302 + s\_1091 \tag{536}$$

Reactants

Table 253: Properties of each reactant.

Id	Name	SBO
s_0215	3-dehydro-4-methylzymosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 254: Properties of each modifier.

Id	Name	SBO
s_0215	3-dehydro-4-methylzymosterol [intracellular]	
s_0302	4alpha-methylzymosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 255: Properties of each product.

Id	Name	SBO
s_0302	4alpha-methylzymosterol [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_63}(\mathrm{Keq\_r\_0263}, \mathrm{Vmax\_r\_0263}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0302r\_0263}, \mathrm{kmp\_s\_1091r\_0263}, \mathrm{kms\_s\_0215r\_0263}, \mathrm{kms\_s\_0763\_br\_0263}, \mathrm{kms\_s\_1096r\_0263}, [\mathrm{s\_0215}], [\mathrm{s\_0302}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{537}$$

$$\mathrm{function\_63}(\mathrm{Keq\_r\_0263}, \mathrm{Vmax\_r\_0263}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0302r\_0263}, \mathrm{kmp\_s\_1091r\_0263}, \mathrm{kms\_s\_0215r\_0263}, \mathrm{kms\_s\_0763\_br\_0263}, \mathrm{kms\_s\_1096r\_0263}, [\mathrm{s\_0215}], [\mathrm{s\_0302}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0263} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0215r\_0263}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0263}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0263}}\right)^{1} \cdot \left([\mathrm{s\_0215}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0302}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0263}}\right)}{\left(1+\frac{[\mathrm{s\_0215}]}{\mathrm{kms\_s\_0215r\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0263}}\right) + \left(1+\frac{[\mathrm{s\_0302}]}{\mathrm{kmp\_s\_0302r\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0263}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{538}$$

$$\mathrm{function\_63}(\mathrm{Keq\_r\_0263}, \mathrm{Vmax\_r\_0263}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0302r\_0263}, \mathrm{kmp\_s\_1091r\_0263}, \mathrm{kms\_s\_0215r\_0263}, \mathrm{kms\_s\_0763\_br\_0263}, \mathrm{kms\_s\_1096r\_0263}, [\mathrm{s\_0215}], [\mathrm{s\_0302}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0263} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0215r\_0263}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0263}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0263}}\right)^{1} \cdot \left([\mathrm{s\_0215}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0302}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0263}}\right)}{\left(1+\frac{[\mathrm{s\_0215}]}{\mathrm{kms\_s\_0215r\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0263}}\right) + \left(1+\frac{[\mathrm{s\_0302}]}{\mathrm{kmp\_s\_0302r\_0263}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0263}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{539}$$

Table 256: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0263	Keq_r_0263		2.004		☑
Vmax_r_0263	Vmax_r_0263		0.045		☑
kmp_s_0302r-_0263	kmp_s_0302r_0263		0.549		☑
kmp_s_1091r-_0263	kmp_s_1091r_0263		0.549		☑
kms_s_0215r-_0263	kms_s_0215r_0263		0.549		☑
kms_s_0763-_br_0263	kms_s_0763_br-_0263		0.549		☑
kms_s_1096r-_0263	kms_s_1096r_0263		0.549		☑

7.64 Reaction r_0264

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name C-3 sterol keto reductase (zymosterol)

Notes GENE_ASSOCIATION:YLR100W

Reaction equation

$$\mathrm{s\_0763\_b} + \mathrm{s\_1096} + \mathrm{s\_1458} \xrightleftharpoons{\mathrm{s\_0763\_b},\ \mathrm{s\_1091},\ \mathrm{s\_1096},\ \mathrm{s\_1447},\ \mathrm{s\_1458}} \mathrm{s\_1091} + \mathrm{s\_1447} \tag{540}$$

Reactants

Table 257: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1458	zymosterol intermediate 2 [intracellular]	

Modifiers

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1447	zymosterol [intracellular]	
s_1458	zymosterol intermediate 2 [intracellular]	

Table 258: Properties of each modifier.

Products

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1447	zymosterol [intracellular]	

Table 259: Properties of each product.

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_64}\left(\mathrm{Keq\_r\_0264}, \mathrm{Vmax\_r\_0264}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0264}, \mathrm{kmp\_s\_1447r\_0264}, \mathrm{kms\_s\_0763\_br\_0264}, \mathrm{kms\_s\_1096r\_0264}, \mathrm{kms\_s\_1458r\_0264}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1447}], [\mathrm{s\_1458}]\right) \tag{541}$$

$$\mathrm{function\_64}\left(\mathrm{Keq\_r\_0264}, \mathrm{Vmax\_r\_0264}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0264}, \mathrm{kmp\_s\_1447r\_0264}, \mathrm{kms\_s\_0763\_br\_0264}, \mathrm{kms\_s\_1096r\_0264}, \mathrm{kms\_s\_1458r\_0264}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1447}], [\mathrm{s\_1458}]\right) = \frac{\mathrm{Vmax\_r\_0264} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0264}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0264}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1458r\_0264}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} \cdot [\mathrm{s\_1458}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1447}]^{1}}{\mathrm{Keq\_r\_0264}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1458}]}{\mathrm{kms\_s\_1458r\_0264}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1447}]}{\mathrm{kmp\_s\_1447r\_0264}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{542}$$

$$\mathrm{function\_64}\left(\mathrm{Keq\_r\_0264}, \mathrm{Vmax\_r\_0264}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0264}, \mathrm{kmp\_s\_1447r\_0264}, \mathrm{kms\_s\_0763\_br\_0264}, \mathrm{kms\_s\_1096r\_0264}, \mathrm{kms\_s\_1458r\_0264}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1447}], [\mathrm{s\_1458}]\right) = \frac{\mathrm{Vmax\_r\_0264} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0264}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0264}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1458r\_0264}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} \cdot [\mathrm{s\_1458}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1447}]^{1}}{\mathrm{Keq\_r\_0264}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1458}]}{\mathrm{kms\_s\_1458r\_0264}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0264}}\right) \cdot \left(1+\frac{[\mathrm{s\_1447}]}{\mathrm{kmp\_s\_1447r\_0264}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{543}$$

Table 260: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0264	Keq_r_0264		2.004		☑
Vmax_r_0264	Vmax_r_0264		0.045		☑
kmp_s_1091r-_0264	kmp_s_1091r_0264		0.549		☑
kmp_s_1447r-_0264	kmp_s_1447r_0264		0.549		☑
kms_s_0763-_br_0264	kms_s_0763_br-_0264		0.549		☑
kms_s_1096r-_0264	kms_s_1096r_0264		0.549		☑
kms_s_1458r-_0264	kms_s_1458r_0264		0.549		☑

7.65 Reaction r_0265

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name C-4 methyl sterol oxidase

Notes GENE_ASSOCIATION:YGR060W

Reaction equation

$$\text{s\_0302} + \text{s\_0763\_b} + \text{s\_1096} + \text{s\_1160} \xrightleftharpoons[]{\text{s\_0302, s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b, s\_1455}} \text{s\_1091} + \text{s\_1434} \quad (544)$$

Reactants

Table 261: Properties of each reactant.

Id	Name	SBO
s_0302	4alpha-methylzymosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	

Modifiers

Table 262: Properties of each modifier.

Id	Name	SBO
s_0302	4alpha-methylzymosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	
s_1455	zymosterol intermediate 1a [intracellular]	

Products

Table 263: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	
s_1455	zymosterol intermediate 1a [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_65}\left(\mathrm{Keq\_r\_0265}, \mathrm{Vmax\_r\_0265}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0265}, \mathrm{kmp\_s\_1434\_br\_0265}, \mathrm{kmp\_s\_1455r\_0265}, \mathrm{kms\_s\_0302r\_0265}, \mathrm{kms\_s\_0763\_br\_0265}, \mathrm{kms\_s\_1096r\_0265}, \mathrm{kms\_s\_1160r\_0265}, [\mathrm{s\_0302}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1455}]\right) \tag{545}$$

$$\mathrm{function\_65}\left(\mathrm{Keq\_r\_0265}, \mathrm{Vmax\_r\_0265}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0265}, \mathrm{kmp\_s\_1434\_br\_0265}, \mathrm{kmp\_s\_1455r\_0265}, \mathrm{kms\_s\_0302r\_0265}, \mathrm{kms\_s\_0763\_br\_0265}, \mathrm{kms\_s\_1096r\_0265}, \mathrm{kms\_s\_1160r\_0265}, [\mathrm{s\_0302}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1455}]\right) = \frac{\mathrm{Vmax\_r\_0265} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0302r\_0265}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0265}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0265}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0265}}\right)^{1} \cdot \left([\mathrm{s\_0302}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} \cdot [\mathrm{s\_1160}]^{1} - \frac{[\mathrm{s\_1091}}{}\right.}{\left(1 + \frac{[\mathrm{s\_0302}]}{\mathrm{kms\_s\_0302r\_0265}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0265}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0265}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0265}}\right) + \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0265}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0265}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{546}$$

$$\begin{aligned}&\text{function\_65}\left(\text{Keq\_r\_0265}, \text{Vmax\_r\_0265}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_1091r\_0265},\right.\\&\text{kmp\_s\_1434\_br\_0265}, \text{kmp\_s\_1455r\_0265}, \text{kms\_s\_0302r\_0265},\\&\text{kms\_s\_0763\_br\_0265}, \text{kms\_s\_1096r\_0265}, \text{kms\_s\_1160r\_0265},\\&\left.[\text{s\_0302}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1160}], [\text{s\_1434\_b}], [\text{s\_1455}]\right)\\&= \frac{\text{Vmax\_r\_0265} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0302r\_0265}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0265}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0265}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1160r\_0265}}\right)^{1} \cdot \left([\text{s\_0302}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1160}]^{1} - \frac{[\text{s\_1091}]}{\ldots}\right.}{\left(1+\frac{[\text{s\_0302}]}{\text{kms\_s\_0302r\_0265}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0265}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0265}}\right) \cdot \left(1+\frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0265}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0265}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0265}}\right) \ldots}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{547}$$

Table 264: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0265	Keq_r_0265		2.004		☑
Vmax_r_0265	Vmax_r_0265		0.095		☑
kmp_s_1091r-_0265	kmp_s_1091r_0265		0.549		☑
kmp_s_1434-_br_0265	kmp_s_1434_br-_0265		0.549		☑
kmp_s_1455r-_0265	kmp_s_1455r_0265		0.549		☑
kms_s_0302r-_0265	kms_s_0302r_0265		0.549		☑
kms_s_0763-_br_0265	kms_s_0763_br-_0265		0.549		☑
kms_s_1096r-_0265	kms_s_1096r_0265		0.549		☑
kms_s_1160r-_0265	kms_s_1160r_0265		0.549		☑

7.66 Reaction r_0266

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name C-4 methyl sterol oxidase_2

Notes GENE_ASSOCIATION:YGR060W

Reaction equation

$$\text{s\_0763\_b} + \text{s\_1096} + \text{s\_1160} + \text{s\_1455} \xrightleftharpoons{\text{s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b, s\_1455, s\_1456}} \text{s\_1091} + 2\,\text{s\_143}\ldots \tag{548}$$

Reactants

Table 265: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1455	zymosterol intermediate 1a [intracellular]	

Modifiers

Table 266: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	
s_1455	zymosterol intermediate 1a [intracellular]	
s_1456	zymosterol intermediate 1b [intracellular]	

Products

Table 267: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	
s_1456	zymosterol intermediate 1b [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_66}\left(\mathrm{Keq\_r\_0266}, \mathrm{Vmax\_r\_0266}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0266}, \mathrm{kmp\_s\_1434\_br\_0266}, \mathrm{kmp\_s\_1456r\_0266}, \mathrm{kms\_s\_0763\_br\_0266}, \mathrm{kms\_s\_1096r\_0266}, \mathrm{kms\_s\_1160r\_0266}, \mathrm{kms\_s\_1455r\_0266}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1455}], [\mathrm{s\_1456}]\right) \quad (549)$$

$$\text{function\_66}\left(\text{Keq\_r\_0266}, \text{Vmax\_r\_0266}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_1091r\_0266}, \text{kmp\_s\_1434\_br\_0266}, \text{kmp\_s\_1456r\_0266}, \text{kms\_s\_0763\_br\_0266}, \text{kms\_s\_1096r\_0266}, \text{kms\_s\_1160r\_0266}, \text{kms\_s\_1455r\_0266}, [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1160}], [\text{s\_1434\_b}], [\text{s\_1455}], [\text{s\_1456}]\right) = \frac{\text{Vmax\_r\_0266} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1160r\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1455r\_0266}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1160}]^{1} \cdot [\text{s\_1455}]^{1} - \frac{[\text{s\_1091}]}{\ldots}\right.}{\left(1 + \frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1455}]}{\text{kms\_s\_1455r\_0266}}\right) + \left(1 + \frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0266}}\right) \ldots}}{\text{vol}\left(\text{intracellular}\right)} \tag{550}$$

$$\text{function\_66}\left(\text{Keq\_r\_0266}, \text{Vmax\_r\_0266}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_1091r\_0266}, \text{kmp\_s\_1434\_br\_0266}, \text{kmp\_s\_1456r\_0266}, \text{kms\_s\_0763\_br\_0266}, \text{kms\_s\_1096r\_0266}, \text{kms\_s\_1160r\_0266}, \text{kms\_s\_1455r\_0266}, [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1160}], [\text{s\_1434\_b}], [\text{s\_1455}], [\text{s\_1456}]\right) = \frac{\text{Vmax\_r\_0266} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1160r\_0266}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1455r\_0266}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1160}]^{1} \cdot [\text{s\_1455}]^{1} - \frac{[\text{s\_1091}]}{\ldots}\right.}{\left(1 + \frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1455}]}{\text{kms\_s\_1455r\_0266}}\right) + \left(1 + \frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0266}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0266}}\right) \ldots}}{\text{vol}\left(\text{intracellular}\right)} \tag{551}$$

Table 268: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0266`	Keq_r_0266		1.100		☑
`Vmax_r_0266`	Vmax_r_0266		0.095		☑
`kmp_s_1091r_0266`	kmp_s_1091r_0266		0.549		☑
`kmp_s_1434_br_0266`	kmp_s_1434_br_0266		0.549		☑
`kmp_s_1456r_0266`	kmp_s_1456r_0266		0.549		☑
`kms_s_0763_br_0266`	kms_s_0763_br_0266		0.549		☑
`kms_s_1096r_0266`	kms_s_1096r_0266		0.549		☑
`kms_s_1160r_0266`	kms_s_1160r_0266		0.549		☑
`kms_s_1455r_0266`	kms_s_1455r_0266		0.549		☑

7.67 Reaction `r_0267`

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name C-4 methyl sterol oxidase_3

Notes GENE_ASSOCIATION:YGR060W

Reaction equation

$$s\_0763\_b + s\_1096 + s\_1160 + s\_1456 \xrightleftharpoons{s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1160,\ s\_1434\_b,\ s\_1456,\ s\_1457} s\_1091 + s\_1434 \quad (552)$$

Reactants

Table 269: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1456	zymosterol intermediate 1b [intracellular]	

Modifiers

Table 270: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	
s_1456	zymosterol intermediate 1b [intracellular]	
s_1457	zymosterol intermediate 1c [intracellular]	

Products

Table 271: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	
s_1457	zymosterol intermediate 1c [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{67} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_67}(\mathrm{Keq\_r\_0267}, \mathrm{Vmax\_r\_0267}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_0267}, \mathrm{kmp\_s\_1434\_br\_0267}, \mathrm{kmp\_s\_1457r\_0267}, \mathrm{kms\_s\_0763\_br\_0267}, \mathrm{kms\_s\_1096r\_0267}, \mathrm{kms\_s\_1160r\_0267}, \mathrm{kms\_s\_1456r\_0267}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1456}], [\mathrm{s\_1457}]) \tag{553}$$

$$\mathrm{function\_67}(\mathrm{Keq\_r\_0267}, \mathrm{Vmax\_r\_0267}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_0267}, \mathrm{kmp\_s\_1434\_br\_0267}, \mathrm{kmp\_s\_1457r\_0267}, \mathrm{kms\_s\_0763\_br\_0267}, \mathrm{kms\_s\_1096r\_0267}, \mathrm{kms\_s\_1160r\_0267}, \mathrm{kms\_s\_1456r\_0267}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1456}], [\mathrm{s\_1457}]) = \frac{\mathrm{Vmax\_r\_0267} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1456r\_0267}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1456}]^1 - \frac{[\mathrm{s\_1091}]}{}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1456}]}{\mathrm{kms\_s\_1456r\_0267}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0267}}\right)}}{\mathrm{vol}(\mathrm{intracellular})} \tag{554}$$

$$\mathrm{function\_67}(\mathrm{Keq\_r\_0267}, \mathrm{Vmax\_r\_0267}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_0267}, \mathrm{kmp\_s\_1434\_br\_0267}, \mathrm{kmp\_s\_1457r\_0267}, \mathrm{kms\_s\_0763\_br\_0267}, \mathrm{kms\_s\_1096r\_0267}, \mathrm{kms\_s\_1160r\_0267}, \mathrm{kms\_s\_1456r\_0267}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1456}], [\mathrm{s\_1457}]) = \frac{\mathrm{Vmax\_r\_0267} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0267}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1456r\_0267}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 \cdot [\mathrm{s\_1456}]^1 - \frac{[\mathrm{s\_1091}]}{}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1456}]}{\mathrm{kms\_s\_1456r\_0267}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0267}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0267}}\right)}}{\mathrm{vol}(\mathrm{intracellular})} \tag{555}$$

Table 272: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0267`	Keq_r_0267		2.004		☑
`Vmax_r_0267`	Vmax_r_0267		0.095		☑
`kmp_s_1091r_0267`	kmp_s_1091r_0267		0.549		☑
`kmp_s_1434_br_0267`	kmp_s_1434_br_0267		0.549		☑
`kmp_s_1457r_0267`	kmp_s_1457r_0267		0.549		☑
`kms_s_0763_br_0267`	kms_s_0763_br_0267		0.549		☑
`kms_s_1096r_0267`	kms_s_1096r_0267		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_1160r-_0267	kms_s_1160r_0267		0.549		☑
kms_s_1456r-_0267	kms_s_1456r_0267		0.549		☑

7.68 Reaction r_0268

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name C-4 sterol methyl oxidase (4,4-dimethylzymosterol)

Notes GENE_ASSOCIATION:YGR060W

Reaction equation

$$\text{s\_0124} + 3\,\text{s\_0763\_b} + 3\,\text{s\_1096} + 3\,\text{s\_1160} \xrightleftharpoons{\text{s\_0124, s\_0303, s\_0763\_b, s\_1091, s\_1096, s\_1160, s\_1434\_b}} \text{s\_0303} + 3\,\text{s} \tag{556}$$

Reactants

Table 273: Properties of each reactant.

Id	Name	SBO
s_0124	14-demethyllanosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	

Modifiers

Table 274: Properties of each modifier.

Id	Name	SBO
s_0124	14-demethyllanosterol [intracellular]	
s_0303	4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 275: Properties of each product.

Id	Name	SBO
`s_0303`	4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]	
`s_1091`	NADP(+) [intracellular]	
`s_1434_b`	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{68} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_68}\left(\mathrm{Keq\_r\_0268}, \mathrm{Vmax\_r\_0268}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0303r\_0268}, \mathrm{kmp\_s\_1091r\_0268}, \mathrm{kmp\_s\_1434\_br\_0268}, \mathrm{kms\_s\_0124r\_0268}, \mathrm{kms\_s\_0763\_br\_0268}, \mathrm{kms\_s\_1096r\_0268}, \mathrm{kms\_s\_1160r\_0268}, [\mathrm{s\_0124}], [\mathrm{s\_0303}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{557}$$

$$\mathrm{function\_68}\left(\mathrm{Keq\_r\_0268}, \mathrm{Vmax\_r\_0268}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0303r\_0268}, \mathrm{kmp\_s\_1091r\_0268}, \mathrm{kmp\_s\_1434\_br\_0268}, \mathrm{kms\_s\_0124r\_0268}, \mathrm{kms\_s\_0763\_br\_0268}, \mathrm{kms\_s\_1096r\_0268}, \mathrm{kms\_s\_1160r\_0268}, [\mathrm{s\_0124}], [\mathrm{s\_0303}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0268} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0124r\_0268}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0268}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0268}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0268}}\right)^{3} \cdot \left([\mathrm{s\_0124}]^{1} \cdot [\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1096}]^{3} \cdot [\mathrm{s\_1160}]^{3} - \frac{[\mathrm{s\_0303}]}{\ldots}\right.}{\left(1+\frac{[\mathrm{s\_0124}]}{\mathrm{kms\_s\_0124r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0268}}\right) + \left(1+\frac{[\mathrm{s\_0303}]}{\mathrm{kmp\_s\_0303r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0268}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{558}$$

$$\mathrm{function\_68}\left(\mathrm{Keq\_r\_0268}, \mathrm{Vmax\_r\_0268}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0303r\_0268}, \mathrm{kmp\_s\_1091r\_0268}, \mathrm{kmp\_s\_1434\_br\_0268}, \mathrm{kms\_s\_0124r\_0268}, \mathrm{kms\_s\_0763\_br\_0268}, \mathrm{kms\_s\_1096r\_0268}, \mathrm{kms\_s\_1160r\_0268}, [\mathrm{s\_0124}], [\mathrm{s\_0303}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0268} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0124r\_0268}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0268}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0268}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0268}}\right)^{3} \cdot \left([\mathrm{s\_0124}]^{1} \cdot [\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1096}]^{3} \cdot [\mathrm{s\_1160}]^{3} - \frac{[\mathrm{s\_0303}]}{\ldots}\right.}{\left(1+\frac{[\mathrm{s\_0124}]}{\mathrm{kms\_s\_0124r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0268}}\right) + \left(1+\frac{[\mathrm{s\_0303}]}{\mathrm{kmp\_s\_0303r\_0268}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0268}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{559}$$

Table 276: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0268`	Keq_r_0268		3.650		☑
`Vmax_r_0268`	Vmax_r_0268		0.095		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0303r-_0268	kmp_s_0303r_0268		0.549		☑
kmp_s_1091r-_0268	kmp_s_1091r_0268		0.549		☑
kmp_s_1434-_br_0268	kmp_s_1434_br-_0268		0.549		☑
kms_s_0124r-_0268	kms_s_0124r_0268		0.549		☑
kms_s_0763-_br_0268	kms_s_0763_br-_0268		0.549		☑
kms_s_1096r-_0268	kms_s_1096r_0268		0.549		☑
kms_s_1160r-_0268	kms_s_1160r_0268		0.549		☑

7.69 Reaction r_0270

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name C-8 sterol isomerase

Notes GENE_ASSOCIATION:YMR202W

Reaction equation

$$\text{s\_0669} \xrightleftharpoons{\text{s\_0627, s\_0669}} \text{s\_0627} \tag{560}$$

Reactant

Table 277: Properties of each reactant.

Id	Name	SBO
s_0669	fecosterol [intracellular]	

Modifiers

Table 278: Properties of each modifier.

Id	Name	SBO
s_0627	episterol [intracellular]	
s_0669	fecosterol [intracellular]	

Product

Table 279: Properties of each product.

Id	Name	SBO
s_0627	episterol [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_69}\left(\mathrm{Keq\_r\_0270}, \mathrm{Vmax\_r\_0270}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0627r\_0270}, \mathrm{kms\_s\_0669r\_0270}, [\mathrm{s\_0627}], [\mathrm{s\_0669}]\right) \tag{561}$$

$$\mathrm{function\_69}\left(\mathrm{Keq\_r\_0270}, \mathrm{Vmax\_r\_0270}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0627r\_0270}, \mathrm{kms\_s\_0669r\_0270}, [\mathrm{s\_0627}], [\mathrm{s\_0669}]\right) = \frac{\mathrm{Vmax\_r\_0270} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0669r\_0270}}\right)^{1} \cdot \left([\mathrm{s\_0669}]^{1} - \frac{[\mathrm{s\_0627}]^{1}}{\mathrm{Keq\_r\_0270}}\right)}{1 + \frac{[\mathrm{s\_0669}]}{\mathrm{kms\_s\_0669r\_0270}} + 1 + \frac{[\mathrm{s\_0627}]}{\mathrm{kmp\_s\_0627r\_0270}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{562}$$

$$\mathrm{function\_69}\left(\mathrm{Keq\_r\_0270}, \mathrm{Vmax\_r\_0270}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0627r\_0270}, \mathrm{kms\_s\_0669r\_0270}, [\mathrm{s\_0627}], [\mathrm{s\_0669}]\right) = \frac{\mathrm{Vmax\_r\_0270} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0669r\_0270}}\right)^{1} \cdot \left([\mathrm{s\_0669}]^{1} - \frac{[\mathrm{s\_0627}]^{1}}{\mathrm{Keq\_r\_0270}}\right)}{1 + \frac{[\mathrm{s\_0669}]}{\mathrm{kms\_s\_0669r\_0270}} + 1 + \frac{[\mathrm{s\_0627}]}{\mathrm{kmp\_s\_0627r\_0270}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{563}$$

Table 280: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0270	Keq_r_0270		1.100		☑
Vmax_r_0270	Vmax_r_0270		$1.7589 \cdot 10^{-4}$		☑
kmp_s_0627r-_0270	kmp_s_0627r_0270		0.549		☑
kms_s_0669r-_0270	kms_s_0669r_0270		0.549		☑

7.70 Reaction r_0271

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name C-s24 sterol reductase

Notes GENE_ASSOCIATION:YGL012W

Reaction equation

$$\text{s\_0632} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0632, s\_0635, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0635} + \text{s\_1091} \tag{564}$$

Reactants

Table 281: Properties of each reactant.

Id	Name	SBO
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 282: Properties of each modifier.

Id	Name	SBO
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0635	ergosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 283: Properties of each product.

Id	Name	SBO
s_0635	ergosterol [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{70} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_70}(\mathrm{Keq\_r\_0271}, \mathrm{Vmax\_r\_0271}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0635r\_0271}, \mathrm{kmp\_s\_1091r\_0271}, \mathrm{kms\_s\_0632r\_0271}, \mathrm{kms\_s\_0763\_br\_0271}, \mathrm{kms\_s\_1096r\_0271}, [\mathrm{s\_0632}], [\mathrm{s\_0635}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{565}$$

$$\mathrm{function\_70}(\mathrm{Keq\_r\_0271}, \mathrm{Vmax\_r\_0271}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0635r\_0271}, \mathrm{kmp\_s\_1091r\_0271}, \mathrm{kms\_s\_0632r\_0271}, \mathrm{kms\_s\_0763\_br\_0271}, \mathrm{kms\_s\_1096r\_0271}, [\mathrm{s\_0632}], [\mathrm{s\_0635}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0271} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0632r\_0271}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0271}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0271}}\right)^1 \cdot \left([\mathrm{s\_0632}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0635}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0271}}\right)}{\left(1+\frac{[\mathrm{s\_0632}]}{\mathrm{kms\_s\_0632r\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0271}}\right) + \left(1+\frac{[\mathrm{s\_0635}]}{\mathrm{kmp\_s\_0635r\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0271}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{566}$$

$$\mathrm{function\_70}(\mathrm{Keq\_r\_0271}, \mathrm{Vmax\_r\_0271}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0635r\_0271}, \mathrm{kmp\_s\_1091r\_0271}, \mathrm{kms\_s\_0632r\_0271}, \mathrm{kms\_s\_0763\_br\_0271}, \mathrm{kms\_s\_1096r\_0271}, [\mathrm{s\_0632}], [\mathrm{s\_0635}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0271} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0632r\_0271}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0271}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0271}}\right)^1 \cdot \left([\mathrm{s\_0632}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0635}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0271}}\right)}{\left(1+\frac{[\mathrm{s\_0632}]}{\mathrm{kms\_s\_0632r\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0271}}\right) + \left(1+\frac{[\mathrm{s\_0635}]}{\mathrm{kmp\_s\_0635r\_0271}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0271}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{567}$$

Table 284: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0271`	Keq_r_0271		2.004		☑
`Vmax_r_0271`	Vmax_r_0271		0.043		☑
`kmp_s_0635r-_0271`	kmp_s_0635r_0271		0.549		☑
`kmp_s_1091r-_0271`	kmp_s_1091r_0271		0.549		☑
`kms_s_0632r-_0271`	kms_s_0632r_0271		0.549		☑
`kms_s_0763-_br_0271`	kms_s_0763_br-_0271		0.549		☑
`kms_s_1096r-_0271`	kms_s_1096r_0271		0.549		☑

7.71 Reaction r_0277

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name carbamoyl-phosphate synthase (glutamine-hydrolysing)

Notes GENE_ASSOCIATION:(YJL130C or (YJR109C and YOR303W))

Reaction equation

$$2\,\text{s\_0446} + \text{s\_0458} + \text{s\_0907} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0458, s\_0469, s\_0763\_b, s\_0899, s\_0907, s\_1207, s\_1434\_b}} \tag{568}$$

Reactants

Table 285: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 286: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	
s_0469	carbamoyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 287: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0469	carbamoyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{71} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_71}(\mathrm{Keq\_r\_0277}, \mathrm{Vmax\_r\_0277}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0277}, \mathrm{kmp\_s\_0469r\_0277}, \mathrm{kmp\_s\_0763\_br\_0277}, \mathrm{kmp\_s\_0899r\_0277}, \mathrm{kmp\_s\_1207r\_0277}, \mathrm{kms\_s\_0446r\_0277}, \mathrm{kms\_s\_0458r\_0277}, \mathrm{kms\_s\_0907r\_0277}, \mathrm{kms\_s\_1434\_br\_0277}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \quad (569)$$

$$\mathrm{function\_71}(\mathrm{Keq\_r\_0277}, \mathrm{Vmax\_r\_0277}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0277}, \mathrm{kmp\_s\_0469r\_0277}, \mathrm{kmp\_s\_0763\_br\_0277}, \mathrm{kmp\_s\_0899r\_0277}, \mathrm{kmp\_s\_1207r\_0277}, \mathrm{kms\_s\_0446r\_0277}, \mathrm{kms\_s\_0458r\_0277}, \mathrm{kms\_s\_0907r\_0277}, \mathrm{kms\_s\_1434\_br\_0277}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0277} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0277}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0277}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{2} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_14}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0277}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0469}]}{\mathrm{kmp\_s\_0469r\_0277}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \quad (570)$$

$$\mathrm{function\_71}(\mathrm{Keq\_r\_0277}, \mathrm{Vmax\_r\_0277}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0277}, \mathrm{kmp\_s\_0469r\_0277}, \mathrm{kmp\_s\_0763\_br\_0277}, \mathrm{kmp\_s\_0899r\_0277}, \mathrm{kmp\_s\_1207r\_0277}, \mathrm{kms\_s\_0446r\_0277}, \mathrm{kms\_s\_0458r\_0277}, \mathrm{kms\_s\_0907r\_0277}, \mathrm{kms\_s\_1434\_br\_0277}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0469}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0277} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0277}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0277}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0277}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{2} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_14}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0277}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0277}}\right) \cdot \left(1+\frac{[\mathrm{s\_0469}]}{\mathrm{kmp\_s\_0469r\_0277}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \quad (571)$$

Table 288: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0277	Keq_r_0277		0.822		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0277	Vmax_r_0277		7.445		☑
kmp_s_0400r-_0277	kmp_s_0400r_0277		1.719		☑
kmp_s_0469r-_0277	kmp_s_0469r_0277		0.549		☑
kmp_s_0763-_br_0277	kmp_s_0763_br-_0277		0.549		☑
kmp_s_0899r-_0277	kmp_s_0899r_0277		0.549		☑
kmp_s_1207r-_0277	kmp_s_1207r_0277		0.549		☑
kms_s_0446r-_0277	kms_s_0446r_0277		1.092		☑
kms_s_0458r-_0277	kms_s_0458r_0277		0.549		☑
kms_s_0907r-_0277	kms_s_0907r_0277		0.549		☑
kms_s_1434-_br_0277	kms_s_1434_br-_0277		0.549		☑

7.72 Reaction r_0282

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name catalase

Notes GENE_ASSOCIATION:YGR088W or YDR256C

Reaction equation

$$2\,\text{s\_0801} \xrightleftharpoons{\text{s\_0801, s\_1160, s\_1434\_b}} \text{s\_1160} + 2\,\text{s\_1434\_b} \tag{572}$$

Reactant

Table 289: Properties of each reactant.

Id	Name	SBO
s_0801	hydrogen peroxide [intracellular]	

Modifiers

Table 290: Properties of each modifier.

Id	Name	SBO
s_0801	hydrogen peroxide [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 291: Properties of each product.

Id	Name	SBO
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{72} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_72}\left(\mathrm{Keq\_r\_0282}, \mathrm{Vmax\_r\_0282}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1160r\_0282}, \mathrm{kmp\_s\_1434\_br\_0282}, \mathrm{kms\_s\_0801r\_0282}, [\mathrm{s\_0801}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{573}$$

$$\mathrm{function\_72}\left(\mathrm{Keq\_r\_0282}, \mathrm{Vmax\_r\_0282}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1160r\_0282}, \mathrm{kmp\_s\_1434\_br\_0282}, \mathrm{kms\_s\_0801r\_0282}, [\mathrm{s\_0801}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0282} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0801r\_0282}}\right)^{2} \cdot \left([\mathrm{s\_0801}]^{2} - \frac{[\mathrm{s\_1160}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0282}}\right)}{1 + \frac{[\mathrm{s\_0801}]}{\mathrm{kms\_s\_0801r\_0282}} + \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kmp\_s\_1160r\_0282}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0282}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{574}$$

$$\mathrm{function\_72}\left(\mathrm{Keq\_r\_0282}, \mathrm{Vmax\_r\_0282}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1160r\_0282}, \mathrm{kmp\_s\_1434\_br\_0282}, \mathrm{kms\_s\_0801r\_0282}, [\mathrm{s\_0801}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0282} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0801r\_0282}}\right)^{2} \cdot \left([\mathrm{s\_0801}]^{2} - \frac{[\mathrm{s\_1160}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0282}}\right)}{1 + \frac{[\mathrm{s\_0801}]}{\mathrm{kms\_s\_0801r\_0282}} + \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kmp\_s\_1160r\_0282}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0282}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{575}$$

Table 292: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0282	Keq_r_0282		0.604		☑
Vmax_r_0282	Vmax_r_0282		0.188		☑
kmp_s_1160r-_0282	kmp_s_1160r_0282		0.549		☑
kmp_s_1434-_br_0282	kmp_s_1434_br-_0282		0.549		☑
kms_s_0801r-_0282	kms_s_0801r_0282		0.549		☑

7.73 Reaction r_0284

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name CDP-diacylglycerol synthase

Notes GENE_ASSOCIATION:YBR029C

Reaction equation

$$s\_0521 + s\_0763\_b + s\_1215 \xrightleftharpoons{s\_0485,\ s\_0521,\ s\_0605,\ s\_0763\_b,\ s\_1215} s\_0485 + s\_0605 \tag{576}$$

Reactants

Table 293: Properties of each reactant.

Id	Name	SBO
s_0521	CTP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1215	phosphatidate [intracellular]	

Modifiers

Table 294: Properties of each modifier.

Id	Name	SBO
s_0485	CDP-diacylglycerol [intracellular]	
s_0521	CTP [intracellular]	
s_0605	diphosphate [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1215	phosphatidate [intracellular]	

Products

Table 295: Properties of each product.

Id	Name	SBO
s_0485	CDP-diacylglycerol [intracellular]	
s_0605	diphosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{73} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_73}(\mathrm{Keq\_r\_0284}, \mathrm{Vmax\_r\_0284}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0485r\_0284}, \mathrm{kmp\_s\_0605r\_0284}, \mathrm{kms\_s\_0521r\_0284}, \mathrm{kms\_s\_0763\_br\_0284}, \mathrm{kms\_s\_1215r\_0284}, [\mathrm{s\_0485}], [\mathrm{s\_0521}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) \quad (577)$$

$$\mathrm{function\_73}(\mathrm{Keq\_r\_0284}, \mathrm{Vmax\_r\_0284}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0485r\_0284}, \mathrm{kmp\_s\_0605r\_0284}, \mathrm{kms\_s\_0521r\_0284}, \mathrm{kms\_s\_0763\_br\_0284}, \mathrm{kms\_s\_1215r\_0284}, [\mathrm{s\_0485}], [\mathrm{s\_0521}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) = \frac{\mathrm{Vmax\_r\_0284} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0521r\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1215r\_0284}}\right)^{1} \cdot \left([\mathrm{s\_0521}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1215}]^{1} - \frac{[\mathrm{s\_0485}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0284}}\right)}{\left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kms\_s\_1215r\_0284}}\right) + \left(1+\frac{[\mathrm{s\_0485}]}{\mathrm{kmp\_s\_0485r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0284}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (578)$$

$$\mathrm{function\_73}(\mathrm{Keq\_r\_0284}, \mathrm{Vmax\_r\_0284}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0485r\_0284}, \mathrm{kmp\_s\_0605r\_0284}, \mathrm{kms\_s\_0521r\_0284}, \mathrm{kms\_s\_0763\_br\_0284}, \mathrm{kms\_s\_1215r\_0284}, [\mathrm{s\_0485}], [\mathrm{s\_0521}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1215}]) = \frac{\mathrm{Vmax\_r\_0284} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0521r\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0284}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1215r\_0284}}\right)^{1} \cdot \left([\mathrm{s\_0521}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1215}]^{1} - \frac{[\mathrm{s\_0485}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0284}}\right)}{\left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kms\_s\_1215r\_0284}}\right) + \left(1+\frac{[\mathrm{s\_0485}]}{\mathrm{kmp\_s\_0485r\_0284}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0284}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (579)$$

Table 296: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0284	Keq_r_0284		2.004		☑
Vmax_r_0284	Vmax_r_0284		0.037		☑
kmp_s_0485r-_0284	kmp_s_0485r_0284		0.549		☑
kmp_s_0605r-_0284	kmp_s_0605r_0284		0.549		☑
kms_s_0521r-_0284	kms_s_0521r_0284		0.549		☑
kms_s_0763-_br_0284	kms_s_0763_br-_0284		0.549		☑
kms_s_1215r-_0284	kms_s_1215r_0284		0.549		☑

7.74 Reaction r_0287

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name ceramide-1 hydroxylase (24C)

Notes GENE_ASSOCIATION:YMR272C

Reaction equation

$$s\_0763\_b + s\_1080 + s\_1096 + s\_1160 \xrightleftharpoons{s\_0763\_b,\ s\_1060,\ s\_1080,\ s\_1091,\ s\_1096,\ s\_1160,\ s\_1434\_b} s\_1060 + s\_1091 \quad (580)$$

Reactants

Table 297: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1080	N-tetracosanylsphinganine [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	

Modifiers

Table 298: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1060	N-(24-hydroxytetracosanyl)sphinganine [intracellular]	
s_1080	N-tetracosanylsphinganine [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 299: Properties of each product.

Id	Name	SBO
s_1060	N-(24-hydroxytetracosanyl)sphinganine [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{74} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_74}\left(\mathrm{Keq\_r\_0287}, \mathrm{Vmax\_r\_0287}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1060r\_0287}, \mathrm{kmp\_s\_1091r\_0287}, \mathrm{kmp\_s\_1434\_br\_0287}, \mathrm{kms\_s\_0763\_br\_0287}, \mathrm{kms\_s\_1080r\_0287}, \mathrm{kms\_s\_1096r\_0287}, \mathrm{kms\_s\_1160r\_0287}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1060}], [\mathrm{s\_1080}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{581}$$

$$\mathrm{function\_74}\left(\mathrm{Keq\_r\_0287}, \mathrm{Vmax\_r\_0287}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1060r\_0287}, \mathrm{kmp\_s\_1091r\_0287}, \mathrm{kmp\_s\_1434\_br\_0287}, \mathrm{kms\_s\_0763\_br\_0287}, \mathrm{kms\_s\_1080r\_0287}, \mathrm{kms\_s\_1096r\_0287}, \mathrm{kms\_s\_1160r\_0287}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1060}], [\mathrm{s\_1080}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{582}$$

$$= \frac{\mathrm{Vmax\_r\_0287} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1080r\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0287}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0287}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1080}]^1 \cdot [\mathrm{s\_1096}]^1 \cdot [\mathrm{s\_1160}]^1 - \frac{[\mathrm{s\_1060}]}{\cdots}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0287}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1080}]}{\mathrm{kms\_s\_1080r\_0287}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0287}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0287}}\right) + \left(1 + \frac{[\mathrm{s\_1060}]}{\mathrm{kmp\_s\_1060r\_0287}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0287}}\right) \cdot \cdots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\begin{aligned}
&\mathrm{function_74}\left(\mathrm{Keq_r_0287}, \mathrm{Vmax_r_0287}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp_s_1060r_0287},\right. \\
&\mathrm{kmp_s_1091r_0287}, \mathrm{kmp_s_1434_br_0287}, \mathrm{kms_s_0763_br_0287}, \\
&\mathrm{kms_s_1080r_0287}, \mathrm{kms_s_1096r_0287}, \mathrm{kms_s_1160r_0287}, \\
&\left.[\mathrm{s_0763_b}], [\mathrm{s_1060}], [\mathrm{s_1080}], [\mathrm{s_1091}], [\mathrm{s_1096}], [\mathrm{s_1160}], [\mathrm{s_1434_b}]\right) \\
&= \frac{\mathrm{Vmax_r_0287} \cdot \frac{\left(\frac{1}{\mathrm{kms_s_0763_br_0287}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_1080r_0287}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_1096r_0287}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_1160r_0287}}\right)^{1} \cdot \left([\mathrm{s_0763_b}]^{1} \cdot [\mathrm{s_1080}]^{1} \cdot [\mathrm{s_1096}]^{1} \cdot [\mathrm{s_1160}]^{1} - \frac{[\mathrm{s_106}}{}\right.}{\left(1+\frac{[\mathrm{s_0763_b}]}{\mathrm{kms_s_0763_br_0287}}\right) \cdot \left(1+\frac{[\mathrm{s_1080}]}{\mathrm{kms_s_1080r_0287}}\right) \cdot \left(1+\frac{[\mathrm{s_1096}]}{\mathrm{kms_s_1096r_0287}}\right) \cdot \left(1+\frac{[\mathrm{s_1160}]}{\mathrm{kms_s_1160r_0287}}\right) + \left(1+\frac{[\mathrm{s_1060}]}{\mathrm{kmp_s_1060r_0287}}\right) \cdot \left(1+\frac{[\mathrm{s_1091}]}{\mathrm{kmp_s_1091r_0287}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{583}$$

Table 300: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0287`	Keq_r_0287		2.004		☑
`Vmax_r_0287`	Vmax_r_0287		0.006		☑
`kmp_s_1060r_0287`	kmp_s_1060r_0287		0.549		☑
`kmp_s_1091r_0287`	kmp_s_1091r_0287		0.549		☑
`kmp_s_1434_br_0287`	kmp_s_1434_br_0287		0.549		☑
`kms_s_0763_br_0287`	kms_s_0763_br_0287		0.549		☑
`kms_s_1080r_0287`	kms_s_1080r_0287		0.549		☑
`kms_s_1096r_0287`	kms_s_1096r_0287		0.549		☑
`kms_s_1160r_0287`	kms_s_1160r_0287		0.549		☑

7.75 Reaction `r_0290`

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ceramide-1 synthase (24C)

Notes GENE_ASSOCIATION:(YHL003C or YKL008C or YPL087W)

Reaction equation

$$\mathrm{s\_1325} + \mathrm{s\_1355} \xrightleftharpoons{\mathrm{s\_0514,\ s\_0763\_b,\ s\_1080,\ s\_1325,\ s\_1355}} \mathrm{s\_0514} + \mathrm{s\_0763\_b} + \mathrm{s\_1080} \tag{584}$$

Reactants

Table 301: Properties of each reactant.

Id	Name	SBO
s_1325	sphinganine [intracellular]	
s_1355	tetracosanoyl-CoA [intracellular]	

Modifiers

Table 302: Properties of each modifier.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1080	N-tetracosanylsphinganine [intracellular]	
s_1325	sphinganine [intracellular]	
s_1355	tetracosanoyl-CoA [intracellular]	

Products

Table 303: Properties of each product.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1080	N-tetracosanylsphinganine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{75} = &\mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_75}(\mathrm{Keq\_r\_0290}, \mathrm{Vmax\_r\_0290}, \mathrm{vol}(\mathrm{intracellular}), \\ &\mathrm{kmp\_s\_0514r\_0290}, \mathrm{kmp\_s\_0763\_br\_0290}, \mathrm{kmp\_s\_1080r\_0290}, \mathrm{kms\_s\_1325r\_0290}, \\ &\mathrm{kms\_s\_1355r\_0290}, [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1080}], [\mathrm{s\_1325}], [\mathrm{s\_1355}]) \end{aligned} \tag{585}$$

$$\begin{aligned} &\mathrm{function\_75}(\mathrm{Keq\_r\_0290}, \mathrm{Vmax\_r\_0290}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0290}, \\ &\mathrm{kmp\_s\_0763\_br\_0290}, \mathrm{kmp\_s\_1080r\_0290}, \mathrm{kms\_s\_1325r\_0290}, \\ &\mathrm{kms\_s\_1355r\_0290}, [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1080}], [\mathrm{s\_1325}], [\mathrm{s\_1355}]) \\ &= \frac{\mathrm{Vmax\_r\_0290} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1325r\_0290}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1355r\_0290}}\right)^{1} \cdot \left([\mathrm{s\_1325}]^{1} \cdot [\mathrm{s\_1355}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1080}]^{1}}{\mathrm{Keq\_r\_0290}}\right)}{\left(1 + \frac{[\mathrm{s\_1325}]}{\mathrm{kms\_s\_1325r\_0290}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1355}]}{\mathrm{kms\_s\_1355r\_0290}}\right) + \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0290}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0290}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1080}]}{\mathrm{kmp\_s\_1080r\_0290}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \end{aligned} \tag{586}$$

$$\text{function\_75}\left(\text{Keq\_r\_0290}, \text{Vmax\_r\_0290}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0514r\_0290}, \text{kmp\_s\_0763\_br\_0290}, \text{kmp\_s\_1080r\_0290}, \text{kms\_s\_1325r\_0290}, \text{kms\_s\_1355r\_0290}, [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1080}], [\text{s\_1325}], [\text{s\_1355}]\right) = \frac{\text{Vmax\_r\_0290} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1325r\_0290}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1355r\_0290}}\right)^{1} \cdot \left([\text{s\_1325}]^{1} \cdot [\text{s\_1355}]^{1} - \frac{[\text{s\_0514}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1080}]^{1}}{\text{Keq\_r\_0290}}\right)}{\left(1+\frac{[\text{s\_1325}]}{\text{kms\_s\_1325r\_0290}}\right) \cdot \left(1+\frac{[\text{s\_1355}]}{\text{kms\_s\_1355r\_0290}}\right) + \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0290}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0290}}\right) \cdot \left(1+\frac{[\text{s\_1080}]}{\text{kmp\_s\_1080r\_0290}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{587}$$

Table 304: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0290	Keq_r_0290		0.604		☑
Vmax_r_0290	Vmax_r_0290		0.003		☑
kmp_s_0514r-_0290	kmp_s_0514r_0290		0.549		☑
kmp_s_0763-_br_0290	kmp_s_0763_br-_0290		0.549		☑
kmp_s_1080r-_0290	kmp_s_1080r_0290		0.549		☑
kms_s_1325r-_0290	kms_s_1325r_0290		0.549		☑
kms_s_1355r-_0290	kms_s_1355r_0290		0.549		☑

7.76 Reaction r_0298

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name cholestenol delta-isomerase, lumped reaction

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_1160} + \text{s\_1293} + \text{s\_1447} \xrightleftharpoons{\text{s\_0632, s\_0763\_b, s\_1160, s\_1290, s\_1293, s\_1434\_b, s\_1447}} \text{s\_0632} + \text{s\_0763\_b} + \text{s\_1290} \tag{588}$$

Reactants

Table 305: Properties of each reactant.

Id	Name	SBO
s_1160	oxygen [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	
s_1447	zymosterol [intracellular]	

Modifiers

Table 306: Properties of each modifier.

Id	Name	SBO
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1160	oxygen [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	
s_1434_b	water [intracellular]	
s_1447	zymosterol [intracellular]	

Products

Table 307: Properties of each product.

Id	Name	SBO
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{76} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_76}\left(\mathrm{Keq\_r\_0298}, \mathrm{Vmax\_r\_0298}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0632r\_0298}, \mathrm{kmp\_s\_0763\_br\_0298}, \mathrm{kmp\_s\_1290r\_0298}, \mathrm{kmp\_s\_1434\_br\_0298}, \mathrm{kms\_s\_1160r\_0298}, \mathrm{kms\_s\_1293r\_0298}, \mathrm{kms\_s\_1447r\_0298}, [\mathrm{s\_0632}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1160}], [\mathrm{s\_1290}], [\mathrm{s\_1293}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1447}]\right) \tag{589}$$

$$
\begin{aligned}
&\text{function\_76}\left(\text{Keq\_r\_0298}, \text{Vmax\_r\_0298}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0632r\_0298},\right.\\
&\text{kmp\_s\_0763\_br\_0298}, \text{kmp\_s\_1290r\_0298}, \text{kmp\_s\_1434\_br\_0298},\\
&\text{kms\_s\_1160r\_0298}, \text{kms\_s\_1293r\_0298}, \text{kms\_s\_1447r\_0298}, [\text{s\_0632}],\\
&\left.[\text{s\_0763\_b}], [\text{s\_1160}], [\text{s\_1290}], [\text{s\_1293}], [\text{s\_1434\_b}], [\text{s\_1447}]\right)\\
&= \frac{\text{Vmax\_r\_0298} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1160r\_0298}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0298}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1447r\_0298}}\right)^1 \cdot \left([\text{s\_1160}]^1 \cdot [\text{s\_1293}]^1 \cdot [\text{s\_1447}]^1 - \frac{[\text{s\_0632}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1290}]^1 \cdot [\text{s}\cdots}{\text{Keq\_r\_0298}}\right.}{\left(1+\frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1447}]}{\text{kms\_s\_1447r\_0298}}\right) + \left(1+\frac{[\text{s\_0632}]}{\text{kmp\_s\_0632r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0298}}\right) \cdot \cdots}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned}
\tag{590}
$$

$$
\begin{aligned}
&\text{function\_76}\left(\text{Keq\_r\_0298}, \text{Vmax\_r\_0298}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0632r\_0298},\right.\\
&\text{kmp\_s\_0763\_br\_0298}, \text{kmp\_s\_1290r\_0298}, \text{kmp\_s\_1434\_br\_0298},\\
&\text{kms\_s\_1160r\_0298}, \text{kms\_s\_1293r\_0298}, \text{kms\_s\_1447r\_0298}, [\text{s\_0632}],\\
&\left.[\text{s\_0763\_b}], [\text{s\_1160}], [\text{s\_1290}], [\text{s\_1293}], [\text{s\_1434\_b}], [\text{s\_1447}]\right)\\
&= \frac{\text{Vmax\_r\_0298} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1160r\_0298}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0298}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1447r\_0298}}\right)^1 \cdot \left([\text{s\_1160}]^1 \cdot [\text{s\_1293}]^1 \cdot [\text{s\_1447}]^1 - \frac{[\text{s\_0632}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1290}]^1 \cdot [\text{s}\cdots}{\text{Keq\_r\_0298}}\right.}{\left(1+\frac{[\text{s\_1160}]}{\text{kms\_s\_1160r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1447}]}{\text{kms\_s\_1447r\_0298}}\right) + \left(1+\frac{[\text{s\_0632}]}{\text{kmp\_s\_0632r\_0298}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0298}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0298}}\right) \cdot \cdots}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned}
\tag{591}
$$

Table 308: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0298	Keq_r_0298		0.332		☑
Vmax_r_0298	Vmax_r_0298		0.092		☑
kmp_s_0632r-_0298	kmp_s_0632r_0298		0.549		☑
kmp_s_0763-_br_0298	kmp_s_0763_br-_0298		0.549		☑
kmp_s_1290r-_0298	kmp_s_1290r_0298		0.549		☑
kmp_s_1434-_br_0298	kmp_s_1434_br-_0298		0.549		☑
kms_s_1160r-_0298	kms_s_1160r_0298		0.549		☑
kms_s_1293r-_0298	kms_s_1293r_0298		0.549		☑
kms_s_1447r-_0298	kms_s_1447r_0298		0.549		☑

7.77 Reaction r_0304

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name chorismate mutase

Notes GENE_ASSOCIATION:YPR060C

Reaction equation

$$s\_0500 \xrightleftharpoons{s\_0500,\, s\_1258} s\_1258 \tag{592}$$

Reactant

Table 309: Properties of each reactant.

Id	Name	SBO
s_0500	chorismate(2-) [intracellular]	

Modifiers

Table 310: Properties of each modifier.

Id	Name	SBO
s_0500	chorismate(2-) [intracellular]	
s_1258	prephenate(2-) [intracellular]	

Product

Table 311: Properties of each product.

Id	Name	SBO
s_1258	prephenate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{77} = & \operatorname{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_77}(\mathrm{Keq\_r\_0304}, \mathrm{Vmax\_r\_0304}, \operatorname{vol}(\mathrm{intracellular}), \\ & \mathrm{kmp\_s\_1258r\_0304}, \mathrm{kms\_s\_0500r\_0304}, [\mathrm{s\_0500}], [\mathrm{s\_1258}]) \end{aligned} \tag{593}$$

$$\begin{aligned}&\text{function\_77}\left(\text{Keq\_r\_0304}, \text{Vmax\_r\_0304}, \text{vol}\left(\text{intracellular}\right),\right.\\&\left.\text{kmp\_s\_1258r\_0304}, \text{kms\_s\_0500r\_0304}, [\text{s\_0500}],\right.\\&\left.[\text{s\_1258}]\right) = \frac{\text{Vmax\_r\_0304} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0500r\_0304}}\right)^{1} \cdot \left([\text{s\_0500}]^{1} - \frac{[\text{s\_1258}]^{1}}{\text{Keq\_r\_0304}}\right)}{1 + \frac{[\text{s\_0500}]}{\text{kms\_s\_0500r\_0304}} + 1 + \frac{[\text{s\_1258}]}{\text{kmp\_s\_1258r\_0304}} - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{594}$$

$$\begin{aligned}&\text{function\_77}\left(\text{Keq\_r\_0304}, \text{Vmax\_r\_0304}, \text{vol}\left(\text{intracellular}\right),\right.\\&\left.\text{kmp\_s\_1258r\_0304}, \text{kms\_s\_0500r\_0304}, [\text{s\_0500}],\right.\\&\left.[\text{s\_1258}]\right) = \frac{\text{Vmax\_r\_0304} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0500r\_0304}}\right)^{1} \cdot \left([\text{s\_0500}]^{1} - \frac{[\text{s\_1258}]^{1}}{\text{Keq\_r\_0304}}\right)}{1 + \frac{[\text{s\_0500}]}{\text{kms\_s\_0500r\_0304}} + 1 + \frac{[\text{s\_1258}]}{\text{kmp\_s\_1258r\_0304}} - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{595}$$

Table 312: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0304`	Keq_r_0304		1.100		☑
`Vmax_r_0304`	Vmax_r_0304		0.386		☑
`kmp_s_1258r-_0304`	kmp_s_1258r_0304		0.549		☑
`kms_s_0500r-_0304`	kms_s_0500r_0304		0.549		☑

7.78 Reaction `r_0306`

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name chorismate synthase

Notes GENE_ASSOCIATION:YGL148W

Reaction equation

$$\text{s\_0330} \xrightleftharpoons{\text{s\_0330, s\_0500, s\_1207}} \text{s\_0500} + \text{s\_1207} \tag{596}$$

Reactant

Table 313: Properties of each reactant.

Id	Name	SBO
s_0330	5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]	

Modifiers

Table 314: Properties of each modifier.

Id	Name	SBO
s_0330	5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]	
s_0500	chorismate(2-) [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 315: Properties of each product.

Id	Name	SBO
s_0500	chorismate(2-) [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{78} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_78}(\mathrm{Keq\_r\_0306}, \mathrm{Vmax\_r\_0306}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0500r\_0306}, \mathrm{kmp\_s\_1207r\_0306}, \mathrm{kms\_s\_0330r\_0306}, [\mathrm{s\_0330}], [\mathrm{s\_0500}], [\mathrm{s\_1207}]) \tag{597}$$

$$\mathrm{function\_78}(\mathrm{Keq\_r\_0306}, \mathrm{Vmax\_r\_0306}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0500r\_0306}, \mathrm{kmp\_s\_1207r\_0306}, \mathrm{kms\_s\_0330r\_0306}, [\mathrm{s\_0330}], [\mathrm{s\_0500}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0306} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0330r\_0306}}\right)^{1} \cdot \left([\mathrm{s\_0330}]^{1} - \frac{[\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0306}}\right)}{1 + \frac{[\mathrm{s\_0330}]}{\mathrm{kms\_s\_0330r\_0306}} + \left(1 + \frac{[\mathrm{s\_0500}]}{\mathrm{kmp\_s\_0500r\_0306}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0306}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{598}$$

$$\mathrm{function\_78}(\mathrm{Keq\_r\_0306}, \mathrm{Vmax\_r\_0306}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0500r\_0306}, \mathrm{kmp\_s\_1207r\_0306}, \mathrm{kms\_s\_0330r\_0306}, [\mathrm{s\_0330}], [\mathrm{s\_0500}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0306} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0330r\_0306}}\right)^{1} \cdot \left([\mathrm{s\_0330}]^{1} - \frac{[\mathrm{s\_0500}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0306}}\right)}{1 + \frac{[\mathrm{s\_0330}]}{\mathrm{kms\_s\_0330r\_0306}} + \left(1 + \frac{[\mathrm{s\_0500}]}{\mathrm{kmp\_s\_0500r\_0306}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0306}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{599}$$

Table 316: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0306	Keq_r_0306		0.604		☑
Vmax_r_0306	Vmax_r_0306		0.731		☑
kmp_s_0500r-_0306	kmp_s_0500r_0306		0.549		☑
kmp_s_1207r-_0306	kmp_s_1207r_0306		0.549		☑
kms_s_0330r-_0306	kms_s_0330r_0306		0.549		☑

7.79 Reaction r_0307

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name cis-aconitate(3-) to isocitrate

Notes GENE_ASSOCIATION:YLR304C

Reaction equation

$$\text{s\_0501} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0501, s\_0847, s\_1434\_b}} \text{s\_0847} \tag{600}$$

Reactants

Table 317: Properties of each reactant.

Id	Name	SBO
s_0501	cis-aconitate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 318: Properties of each modifier.

Id	Name	SBO
s_0501	cis-aconitate(3-) [intracellular]	
s_0847	isocitrate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Product

Table 319: Properties of each product.

Id	Name	SBO
s_0847	isocitrate(3-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{79} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_79}\left(\mathrm{Keq\_r\_0307}, \mathrm{Vmax\_r\_0307}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0847r\_0307}, \mathrm{kms\_s\_0501r\_0307}, \mathrm{kms\_s\_1434\_br\_0307}, [\mathrm{s\_0501}], [\mathrm{s\_0847}], [\mathrm{s\_1434\_b}]\right) \quad (601)$$

$$\mathrm{function\_79}\left(\mathrm{Keq\_r\_0307}, \mathrm{Vmax\_r\_0307}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0847r\_0307}, \mathrm{kms\_s\_0501r\_0307}, \mathrm{kms\_s\_1434\_br\_0307}, [\mathrm{s\_0501}], [\mathrm{s\_0847}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0307} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0501r\_0307}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0307}}\right)^{1} \cdot \left([\mathrm{s\_0501}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0847}]^{1}}{\mathrm{Keq\_r\_0307}}\right)}{\left(1 + \frac{[\mathrm{s\_0501}]}{\mathrm{kms\_s\_0501r\_0307}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0307}}\right) + 1 + \frac{[\mathrm{s\_0847}]}{\mathrm{kmp\_s\_0847r\_0307}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (602)$$

$$\mathrm{function\_79}\left(\mathrm{Keq\_r\_0307}, \mathrm{Vmax\_r\_0307}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0847r\_0307}, \mathrm{kms\_s\_0501r\_0307}, \mathrm{kms\_s\_1434\_br\_0307}, [\mathrm{s\_0501}], [\mathrm{s\_0847}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0307} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0501r\_0307}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0307}}\right)^{1} \cdot \left([\mathrm{s\_0501}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0847}]^{1}}{\mathrm{Keq\_r\_0307}}\right)}{\left(1 + \frac{[\mathrm{s\_0501}]}{\mathrm{kms\_s\_0501r\_0307}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0307}}\right) + 1 + \frac{[\mathrm{s\_0847}]}{\mathrm{kmp\_s\_0847r\_0307}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (603)$$

Table 320: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0307	Keq_r_0307		2.004		☑
Vmax_r_0307	Vmax_r_0307		4.406		☑
kmp_s_0847r-_0307	kmp_s_0847r_0307		0.549		☑
kms_s_0501r-_0307	kms_s_0501r_0307		0.549		☑
kms_s_1434-_br_0307	kms_s_1434_br-_0307		0.549		☑

7.80 Reaction r_0328

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name citrate synthase

Notes GENE_ASSOCIATION:(YNR001C or YPR001W) or YCR005C

Reaction equation

$$\text{s\_0380} + \text{s\_1156} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0380, s\_0507, s\_0514, s\_0763\_b, s\_1156, s\_1434\_b}} \text{s\_0507} + \text{s\_0514} + \text{s\_0763\_b} \quad (604)$$

Reactants

Table 321: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 322: Properties of each modifier.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0507	citrate(3-) [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 323: Properties of each product.

Id	Name	SBO
s_0507	citrate(3-) [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{80} = &\ \mathrm{vol}\left(\mathrm{intracellular}\right) \\ &\cdot \mathrm{function\_80}\left(\mathrm{Keq\_r\_0328}, \mathrm{Vmax\_r\_0328}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0507r\_0328}, \right. \\ &\quad \mathrm{kmp\_s\_0514r\_0328}, \mathrm{kmp\_s\_0763\_br\_0328}, \mathrm{kms\_s\_0380r\_0328}, \mathrm{kms\_s\_1156r\_0328}, \\ &\quad \left. \mathrm{kms\_s\_1434\_br\_0328}, [\mathrm{s\_0380}], [\mathrm{s\_0507}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1434\_b}]\right) \end{aligned} \tag{605}$$

$$\mathrm{function\_80}\left(\mathrm{Keq\_r\_0328}, \mathrm{Vmax\_r\_0328}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0507r\_0328}, \mathrm{kmp\_s\_0514r\_0328}, \mathrm{kmp\_s\_0763\_br\_0328}, \mathrm{kms\_s\_0380r\_0328}, \mathrm{kms\_s\_1156r\_0328}, \mathrm{kms\_s\_1434\_br\_0328}, [\mathrm{s\_0380}], [\mathrm{s\_0507}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0328} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0328}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1156r\_0328}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0328}}\right)^{1} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1156}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0507}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0328}}\right)}{\left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1156}]}{\mathrm{kms\_s\_1156r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0328}}\right) + \left(1 + \frac{[\mathrm{s\_0507}]}{\mathrm{kmp\_s\_0507r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0328}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{606}$$

$$\mathrm{function\_80}\left(\mathrm{Keq\_r\_0328}, \mathrm{Vmax\_r\_0328}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0507r\_0328}, \mathrm{kmp\_s\_0514r\_0328}, \mathrm{kmp\_s\_0763\_br\_0328}, \mathrm{kms\_s\_0380r\_0328}, \mathrm{kms\_s\_1156r\_0328}, \mathrm{kms\_s\_1434\_br\_0328}, [\mathrm{s\_0380}], [\mathrm{s\_0507}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0328} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0328}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1156r\_0328}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0328}}\right)^{1} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1156}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0507}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0328}}\right)}{\left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1156}]}{\mathrm{kms\_s\_1156r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0328}}\right) + \left(1 + \frac{[\mathrm{s\_0507}]}{\mathrm{kmp\_s\_0507r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0328}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0328}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{607}$$

Table 324: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0328`	Keq_r_0328		1.100		☑
`Vmax_r_0328`	Vmax_r_0328		13.217		☑
`kmp_s_0507r_0328`	kmp_s_0507r_0328		0.549		☑
`kmp_s_0514r_0328`	kmp_s_0514r_0328		0.549		☑
`kmp_s_0763_br_0328`	kmp_s_0763_br_0328		0.549		☑
`kms_s_0380r_0328`	kms_s_0380r_0328		0.549		☑
`kms_s_1156r_0328`	kms_s_1156r_0328		0.549		☑
`kms_s_1434_br_0328`	kms_s_1434_br_0328		0.549		☑

7.81 Reaction r_0330

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name citrate to cis-aconitate(3-)

Notes GENE_ASSOCIATION:YLR304C

Reaction equation

$$s\_0507 \xrightleftharpoons{s\_0501,\ s\_0507,\ s\_1434\_b} s\_0501 + s\_1434\_b \tag{608}$$

Reactant

Table 325: Properties of each reactant.

Id	Name	SBO
s_0507	citrate(3-) [intracellular]	

Modifiers

Table 326: Properties of each modifier.

Id	Name	SBO
s_0501	cis-aconitate(3-) [intracellular]	
s_0507	citrate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 327: Properties of each product.

Id	Name	SBO
s_0501	cis-aconitate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{81} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_81}(\mathrm{Keq\_r\_0330}, \mathrm{Vmax\_r\_0330}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0501r\_0330}, \mathrm{kmp\_s\_1434\_br\_0330}, \mathrm{kms\_s\_0507r\_0330}, [\mathrm{s\_0501}], [\mathrm{s\_0507}], [\mathrm{s\_1434\_b}]) \quad (609)$$

$$\mathrm{function\_81}(\mathrm{Keq\_r\_0330}, \mathrm{Vmax\_r\_0330}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0501r\_0330}, \mathrm{kmp\_s\_1434\_br\_0330}, \mathrm{kms\_s\_0507r\_0330}, [\mathrm{s\_0501}], [\mathrm{s\_0507}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0330} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0507r\_0330}}\right)^{1} \cdot \left([\mathrm{s\_0507}]^{1} - \frac{[\mathrm{s\_0501}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0330}}\right)}{1 + \frac{[\mathrm{s\_0507}]}{\mathrm{kms\_s\_0507r\_0330}} + \left(1 + \frac{[\mathrm{s\_0501}]}{\mathrm{kmp\_s\_0501r\_0330}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0330}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (610)$$

$$\mathrm{function\_81}(\mathrm{Keq\_r\_0330}, \mathrm{Vmax\_r\_0330}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0501r\_0330}, \mathrm{kmp\_s\_1434\_br\_0330}, \mathrm{kms\_s\_0507r\_0330}, [\mathrm{s\_0501}], [\mathrm{s\_0507}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0330} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0507r\_0330}}\right)^{1} \cdot \left([\mathrm{s\_0507}]^{1} - \frac{[\mathrm{s\_0501}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0330}}\right)}{1 + \frac{[\mathrm{s\_0507}]}{\mathrm{kms\_s\_0507r\_0330}} + \left(1 + \frac{[\mathrm{s\_0501}]}{\mathrm{kmp\_s\_0501r\_0330}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0330}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (611)$$

Table 328: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0330	Keq_r_0330		0.604		☑
Vmax_r_0330	Vmax_r_0330		4.405		☑
kmp_s_0501r-_0330	kmp_s_0501r_0330		0.549		☑
kmp_s_1434-_br_0330	kmp_s_1434_br-_0330		0.549		☑
kms_s_0507r-_0330	kms_s_0507r_0330		0.549		☑

7.82 Reaction r_0336

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name CTP synthase (NH3)

Notes GENE_ASSOCIATION:(YBL039C or YJR103W)

Reaction equation

$$s\_0430 + s\_0446 + s\_1430 \xrightleftharpoons[]{s\_0400,\ s\_0430,\ s\_0446,\ s\_0521,\ s\_0763\_b,\ s\_1207,\ s\_1430} s\_0400 + s\_0521 + 2\,s\_0763\_b + \tag{612}$$

Reactants

Table 329: Properties of each reactant.

Id	Name	SBO
s_0430	ammonium [intracellular]	
s_0446	ATP [intracellular]	
s_1430	UTP [intracellular]	

Modifiers

Table 330: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0430	ammonium [intracellular]	
s_0446	ATP [intracellular]	
s_0521	CTP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	
s_1430	UTP [intracellular]	

Products

Table 331: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0521	CTP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{82} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_82}(\mathrm{Keq\_r\_0336}, \mathrm{Vmax\_r\_0336}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0336}, \mathrm{kmp\_s\_0521r\_0336}, \mathrm{kmp\_s\_0763\_br\_0336}, \mathrm{kmp\_s\_1207r\_0336}, \mathrm{kms\_s\_0430r\_0336}, \mathrm{kms\_s\_0446r\_0336}, \mathrm{kms\_s\_1430r\_0336}, [\mathrm{s\_0400}], [\mathrm{s\_0430}], [\mathrm{s\_0446}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1430}]) \tag{613}$$

$$\mathrm{function\_82}(\mathrm{Keq\_r\_0336}, \mathrm{Vmax\_r\_0336}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0336}, \mathrm{kmp\_s\_0521r\_0336}, \mathrm{kmp\_s\_0763\_br\_0336}, \mathrm{kmp\_s\_1207r\_0336}, \mathrm{kms\_s\_0430r\_0336}, \mathrm{kms\_s\_0446r\_0336}, \mathrm{kms\_s\_1430r\_0336}, [\mathrm{s\_0400}], [\mathrm{s\_0430}], [\mathrm{s\_0446}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1430}]) = \frac{\mathrm{Vmax\_r\_0336} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0430r\_0336}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0336}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1430r\_0336}}\right)^1 \cdot \left([\mathrm{s\_0430}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1430}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0521}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0336}}\right)}{\left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_1430}]}{\mathrm{kms\_s\_1430r\_0336}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kmp\_s\_0521r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0336}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{614}$$

$$\mathrm{function\_82}(\mathrm{Keq\_r\_0336}, \mathrm{Vmax\_r\_0336}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0336}, \mathrm{kmp\_s\_0521r\_0336}, \mathrm{kmp\_s\_0763\_br\_0336}, \mathrm{kmp\_s\_1207r\_0336}, \mathrm{kms\_s\_0430r\_0336}, \mathrm{kms\_s\_0446r\_0336}, \mathrm{kms\_s\_1430r\_0336}, [\mathrm{s\_0400}], [\mathrm{s\_0430}], [\mathrm{s\_0446}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1430}]) = \frac{\mathrm{Vmax\_r\_0336} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0430r\_0336}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0336}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1430r\_0336}}\right)^1 \cdot \left([\mathrm{s\_0430}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1430}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0521}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0336}}\right)}{\left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_1430}]}{\mathrm{kms\_s\_1430r\_0336}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0521}]}{\mathrm{kmp\_s\_0521r\_0336}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0336}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{615}$$

Table 332: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0336	Keq_r_0336		0.522		☑
Vmax_r_0336	Vmax_r_0336		0.703		☑
kmp_s_0400r_0336	kmp_s_0400r_0336		1.719		☑
kmp_s_0521r_0336	kmp_s_0521r_0336		0.549		☑
kmp_s_0763_br_0336	kmp_s_0763_br_0336		0.549		☑
kmp_s_1207r_0336	kmp_s_1207r_0336		0.549		☑
kms_s_0430r_0336	kms_s_0430r_0336		0.549		☑
kms_s_0446r_0336	kms_s_0446r_0336		1.092		☑
kms_s_1430r_0336	kms_s_1430r_0336		0.549		☑

7.83 Reaction r_0338

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name cystathionine beta-synthase

Notes GENE_ASSOCIATION:YGR155W

Reaction equation

$$s\_0917 + s\_0943 \xrightleftharpoons{s\_0888,\ s\_0917,\ s\_0943,\ s\_1434\_b} s\_0888 + s\_1434\_b \tag{616}$$

Reactants

Table 333: Properties of each reactant.

Id	Name	SBO
s_0917	L-homocysteine [intracellular]	
s_0943	L-serine [intracellular]	

Modifiers

Table 334: Properties of each modifier.

Id	Name	SBO
s_0888	L-cystathionine [intracellular]	
s_0917	L-homocysteine [intracellular]	
s_0943	L-serine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 335: Properties of each product.

Id	Name	SBO
s_0888	L-cystathionine [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{83} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_83}(\mathrm{Keq\_r\_0338}, \mathrm{Vmax\_r\_0338}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0888r\_0338}, \mathrm{kmp\_s\_1434\_br\_0338}, \mathrm{kms\_s\_0917r\_0338}, \mathrm{kms\_s\_0943r\_0338}, [\mathrm{s\_0888}], [\mathrm{s\_0917}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) \quad (617)$$

$$\mathrm{function\_83}(\mathrm{Keq\_r\_0338}, \mathrm{Vmax\_r\_0338}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0888r\_0338}, \mathrm{kmp\_s\_1434\_br\_0338}, \mathrm{kms\_s\_0917r\_0338}, \mathrm{kms\_s\_0943r\_0338}, [\mathrm{s\_0888}], [\mathrm{s\_0917}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0338} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0917r\_0338}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0943r\_0338}}\right)^1 \cdot \left([\mathrm{s\_0917}]^1 \cdot [\mathrm{s\_0943}]^1 - \frac{[\mathrm{s\_0888}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0338}}\right)}{\left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kms\_s\_0917r\_0338}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0338}}\right) + \left(1+\frac{[\mathrm{s\_0888}]}{\mathrm{kmp\_s\_0888r\_0338}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0338}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (618)$$

$$\mathrm{function\_83}(\mathrm{Keq\_r\_0338}, \mathrm{Vmax\_r\_0338}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0888r\_0338}, \mathrm{kmp\_s\_1434\_br\_0338}, \mathrm{kms\_s\_0917r\_0338}, \mathrm{kms\_s\_0943r\_0338}, [\mathrm{s\_0888}], [\mathrm{s\_0917}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0338} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0917r\_0338}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0943r\_0338}}\right)^1 \cdot \left([\mathrm{s\_0917}]^1 \cdot [\mathrm{s\_0943}]^1 - \frac{[\mathrm{s\_0888}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0338}}\right)}{\left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kms\_s\_0917r\_0338}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0338}}\right) + \left(1+\frac{[\mathrm{s\_0888}]}{\mathrm{kmp\_s\_0888r\_0338}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0338}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (619)$$

Table 336: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0338	Keq_r_0338		1.100		☑
Vmax_r_0338	Vmax_r_0338		0.183		☑
kmp_s_0888r_0338	kmp_s_0888r_0338		0.549		☑
kmp_s_1434_br_0338	kmp_s_1434_br_0338		0.549		☑
kms_s_0917r_0338	kms_s_0917r_0338		0.549		☑
kms_s_0943r_0338	kms_s_0943r_0338		0.549		☑

7.84 Reaction r_0339

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name cystathionine g-lyase

Notes GENE_ASSOCIATION:YAL012W

Reaction equation

$$s\_0888 + s\_1434\_b \xrightleftharpoons{s\_0183,\ s\_0430,\ s\_0888,\ s\_0889,\ s\_1434\_b} s\_0183 + s\_0430 + s\_0889 \quad (620)$$

Reactants

Table 337: Properties of each reactant.

Id	Name	SBO
s_0888	L-cystathionine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 338: Properties of each modifier.

Id	Name	SBO
s_0183	2-oxobutanoate [intracellular]	
s_0430	ammonium [intracellular]	
s_0888	L-cystathionine [intracellular]	
s_0889	L-cysteine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 339: Properties of each product.

Id	Name	SBO
s_0183	2-oxobutanoate [intracellular]	
s_0430	ammonium [intracellular]	
s_0889	L-cysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{84} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_84}\left(\mathrm{Keq\_r\_0339}, \mathrm{Vmax\_r\_0339}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0339}, \mathrm{kmp\_s\_0430r\_0339}, \mathrm{kmp\_s\_0889r\_0339}, \mathrm{kms\_s\_0888r\_0339}, \mathrm{kms\_s\_1434\_br\_0339}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0888}], [\mathrm{s\_0889}], [\mathrm{s\_1434\_b}]\right) \tag{621}$$

$$\mathrm{function\_84}\left(\mathrm{Keq\_r\_0339}, \mathrm{Vmax\_r\_0339}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0339}, \mathrm{kmp\_s\_0430r\_0339}, \mathrm{kmp\_s\_0889r\_0339}, \mathrm{kms\_s\_0888r\_0339}, \mathrm{kms\_s\_1434\_br\_0339}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0888}], [\mathrm{s\_0889}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0339} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0888r\_0339}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0339}}\right)^{1} \cdot \left([\mathrm{s\_0888}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0889}]^{1}}{\mathrm{Keq\_r\_0339}}\right)}{\left(1+\frac{[\mathrm{s\_0888}]}{\mathrm{kms\_s\_0888r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0339}}\right) + \left(1+\frac{[\mathrm{s\_0183}]}{\mathrm{kmp\_s\_0183r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_0889}]}{\mathrm{kmp\_s\_0889r\_0339}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{622}$$

$$\mathrm{function\_84}\left(\mathrm{Keq\_r\_0339}, \mathrm{Vmax\_r\_0339}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0339}, \mathrm{kmp\_s\_0430r\_0339}, \mathrm{kmp\_s\_0889r\_0339}, \mathrm{kms\_s\_0888r\_0339}, \mathrm{kms\_s\_1434\_br\_0339}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0888}], [\mathrm{s\_0889}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0339} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0888r\_0339}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0339}}\right)^{1} \cdot \left([\mathrm{s\_0888}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0889}]^{1}}{\mathrm{Keq\_r\_0339}}\right)}{\left(1+\frac{[\mathrm{s\_0888}]}{\mathrm{kms\_s\_0888r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0339}}\right) + \left(1+\frac{[\mathrm{s\_0183}]}{\mathrm{kmp\_s\_0183r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0339}}\right) \cdot \left(1+\frac{[\mathrm{s\_0889}]}{\mathrm{kmp\_s\_0889r\_0339}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{623}$$

Table 340: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0339`	Keq_r_0339		0.604		☑
`Vmax_r_0339`	Vmax_r_0339		0.720		☑
`kmp_s_0183r_0339`	kmp_s_0183r_0339		0.549		☑
`kmp_s_0430r_0339`	kmp_s_0430r_0339		0.549		☑
`kmp_s_0889r_0339`	kmp_s_0889r_0339		0.549		☑
`kms_s_0888r_0339`	kms_s_0888r_0339		0.549		☑
`kms_s_1434_br_0339`	kms_s_1434_br_0339		0.549		☑

7.85 Reaction `r_0340`

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name cystathionine gamma-synthase

Notes GENE_ASSOCIATION:(YJR130C or YML082W)

Reaction equation

$$s\_0889 + s\_1117 \xrightleftharpoons{s\_0369,\, s\_0763\_b,\, s\_0888,\, s\_0889,\, s\_1117} s\_0369 + s\_0763\_b + s\_0888 \quad (624)$$

Reactants

Table 341: Properties of each reactant.

Id	Name	SBO
s_0889	L-cysteine [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Modifiers

Table 342: Properties of each modifier.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0888	L-cystathionine [intracellular]	
s_0889	L-cysteine [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Products

Table 343: Properties of each product.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0888	L-cystathionine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{85} = \text{vol}(\text{intracellular}) \cdot \text{function\_85}(\text{Keq\_r\_0340}, \text{Vmax\_r\_0340}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0340}, \text{kmp\_s\_0763\_br\_0340}, \text{kmp\_s\_0888r\_0340}, \text{kms\_s\_0889r\_0340}, \text{kms\_s\_1117r\_0340}, [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_0888}], [\text{s\_0889}], [\text{s\_1117}]) \quad (625)$$

$$\text{function\_85}(\text{Keq\_r\_0340}, \text{Vmax\_r\_0340}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0340}, \text{kmp\_s\_0763\_br\_0340}, \text{kmp\_s\_0888r\_0340}, \text{kms\_s\_0889r\_0340}, \text{kms\_s\_1117r\_0340}, [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_0888}], [\text{s\_0889}], [\text{s\_1117}]) = \frac{\text{Vmax\_r\_0340} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0889r\_0340}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1117r\_0340}}\right)^1 \cdot \left([\text{s\_0889}]^1 \cdot [\text{s\_1117}]^1 - \frac{[\text{s\_0369}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_0888}]^1}{\text{Keq\_r\_0340}}\right)}{\left(1+\frac{[\text{s\_0889}]}{\text{kms\_s\_0889r\_0340}}\right) \cdot \left(1+\frac{[\text{s\_1117}]}{\text{kms\_s\_1117r\_0340}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0340}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0340}}\right) \cdot \left(1+\frac{[\text{s\_0888}]}{\text{kmp\_s\_0888r\_0340}}\right) - 1}}{\text{vol}(\text{intracellular})} \quad (626)$$

$$\text{function\_85}(\text{Keq\_r\_0340}, \text{Vmax\_r\_0340}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0369r\_0340}, \text{kmp\_s\_0763\_br\_0340}, \text{kmp\_s\_0888r\_0340}, \text{kms\_s\_0889r\_0340}, \text{kms\_s\_1117r\_0340}, [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_0888}], [\text{s\_0889}], [\text{s\_1117}]) = \frac{\text{Vmax\_r\_0340} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0889r\_0340}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1117r\_0340}}\right)^1 \cdot \left([\text{s\_0889}]^1 \cdot [\text{s\_1117}]^1 - \frac{[\text{s\_0369}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_0888}]^1}{\text{Keq\_r\_0340}}\right)}{\left(1+\frac{[\text{s\_0889}]}{\text{kms\_s\_0889r\_0340}}\right) \cdot \left(1+\frac{[\text{s\_1117}]}{\text{kms\_s\_1117r\_0340}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0340}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0340}}\right) \cdot \left(1+\frac{[\text{s\_0888}]}{\text{kmp\_s\_0888r\_0340}}\right) - 1}}{\text{vol}(\text{intracellular})} \quad (627)$$

Table 344: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0340	Keq_r_0340		0.604		☑
Vmax_r_0340	Vmax_r_0340		0.432		☑
kmp_s_0369r_0340	kmp_s_0369r_0340		0.549		☑
kmp_s_0763_br_0340	kmp_s_0763_br_0340		0.549		☑
kmp_s_0888r_0340	kmp_s_0888r_0340		0.549		☑
kms_s_0889r_0340	kms_s_0889r_0340		0.549		☑
kms_s_1117r_0340	kms_s_1117r_0340		0.549		☑

7.86 Reaction r_0345

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name cytidylate kinase (CMP)

Notes GENE_ASSOCIATION:

Reaction equation

$$s\_0400 + s\_0481 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0481,\ s\_0511} s\_0446 + s\_0511 \quad (628)$$

Reactants

Table 345: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0481	CDP [intracellular]	

Modifiers

Table 346: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0481	CDP [intracellular]	
s_0511	CMP [intracellular]	

Products

Table 347: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0511	CMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{86} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_86}(\mathrm{Keq\_r\_0345}, \mathrm{Vmax\_r\_0345}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0345}, \mathrm{kmp\_s\_0511r\_0345}, \mathrm{kms\_s\_0400r\_0345}, \mathrm{kms\_s\_0481r\_0345}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0481}], [\mathrm{s\_0511}]) \quad (629)$$

$$\begin{aligned}&\text{function\_86}\left(\text{Keq\_r\_0345}, \text{Vmax\_r\_0345}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0446r\_0345}, \text{kmp\_s\_0511r\_0345}, \text{kms\_s\_0400r\_0345},\\&\quad\left.\text{kms\_s\_0481r\_0345}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0481}], [\text{s\_0511}]\right)\\&= \frac{\text{Vmax\_r\_0345} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0345}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0481r\_0345}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0481}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0511}]^{1}}{\text{Keq\_r\_0345}}\right)}{\left(1 + \frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0481}]}{\text{kms\_s\_0481r\_0345}}\right) + \left(1 + \frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0345}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{630}$$

$$\begin{aligned}&\text{function\_86}\left(\text{Keq\_r\_0345}, \text{Vmax\_r\_0345}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0446r\_0345}, \text{kmp\_s\_0511r\_0345}, \text{kms\_s\_0400r\_0345},\\&\quad\left.\text{kms\_s\_0481r\_0345}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0481}], [\text{s\_0511}]\right)\\&= \frac{\text{Vmax\_r\_0345} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_0345}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0481r\_0345}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0481}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0511}]^{1}}{\text{Keq\_r\_0345}}\right)}{\left(1 + \frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0481}]}{\text{kms\_s\_0481r\_0345}}\right) + \left(1 + \frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_0345}}\right) \cdot \left(1 + \frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0345}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{631}$$

Table 348: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0345`	Keq_r_0345		0.699		☑
`Vmax_r_0345`	Vmax_r_0345		0.190		☑
`kmp_s_0446r_0345`	kmp_s_0446r_0345		1.092		☑
`kmp_s_0511r_0345`	kmp_s_0511r_0345		0.549		☑
`kms_s_0400r_0345`	kms_s_0400r_0345		1.719		☑
`kms_s_0481r_0345`	kms_s_0481r_0345		0.549		☑

7.87 Reaction `r_0347`

This is a reversible reaction of four reactants forming four products influenced by eight modifiers.

Name cytochrome P450 lanosterol 14-alpha-demethylase (NAD)

Notes GENE_ASSOCIATION:((YHR007C and YIL043C and YNL111C) or (YHR007C and YKL150W and YNL111C))

Reaction equation

$$2\,\text{s\_0763\_b} + \text{s\_0963} + 3\,\text{s\_1087} + 3\,\text{s\_1160} \xrightleftharpoons{\text{s\_0268, s\_0689, s\_0763\_b, s\_0963, s\_1082, s\_1087, s\_1160, s\_1434\_b}} \text{s\_02} \tag{632}$$

Reactants

Table 349: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0963	lanosterol [intracellular]	
s_1087	NADH [intracellular]	
s_1160	oxygen [intracellular]	

Modifiers

Table 350: Properties of each modifier.

Id	Name	SBO
s_0268	4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]	
s_0689	formate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0963	lanosterol [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1160	oxygen [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 351: Properties of each product.

Id	Name	SBO
s_0268	4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]	
s_0689	formate [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{87} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_87}\left(\mathrm{Keq\_r\_0347}, \mathrm{Vmax\_r\_0347}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0268r\_0347}, \mathrm{kmp\_s\_0689r\_0347}, \mathrm{kmp\_s\_1082r\_0347}, \mathrm{kmp\_s\_1434\_br\_0347}, \mathrm{kms\_s\_0763\_br\_0347}, \mathrm{kms\_s\_0963r\_0347}, \mathrm{kms\_s\_1087r\_0347}, \mathrm{kms\_s\_1160r\_0347}, [\mathrm{s\_0268}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0963}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{633}$$

$$\mathrm{function\_87}\left(\mathrm{Keq\_r\_0347}, \mathrm{Vmax\_r\_0347}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0268r\_0347}, \mathrm{kmp\_s\_0689r\_0347}, \mathrm{kmp\_s\_1082r\_0347}, \mathrm{kmp\_s\_1434\_br\_0347}, \mathrm{kms\_s\_0763\_br\_0347}, \mathrm{kms\_s\_0963r\_0347}, \mathrm{kms\_s\_1087r\_0347}, \mathrm{kms\_s\_1160r\_0347}, [\mathrm{s\_0268}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0963}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{634}$$

$$= \frac{\mathrm{Vmax\_r\_0347} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0347}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0963r\_0347}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0347}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0347}}\right)^{3} \cdot \left([\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_0963}]^{1} \cdot [\mathrm{s\_1087}]^{3} \cdot [\mathrm{s\_1160}]^{3} \cdot \right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0963}]}{\mathrm{kms\_s\_0963r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0347}}\right) + \left(1+\frac{[\mathrm{s\_0268}]}{\mathrm{kmp\_s\_0268r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0347}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\mathrm{function\_87}\left(\mathrm{Keq\_r\_0347}, \mathrm{Vmax\_r\_0347}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0268r\_0347}, \mathrm{kmp\_s\_0689r\_0347}, \mathrm{kmp\_s\_1082r\_0347}, \mathrm{kmp\_s\_1434\_br\_0347}, \mathrm{kms\_s\_0763\_br\_0347}, \mathrm{kms\_s\_0963r\_0347}, \mathrm{kms\_s\_1087r\_0347}, \mathrm{kms\_s\_1160r\_0347}, [\mathrm{s\_0268}], [\mathrm{s\_0689}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0963}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1434\_b}]\right) \tag{635}$$

$$= \frac{\mathrm{Vmax\_r\_0347} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0347}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0963r\_0347}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0347}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0347}}\right)^{3} \cdot \left([\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_0963}]^{1} \cdot [\mathrm{s\_1087}]^{3} \cdot [\mathrm{s\_1160}]^{3} \cdot \right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0963}]}{\mathrm{kms\_s\_0963r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0347}}\right) + \left(1+\frac{[\mathrm{s\_0268}]}{\mathrm{kmp\_s\_0268r\_0347}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0347}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

Table 352: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0347`	Keq_r_0347		5726.730		☑
`Vmax_r_0347`	Vmax_r_0347		0.129		☑
`kmp_s_0268r_0347`	kmp_s_0268r_0347		0.549		☑
`kmp_s_0689r_0347`	kmp_s_0689r_0347		0.549		☑
`kmp_s_1082r_0347`	kmp_s_1082r_0347		1.503		☑
`kmp_s_1434_br_0347`	kmp_s_1434_br_0347		0.549		☑
`kms_s_0763_br_0347`	kms_s_0763_br_0347		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0963r-_0347	kms_s_0963r_0347		0.549		☑
kms_s_1087r-_0347	kms_s_1087r_0347		0.087		☑
kms_s_1160r-_0347	kms_s_1160r_0347		0.549		☑

7.88 Reaction r_0351

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name D-arabinose 1-dehydrogenase (NAD)

Notes GENE_ASSOCIATION:YMR041C

Reaction equation

$$\mathrm{s\_0529} + \mathrm{s\_0763\_b} + \mathrm{s\_1087} \xrightleftharpoons{\mathrm{s\_0529},\ \mathrm{s\_0530},\ \mathrm{s\_0763\_b},\ \mathrm{s\_1082},\ \mathrm{s\_1087}} \mathrm{s\_0530} + \mathrm{s\_1082} \tag{636}$$

Reactants

Table 353: Properties of each reactant.

Id	Name	SBO
s_0529	D-arabinono-1,4-lactone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 354: Properties of each modifier.

Id	Name	SBO
s_0529	D-arabinono-1,4-lactone [intracellular]	
s_0530	D-arabinose [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 355: Properties of each product.

Id	Name	SBO
s_0530	D-arabinose [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{88} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_88}(\mathrm{Keq\_r\_0351}, \mathrm{Vmax\_r\_0351}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0530r\_0351}, \mathrm{kmp\_s\_1082r\_0351}, \mathrm{kms\_s\_0529r\_0351}, \mathrm{kms\_s\_0763\_br\_0351}, \mathrm{kms\_s\_1087r\_0351}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) \quad (637)$$

$$\mathrm{function\_88}(\mathrm{Keq\_r\_0351}, \mathrm{Vmax\_r\_0351}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0530r\_0351}, \mathrm{kmp\_s\_1082r\_0351}, \mathrm{kms\_s\_0529r\_0351}, \mathrm{kms\_s\_0763\_br\_0351}, \mathrm{kms\_s\_1087r\_0351}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0351} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0529r\_0351}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0351}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0351}}\right)^1 \cdot \left([\mathrm{s\_0529}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1 - \frac{[\mathrm{s\_0530}]^1 \cdot [\mathrm{s\_1082}]^1}{\mathrm{Keq\_r\_0351}}\right)}{\left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kms\_s\_0529r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0351}}\right) + \left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kmp\_s\_0530r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0351}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (638)$$

$$\mathrm{function\_88}(\mathrm{Keq\_r\_0351}, \mathrm{Vmax\_r\_0351}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0530r\_0351}, \mathrm{kmp\_s\_1082r\_0351}, \mathrm{kms\_s\_0529r\_0351}, \mathrm{kms\_s\_0763\_br\_0351}, \mathrm{kms\_s\_1087r\_0351}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0351} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0529r\_0351}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0351}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0351}}\right)^1 \cdot \left([\mathrm{s\_0529}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1087}]^1 - \frac{[\mathrm{s\_0530}]^1 \cdot [\mathrm{s\_1082}]^1}{\mathrm{Keq\_r\_0351}}\right)}{\left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kms\_s\_0529r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0351}}\right) + \left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kmp\_s\_0530r\_0351}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0351}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (639)$$

Table 356: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0351	Keq_r_0351		34.726		☑
Vmax_r_0351	Vmax_r_0351		3.303		☑
kmp_s_0530r-_0351	kmp_s_0530r_0351		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1082r_0351	kmp_s_1082r_0351		1.503		☑
kms_s_0529r_0351	kms_s_0529r_0351		0.549		☑
kms_s_0763_br_0351	kms_s_0763_br_0351		0.549		☑
kms_s_1087r_0351	kms_s_1087r_0351		0.087		☑

7.89 Reaction r_0352

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name D-arabinose 1-dehydrogenase (NADP)

Notes GENE_ASSOCIATION:YBR149W

Reaction equation

$$\text{s\_0530} + \text{s\_1091} \xrightleftharpoons{\text{s\_0529, s\_0530, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0529} + \text{s\_0763\_b} + \text{s\_1096} \quad (640)$$

Reactants

Table 357: Properties of each reactant.

Id	Name	SBO
s_0530	D-arabinose [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 358: Properties of each modifier.

Id	Name	SBO
s_0529	D-arabinono-1,4-lactone [intracellular]	
s_0530	D-arabinose [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 359: Properties of each product.

Id	Name	SBO
s_0529	D-arabinono-1,4-lactone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{89} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_89}\left(\mathrm{Keq\_r\_0352}, \mathrm{Vmax\_r\_0352}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0529r\_0352}, \mathrm{kmp\_s\_0763\_br\_0352}, \mathrm{kmp\_s\_1096r\_0352}, \mathrm{kms\_s\_0530r\_0352}, \mathrm{kms\_s\_1091r\_0352}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \tag{641}$$

$$\mathrm{function\_89}\left(\mathrm{Keq\_r\_0352}, \mathrm{Vmax\_r\_0352}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0529r\_0352}, \mathrm{kmp\_s\_0763\_br\_0352}, \mathrm{kmp\_s\_1096r\_0352}, \mathrm{kms\_s\_0530r\_0352}, \mathrm{kms\_s\_1091r\_0352}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0352} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0530r\_0352}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0352}}\right)^{1} \cdot \left([\mathrm{s\_0530}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0529}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0352}}\right)}{\left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kms\_s\_0530r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0352}}\right) + \left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kmp\_s\_0529r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0352}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{642}$$

$$\mathrm{function\_89}\left(\mathrm{Keq\_r\_0352}, \mathrm{Vmax\_r\_0352}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0529r\_0352}, \mathrm{kmp\_s\_0763\_br\_0352}, \mathrm{kmp\_s\_1096r\_0352}, \mathrm{kms\_s\_0530r\_0352}, \mathrm{kms\_s\_1091r\_0352}, [\mathrm{s\_0529}], [\mathrm{s\_0530}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0352} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0530r\_0352}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0352}}\right)^{1} \cdot \left([\mathrm{s\_0530}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0529}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0352}}\right)}{\left(1+\frac{[\mathrm{s\_0530}]}{\mathrm{kms\_s\_0530r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0352}}\right) + \left(1+\frac{[\mathrm{s\_0529}]}{\mathrm{kmp\_s\_0529r\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0352}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0352}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{643}$$

Table 360: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0352	Keq_r_0352		0.604		☑
Vmax_r_0352	Vmax_r_0352		3.303		☑
kmp_s_0529r-_0352	kmp_s_0529r_0352		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763_br_0352	kmp_s_0763_br_0352		0.549		☑
kmp_s_1096r_0352	kmp_s_1096r_0352		0.549		☑
kms_s_0530r_0352	kms_s_0530r_0352		0.549		☑
kms_s_1091r_0352	kms_s_1091r_0352		0.549		☑

7.90 Reaction r_0357

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name dCMP deaminase

Notes GENE_ASSOCIATION:YHR144C

Reaction equation

$$\text{s\_0430} + \text{s\_0624} \xrightleftharpoons{\text{s\_0430, s\_0569, s\_0624, s\_0763\_b, s\_1434\_b}} \text{s\_0569} + \text{s\_0763\_b} + \text{s\_1434\_b} \tag{644}$$

Reactants

Table 361: Properties of each reactant.

Id	Name	SBO
s_0430	ammonium [intracellular]	
s_0624	dUMP [intracellular]	

Modifiers

Table 362: Properties of each modifier.

Id	Name	SBO
s_0430	ammonium [intracellular]	
s_0569	dCMP [intracellular]	
s_0624	dUMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 363: Properties of each product.

Id	Name	SBO
s_0569	dCMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{90} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_90}\left(\mathrm{Keq\_r\_0357}, \mathrm{Vmax\_r\_0357}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0569r\_0357}, \mathrm{kmp\_s\_0763\_br\_0357}, \mathrm{kmp\_s\_1434\_br\_0357}, \mathrm{kms\_s\_0430r\_0357}, \mathrm{kms\_s\_0624r\_0357}, [\mathrm{s\_0430}], [\mathrm{s\_0569}], [\mathrm{s\_0624}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) \tag{645}$$

$$\mathrm{function\_90}\left(\mathrm{Keq\_r\_0357}, \mathrm{Vmax\_r\_0357}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0569r\_0357}, \mathrm{kmp\_s\_0763\_br\_0357}, \mathrm{kmp\_s\_1434\_br\_0357}, \mathrm{kms\_s\_0430r\_0357}, \mathrm{kms\_s\_0624r\_0357}, [\mathrm{s\_0430}], [\mathrm{s\_0569}], [\mathrm{s\_0624}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0357} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0430r\_0357}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0624r\_0357}}\right)^{1} \cdot \left([\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0624}]^{1} - \frac{[\mathrm{s\_0569}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0357}}\right)}{\left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0624}]}{\mathrm{kms\_s\_0624r\_0357}}\right) + \left(1 + \frac{[\mathrm{s\_0569}]}{\mathrm{kmp\_s\_0569r\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0357}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{646}$$

$$\mathrm{function\_90}\left(\mathrm{Keq\_r\_0357}, \mathrm{Vmax\_r\_0357}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0569r\_0357}, \mathrm{kmp\_s\_0763\_br\_0357}, \mathrm{kmp\_s\_1434\_br\_0357}, \mathrm{kms\_s\_0430r\_0357}, \mathrm{kms\_s\_0624r\_0357}, [\mathrm{s\_0430}], [\mathrm{s\_0569}], [\mathrm{s\_0624}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0357} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0430r\_0357}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0624r\_0357}}\right)^{1} \cdot \left([\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0624}]^{1} - \frac{[\mathrm{s\_0569}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0357}}\right)}{\left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0624}]}{\mathrm{kms\_s\_0624r\_0357}}\right) + \left(1 + \frac{[\mathrm{s\_0569}]}{\mathrm{kmp\_s\_0569r\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0357}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0357}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{647}$$

Table 364: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0357	Keq_r_0357		0.604		☑
Vmax_r_0357	Vmax_r_0357		0.016		☑
kmp_s_0569r_0357	kmp_s_0569r_0357		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763-_br_0357	kmp_s_0763_br-_0357		0.549		☑
kmp_s_1434-_br_0357	kmp_s_1434_br-_0357		0.549		☑
kms_s_0430r-_0357	kms_s_0430r_0357		0.549		☑
kms_s_0624r-_0357	kms_s_0624r_0357		0.549		☑

7.91 Reaction r_0360

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name deoxyadenylate kinase

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0400} + \text{s\_0562} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0562, s\_0564}} \text{s\_0446} + \text{s\_0564} \tag{648}$$

Reactants

Table 365: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0562	dADP [intracellular]	

Modifiers

Table 366: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0562	dADP [intracellular]	
s_0564	dAMP [intracellular]	

Products

Table 367: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0564	dAMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{91} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_91}(\mathrm{Keq\_r\_0360}, \mathrm{Vmax\_r\_0360}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0360}, \mathrm{kmp\_s\_0564r\_0360}, \mathrm{kms\_s\_0400r\_0360}, \mathrm{kms\_s\_0562r\_0360}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0562}], [\mathrm{s\_0564}]) \quad (649)$$

$$\mathrm{function\_91}(\mathrm{Keq\_r\_0360}, \mathrm{Vmax\_r\_0360}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0360}, \mathrm{kmp\_s\_0564r\_0360}, \mathrm{kms\_s\_0400r\_0360}, \mathrm{kms\_s\_0562r\_0360}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0562}], [\mathrm{s\_0564}]) = \frac{\mathrm{Vmax\_r\_0360} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0360}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0562r\_0360}}\right)^1 \cdot \left([\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0562}]^1 - \frac{[\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0564}]^1}{\mathrm{Keq\_r\_0360}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0360}}\right) \cdot \left(1+\frac{[\mathrm{s\_0562}]}{\mathrm{kms\_s\_0562r\_0360}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0360}}\right) \cdot \left(1+\frac{[\mathrm{s\_0564}]}{\mathrm{kmp\_s\_0564r\_0360}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (650)$$

$$\mathrm{function\_91}(\mathrm{Keq\_r\_0360}, \mathrm{Vmax\_r\_0360}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0360}, \mathrm{kmp\_s\_0564r\_0360}, \mathrm{kms\_s\_0400r\_0360}, \mathrm{kms\_s\_0562r\_0360}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0562}], [\mathrm{s\_0564}]) = \frac{\mathrm{Vmax\_r\_0360} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0360}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0562r\_0360}}\right)^1 \cdot \left([\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0562}]^1 - \frac{[\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0564}]^1}{\mathrm{Keq\_r\_0360}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0360}}\right) \cdot \left(1+\frac{[\mathrm{s\_0562}]}{\mathrm{kms\_s\_0562r\_0360}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0360}}\right) \cdot \left(1+\frac{[\mathrm{s\_0564}]}{\mathrm{kmp\_s\_0564r\_0360}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (651)$$

Table 368: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0360	Keq_r_0360		0.699		☑
Vmax_r_0360	Vmax_r_0360		0.015		☑
kmp_s_0446r-_0360	kmp_s_0446r_0360		1.092		☑
kmp_s_0564r-_0360	kmp_s_0564r_0360		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0400r-_0360	kms_s_0400r_0360		1.719		☑
kms_s_0562r-_0360	kms_s_0562r_0360		0.549		☑

7.92 Reaction r_0362

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name deoxyguanylate kinase (dGMP:ATP)

Notes GENE_ASSOCIATION:YDR454C

Reaction equation

$$\text{s\_0400} + \text{s\_0591} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0591, s\_0593}} \text{s\_0446} + \text{s\_0593} \tag{652}$$

Reactants

Table 369: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0591	dGDP [intracellular]	

Modifiers

Table 370: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0591	dGDP [intracellular]	
s_0593	dGMP [intracellular]	

Products

Table 371: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0593	dGMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{92} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_92}\left(\mathrm{Keq\_r\_0362}, \mathrm{Vmax\_r\_0362}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0362}, \mathrm{kmp\_s\_0593r\_0362}, \mathrm{kms\_s\_0400r\_0362}, \mathrm{kms\_s\_0591r\_0362}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0591}], [\mathrm{s\_0593}]\right) \quad (653)$$

$$\mathrm{function\_92}\left(\mathrm{Keq\_r\_0362}, \mathrm{Vmax\_r\_0362}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0362}, \mathrm{kmp\_s\_0593r\_0362}, \mathrm{kms\_s\_0400r\_0362}, \mathrm{kms\_s\_0591r\_0362}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0591}], [\mathrm{s\_0593}]\right) = \frac{\mathrm{Vmax\_r\_0362} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0362}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0591r\_0362}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0591}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0593}]^{1}}{\mathrm{Keq\_r\_0362}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0362}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0591}]}{\mathrm{kms\_s\_0591r\_0362}}\right) + \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0362}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0593}]}{\mathrm{kmp\_s\_0593r\_0362}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (654)$$

$$\mathrm{function\_92}\left(\mathrm{Keq\_r\_0362}, \mathrm{Vmax\_r\_0362}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0362}, \mathrm{kmp\_s\_0593r\_0362}, \mathrm{kms\_s\_0400r\_0362}, \mathrm{kms\_s\_0591r\_0362}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0591}], [\mathrm{s\_0593}]\right) = \frac{\mathrm{Vmax\_r\_0362} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0362}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0591r\_0362}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0591}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0593}]^{1}}{\mathrm{Keq\_r\_0362}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0362}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0591}]}{\mathrm{kms\_s\_0591r\_0362}}\right) + \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0362}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0593}]}{\mathrm{kmp\_s\_0593r\_0362}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (655)$$

Table 372: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0362	Keq_r_0362		0.699		☑
Vmax_r_0362	Vmax_r_0362		0.010		☑
kmp_s_0446r-_0362	kmp_s_0446r_0362		1.092		☑
kmp_s_0593r-_0362	kmp_s_0593r_0362		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0400r-_0362	kms_s_0400r_0362		1.719		☑
kms_s_0591r-_0362	kms_s_0591r_0362		0.549		☑

7.93 Reaction r_0370

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name diacylglycerol acyltransferase

Notes GENE_ASSOCIATION:YOR245C

Reaction equation

$$\text{s\_0386} + \text{s\_0596} \xrightleftharpoons{\text{s\_0386, s\_0514, s\_0596, s\_0763\_b, s\_1399}} \text{s\_0514} + 4\,\text{s\_0763\_b} + \text{s\_1399} \tag{656}$$

Reactants

Table 373: Properties of each reactant.

Id	Name	SBO
s_0386	acyl-CoA [intracellular]	
s_0596	diglyceride [intracellular]	

Modifiers

Table 374: Properties of each modifier.

Id	Name	SBO
s_0386	acyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0596	diglyceride [intracellular]	
s_0763_b	H+ [intracellular]	
s_1399	triglyceride [intracellular]	

Products

Table 375: Properties of each product.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1399	triglyceride [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{93} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_93}\left(\mathrm{Keq\_r\_0370}, \mathrm{Vmax\_r\_0370}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0370}, \mathrm{kmp\_s\_0763\_br\_0370}, \mathrm{kmp\_s\_1399r\_0370}, \mathrm{kms\_s\_0386r\_0370}, \mathrm{kms\_s\_0596r\_0370}, [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1399}]\right) \quad (657)$$

$$\mathrm{function\_93}\left(\mathrm{Keq\_r\_0370}, \mathrm{Vmax\_r\_0370}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0370}, \mathrm{kmp\_s\_0763\_br\_0370}, \mathrm{kmp\_s\_1399r\_0370}, \mathrm{kms\_s\_0386r\_0370}, \mathrm{kms\_s\_0596r\_0370}, [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1399}]\right) = \frac{\mathrm{Vmax\_r\_0370} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0386r\_0370}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0596r\_0370}}\right)^{1} \cdot \left([\mathrm{s\_0386}]^{1} \cdot [\mathrm{s\_0596}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{4} \cdot [\mathrm{s\_1399}]^{1}}{\mathrm{Keq\_r\_0370}}\right)}{\left(1+\frac{[\mathrm{s\_0386}]}{\mathrm{kms\_s\_0386r\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kms\_s\_0596r\_0370}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_1399}]}{\mathrm{kmp\_s\_1399r\_0370}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (658)$$

$$\mathrm{function\_93}\left(\mathrm{Keq\_r\_0370}, \mathrm{Vmax\_r\_0370}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0370}, \mathrm{kmp\_s\_0763\_br\_0370}, \mathrm{kmp\_s\_1399r\_0370}, \mathrm{kms\_s\_0386r\_0370}, \mathrm{kms\_s\_0596r\_0370}, [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1399}]\right) = \frac{\mathrm{Vmax\_r\_0370} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0386r\_0370}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0596r\_0370}}\right)^{1} \cdot \left([\mathrm{s\_0386}]^{1} \cdot [\mathrm{s\_0596}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{4} \cdot [\mathrm{s\_1399}]^{1}}{\mathrm{Keq\_r\_0370}}\right)}{\left(1+\frac{[\mathrm{s\_0386}]}{\mathrm{kms\_s\_0386r\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kms\_s\_0596r\_0370}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0370}}\right) \cdot \left(1+\frac{[\mathrm{s\_1399}]}{\mathrm{kmp\_s\_1399r\_0370}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (659)$$

Table 376: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0370	Keq_r_0370		0.100		☑
Vmax_r_0370	Vmax_r_0370		0.012		☑
kmp_s_0514r_0370	kmp_s_0514r_0370		0.549		☑
kmp_s_0763_br_0370	kmp_s_0763_br_0370		0.549		☑
kmp_s_1399r_0370	kmp_s_1399r_0370		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0386r-_0370	kms_s_0386r_0370		0.549		☑
kms_s_0596r-_0370	kms_s_0596r_0370		0.549		☑

7.94 Reaction r_0371

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name diacylglycerol pyrophosphate phosphatase

Notes GENE_ASSOCIATION:YDR284C

Reaction equation

$$\mathrm{s\_1215} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0596,\ s\_0763\_b,\ s\_1207,\ s\_1215,\ s\_1434\_b}} \mathrm{s\_0596} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1207} \tag{660}$$

Reactants

Table 377: Properties of each reactant.

Id	Name	SBO
s_1215	phosphatidate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 378: Properties of each modifier.

Id	Name	SBO
s_0596	diglyceride [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	
s_1215	phosphatidate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 379: Properties of each product.

Id	Name	SBO
s_0596	diglyceride [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{94} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_94}(\mathrm{Keq\_r\_0371}, \mathrm{Vmax\_r\_0371}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_0371}, \mathrm{kmp\_s\_0763\_br\_0371}, \mathrm{kmp\_s\_1207r\_0371}, \mathrm{kms\_s\_1215r\_0371}, \mathrm{kms\_s\_1434\_br\_0371}, [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1215}], [\mathrm{s\_1434\_b}]) \quad (661)$$

$$\mathrm{function\_94}(\mathrm{Keq\_r\_0371}, \mathrm{Vmax\_r\_0371}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_0371}, \mathrm{kmp\_s\_0763\_br\_0371}, \mathrm{kmp\_s\_1207r\_0371}, \mathrm{kms\_s\_1215r\_0371}, \mathrm{kms\_s\_1434\_br\_0371}, [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1215}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0371} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1215r\_0371}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0371}}\right)^1 \cdot \left([\mathrm{s\_1215}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0596}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0371}}\right)}{\left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kms\_s\_1215r\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0371}}\right) + \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kmp\_s\_0596r\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0371}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (662)$$

$$\mathrm{function\_94}(\mathrm{Keq\_r\_0371}, \mathrm{Vmax\_r\_0371}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_0371}, \mathrm{kmp\_s\_0763\_br\_0371}, \mathrm{kmp\_s\_1207r\_0371}, \mathrm{kms\_s\_1215r\_0371}, \mathrm{kms\_s\_1434\_br\_0371}, [\mathrm{s\_0596}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1215}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0371} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1215r\_0371}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0371}}\right)^1 \cdot \left([\mathrm{s\_1215}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0596}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0371}}\right)}{\left(1+\frac{[\mathrm{s\_1215}]}{\mathrm{kms\_s\_1215r\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0371}}\right) + \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kmp\_s\_0596r\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0371}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0371}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (663)$$

Table 380: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0371	Keq_r_0371		0.332		☑
Vmax_r_0371	Vmax_r_0371		0.005		☑
kmp_s_0596r-_0371	kmp_s_0596r_0371		0.549		☑
kmp_s_0763-_br_0371	kmp_s_0763_br-_0371		0.549		☑
kmp_s_1207r-_0371	kmp_s_1207r_0371		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_1215r-_0371	kms_s_1215r_0371		0.549		☑
kms_s_1434-_br_0371	kms_s_1434_br-_0371		0.549		☑

7.95 Reaction r_0374

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name dihydoorotic acid dehydrogenase

Notes GENE_ASSOCIATION:YKL216W

Reaction equation

$$s\_0064 + s\_1160 \xrightleftharpoons{s\_0064,\ s\_0801,\ s\_1154,\ s\_1160} s\_0801 + s\_1154 \quad (664)$$

Reactants

Table 381: Properties of each reactant.

Id	Name	SBO
s_0064	(S)-dihydroorotate [intracellular]	
s_1160	oxygen [intracellular]	

Modifiers

Table 382: Properties of each modifier.

Id	Name	SBO
s_0064	(S)-dihydroorotate [intracellular]	
s_0801	hydrogen peroxide [intracellular]	
s_1154	orotate [intracellular]	
s_1160	oxygen [intracellular]	

Products

Table 383: Properties of each product.

Id	Name	SBO
s_0801	hydrogen peroxide [intracellular]	
s_1154	orotate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{95} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_95}(\mathrm{Keq\_r\_0374}, \mathrm{Vmax\_r\_0374}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0801r\_0374}, \mathrm{kmp\_s\_1154r\_0374}, \mathrm{kms\_s\_0064r\_0374}, \mathrm{kms\_s\_1160r\_0374}, [\mathrm{s\_0064}], [\mathrm{s\_0801}], [\mathrm{s\_1154}], [\mathrm{s\_1160}]) \tag{665}$$

$$\mathrm{function\_95}(\mathrm{Keq\_r\_0374}, \mathrm{Vmax\_r\_0374}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0801r\_0374}, \mathrm{kmp\_s\_1154r\_0374}, \mathrm{kms\_s\_0064r\_0374}, \mathrm{kms\_s\_1160r\_0374}, [\mathrm{s\_0064}], [\mathrm{s\_0801}], [\mathrm{s\_1154}], [\mathrm{s\_1160}]) = \frac{\mathrm{Vmax\_r\_0374} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0064r\_0374}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0374}}\right)^{1} \cdot \left([\mathrm{s\_0064}]^{1} \cdot [\mathrm{s\_1160}]^{1} - \frac{[\mathrm{s\_0801}]^{1} \cdot [\mathrm{s\_1154}]^{1}}{\mathrm{Keq\_r\_0374}}\right)}{\left(1+\frac{[\mathrm{s\_0064}]}{\mathrm{kms\_s\_0064r\_0374}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0374}}\right) + \left(1+\frac{[\mathrm{s\_0801}]}{\mathrm{kmp\_s\_0801r\_0374}}\right) \cdot \left(1+\frac{[\mathrm{s\_1154}]}{\mathrm{kmp\_s\_1154r\_0374}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{666}$$

$$\mathrm{function\_95}(\mathrm{Keq\_r\_0374}, \mathrm{Vmax\_r\_0374}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0801r\_0374}, \mathrm{kmp\_s\_1154r\_0374}, \mathrm{kms\_s\_0064r\_0374}, \mathrm{kms\_s\_1160r\_0374}, [\mathrm{s\_0064}], [\mathrm{s\_0801}], [\mathrm{s\_1154}], [\mathrm{s\_1160}]) = \frac{\mathrm{Vmax\_r\_0374} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0064r\_0374}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0374}}\right)^{1} \cdot \left([\mathrm{s\_0064}]^{1} \cdot [\mathrm{s\_1160}]^{1} - \frac{[\mathrm{s\_0801}]^{1} \cdot [\mathrm{s\_1154}]^{1}}{\mathrm{Keq\_r\_0374}}\right)}{\left(1+\frac{[\mathrm{s\_0064}]}{\mathrm{kms\_s\_0064r\_0374}}\right) \cdot \left(1+\frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0374}}\right) + \left(1+\frac{[\mathrm{s\_0801}]}{\mathrm{kmp\_s\_0801r\_0374}}\right) \cdot \left(1+\frac{[\mathrm{s\_1154}]}{\mathrm{kmp\_s\_1154r\_0374}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{667}$$

Table 384: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0374	Keq_r_0374		1.100		☑
Vmax_r_0374	Vmax_r_0374		0.526		☑
kmp_s_0801r-_0374	kmp_s_0801r_0374		0.549		☑
kmp_s_1154r-_0374	kmp_s_1154r_0374		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0064r-_0374	kms_s_0064r_0374		0.549		☑
kms_s_1160r-_0374	kms_s_1160r_0374		0.549		☑

7.96 Reaction r_0375

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name dihydrofolate reductase

Notes GENE_ASSOCIATION:YOR236W

Reaction equation

$$\text{s\_0601} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0309, s\_0601, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0309} + \text{s\_1091} \tag{668}$$

Reactants

Table 385: Properties of each reactant.

Id	Name	SBO
s_0601	dihydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 386: Properties of each modifier.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0601	dihydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 387: Properties of each product.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{96} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_96}(\mathrm{Keq\_r\_0375}, \mathrm{Vmax\_r\_0375}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0375}, \mathrm{kmp\_s\_1091r\_0375}, \mathrm{kms\_s\_0601r\_0375}, \mathrm{kms\_s\_0763\_br\_0375}, \mathrm{kms\_s\_1096r\_0375}, [\mathrm{s\_0309}], [\mathrm{s\_0601}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{669}$$

$$\mathrm{function\_96}(\mathrm{Keq\_r\_0375}, \mathrm{Vmax\_r\_0375}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0375}, \mathrm{kmp\_s\_1091r\_0375}, \mathrm{kms\_s\_0601r\_0375}, \mathrm{kms\_s\_0763\_br\_0375}, \mathrm{kms\_s\_1096r\_0375}, [\mathrm{s\_0309}], [\mathrm{s\_0601}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0375} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0601r\_0375}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0375}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0375}}\right)^1 \cdot \left([\mathrm{s\_0601}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0375}}\right)}{\left(1+\frac{[\mathrm{s\_0601}]}{\mathrm{kms\_s\_0601r\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0375}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0375}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{670}$$

$$\mathrm{function\_96}(\mathrm{Keq\_r\_0375}, \mathrm{Vmax\_r\_0375}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0375}, \mathrm{kmp\_s\_1091r\_0375}, \mathrm{kms\_s\_0601r\_0375}, \mathrm{kms\_s\_0763\_br\_0375}, \mathrm{kms\_s\_1096r\_0375}, [\mathrm{s\_0309}], [\mathrm{s\_0601}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0375} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0601r\_0375}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0375}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0375}}\right)^1 \cdot \left([\mathrm{s\_0601}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0375}}\right)}{\left(1+\frac{[\mathrm{s\_0601}]}{\mathrm{kms\_s\_0601r\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0375}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0375}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0375}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{671}$$

Table 388: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0375	Keq_r_0375		2.004		☑
Vmax_r_0375	Vmax_r_0375		0.024		☑
kmp_s_0309r-_0375	kmp_s_0309r_0375		0.549		☑
kmp_s_1091r-_0375	kmp_s_1091r_0375		0.549		☑
kms_s_0601r-_0375	kms_s_0601r_0375		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0763-_br_0375	kms_s_0763_br-_0375		0.549		☑
kms_s_1096r-_0375	kms_s_1096r_0375		0.549		☑

7.97 Reaction r_0381

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name dihydroorotase

Notes GENE_ASSOCIATION:YLR420W

Reaction equation

$$\text{s\_0763\_b} + \text{s\_1073} \xrightleftharpoons{\text{s\_0064, s\_0763\_b, s\_1073, s\_1434\_b}} \text{s\_0064} + \text{s\_1434\_b} \tag{672}$$

Reactants

Table 389: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1073	N-carbamoyl-L-aspartate [intracellular]	

Modifiers

Table 390: Properties of each modifier.

Id	Name	SBO
s_0064	(S)-dihydroorotate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1073	N-carbamoyl-L-aspartate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 391: Properties of each product.

Id	Name	SBO
s_0064	(S)-dihydroorotate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{97} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_97}\left(\mathrm{Keq\_r\_0381}, \mathrm{Vmax\_r\_0381}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0064r\_0381}, \mathrm{kmp\_s\_1434\_br\_0381}, \mathrm{kms\_s\_0763\_br\_0381}, \mathrm{kms\_s\_1073r\_0381}, [\mathrm{s\_0064}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1073}], [\mathrm{s\_1434\_b}]\right) \tag{673}$$

$$\mathrm{function\_97}\left(\mathrm{Keq\_r\_0381}, \mathrm{Vmax\_r\_0381}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0064r\_0381}, \mathrm{kmp\_s\_1434\_br\_0381}, \mathrm{kms\_s\_0763\_br\_0381}, \mathrm{kms\_s\_1073r\_0381}, [\mathrm{s\_0064}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1073}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0381} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0381}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1073r\_0381}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1073}]^{1} - \frac{[\mathrm{s\_0064}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0381}}\right)}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0381}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1073}]}{\mathrm{kms\_s\_1073r\_0381}}\right) + \left(1 + \frac{[\mathrm{s\_0064}]}{\mathrm{kmp\_s\_0064r\_0381}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0381}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{674}$$

$$\mathrm{function\_97}\left(\mathrm{Keq\_r\_0381}, \mathrm{Vmax\_r\_0381}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0064r\_0381}, \mathrm{kmp\_s\_1434\_br\_0381}, \mathrm{kms\_s\_0763\_br\_0381}, \mathrm{kms\_s\_1073r\_0381}, [\mathrm{s\_0064}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1073}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0381} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0381}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1073r\_0381}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1073}]^{1} - \frac{[\mathrm{s\_0064}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0381}}\right)}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0381}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1073}]}{\mathrm{kms\_s\_1073r\_0381}}\right) + \left(1 + \frac{[\mathrm{s\_0064}]}{\mathrm{kmp\_s\_0064r\_0381}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0381}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{675}$$

Table 392: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0381	Keq_r_0381		1.100		☑
Vmax_r_0381	Vmax_r_0381		0.526		☑
kmp_s_0064r-_0381	kmp_s_0064r_0381		0.549		☑
kmp_s_1434-_br_0381	kmp_s_1434_br-_0381		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0763-_br_0381	kms_s_0763_br-_0381		0.549		☑
kms_s_1073r-_0381	kms_s_1073r_0381		0.549		☑

7.98 Reaction r_0384

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylbutanoate)

Notes GENE_ASSOCIATION:YJR016C

Reaction equation

$$s\_0018 \xrightleftharpoons{s\_0018,\ s\_0238,\ s\_1434\_b} s\_0238 + s\_1434\_b \tag{676}$$

Reactant

Table 393: Properties of each reactant.

Id	Name	SBO
s_0018	(R)-2,3-dihydroxy-3-methylbutanoate [intracellular]	

Modifiers

Table 394: Properties of each modifier.

Id	Name	SBO
s_0018	(R)-2,3-dihydroxy-3-methylbutanoate [intracellular]	
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 395: Properties of each product.

Id	Name	SBO
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{98} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_98}(\mathrm{Keq\_r\_0384}, \mathrm{Vmax\_r\_0384}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0238r\_0384}, \mathrm{kmp\_s\_1434\_br\_0384}, \mathrm{kms\_s\_0018r\_0384}, [\mathrm{s\_0018}], [\mathrm{s\_0238}], [\mathrm{s\_1434\_b}]) \quad (677)$$

$$\mathrm{function\_98}(\mathrm{Keq\_r\_0384}, \mathrm{Vmax\_r\_0384}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0238r\_0384}, \mathrm{kmp\_s\_1434\_br\_0384}, \mathrm{kms\_s\_0018r\_0384}, [\mathrm{s\_0018}], [\mathrm{s\_0238}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0384} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0018r\_0384}}\right)^{1} \cdot \left([\mathrm{s\_0018}]^{1} - \frac{[\mathrm{s\_0238}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0384}}\right)}{1 + \frac{[\mathrm{s\_0018}]}{\mathrm{kms\_s\_0018r\_0384}} + \left(1 + \frac{[\mathrm{s\_0238}]}{\mathrm{kmp\_s\_0238r\_0384}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0384}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (678)$$

$$\mathrm{function\_98}(\mathrm{Keq\_r\_0384}, \mathrm{Vmax\_r\_0384}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0238r\_0384}, \mathrm{kmp\_s\_1434\_br\_0384}, \mathrm{kms\_s\_0018r\_0384}, [\mathrm{s\_0018}], [\mathrm{s\_0238}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0384} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0018r\_0384}}\right)^{1} \cdot \left([\mathrm{s\_0018}]^{1} - \frac{[\mathrm{s\_0238}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0384}}\right)}{1 + \frac{[\mathrm{s\_0018}]}{\mathrm{kms\_s\_0018r\_0384}} + \left(1 + \frac{[\mathrm{s\_0238}]}{\mathrm{kmp\_s\_0238r\_0384}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0384}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (679)$$

Table 396: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0384	Keq_r_0384		0.604		☑
Vmax_r_0384	Vmax_r_0384		1.551		☑
kmp_s_0238r-_0384	kmp_s_0238r_0384		0.549		☑
kmp_s_1434-_br_0384	kmp_s_1434_br-_0384		0.549		☑
kms_s_0018r-_0384	kms_s_0018r_0384		0.549		☑

7.99 Reaction r_0385

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name dihydroxy-acid dehydratase (2,3-dihydroxy-3-methylpentanoate)

Notes GENE_ASSOCIATION:YJR016C

Reaction equation

$$\text{s\_0007} \xrightleftharpoons{\text{s\_0007, s\_0058, s\_1434\_b}} \text{s\_0058} + \text{s\_1434\_b} \tag{680}$$

Reactant

Table 397: Properties of each reactant.

Id	Name	SBO
s_0007	(2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]	

Modifiers

Table 398: Properties of each modifier.

Id	Name	SBO
s_0007	(2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]	
s_0058	(S)-3-methyl-2-oxopentanoate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 399: Properties of each product.

Id	Name	SBO
s_0058	(S)-3-methyl-2-oxopentanoate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{99} = & \operatorname{vol}(\text{intracellular}) \\ & \cdot \text{function\_99}(\text{Keq\_r\_0385}, \text{Vmax\_r\_0385}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0058r\_0385}, \\ & \text{kmp\_s\_1434\_br\_0385}, \text{kms\_s\_0007r\_0385}, [\text{s\_0007}], [\text{s\_0058}], [\text{s\_1434\_b}]) \end{aligned} \tag{681}$$

$$\begin{aligned} & \text{function\_99}(\text{Keq\_r\_0385}, \text{Vmax\_r\_0385}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0058r\_0385}, \\ & \text{kmp\_s\_1434\_br\_0385}, \text{kms\_s\_0007r\_0385}, [\text{s\_0007}], [\text{s\_0058}], \\ & [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0385} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0007r\_0385}}\right)^{1} \cdot \left([\text{s\_0007}]^{1} - \frac{[\text{s\_0058}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0385}}\right)}{1 + \frac{[\text{s\_0007}]}{\text{kms\_s\_0007r\_0385}} + \left(1 + \frac{[\text{s\_0058}]}{\text{kmp\_s\_0058r\_0385}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0385}}\right) - 1}}{\operatorname{vol}(\text{intracellular})} \end{aligned} \tag{682}$$

$$\text{function\_99}\left(\text{Keq\_r\_0385}, \text{Vmax\_r\_0385}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0058r\_0385}, \text{kmp\_s\_1434\_br\_0385}, \text{kms\_s\_0007r\_0385}, [\text{s\_0007}], [\text{s\_0058}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0385} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0007r\_0385}}\right)^{1} \cdot \left([\text{s\_0007}]^{1} - \frac{[\text{s\_0058}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0385}}\right)}{1 + \frac{[\text{s\_0007}]}{\text{kms\_s\_0007r\_0385}} + \left(1 + \frac{[\text{s\_0058}]}{\text{kmp\_s\_0058r\_0385}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0385}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{683}$$

Table 400: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0385	Keq_r_0385		0.604		☑
Vmax_r_0385	Vmax_r_0385		0.524		☑
kmp_s_0058r_0385	kmp_s_0058r_0385		0.549		☑
kmp_s_1434_br_0385	kmp_s_1434_br_0385		0.549		☑
kms_s_0007r_0385	kms_s_0007r_0385		0.549		☑

7.100 Reaction r_0386

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name dihydroxyacetone kinase

Notes GENE_ASSOCIATION:(YFL053W or YML070W)

Reaction equation

$$\text{s\_0446} + \text{s\_0734} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0734, s\_0735, s\_0763\_b}} \text{s\_0400} + \text{s\_0735} + \text{s\_0763\_b} \tag{684}$$

Reactants

Table 401: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0734	glycerone [intracellular]	

Modifiers

Table 402: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0734	glycerone [intracellular]	
s_0735	glycerone phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 403: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0735	glycerone phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{100} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_100}(\mathrm{Keq\_r\_0386}, \mathrm{Vmax\_r\_0386}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0386}, \mathrm{kmp\_s\_0735r\_0386}, \mathrm{kmp\_s\_0763\_br\_0386}, \mathrm{kms\_s\_0446r\_0386}, \mathrm{kms\_s\_0734r\_0386}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0734}], [\mathrm{s\_0735}], [\mathrm{s\_0763\_b}]) \quad (685)$$

$$\mathrm{function\_100}(\mathrm{Keq\_r\_0386}, \mathrm{Vmax\_r\_0386}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0386}, \mathrm{kmp\_s\_0735r\_0386}, \mathrm{kmp\_s\_0763\_br\_0386}, \mathrm{kms\_s\_0446r\_0386}, \mathrm{kms\_s\_0734r\_0386}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0734}], [\mathrm{s\_0735}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0386} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0386}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0734r\_0386}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0734}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0735}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0386}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0734}]}{\mathrm{kms\_s\_0734r\_0386}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0735}]}{\mathrm{kmp\_s\_0735r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0386}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (686)$$

$$\mathrm{function\_100}(\mathrm{Keq\_r\_0386}, \mathrm{Vmax\_r\_0386}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0386}, \mathrm{kmp\_s\_0735r\_0386}, \mathrm{kmp\_s\_0763\_br\_0386}, \mathrm{kms\_s\_0446r\_0386}, \mathrm{kms\_s\_0734r\_0386}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0734}], [\mathrm{s\_0735}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0386} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0386}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0734r\_0386}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0734}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0735}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0386}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0734}]}{\mathrm{kms\_s\_0734r\_0386}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0735}]}{\mathrm{kmp\_s\_0735r\_0386}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0386}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (687)$$

Table 404: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0386	Keq_r_0386		1.042		☑
Vmax_r_0386	Vmax_r_0386		5.481		☑
kmp_s_0400r_0386	kmp_s_0400r_0386		1.719		☑
kmp_s_0735r_0386	kmp_s_0735r_0386		0.602		☑
kmp_s_0763_br_0386	kmp_s_0763_br_0386		0.549		☑
kms_s_0446r_0386	kms_s_0446r_0386		1.092		☑
kms_s_0734r_0386	kms_s_0734r_0386		0.549		☑

7.101 Reaction r_0387

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name dimethylallyltranstransferase

Notes GENE_ASSOCIATION:YJL167W

Reaction equation

$$\text{s\_0850} + \text{s\_1257} \xrightleftharpoons{\text{s\_0605, s\_0712, s\_0850, s\_1257}} \text{s\_0605} + \text{s\_0712} \quad (688)$$

Reactants

Table 405: Properties of each reactant.

Id	Name	SBO
s_0850	isopentenyl diphosphate [intracellular]	
s_1257	prenyl diphosphate [intracellular]	

Modifiers

Table 406: Properties of each modifier.

Id	Name	SBO
s_0605	diphosphate [intracellular]	

Id	Name	SBO
s_0712	geranyl diphosphate [intracellular]	
s_0850	isopentenyl diphosphate [intracellular]	
s_1257	prenyl diphosphate [intracellular]	

Products

Table 407: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_0712	geranyl diphosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{101} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_101}(\mathrm{Keq\_r\_0387}, \mathrm{Vmax\_r\_0387}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0387}, \mathrm{kmp\_s\_0712r\_0387}, \mathrm{kms\_s\_0850r\_0387}, \mathrm{kms\_s\_1257r\_0387}, [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}], [\mathrm{s\_1257}]) \quad (689)$$

$$\mathrm{function\_101}(\mathrm{Keq\_r\_0387}, \mathrm{Vmax\_r\_0387}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0387}, \mathrm{kmp\_s\_0712r\_0387}, \mathrm{kms\_s\_0850r\_0387}, \mathrm{kms\_s\_1257r\_0387}, [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}], [\mathrm{s\_1257}]) = \frac{\mathrm{Vmax\_r\_0387} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0850r\_0387}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1257r\_0387}}\right)^{1} \cdot \left([\mathrm{s\_0850}]^{1} \cdot [\mathrm{s\_1257}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0712}]^{1}}{\mathrm{Keq\_r\_0387}}\right)}{\left(1 + \frac{[\mathrm{s\_0850}]}{\mathrm{kms\_s\_0850r\_0387}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1257}]}{\mathrm{kms\_s\_1257r\_0387}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0387}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0712}]}{\mathrm{kmp\_s\_0712r\_0387}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (690)$$

$$\mathrm{function\_101}(\mathrm{Keq\_r\_0387}, \mathrm{Vmax\_r\_0387}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0387}, \mathrm{kmp\_s\_0712r\_0387}, \mathrm{kms\_s\_0850r\_0387}, \mathrm{kms\_s\_1257r\_0387}, [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}], [\mathrm{s\_1257}]) = \frac{\mathrm{Vmax\_r\_0387} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0850r\_0387}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1257r\_0387}}\right)^{1} \cdot \left([\mathrm{s\_0850}]^{1} \cdot [\mathrm{s\_1257}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0712}]^{1}}{\mathrm{Keq\_r\_0387}}\right)}{\left(1 + \frac{[\mathrm{s\_0850}]}{\mathrm{kms\_s\_0850r\_0387}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1257}]}{\mathrm{kms\_s\_1257r\_0387}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0387}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0712}]}{\mathrm{kmp\_s\_0712r\_0387}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (691)$$

Table 408: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0387	Keq_r_0387		1.100		☑
Vmax_r_0387	Vmax_r_0387		0.059		☑
kmp_s_0605r-_0387	kmp_s_0605r_0387		0.549		☑
kmp_s_0712r-_0387	kmp_s_0712r_0387		0.549		☑
kms_s_0850r-_0387	kms_s_0850r_0387		0.549		☑
kms_s_1257r-_0387	kms_s_1257r_0387		0.549		☑

7.102 Reaction r_0393

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name dolichyl-phosphate D-mannosyltransferase

Notes GENE_ASSOCIATION:YPR183W

Reaction equation

$$\mathrm{s\_0616} + \mathrm{s\_0710} \xrightleftharpoons{\mathrm{s\_0615,\ s\_0616,\ s\_0706,\ s\_0710}} \mathrm{s\_0615} + \mathrm{s\_0706} \tag{692}$$

Reactants

Table 409: Properties of each reactant.

Id	Name	SBO
s_0616	dolichyl phosphate [intracellular]	
s_0710	GDP-alpha-D-mannose [intracellular]	

Modifiers

Table 410: Properties of each modifier.

Id	Name	SBO
s_0615	dolichyl D-mannosyl phosphate [intracellular]	
s_0616	dolichyl phosphate [intracellular]	
s_0706	GDP [intracellular]	

Id	Name	SBO
s_0710	GDP-alpha-D-mannose [intracellular]	

Products

Table 411: Properties of each product.

Id	Name	SBO
s_0615	dolichyl D-mannosyl phosphate [intracellular]	
s_0706	GDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{102} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_102}\left(\mathrm{Keq\_r\_0393}, \mathrm{Vmax\_r\_0393}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0615r\_0393}, \mathrm{kmp\_s\_0706r\_0393}, \mathrm{kms\_s\_0616r\_0393}, \mathrm{kms\_s\_0710r\_0393}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0706}], [\mathrm{s\_0710}]\right) \tag{693}$$

$$\mathrm{function\_102}\left(\mathrm{Keq\_r\_0393}, \mathrm{Vmax\_r\_0393}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0615r\_0393}, \mathrm{kmp\_s\_0706r\_0393}, \mathrm{kms\_s\_0616r\_0393}, \mathrm{kms\_s\_0710r\_0393}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0706}], [\mathrm{s\_0710}]\right) = \frac{\mathrm{Vmax\_r\_0393} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0616r\_0393}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0710r\_0393}}\right)^{1} \cdot \left([\mathrm{s\_0616}]^{1} \cdot [\mathrm{s\_0710}]^{1} - \frac{[\mathrm{s\_0615}]^{1} \cdot [\mathrm{s\_0706}]^{1}}{\mathrm{Keq\_r\_0393}}\right)}{\left(1+\frac{[\mathrm{s\_0616}]}{\mathrm{kms\_s\_0616r\_0393}}\right) \cdot \left(1+\frac{[\mathrm{s\_0710}]}{\mathrm{kms\_s\_0710r\_0393}}\right) + \left(1+\frac{[\mathrm{s\_0615}]}{\mathrm{kmp\_s\_0615r\_0393}}\right) \cdot \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0393}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{694}$$

$$\mathrm{function\_102}\left(\mathrm{Keq\_r\_0393}, \mathrm{Vmax\_r\_0393}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0615r\_0393}, \mathrm{kmp\_s\_0706r\_0393}, \mathrm{kms\_s\_0616r\_0393}, \mathrm{kms\_s\_0710r\_0393}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0706}], [\mathrm{s\_0710}]\right) = \frac{\mathrm{Vmax\_r\_0393} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0616r\_0393}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0710r\_0393}}\right)^{1} \cdot \left([\mathrm{s\_0616}]^{1} \cdot [\mathrm{s\_0710}]^{1} - \frac{[\mathrm{s\_0615}]^{1} \cdot [\mathrm{s\_0706}]^{1}}{\mathrm{Keq\_r\_0393}}\right)}{\left(1+\frac{[\mathrm{s\_0616}]}{\mathrm{kms\_s\_0616r\_0393}}\right) \cdot \left(1+\frac{[\mathrm{s\_0710}]}{\mathrm{kms\_s\_0710r\_0393}}\right) + \left(1+\frac{[\mathrm{s\_0615}]}{\mathrm{kmp\_s\_0615r\_0393}}\right) \cdot \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0393}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{695}$$

Table 412: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0393	Keq_r_0393		1.100		☑
Vmax_r_0393	Vmax_r_0393		3.511		☑
kmp_s_0615r-_0393	kmp_s_0615r_0393		0.549		☑
kmp_s_0706r-_0393	kmp_s_0706r_0393		0.549		☑
kms_s_0616r-_0393	kms_s_0616r_0393		0.549		☑
kms_s_0710r-_0393	kms_s_0710r_0393		0.549		☑

7.103 Reaction r_0394

This is a reversible reaction of one reactant forming three products influenced by four modifiers.

Name dolichyl-phosphate-mannose–protein mannosyltransferase

Notes GENE_ASSOCIATION:(YDL093W or YGR199W or YJR143C or YOR321W or (YAL023C and YDL095W))

Reaction equation

$$s\_0615 \xrightleftharpoons{s\_0615,\ s\_0616,\ s\_0763\_b,\ s\_1011} s\_0616 + s\_0763\_b + s\_1011 \qquad (696)$$

Reactant

Table 413: Properties of each reactant.

Id	Name	SBO
s_0615	dolichyl D-mannosyl phosphate [intracellular]	

Modifiers

Table 414: Properties of each modifier.

Id	Name	SBO
s_0615	dolichyl D-mannosyl phosphate [intracellular]	
s_0616	dolichyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Id	Name	SBO
s_1011	mannan [intracellular]	

Products

Table 415: Properties of each product.

Id	Name	SBO
s_0616	dolichyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1011	mannan [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{103} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_103}(\mathrm{Keq\_r\_0394}, \mathrm{Vmax\_r\_0394}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0616r\_0394}, \mathrm{kmp\_s\_0763\_br\_0394}, \mathrm{kmp\_s\_1011r\_0394}, \mathrm{kms\_s\_0615r\_0394}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1011}]) \tag{697}$$

$$\mathrm{function\_103}(\mathrm{Keq\_r\_0394}, \mathrm{Vmax\_r\_0394}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0616r\_0394}, \mathrm{kmp\_s\_0763\_br\_0394}, \mathrm{kmp\_s\_1011r\_0394}, \mathrm{kms\_s\_0615r\_0394}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1011}]) = \frac{\mathrm{Vmax\_r\_0394} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0615r\_0394}}\right)^{1} \cdot \left([\mathrm{s\_0615}]^{1} - \frac{[\mathrm{s\_0616}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1011}]^{1}}{\mathrm{Keq\_r\_0394}}\right)}{1 + \frac{[\mathrm{s\_0615}]}{\mathrm{kms\_s\_0615r\_0394}} + \left(1 + \frac{[\mathrm{s\_0616}]}{\mathrm{kmp\_s\_0616r\_0394}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0394}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1011}]}{\mathrm{kmp\_s\_1011r\_0394}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{698}$$

$$\mathrm{function\_103}(\mathrm{Keq\_r\_0394}, \mathrm{Vmax\_r\_0394}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0616r\_0394}, \mathrm{kmp\_s\_0763\_br\_0394}, \mathrm{kmp\_s\_1011r\_0394}, \mathrm{kms\_s\_0615r\_0394}, [\mathrm{s\_0615}], [\mathrm{s\_0616}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1011}]) = \frac{\mathrm{Vmax\_r\_0394} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0615r\_0394}}\right)^{1} \cdot \left([\mathrm{s\_0615}]^{1} - \frac{[\mathrm{s\_0616}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1011}]^{1}}{\mathrm{Keq\_r\_0394}}\right)}{1 + \frac{[\mathrm{s\_0615}]}{\mathrm{kms\_s\_0615r\_0394}} + \left(1 + \frac{[\mathrm{s\_0616}]}{\mathrm{kmp\_s\_0616r\_0394}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0394}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1011}]}{\mathrm{kmp\_s\_1011r\_0394}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{699}$$

Table 416: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0394	Keq_r_0394		0.332		☑
Vmax_r_0394	Vmax_r_0394		4.514		☑
kmp_s_0616r-_0394	kmp_s_0616r_0394		0.549		☑
kmp_s_0763-_br_0394	kmp_s_0763_br-_0394		0.549		☑
kmp_s_1011r-_0394	kmp_s_1011r_0394		0.549		☑
kms_s_0615r-_0394	kms_s_0615r_0394		0.549		☑

7.104 Reaction r_0398

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name enolase

Notes GENE_ASSOCIATION:(YGR254W or YHR174W)

Reaction equation

$$s\_0193 \xrightleftharpoons{s\_0193,\ s\_1243,\ s\_1434\_b} s\_1243 + s\_1434\_b \tag{700}$$

Reactant

Table 417: Properties of each reactant.

Id	Name	SBO
s_0193	2-phospho-D-glyceric acid [intracellular]	

Modifiers

Table 418: Properties of each modifier.

Id	Name	SBO
s_0193	2-phospho-D-glyceric acid [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 419: Properties of each product.

Id	Name	SBO
s_1243	phosphoenolpyruvate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{104} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_104}(\mathrm{Keq\_r\_0398}, \mathrm{Vmax\_r\_0398}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1243r\_0398}, \mathrm{kmp\_s\_1434\_br\_0398}, \mathrm{kms\_s\_0193r\_0398}, [\mathrm{s\_0193}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) \tag{701}$$

$$\mathrm{function\_104}(\mathrm{Keq\_r\_0398}, \mathrm{Vmax\_r\_0398}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1243r\_0398}, \mathrm{kmp\_s\_1434\_br\_0398}, \mathrm{kms\_s\_0193r\_0398}, [\mathrm{s\_0193}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0398} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0193r\_0398}}\right)^1 \cdot \left([\mathrm{s\_0193}]^1 - \frac{[\mathrm{s\_1243}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0398}}\right)}{1 + \frac{[\mathrm{s\_0193}]}{\mathrm{kms\_s\_0193r\_0398}} + \left(1 + \frac{[\mathrm{s\_1243}]}{\mathrm{kmp\_s\_1243r\_0398}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0398}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{702}$$

$$\mathrm{function\_104}(\mathrm{Keq\_r\_0398}, \mathrm{Vmax\_r\_0398}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1243r\_0398}, \mathrm{kmp\_s\_1434\_br\_0398}, \mathrm{kms\_s\_0193r\_0398}, [\mathrm{s\_0193}], [\mathrm{s\_1243}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0398} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0193r\_0398}}\right)^1 \cdot \left([\mathrm{s\_0193}]^1 - \frac{[\mathrm{s\_1243}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0398}}\right)}{1 + \frac{[\mathrm{s\_0193}]}{\mathrm{kms\_s\_0193r\_0398}} + \left(1 + \frac{[\mathrm{s\_1243}]}{\mathrm{kmp\_s\_1243r\_0398}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0398}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{703}$$

Table 420: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0398	Keq_r_0398		6500.000		☑
Vmax_r_0398	Vmax_r_0398		6.150		☑
kmp_s_1243r-_0398	kmp_s_1243r_0398		0.027		☑
kmp_s_1434-_br_0398	kmp_s_1434_br-_0398		0.549		☑
kms_s_0193r-_0398	kms_s_0193r_0398		0.052		☑

7.105 Reaction r_0417

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C10:0)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\text{s\_0763\_b} + \text{s\_1005} + 2\,\text{s\_1096} + \text{s\_1132} \xrightleftharpoons{\text{s\_0470, s\_0514, s\_0574, s\_0763\_b, s\_1005, s\_1091, s\_1096, s\_1132, s\_1434}} \tag{704}$$

Reactants

Table 421: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	
s_1132	octanoate [intracellular]	

Modifiers

Table 422: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0574	decanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1132	octanoate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 423: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0574	decanoate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{105} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_105}(\mathrm{Keq\_r\_0417}, \mathrm{Vmax\_r\_0417}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0417}, \mathrm{kmp\_s\_0514r\_0417}, \mathrm{kmp\_s\_0574r\_0417}, \mathrm{kmp\_s\_1091r\_0417}, \mathrm{kmp\_s\_1434\_br\_0417}, \mathrm{kms\_s\_0763\_br\_0417}, \mathrm{kms\_s\_1005r\_0417}, \mathrm{kms\_s\_1096r\_0417}, \mathrm{kms\_s\_1132r\_0417}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0574}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1132}], [\mathrm{s\_1434\_b}]) \tag{705}$$

$$\mathrm{function\_105}(\mathrm{Keq\_r\_0417}, \mathrm{Vmax\_r\_0417}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0417}, \mathrm{kmp\_s\_0514r\_0417}, \mathrm{kmp\_s\_0574r\_0417}, \mathrm{kmp\_s\_1091r\_0417}, \mathrm{kmp\_s\_1434\_br\_0417}, \mathrm{kms\_s\_0763\_br\_0417}, \mathrm{kms\_s\_1005r\_0417}, \mathrm{kms\_s\_1096r\_0417}, \mathrm{kms\_s\_1132r\_0417}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0574}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1132}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0417} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0417}}\right)^3 \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0417}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0417}}\right)^2 \cdot \left(\frac{1}{\mathrm{kms\_s\_1132r\_0417}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^3 \cdot [\mathrm{s\_1005}]^1 \cdot [\mathrm{s\_1096}]^2 \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kms\_s\_1132r\_0417}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0417}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{706}$$

$$\mathrm{function\_105}(\mathrm{Keq\_r\_0417}, \mathrm{Vmax\_r\_0417}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0417}, \mathrm{kmp\_s\_0514r\_0417}, \mathrm{kmp\_s\_0574r\_0417}, \mathrm{kmp\_s\_1091r\_0417}, \mathrm{kmp\_s\_1434\_br\_0417}, \mathrm{kms\_s\_0763\_br\_0417}, \mathrm{kms\_s\_1005r\_0417}, \mathrm{kms\_s\_1096r\_0417}, \mathrm{kms\_s\_1132r\_0417}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0574}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1132}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0417} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0417}}\right)^3 \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0417}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0417}}\right)^2 \cdot \left(\frac{1}{\mathrm{kms\_s\_1132r\_0417}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^3 \cdot [\mathrm{s\_1005}]^1 \cdot [\mathrm{s\_1096}]^2 \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kms\_s\_1132r\_0417}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0417}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0417}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{707}$$

Table 424: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0417	Keq_r_0417		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0417	Vmax_r_0417		0.006		☑
kmp_s_0470r-_0417	kmp_s_0470r_0417		1.000		☑
kmp_s_0514r-_0417	kmp_s_0514r_0417		0.549		☑
kmp_s_0574r-_0417	kmp_s_0574r_0417		0.549		☑
kmp_s_1091r-_0417	kmp_s_1091r_0417		0.549		☑
kmp_s_1434-_br_0417	kmp_s_1434_br-_0417		0.549		☑
kms_s_0763-_br_0417	kms_s_0763_br-_0417		0.549		☑
kms_s_1005r-_0417	kms_s_1005r_0417		0.549		☑
kms_s_1096r-_0417	kms_s_1096r_0417		0.549		☑
kms_s_1132r-_0417	kms_s_1132r_0417		0.549		☑

7.106 Reaction r_0418

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C12:0)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$\mathrm{s\_0574} + 3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons[]{\mathrm{s\_0470},\ \mathrm{s\_0514},\ \mathrm{s\_0574},\ \mathrm{s\_0763\_b},\ \mathrm{s\_0968},\ \mathrm{s\_1005},\ \mathrm{s\_1091},\ \mathrm{s\_1096},\ \mathrm{s\_1434}} \tag{708}$$

Reactants

Table 425: Properties of each reactant.

Id	Name	SBO
s_0574	decanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 426: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0574	decanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0968	laurate [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 427: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0968	laurate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{106} = &\operatorname{vol}(\text{intracellular}) \\
&\cdot \text{function\_106}(\text{Keq\_r\_0418}, \text{Vmax\_r\_0418}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0418}, \\
&\text{kmp\_s\_0514r\_0418}, \text{kmp\_s\_0968r\_0418}, \text{kmp\_s\_1091r\_0418}, \text{kmp\_s\_1434\_br\_0418}, \\
&\text{kms\_s\_0574r\_0418}, \text{kms\_s\_0763\_br\_0418}, \text{kms\_s\_1005r\_0418}, \text{kms\_s\_1096r\_0418}, \\
&[\text{s\_0470}], [\text{s\_0514}], [\text{s\_0574}], [\text{s\_0763\_b}], [\text{s\_0968}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}])
\end{aligned}
\tag{709}
$$

$$\begin{aligned}&\text{function\_106}\left(\text{Keq\_r\_0418}, \text{Vmax\_r\_0418}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0418},\\&\text{kmp\_s\_0514r\_0418}, \text{kmp\_s\_0968r\_0418}, \text{kmp\_s\_1091r\_0418}, \text{kmp\_s\_1434\_br\_0418},\\&\text{kms\_s\_0574r\_0418}, \text{kms\_s\_0763\_br\_0418}, \text{kms\_s\_1005r\_0418}, \text{kms\_s\_1096r\_0418},\\&[\text{s\_0470}], [\text{s\_0514}], [\text{s\_0574}], [\text{s\_0763\_b}], [\text{s\_0968}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0418} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0574r\_0418}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0418}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0418}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0418}}\right)^{2} \cdot \left([\text{s\_0574}]^{1} \cdot [\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0574}]}{\text{kms\_s\_0574r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0418}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0418}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0418}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{710}$$

$$\begin{aligned}&\text{function\_106}\left(\text{Keq\_r\_0418}, \text{Vmax\_r\_0418}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0418},\\&\text{kmp\_s\_0514r\_0418}, \text{kmp\_s\_0968r\_0418}, \text{kmp\_s\_1091r\_0418}, \text{kmp\_s\_1434\_br\_0418},\\&\text{kms\_s\_0574r\_0418}, \text{kms\_s\_0763\_br\_0418}, \text{kms\_s\_1005r\_0418}, \text{kms\_s\_1096r\_0418},\\&[\text{s\_0470}], [\text{s\_0514}], [\text{s\_0574}], [\text{s\_0763\_b}], [\text{s\_0968}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0418} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0574r\_0418}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0418}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0418}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0418}}\right)^{2} \cdot \left([\text{s\_0574}]^{1} \cdot [\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0574}]}{\text{kms\_s\_0574r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0418}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0418}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0418}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0418}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{711}$$

Table 428: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0418`	Keq_r_0418		3.650		☑
`Vmax_r_0418`	Vmax_r_0418		0.006		☑
`kmp_s_0470r_0418`	kmp_s_0470r_0418		1.000		☑
`kmp_s_0514r_0418`	kmp_s_0514r_0418		0.549		☑
`kmp_s_0968r_0418`	kmp_s_0968r_0418		0.549		☑
`kmp_s_1091r_0418`	kmp_s_1091r_0418		0.549		☑
`kmp_s_1434_br_0418`	kmp_s_1434_br_0418		0.549		☑
`kms_s_0574r_0418`	kms_s_0574r_0418		0.549		☑
`kms_s_0763_br_0418`	kms_s_0763_br_0418		0.549		☑
`kms_s_1005r_0418`	kms_s_1005r_0418		0.549		☑
`kms_s_1096r_0418`	kms_s_1096r_0418		0.549		☑

7.107 Reaction r_0419

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C14:0)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\mathrm{s\_0763\_b} + \mathrm{s\_0968} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_0968,\ s\_1005,\ s\_1028,\ s\_1091,\ s\_1096,\ s\_1434}} \tag{712}$$

Reactants

Table 429: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0968	laurate [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 430: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_0968	laurate [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1028	myristate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 431: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1028	myristate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{107} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_107}\left(\mathrm{Keq\_r\_0419}, \mathrm{Vmax\_r\_0419}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0419}, \mathrm{kmp\_s\_0514r\_0419}, \mathrm{kmp\_s\_1028r\_0419}, \mathrm{kmp\_s\_1091r\_0419}, \mathrm{kmp\_s\_1434\_br\_0419}, \mathrm{kms\_s\_0763\_br\_0419}, \mathrm{kms\_s\_0968r\_0419}, \mathrm{kms\_s\_1005r\_0419}, \mathrm{kms\_s\_1096r\_0419}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0968}], [\mathrm{s\_1005}], [\mathrm{s\_1028}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) \tag{713}$$

$$\mathrm{function\_107}\left(\mathrm{Keq\_r\_0419}, \mathrm{Vmax\_r\_0419}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0419}, \mathrm{kmp\_s\_0514r\_0419}, \mathrm{kmp\_s\_1028r\_0419}, \mathrm{kmp\_s\_1091r\_0419}, \mathrm{kmp\_s\_1434\_br\_0419}, \mathrm{kms\_s\_0763\_br\_0419}, \mathrm{kms\_s\_0968r\_0419}, \mathrm{kms\_s\_1005r\_0419}, \mathrm{kms\_s\_1096r\_0419}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0968}], [\mathrm{s\_1005}], [\mathrm{s\_1028}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0419} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0419}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_0968r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0419}}\right)^{2} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_0968}]^{1} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0968}]}{\mathrm{kms\_s\_0968r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0419}}\right) + \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0419}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{714}$$

$$\mathrm{function\_107}\left(\mathrm{Keq\_r\_0419}, \mathrm{Vmax\_r\_0419}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0419}, \mathrm{kmp\_s\_0514r\_0419}, \mathrm{kmp\_s\_1028r\_0419}, \mathrm{kmp\_s\_1091r\_0419}, \mathrm{kmp\_s\_1434\_br\_0419}, \mathrm{kms\_s\_0763\_br\_0419}, \mathrm{kms\_s\_0968r\_0419}, \mathrm{kms\_s\_1005r\_0419}, \mathrm{kms\_s\_1096r\_0419}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0968}], [\mathrm{s\_1005}], [\mathrm{s\_1028}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0419} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0419}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_0968r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0419}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0419}}\right)^{2} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_0968}]^{1} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0968}]}{\mathrm{kms\_s\_0968r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0419}}\right) + \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0419}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0419}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{715}$$

Table 432: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0419	Keq_r_0419		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0419	Vmax_r_0419		0.006		☑
kmp_s_0470r_0419	kmp_s_0470r_0419		1.000		☑
kmp_s_0514r_0419	kmp_s_0514r_0419		0.549		☑
kmp_s_1028r_0419	kmp_s_1028r_0419		0.549		☑
kmp_s_1091r_0419	kmp_s_1091r_0419		0.549		☑
kmp_s_1434_br_0419	kmp_s_1434_br_0419		0.549		☑
kms_s_0763_br_0419	kms_s_0763_br_0419		0.549		☑
kms_s_0968r_0419	kms_s_0968r_0419		0.549		☑
kms_s_1005r_0419	kms_s_1005r_0419		0.549		☑
kms_s_1096r_0419	kms_s_1096r_0419		0.549		☑

7.108 Reaction r_0421

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C16:0)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\text{s\_0763\_b} + \text{s\_1005} + \text{s\_1028} + 2\,\text{s\_1096} \xrightleftharpoons{\text{s\_0470, s\_0514, s\_0763\_b, s\_1005, s\_1028, s\_1091, s\_1096, s\_1170, s\_1434}} \tag{716}$$

Reactants

Table 433: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1028	myristate [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 434: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1028	myristate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1170	palmitate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 435: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1170	palmitate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{108} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \\
& \cdot \mathrm{function\_108}\left(\mathrm{Keq\_r\_0421}, \mathrm{Vmax\_r\_0421}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0421},\right. \\
& \mathrm{kmp\_s\_0514r\_0421}, \mathrm{kmp\_s\_1091r\_0421}, \mathrm{kmp\_s\_1170r\_0421}, \mathrm{kmp\_s\_1434\_br\_0421}, \\
& \mathrm{kms\_s\_0763\_br\_0421}, \mathrm{kms\_s\_1005r\_0421}, \mathrm{kms\_s\_1028r\_0421}, \mathrm{kms\_s\_1096r\_0421}, \\
& \left.[\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1028}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1170}], [\mathrm{s\_1434\_b}]\right)
\end{aligned}
\tag{717}
$$

$$\text{function\_108}(\text{Keq\_r\_0421}, \text{Vmax\_r\_0421}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0421}, \text{kmp\_s\_0514r\_0421}, \text{kmp\_s\_1091r\_0421}, \text{kmp\_s\_1170r\_0421}, \text{kmp\_s\_1434\_br\_0421}, \text{kms\_s\_0763\_br\_0421}, \text{kms\_s\_1005r\_0421}, \text{kms\_s\_1028r\_0421}, \text{kms\_s\_1096r\_0421}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1028}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1170}], [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0421} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0421}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0421}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1028r\_0421}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0421}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1028}]^{1} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1028}]}{\text{kms\_s\_1028r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0421}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0421}}\right) \cdot}}{\text{vol}(\text{intracellular})} \tag{718}$$

$$\text{function\_108}(\text{Keq\_r\_0421}, \text{Vmax\_r\_0421}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0421}, \text{kmp\_s\_0514r\_0421}, \text{kmp\_s\_1091r\_0421}, \text{kmp\_s\_1170r\_0421}, \text{kmp\_s\_1434\_br\_0421}, \text{kms\_s\_0763\_br\_0421}, \text{kms\_s\_1005r\_0421}, \text{kms\_s\_1028r\_0421}, \text{kms\_s\_1096r\_0421}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1028}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1170}], [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0421} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0421}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0421}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1028r\_0421}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0421}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1028}]^{1} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1028}]}{\text{kms\_s\_1028r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0421}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0421}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0421}}\right) \cdot}}{\text{vol}(\text{intracellular})} \tag{719}$$

Table 436: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0421	Keq_r_0421		3.650		☑
Vmax_r_0421	Vmax_r_0421		0.006		☑
kmp_s_0470r_0421	kmp_s_0470r_0421		1.000		☑
kmp_s_0514r_0421	kmp_s_0514r_0421		0.549		☑
kmp_s_1091r_0421	kmp_s_1091r_0421		0.549		☑
kmp_s_1170r_0421	kmp_s_1170r_0421		0.549		☑
kmp_s_1434_br_0421	kmp_s_1434_br_0421		0.549		☑
kms_s_0763_br_0421	kms_s_0763_br_0421		0.549		☑
kms_s_1005r_0421	kms_s_1005r_0421		0.549		☑
kms_s_1028r_0421	kms_s_1028r_0421		0.549		☑
kms_s_1096r_0421	kms_s_1096r_0421		0.549		☑

7.109 Reaction `r_0423`

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C18:0)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} + \mathrm{s\_1170} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1170,\ s\_1329,\ s\_1434}} \tag{720}$$

Reactants

Table 437: Properties of each reactant.

Id	Name	SBO
`s_0763_b`	H+ [intracellular]	
`s_1005`	malonyl-CoA [intracellular]	
`s_1096`	NADPH [intracellular]	
`s_1170`	palmitate [intracellular]	

Modifiers

Table 438: Properties of each modifier.

Id	Name	SBO
`s_0470`	carbon dioxide [intracellular]	
`s_0514`	coenzyme A [intracellular]	
`s_0763_b`	H+ [intracellular]	
`s_1005`	malonyl-CoA [intracellular]	
`s_1091`	NADP(+) [intracellular]	
`s_1096`	NADPH [intracellular]	
`s_1170`	palmitate [intracellular]	
`s_1329`	stearate [intracellular]	
`s_1434_b`	water [intracellular]	

Products

Table 439: Properties of each product.

Id	Name	SBO
`s_0470`	carbon dioxide [intracellular]	
`s_0514`	coenzyme A [intracellular]	
`s_1091`	NADP(+) [intracellular]	
`s_1329`	stearate [intracellular]	
`s_1434_b`	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_109}\left(\mathrm{Keq\_r\_0423}, \mathrm{Vmax\_r\_0423}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0423}, \mathrm{kmp\_s\_0514r\_0423}, \mathrm{kmp\_s\_1091r\_0423}, \mathrm{kmp\_s\_1329r\_0423}, \mathrm{kmp\_s\_1434\_br\_0423}, \mathrm{kms\_s\_0763\_br\_0423}, \mathrm{kms\_s\_1005r\_0423}, \mathrm{kms\_s\_1096r\_0423}, \mathrm{kms\_s\_1170r\_0423}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1170}], [\mathrm{s\_1329}], [\mathrm{s\_1434\_b}]\right) \quad (721)$$

$$\mathrm{function\_109}\left(\mathrm{Keq\_r\_0423}, \mathrm{Vmax\_r\_0423}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0423}, \mathrm{kmp\_s\_0514r\_0423}, \mathrm{kmp\_s\_1091r\_0423}, \mathrm{kmp\_s\_1329r\_0423}, \mathrm{kmp\_s\_1434\_br\_0423}, \mathrm{kms\_s\_0763\_br\_0423}, \mathrm{kms\_s\_1005r\_0423}, \mathrm{kms\_s\_1096r\_0423}, \mathrm{kms\_s\_1170r\_0423}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1170}], [\mathrm{s\_1329}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0423} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0423}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0423}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0423}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1170r\_0423}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_1096}]^{2} \cdot [\mathrm{s\_}\ldots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1170}]}{\mathrm{kms\_s\_1170r\_0423}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0423}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (722)$$

$$\mathrm{function\_109}\left(\mathrm{Keq\_r\_0423}, \mathrm{Vmax\_r\_0423}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0423}, \mathrm{kmp\_s\_0514r\_0423}, \mathrm{kmp\_s\_1091r\_0423}, \mathrm{kmp\_s\_1329r\_0423}, \mathrm{kmp\_s\_1434\_br\_0423}, \mathrm{kms\_s\_0763\_br\_0423}, \mathrm{kms\_s\_1005r\_0423}, \mathrm{kms\_s\_1096r\_0423}, \mathrm{kms\_s\_1170r\_0423}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1170}], [\mathrm{s\_1329}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0423} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0423}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0423}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0423}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1170r\_0423}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_1096}]^{2} \cdot [\mathrm{s\_}\ldots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_1170}]}{\mathrm{kms\_s\_1170r\_0423}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0423}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0423}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (723)$$

Table 440: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0423`	Keq_r_0423		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0423	Vmax_r_0423		0.006		☑
kmp_s_0470r-_0423	kmp_s_0470r_0423		1.000		☑
kmp_s_0514r-_0423	kmp_s_0514r_0423		0.549		☑
kmp_s_1091r-_0423	kmp_s_1091r_0423		0.549		☑
kmp_s_1329r-_0423	kmp_s_1329r_0423		0.549		☑
kmp_s_1434-_br_0423	kmp_s_1434_br-_0423		0.549		☑
kms_s_0763-_br_0423	kms_s_0763_br-_0423		0.549		☑
kms_s_1005r-_0423	kms_s_1005r_0423		0.549		☑
kms_s_1096r-_0423	kms_s_1096r_0423		0.549		☑
kms_s_1170r-_0423	kms_s_1170r_0423		0.549		☑

7.110 Reaction r_0425

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acid synthase (n-C24:0), lumped reaction

Notes GENE_ASSOCIATION:(YCR034W and YDL015C and YLR372W)

Reaction equation

$$9\,\mathrm{s\_0763\_b} + 3\,\mathrm{s\_1005} + 6\,\mathrm{s\_1096} + \mathrm{s\_1329} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_0987,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1329,\ s\_143}} \tag{724}$$

Reactants

Table 441: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	
s_1329	stearate [intracellular]	

Modifiers

Table 442: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_0987	lignocerate [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1329	stearate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 443: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0987	lignocerate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{110} = & \operatorname{vol}(\text{intracellular}) \\ & \cdot \text{function\_110}(\text{Keq\_r\_0425}, \text{Vmax\_r\_0425}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0425}, \\ & \text{kmp\_s\_0514r\_0425}, \text{kmp\_s\_0987r\_0425}, \text{kmp\_s\_1091r\_0425}, \text{kmp\_s\_1434\_br\_0425}, \\ & \text{kms\_s\_0763\_br\_0425}, \text{kms\_s\_1005r\_0425}, \text{kms\_s\_1096r\_0425}, \text{kms\_s\_1329r\_0425}, \\ & [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_0987}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1329}], [\text{s\_1434\_b}]) \end{aligned} \tag{725}$$

$$\text{function\_110}\left(\text{Keq\_r\_0425}, \text{Vmax\_r\_0425}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0425}, \text{kmp\_s\_0514r\_0425}, \text{kmp\_s\_0987r\_0425}, \text{kmp\_s\_1091r\_0425}, \text{kmp\_s\_1434\_br\_0425}, \text{kms\_s\_0763\_br\_0425}, \text{kms\_s\_1005r\_0425}, \text{kms\_s\_1096r\_0425}, \text{kms\_s\_1329r\_0425}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_0987}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1329}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0425} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0425}}\right)^{9} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0425}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0425}}\right)^{6} \cdot \left(\frac{1}{\text{kms\_s\_1329r\_0425}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{9} \cdot [\text{s\_1005}]^{3} \cdot [\text{s\_1096}]^{6} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1329}]}{\text{kms\_s\_1329r\_0425}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0425}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)} \tag{726}$$

$$\text{function\_110}\left(\text{Keq\_r\_0425}, \text{Vmax\_r\_0425}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0425}, \text{kmp\_s\_0514r\_0425}, \text{kmp\_s\_0987r\_0425}, \text{kmp\_s\_1091r\_0425}, \text{kmp\_s\_1434\_br\_0425}, \text{kms\_s\_0763\_br\_0425}, \text{kms\_s\_1005r\_0425}, \text{kms\_s\_1096r\_0425}, \text{kms\_s\_1329r\_0425}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_0987}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1329}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0425} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0425}}\right)^{9} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0425}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0425}}\right)^{6} \cdot \left(\frac{1}{\text{kms\_s\_1329r\_0425}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{9} \cdot [\text{s\_1005}]^{3} \cdot [\text{s\_1096}]^{6} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_1329}]}{\text{kms\_s\_1329r\_0425}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0425}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0425}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)} \tag{727}$$

Table 444: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0425	Keq_r_0425		40.200		☑
Vmax_r_0425	Vmax_r_0425		0.012		☑
kmp_s_0470r_0425	kmp_s_0470r_0425		1.000		☑
kmp_s_0514r_0425	kmp_s_0514r_0425		0.549		☑
kmp_s_0987r_0425	kmp_s_0987r_0425		0.549		☑
kmp_s_1091r_0425	kmp_s_1091r_0425		0.549		☑
kmp_s_1434_br_0425	kmp_s_1434_br_0425		0.549		☑
kms_s_0763_br_0425	kms_s_0763_br_0425		0.549		☑
kms_s_1005r_0425	kms_s_1005r_0425		0.549		☑
kms_s_1096r_0425	kms_s_1096r_0425		0.549		☑
kms_s_1329r_0425	kms_s_1329r_0425		0.549		☑

7.111 Reaction r_0429

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acyl-CoA synthase (n-C10:0CoA)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} + \mathrm{s\_1140} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0582,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1140,\ s\_1434}} \tag{728}$$

Reactants

Table 445: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	
s_1140	octanoyl-CoA [intracellular]	

Modifiers

Table 446: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0582	decanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1140	octanoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 447: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0582	decanoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{111} = & \operatorname{vol}(\text{intracellular}) \\ & \cdot \text{function\_111}(\text{Keq\_r\_0429}, \text{Vmax\_r\_0429}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0429}, \\ & \text{kmp\_s\_0514r\_0429}, \text{kmp\_s\_0582r\_0429}, \text{kmp\_s\_1091r\_0429}, \text{kmp\_s\_1434\_br\_0429}, \\ & \text{kms\_s\_0763\_br\_0429}, \text{kms\_s\_1005r\_0429}, \text{kms\_s\_1096r\_0429}, \text{kms\_s\_1140r\_0429}, \\ & [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0582}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1140}], [\text{s\_1434\_b}]) \end{aligned} \tag{729}$$

$$\begin{aligned} & \text{function\_111}(\text{Keq\_r\_0429}, \text{Vmax\_r\_0429}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0429}, \\ & \text{kmp\_s\_0514r\_0429}, \text{kmp\_s\_0582r\_0429}, \text{kmp\_s\_1091r\_0429}, \text{kmp\_s\_1434\_br\_0429}, \\ & \text{kms\_s\_0763\_br\_0429}, \text{kms\_s\_1005r\_0429}, \text{kms\_s\_1096r\_0429}, \text{kms\_s\_1140r\_0429}, \\ & [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0582}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1140}], [\text{s\_1434\_b}]) \\ & = \frac{\text{Vmax\_r\_0429} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0429}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0429}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0429}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1140r\_0429}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1096}]^{2} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1140}]}{\text{kms\_s\_1140r\_0429}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0429}}\right) \cdot}}{\operatorname{vol}(\text{intracellular})} \end{aligned} \tag{730}$$

$$\begin{aligned} & \text{function\_111}(\text{Keq\_r\_0429}, \text{Vmax\_r\_0429}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0429}, \\ & \text{kmp\_s\_0514r\_0429}, \text{kmp\_s\_0582r\_0429}, \text{kmp\_s\_1091r\_0429}, \text{kmp\_s\_1434\_br\_0429}, \\ & \text{kms\_s\_0763\_br\_0429}, \text{kms\_s\_1005r\_0429}, \text{kms\_s\_1096r\_0429}, \text{kms\_s\_1140r\_0429}, \\ & [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0582}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1140}], [\text{s\_1434\_b}]) \\ & = \frac{\text{Vmax\_r\_0429} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0429}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0429}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0429}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1140r\_0429}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_1096}]^{2} \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_1140}]}{\text{kms\_s\_1140r\_0429}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0429}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0429}}\right) \cdot}}{\operatorname{vol}(\text{intracellular})} \end{aligned} \tag{731}$$

Table 448: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0429	Keq_r_0429		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0429	Vmax_r_0429		0.018		☑
kmp_s_0470r-_0429	kmp_s_0470r_0429		1.000		☑
kmp_s_0514r-_0429	kmp_s_0514r_0429		0.549		☑
kmp_s_0582r-_0429	kmp_s_0582r_0429		0.549		☑
kmp_s_1091r-_0429	kmp_s_1091r_0429		0.549		☑
kmp_s_1434-_br_0429	kmp_s_1434_br-_0429		0.549		☑
kms_s_0763-_br_0429	kms_s_0763_br-_0429		0.549		☑
kms_s_1005r-_0429	kms_s_1005r_0429		0.549		☑
kms_s_1096r-_0429	kms_s_1096r_0429		0.549		☑
kms_s_1140r-_0429	kms_s_1140r_0429		0.549		☑

7.112 Reaction r_0430

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty acyl-CoA synthase (n-C8:0CoA), lumped reaction

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$\mathrm{s\_0380} + 9\,\mathrm{s\_0763\_b} + 3\,\mathrm{s\_1005} + 6\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0380,\ s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1140,\ s\_143}} \tag{732}$$

Reactants

Table 449: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 450: Properties of each modifier.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1140	octanoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 451: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1140	octanoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{112} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \\
& \cdot \mathrm{function\_112}\left(\mathrm{Keq\_r\_0430}, \mathrm{Vmax\_r\_0430}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0430}, \right. \\
& \mathrm{kmp\_s\_0514r\_0430}, \mathrm{kmp\_s\_1091r\_0430}, \mathrm{kmp\_s\_1140r\_0430}, \mathrm{kmp\_s\_1434\_br\_0430}, \\
& \mathrm{kms\_s\_0380r\_0430}, \mathrm{kms\_s\_0763\_br\_0430}, \mathrm{kms\_s\_1005r\_0430}, \mathrm{kms\_s\_1096r\_0430}, \\
& \left. [\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1140}], [\mathrm{s\_1434\_b}]\right)
\end{aligned}
\tag{733}
$$

$$
\begin{aligned}
&\mathrm{function\_112}\left(\mathrm{Keq\_r\_0430}, \mathrm{Vmax\_r\_0430}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0430},\right.\\
&\mathrm{kmp\_s\_0514r\_0430}, \mathrm{kmp\_s\_1091r\_0430}, \mathrm{kmp\_s\_1140r\_0430}, \mathrm{kmp\_s\_1434\_br\_0430},\\
&\mathrm{kms\_s\_0380r\_0430}, \mathrm{kms\_s\_0763\_br\_0430}, \mathrm{kms\_s\_1005r\_0430}, \mathrm{kms\_s\_1096r\_0430},\\
&\left.[\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1140}], [\mathrm{s\_1434\_b}]\right)\\
&= \frac{\mathrm{Vmax\_r\_0430} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0430}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0430}}\right)^{9} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0430}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0430}}\right)^{6} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0763\_b}]^{9} \cdot [\mathrm{s\_1005}]^{3} \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0430}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0430}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{734}
$$

$$
\begin{aligned}
&\mathrm{function\_112}\left(\mathrm{Keq\_r\_0430}, \mathrm{Vmax\_r\_0430}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0430},\right.\\
&\mathrm{kmp\_s\_0514r\_0430}, \mathrm{kmp\_s\_1091r\_0430}, \mathrm{kmp\_s\_1140r\_0430}, \mathrm{kmp\_s\_1434\_br\_0430},\\
&\mathrm{kms\_s\_0380r\_0430}, \mathrm{kms\_s\_0763\_br\_0430}, \mathrm{kms\_s\_1005r\_0430}, \mathrm{kms\_s\_1096r\_0430},\\
&\left.[\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1140}], [\mathrm{s\_1434\_b}]\right)\\
&= \frac{\mathrm{Vmax\_r\_0430} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0430}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0430}}\right)^{9} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0430}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0430}}\right)^{6} \cdot \left([\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0763\_b}]^{9} \cdot [\mathrm{s\_1005}]^{3} \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0430}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0430}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0430}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{735}
$$

Table 452: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0430`	Keq_r_0430		40.200		☑
`Vmax_r_0430`	Vmax_r_0430		0.024		☑
`kmp_s_0470r_0430`	kmp_s_0470r_0430		1.000		☑
`kmp_s_0514r_0430`	kmp_s_0514r_0430		0.549		☑
`kmp_s_1091r_0430`	kmp_s_1091r_0430		0.549		☑
`kmp_s_1140r_0430`	kmp_s_1140r_0430		0.549		☑
`kmp_s_1434_br_0430`	kmp_s_1434_br_0430		0.549		☑
`kms_s_0380r_0430`	kms_s_0380r_0430		0.549		☑
`kms_s_0763_br_0430`	kms_s_0763_br_0430		0.549		☑
`kms_s_1005r_0430`	kms_s_1005r_0430		0.549		☑
`kms_s_1096r_0430`	kms_s_1096r_0430		0.549		☑

7.113 Reaction r_0437

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name fatty-acid–CoA ligase (n-C24:0)

Notes GENE_ASSOCIATION:YBR041W

Reaction equation

$$s\_0446 + s\_0514 + s\_0987 \xrightleftharpoons{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_0987,\ s\_1355} s\_0434 + s\_0605 + s\_1355 \tag{736}$$

Reactants

Table 453: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0987	lignocerate [intracellular]	

Modifiers

Table 454: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0605	diphosphate [intracellular]	
s_0987	lignocerate [intracellular]	
s_1355	tetracosanoyl-CoA [intracellular]	

Products

Table 455: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_1355	tetracosanoyl-CoA [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{113} = & \operatorname{vol}(\text{intracellular}) \\
& \cdot \text{function\_113}\left(\text{Keq\_r\_0437}, \text{Vmax\_r\_0437}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0437},\right. \\
& \text{kmp\_s\_0605r\_0437}, \text{kmp\_s\_1355r\_0437}, \text{kms\_s\_0446r\_0437}, \text{kms\_s\_0514r\_0437}, \\
& \left.\text{kms\_s\_0987r\_0437}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0514}], [\text{s\_0605}], [\text{s\_0987}], [\text{s\_1355}]\right)
\end{aligned}
\tag{737}
$$

$$
\begin{aligned}
& \text{function\_113}\left(\text{Keq\_r\_0437}, \text{Vmax\_r\_0437}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0437},\right. \\
& \text{kmp\_s\_0605r\_0437}, \text{kmp\_s\_1355r\_0437}, \text{kms\_s\_0446r\_0437}, \text{kms\_s\_0514r\_0437}, \\
& \left.\text{kms\_s\_0987r\_0437}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0514}], [\text{s\_0605}], [\text{s\_0987}], [\text{s\_1355}]\right) \\
= & \frac{\text{Vmax\_r\_0437} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0514r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0987r\_0437}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0987}]^{1} - \frac{[\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_1355}]^{1}}{\text{Keq\_r\_0437}}\right)}{\left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0514}]}{\text{kms\_s\_0514r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0987}]}{\text{kms\_s\_0987r\_0437}}\right) + \left(1 + \frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_1355}]}{\text{kmp\_s\_1355r\_0437}}\right) - }}{\operatorname{vol}(\text{intracellular})}
\end{aligned}
\tag{738}
$$

$$
\begin{aligned}
& \text{function\_113}\left(\text{Keq\_r\_0437}, \text{Vmax\_r\_0437}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0437},\right. \\
& \text{kmp\_s\_0605r\_0437}, \text{kmp\_s\_1355r\_0437}, \text{kms\_s\_0446r\_0437}, \text{kms\_s\_0514r\_0437}, \\
& \left.\text{kms\_s\_0987r\_0437}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0514}], [\text{s\_0605}], [\text{s\_0987}], [\text{s\_1355}]\right) \\
= & \frac{\text{Vmax\_r\_0437} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0514r\_0437}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0987r\_0437}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_0987}]^{1} - \frac{[\text{s\_0434}]^{1} \cdot [\text{s\_0605}]^{1} \cdot [\text{s\_1355}]^{1}}{\text{Keq\_r\_0437}}\right)}{\left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0514}]}{\text{kms\_s\_0514r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0987}]}{\text{kms\_s\_0987r\_0437}}\right) + \left(1 + \frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0437}}\right) \cdot \left(1 + \frac{[\text{s\_1355}]}{\text{kmp\_s\_1355r\_0437}}\right) - }}{\operatorname{vol}(\text{intracellular})}
\end{aligned}
\tag{739}
$$

Table 456: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0437	Keq_r_0437		1.269		☑
Vmax_r_0437	Vmax_r_0437		0.004		☑
kmp_s_0434r_0437	kmp_s_0434r_0437		1.260		☑
kmp_s_0605r_0437	kmp_s_0605r_0437		0.549		☑
kmp_s_1355r_0437	kmp_s_1355r_0437		0.549		☑
kms_s_0446r_0437	kms_s_0446r_0437		1.092		☑
kms_s_0514r_0437	kms_s_0514r_0437		0.549		☑
kms_s_0987r_0437	kms_s_0987r_0437		0.549		☑

7.114 Reaction r_0439

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name fatty-acid–CoA ligase (octadecanoate)

Notes GENE_ASSOCIATION:(YIL009W or YMR246W or YOR317W)

Reaction equation

$$s\_0434 + s\_0605 + s\_1334 \xrightleftharpoons{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_1329,\ s\_1334} s\_0446 + s\_0514 + s\_1329 \quad (740)$$

Reactants

Table 457: Properties of each reactant.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_1334	stearoyl-CoA [intracellular]	

Modifiers

Table 458: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0605	diphosphate [intracellular]	
s_1329	stearate [intracellular]	
s_1334	stearoyl-CoA [intracellular]	

Products

Table 459: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1329	stearate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{114} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \\
& \cdot \mathrm{function\_114}\left(\mathrm{Keq\_r\_0439}, \mathrm{Vmax\_r\_0439}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0439},\right. \\
& \quad \mathrm{kmp\_s\_0514r\_0439}, \mathrm{kmp\_s\_1329r\_0439}, \mathrm{kms\_s\_0434r\_0439}, \mathrm{kms\_s\_0605r\_0439}, \\
& \quad \left. \mathrm{kms\_s\_1334r\_0439}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1329}], [\mathrm{s\_1334}]\right)
\end{aligned}
\tag{741}
$$

$$
\begin{aligned}
& \mathrm{function\_114}\left(\mathrm{Keq\_r\_0439}, \mathrm{Vmax\_r\_0439}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0439},\right. \\
& \mathrm{kmp\_s\_0514r\_0439}, \mathrm{kmp\_s\_1329r\_0439}, \mathrm{kms\_s\_0434r\_0439}, \mathrm{kms\_s\_0605r\_0439}, \\
& \left.\mathrm{kms\_s\_1334r\_0439}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1329}], [\mathrm{s\_1334}]\right) \\
= {} & \frac{\mathrm{Vmax\_r\_0439} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1334r\_0439}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1334}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1329}]^{1}}{\mathrm{Keq\_r\_0439}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1334}]}{\mathrm{kms\_s\_1334r\_0439}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1329}]}{\mathrm{kmp\_s\_1329r\_0439}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{742}
$$

$$
\begin{aligned}
& \mathrm{function\_114}\left(\mathrm{Keq\_r\_0439}, \mathrm{Vmax\_r\_0439}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0439},\right. \\
& \mathrm{kmp\_s\_0514r\_0439}, \mathrm{kmp\_s\_1329r\_0439}, \mathrm{kms\_s\_0434r\_0439}, \mathrm{kms\_s\_0605r\_0439}, \\
& \left.\mathrm{kms\_s\_1334r\_0439}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1329}], [\mathrm{s\_1334}]\right) \\
= {} & \frac{\mathrm{Vmax\_r\_0439} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0439}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1334r\_0439}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1334}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1329}]^{1}}{\mathrm{Keq\_r\_0439}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1334}]}{\mathrm{kms\_s\_1334r\_0439}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0439}}\right) \cdot \left(1+\frac{[\mathrm{s\_1329}]}{\mathrm{kmp\_s\_1329r\_0439}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{743}
$$

Table 460: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0439`	Keq_r_0439		0.954		☑
`Vmax_r_0439`	Vmax_r_0439		0.002		☑
`kmp_s_0446r_0439`	kmp_s_0446r_0439		1.092		☑
`kmp_s_0514r_0439`	kmp_s_0514r_0439		0.549		☑
`kmp_s_1329r_0439`	kmp_s_1329r_0439		0.549		☑
`kms_s_0434r_0439`	kms_s_0434r_0439		1.260		☑
`kms_s_0605r_0439`	kms_s_0605r_0439		0.549		☑
`kms_s_1334r_0439`	kms_s_1334r_0439		0.549		☑

7.115 Reaction r_0442

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name fatty-acid–CoA ligase (octanoate)

Notes GENE_ASSOCIATION:YER015W

Reaction equation

$$s\_0434 + s\_0605 + s\_1140 \xrightleftharpoons{s\_0434,\ s\_0446,\ s\_0514,\ s\_0605,\ s\_1132,\ s\_1140} s\_0446 + s\_0514 + s\_1132 \quad (744)$$

Reactants

Table 461: Properties of each reactant.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_1140	octanoyl-CoA [intracellular]	

Modifiers

Table 462: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0605	diphosphate [intracellular]	
s_1132	octanoate [intracellular]	
s_1140	octanoyl-CoA [intracellular]	

Products

Table 463: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1132	octanoate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{115} = & \operatorname{vol}(\mathrm{intracellular}) \\
& \cdot \mathrm{function\_115}(\mathrm{Keq\_r\_0442}, \mathrm{Vmax\_r\_0442}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0442}, \\
& \mathrm{kmp\_s\_0514r\_0442}, \mathrm{kmp\_s\_1132r\_0442}, \mathrm{kms\_s\_0434r\_0442}, \mathrm{kms\_s\_0605r\_0442}, \\
& \mathrm{kms\_s\_1140r\_0442}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1132}], [\mathrm{s\_1140}])
\end{aligned} \tag{745}
$$

$$
\begin{aligned}
& \mathrm{function\_115}(\mathrm{Keq\_r\_0442}, \mathrm{Vmax\_r\_0442}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0442}, \\
& \mathrm{kmp\_s\_0514r\_0442}, \mathrm{kmp\_s\_1132r\_0442}, \mathrm{kms\_s\_0434r\_0442}, \mathrm{kms\_s\_0605r\_0442}, \\
& \mathrm{kms\_s\_1140r\_0442}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1132}], [\mathrm{s\_1140}]) \\
& = \frac{\mathrm{Vmax\_r\_0442} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1140r\_0442}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1140}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1132}]^{1}}{\mathrm{Keq\_r\_0442}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1140}]}{\mathrm{kms\_s\_1140r\_0442}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kmp\_s\_1132r\_0442}}\right) - 1}}{\operatorname{vol}(\mathrm{intracellular})}
\end{aligned} \tag{746}
$$

$$
\begin{aligned}
& \mathrm{function\_115}(\mathrm{Keq\_r\_0442}, \mathrm{Vmax\_r\_0442}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_0442}, \\
& \mathrm{kmp\_s\_0514r\_0442}, \mathrm{kmp\_s\_1132r\_0442}, \mathrm{kms\_s\_0434r\_0442}, \mathrm{kms\_s\_0605r\_0442}, \\
& \mathrm{kms\_s\_1140r\_0442}, [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_0605}], [\mathrm{s\_1132}], [\mathrm{s\_1140}]) \\
& = \frac{\mathrm{Vmax\_r\_0442} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0434r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0605r\_0442}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1140r\_0442}}\right)^{1} \cdot \left([\mathrm{s\_0434}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1140}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1132}]^{1}}{\mathrm{Keq\_r\_0442}}\right)}{\left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kms\_s\_0434r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1140}]}{\mathrm{kms\_s\_1140r\_0442}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0442}}\right) \cdot \left(1+\frac{[\mathrm{s\_1132}]}{\mathrm{kmp\_s\_1132r\_0442}}\right) - 1}}{\operatorname{vol}(\mathrm{intracellular})}
\end{aligned} \tag{747}
$$

Table 464: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0442`	Keq_r_0442		0.954		☑
`Vmax_r_0442`	Vmax_r_0442		0.002		☑
`kmp_s_0446r_0442`	kmp_s_0446r_0442		1.092		☑
`kmp_s_0514r_0442`	kmp_s_0514r_0442		0.549		☑
`kmp_s_1132r_0442`	kmp_s_1132r_0442		0.549		☑
`kms_s_0434r_0442`	kms_s_0434r_0442		1.260		☑
`kms_s_0605r_0442`	kms_s_0605r_0442		0.549		☑
`kms_s_1140r_0442`	kms_s_1140r_0442		0.549		☑

7.116 Reaction r_0464

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty-acyl-CoA synthase (n-C12:0CoA)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$\mathrm{s\_0582} + 3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0582,\ s\_0763\_b,\ s\_0977,\ s\_1005,\ s\_1091,\ s\_1096,\ s\_1434}} \tag{748}$$

Reactants

Table 465: Properties of each reactant.

Id	Name	SBO
s_0582	decanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 466: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0582	decanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_0977	lauroyl-CoA [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 467: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0977	lauroyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{116} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_116}(\mathrm{Keq\_r\_0464}, \mathrm{Vmax\_r\_0464}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0464}, \mathrm{kmp\_s\_0514r\_0464}, \mathrm{kmp\_s\_0977r\_0464}, \mathrm{kmp\_s\_1091r\_0464}, \mathrm{kmp\_s\_1434\_br\_0464}, \mathrm{kms\_s\_0582r\_0464}, \mathrm{kms\_s\_0763\_br\_0464}, \mathrm{kms\_s\_1005r\_0464}, \mathrm{kms\_s\_1096r\_0464}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0582}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0977}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]) \quad (749)$$

$$\mathrm{function\_116}(\mathrm{Keq\_r\_0464}, \mathrm{Vmax\_r\_0464}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0464}, \mathrm{kmp\_s\_0514r\_0464}, \mathrm{kmp\_s\_0977r\_0464}, \mathrm{kmp\_s\_1091r\_0464}, \mathrm{kmp\_s\_1434\_br\_0464}, \mathrm{kms\_s\_0582r\_0464}, \mathrm{kms\_s\_0763\_br\_0464}, \mathrm{kms\_s\_1005r\_0464}, \mathrm{kms\_s\_1096r\_0464}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0582}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0977}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0464} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0582r\_0464}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0464}}\right)^3 \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0464}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0464}}\right)^2 \cdot \left([\mathrm{s\_0582}]^1 \cdot [\mathrm{s\_0763\_b}]^3 \cdot [\mathrm{s\_1005}]^1 \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0582}]}{\mathrm{kms\_s\_0582r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0464}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0464}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \quad (750)$$

$$\mathrm{function\_116}(\mathrm{Keq\_r\_0464}, \mathrm{Vmax\_r\_0464}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0464}, \mathrm{kmp\_s\_0514r\_0464}, \mathrm{kmp\_s\_0977r\_0464}, \mathrm{kmp\_s\_1091r\_0464}, \mathrm{kmp\_s\_1434\_br\_0464}, \mathrm{kms\_s\_0582r\_0464}, \mathrm{kms\_s\_0763\_br\_0464}, \mathrm{kms\_s\_1005r\_0464}, \mathrm{kms\_s\_1096r\_0464}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0582}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0977}], [\mathrm{s\_1005}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0464} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0582r\_0464}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0464}}\right)^3 \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0464}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0464}}\right)^2 \cdot \left([\mathrm{s\_0582}]^1 \cdot [\mathrm{s\_0763\_b}]^3 \cdot [\mathrm{s\_1005}]^1 \cdot [\mathrm{s\_}\right.}{\left(1+\frac{[\mathrm{s\_0582}]}{\mathrm{kms\_s\_0582r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0464}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0464}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0464}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \quad (751)$$

Table 468: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0464	Keq_r_0464		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0464	Vmax_r_0464		0.018		☑
kmp_s_0470r-_0464	kmp_s_0470r_0464		1.000		☑
kmp_s_0514r-_0464	kmp_s_0514r_0464		0.549		☑
kmp_s_0977r-_0464	kmp_s_0977r_0464		0.549		☑
kmp_s_1091r-_0464	kmp_s_1091r_0464		0.549		☑
kmp_s_1434-_br_0464	kmp_s_1434_br-_0464		0.549		☑
kms_s_0582r-_0464	kms_s_0582r_0464		0.549		☑
kms_s_0763-_br_0464	kms_s_0763_br-_0464		0.549		☑
kms_s_1005r-_0464	kms_s_1005r_0464		0.549		☑
kms_s_1096r-_0464	kms_s_1096r_0464		0.549		☑

7.117 Reaction r_0465

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty-acyl-CoA synthase (n-C14:0CoA)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\mathrm{s\_0763\_b} + \mathrm{s\_0977} + \mathrm{s\_1005} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_0977,\ s\_1005,\ s\_1044,\ s\_1091,\ s\_1096,\ s\_1434}} \tag{752}$$

Reactants

Table 469: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0977	lauroyl-CoA [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 470: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_0977	lauroyl-CoA [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1044	myristoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 471: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1044	myristoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{117} = &\operatorname{vol}(\mathrm{intracellular}) \\ &\cdot \mathrm{function\_117}(\mathrm{Keq\_r\_0465}, \mathrm{Vmax\_r\_0465}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0465}, \\ &\mathrm{kmp\_s\_0514r\_0465}, \mathrm{kmp\_s\_1044r\_0465}, \mathrm{kmp\_s\_1091r\_0465}, \mathrm{kmp\_s\_1434\_br\_0465}, \\ &\mathrm{kms\_s\_0763\_br\_0465}, \mathrm{kms\_s\_0977r\_0465}, \mathrm{kms\_s\_1005r\_0465}, \mathrm{kms\_s\_1096r\_0465}, \\ &[\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0977}], [\mathrm{s\_1005}], [\mathrm{s\_1044}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]) \end{aligned} \tag{753}$$

$$\begin{aligned}&\text{function\_117}\left(\text{Keq\_r\_0465}, \text{Vmax\_r\_0465}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0465},\right.\\&\text{kmp\_s\_0514r\_0465}, \text{kmp\_s\_1044r\_0465}, \text{kmp\_s\_1091r\_0465}, \text{kmp\_s\_1434\_br\_0465},\\&\text{kms\_s\_0763\_br\_0465}, \text{kms\_s\_0977r\_0465}, \text{kms\_s\_1005r\_0465}, \text{kms\_s\_1096r\_0465},\\&\left.[\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_0977}], [\text{s\_1005}], [\text{s\_1044}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0465} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0465}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_0977r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0465}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_0977}]^{1} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_}\right.}{\left(1 + \frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_0977}]}{\text{kms\_s\_0977r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0465}}\right) + \left(1 + \frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0465}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{754}$$

$$\begin{aligned}&\text{function\_117}\left(\text{Keq\_r\_0465}, \text{Vmax\_r\_0465}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0470r\_0465},\right.\\&\text{kmp\_s\_0514r\_0465}, \text{kmp\_s\_1044r\_0465}, \text{kmp\_s\_1091r\_0465}, \text{kmp\_s\_1434\_br\_0465},\\&\text{kms\_s\_0763\_br\_0465}, \text{kms\_s\_0977r\_0465}, \text{kms\_s\_1005r\_0465}, \text{kms\_s\_1096r\_0465},\\&\left.[\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_0977}], [\text{s\_1005}], [\text{s\_1044}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0465} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0465}}\right)^{3} \cdot \left(\frac{1}{\text{kms\_s\_0977r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0465}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0465}}\right)^{2} \cdot \left([\text{s\_0763\_b}]^{3} \cdot [\text{s\_0977}]^{1} \cdot [\text{s\_1005}]^{1} \cdot [\text{s\_}\right.}{\left(1 + \frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_0977}]}{\text{kms\_s\_0977r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0465}}\right) + \left(1 + \frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0465}}\right) \cdot \left(1 + \frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0465}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{755}$$

Table 472: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0465`	Keq_r_0465		3.650		☑
`Vmax_r_0465`	Vmax_r_0465		0.018		☑
`kmp_s_0470r_0465`	kmp_s_0470r_0465		1.000		☑
`kmp_s_0514r_0465`	kmp_s_0514r_0465		0.549		☑
`kmp_s_1044r_0465`	kmp_s_1044r_0465		0.549		☑
`kmp_s_1091r_0465`	kmp_s_1091r_0465		0.549		☑
`kmp_s_1434_br_0465`	kmp_s_1434_br_0465		0.549		☑
`kms_s_0763_br_0465`	kms_s_0763_br_0465		0.549		☑
`kms_s_0977r_0465`	kms_s_0977r_0465		0.549		☑
`kms_s_1005r_0465`	kms_s_1005r_0465		0.549		☑
`kms_s_1096r_0465`	kms_s_1096r_0465		0.549		☑

7.118 Reaction r_0466

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty-acyl-CoA synthase (n-C16:0CoA)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\mathrm{s\_0763\_b} + \mathrm{s\_1005} + \mathrm{s\_1044} + 2\,\mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0470,\ s\_0514,\ s\_0763\_b,\ s\_1005,\ s\_1044,\ s\_1091,\ s\_1096,\ s\_1187,\ s\_1434}} \tag{756}$$

Reactants

Table 473: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1044	myristoyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 474: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1044	myristoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 475: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{118} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_118}\left(\mathrm{Keq\_r\_0466}, \mathrm{Vmax\_r\_0466}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0466}, \mathrm{kmp\_s\_0514r\_0466}, \mathrm{kmp\_s\_1091r\_0466}, \mathrm{kmp\_s\_1187r\_0466}, \mathrm{kmp\_s\_1434\_br\_0466}, \mathrm{kms\_s\_0763\_br\_0466}, \mathrm{kms\_s\_1005r\_0466}, \mathrm{kms\_s\_1044r\_0466}, \mathrm{kms\_s\_1096r\_0466}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1044}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1187}], [\mathrm{s\_1434\_b}]\right) \tag{757}$$

$$\mathrm{function\_118}\left(\mathrm{Keq\_r\_0466}, \mathrm{Vmax\_r\_0466}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0466}, \mathrm{kmp\_s\_0514r\_0466}, \mathrm{kmp\_s\_1091r\_0466}, \mathrm{kmp\_s\_1187r\_0466}, \mathrm{kmp\_s\_1434\_br\_0466}, \mathrm{kms\_s\_0763\_br\_0466}, \mathrm{kms\_s\_1005r\_0466}, \mathrm{kms\_s\_1044r\_0466}, \mathrm{kms\_s\_1096r\_0466}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1044}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1187}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0466} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0466}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0466}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1044r\_0466}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0466}}\right)^{2} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_1044}]^{1} \cdot [\mathrm{s\_} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1044}]}{\mathrm{kms\_s\_1044r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0466}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0466}}\right) \cdot \cdots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{758}$$

$$\mathrm{function\_118}\left(\mathrm{Keq\_r\_0466}, \mathrm{Vmax\_r\_0466}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0470r\_0466}, \mathrm{kmp\_s\_0514r\_0466}, \mathrm{kmp\_s\_1091r\_0466}, \mathrm{kmp\_s\_1187r\_0466}, \mathrm{kmp\_s\_1434\_br\_0466}, \mathrm{kms\_s\_0763\_br\_0466}, \mathrm{kms\_s\_1005r\_0466}, \mathrm{kms\_s\_1044r\_0466}, \mathrm{kms\_s\_1096r\_0466}, [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1005}], [\mathrm{s\_1044}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1187}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0466} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0466}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1005r\_0466}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1044r\_0466}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0466}}\right)^{2} \cdot \left([\mathrm{s\_0763\_b}]^{3} \cdot [\mathrm{s\_1005}]^{1} \cdot [\mathrm{s\_1044}]^{1} \cdot [\mathrm{s\_} \cdots\right.}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1005}]}{\mathrm{kms\_s\_1005r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1044}]}{\mathrm{kms\_s\_1044r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0466}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0466}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0466}}\right) \cdot \cdots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{759}$$

Table 476: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0466	Keq_r_0466		3.650		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0466	Vmax_r_0466		0.018		☑
kmp_s_0470r-_0466	kmp_s_0470r_0466		1.000		☑
kmp_s_0514r-_0466	kmp_s_0514r_0466		0.549		☑
kmp_s_1091r-_0466	kmp_s_1091r_0466		0.549		☑
kmp_s_1187r-_0466	kmp_s_1187r_0466		0.549		☑
kmp_s_1434-_br_0466	kmp_s_1434_br-_0466		0.549		☑
kms_s_0763-_br_0466	kms_s_0763_br-_0466		0.549		☑
kms_s_1005r-_0466	kms_s_1005r_0466		0.549		☑
kms_s_1044r-_0466	kms_s_1044r_0466		0.549		☑
kms_s_1096r-_0466	kms_s_1096r_0466		0.549		☑

7.119 Reaction r_0467

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name fatty-acyl-CoA synthase (n-C18:0CoA)

Notes GENE_ASSOCIATION:(YGR037C and YKL182W and YNR016C and YPL231W)

Reaction equation

$$3\,\text{s\_0763\_b} + \text{s\_1005} + 2\,\text{s\_1096} + \text{s\_1187} \xrightleftharpoons{\text{s\_0470, s\_0514, s\_0763\_b, s\_1005, s\_1091, s\_1096, s\_1187, s\_1334, s\_1434}} \tag{760}$$

Reactants

Table 477: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1096	NADPH [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	

Modifiers

Table 478: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1005	malonyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	
s_1334	stearoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 479: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1334	stearoyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{119} = & \operatorname{vol}(\text{intracellular}) \\ & \cdot \text{function\_119}(\text{Keq\_r\_0467}, \text{Vmax\_r\_0467}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0467}, \\ & \text{kmp\_s\_0514r\_0467}, \text{kmp\_s\_1091r\_0467}, \text{kmp\_s\_1334r\_0467}, \text{kmp\_s\_1434\_br\_0467}, \\ & \text{kms\_s\_0763\_br\_0467}, \text{kms\_s\_1005r\_0467}, \text{kms\_s\_1096r\_0467}, \text{kms\_s\_1187r\_0467}, \\ & [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1187}], [\text{s\_1334}], [\text{s\_1434\_b}]) \end{aligned} \tag{761}$$

$$\text{function\_119}(\text{Keq\_r\_0467}, \text{Vmax\_r\_0467}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0467}, \text{kmp\_s\_0514r\_0467}, \text{kmp\_s\_1091r\_0467}, \text{kmp\_s\_1334r\_0467}, \text{kmp\_s\_1434\_br\_0467}, \text{kms\_s\_0763\_br\_0467}, \text{kms\_s\_1005r\_0467}, \text{kms\_s\_1096r\_0467}, \text{kms\_s\_1187r\_0467}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1187}], [\text{s\_1334}], [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0467} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0467}}\right)^3 \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0467}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0467}}\right)^2 \cdot \left(\frac{1}{\text{kms\_s\_1187r\_0467}}\right)^1 \cdot \left([\text{s\_0763\_b}]^3 \cdot [\text{s\_1005}]^1 \cdot [\text{s\_1096}]^2 \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1187}]}{\text{kms\_s\_1187r\_0467}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0467}}\right) \cdot}}{\text{vol}(\text{intracellular})} \tag{762}$$

$$\text{function\_119}(\text{Keq\_r\_0467}, \text{Vmax\_r\_0467}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0470r\_0467}, \text{kmp\_s\_0514r\_0467}, \text{kmp\_s\_1091r\_0467}, \text{kmp\_s\_1334r\_0467}, \text{kmp\_s\_1434\_br\_0467}, \text{kms\_s\_0763\_br\_0467}, \text{kms\_s\_1005r\_0467}, \text{kms\_s\_1096r\_0467}, \text{kms\_s\_1187r\_0467}, [\text{s\_0470}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1005}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1187}], [\text{s\_1334}], [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0467} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0467}}\right)^3 \cdot \left(\frac{1}{\text{kms\_s\_1005r\_0467}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0467}}\right)^2 \cdot \left(\frac{1}{\text{kms\_s\_1187r\_0467}}\right)^1 \cdot \left([\text{s\_0763\_b}]^3 \cdot [\text{s\_1005}]^1 \cdot [\text{s\_1096}]^2 \cdot [\text{s\_}\right.}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1005}]}{\text{kms\_s\_1005r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_1187}]}{\text{kms\_s\_1187r\_0467}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0467}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0467}}\right) \cdot}}{\text{vol}(\text{intracellular})} \tag{763}$$

Table 480: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0467	Keq_r_0467		3.650		☑
Vmax_r_0467	Vmax_r_0467		0.006		☑
kmp_s_0470r_0467	kmp_s_0470r_0467		1.000		☑
kmp_s_0514r_0467	kmp_s_0514r_0467		0.549		☑
kmp_s_1091r_0467	kmp_s_1091r_0467		0.549		☑
kmp_s_1334r_0467	kmp_s_1334r_0467		0.549		☑
kmp_s_1434_br_0467	kmp_s_1434_br_0467		0.549		☑
kms_s_0763_br_0467	kms_s_0763_br_0467		0.549		☑
kms_s_1005r_0467	kms_s_1005r_0467		0.549		☑
kms_s_1096r_0467	kms_s_1096r_0467		0.549		☑
kms_s_1187r_0467	kms_s_1187r_0467		0.549		☑

7.120 Reaction r_0479

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name formate-tetrahydrofolate ligase

Notes GENE_ASSOCIATION:YGR204W or YBR084W

Reaction equation

$$s\_0309 + s\_0446 + s\_0689 \xrightleftharpoons[]{s\_0122,\ s\_0309,\ s\_0400,\ s\_0446,\ s\_0689,\ s\_1207} s\_0122 + s\_0400 + s\_1207 \quad (764)$$

Reactants

Table 481: Properties of each reactant.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0446	ATP [intracellular]	
s_0689	formate [intracellular]	

Modifiers

Table 482: Properties of each modifier.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0689	formate [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 483: Properties of each product.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0400	ADP [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{120} = & \mathrm{vol}\left(\mathrm{intracellular}\right) \\
& \cdot \mathrm{function\_120}\left(\mathrm{Keq\_r\_0479}, \mathrm{Vmax\_r\_0479}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0479}, \right. \\
& \mathrm{kmp\_s\_0400r\_0479}, \mathrm{kmp\_s\_1207r\_0479}, \mathrm{kms\_s\_0309r\_0479}, \mathrm{kms\_s\_0446r\_0479}, \\
& \left. \mathrm{kms\_s\_0689r\_0479}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0689}], [\mathrm{s\_1207}]\right)
\end{aligned}
\tag{765}
$$

$$
\begin{aligned}
& \mathrm{function\_120}\left(\mathrm{Keq\_r\_0479}, \mathrm{Vmax\_r\_0479}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0479}, \right. \\
& \mathrm{kmp\_s\_0400r\_0479}, \mathrm{kmp\_s\_1207r\_0479}, \mathrm{kms\_s\_0309r\_0479}, \mathrm{kms\_s\_0446r\_0479}, \\
& \left. \mathrm{kms\_s\_0689r\_0479}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0689}], [\mathrm{s\_1207}]\right) \\
& = \frac{\mathrm{Vmax\_r\_0479} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0689r\_0479}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0689}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0479}}\right)}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kms\_s\_0689r\_0479}}\right) + \left(1+\frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0479}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{766}
$$

$$
\begin{aligned}
& \mathrm{function\_120}\left(\mathrm{Keq\_r\_0479}, \mathrm{Vmax\_r\_0479}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0479}, \right. \\
& \mathrm{kmp\_s\_0400r\_0479}, \mathrm{kmp\_s\_1207r\_0479}, \mathrm{kms\_s\_0309r\_0479}, \mathrm{kms\_s\_0446r\_0479}, \\
& \left. \mathrm{kms\_s\_0689r\_0479}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0689}], [\mathrm{s\_1207}]\right) \\
& = \frac{\mathrm{Vmax\_r\_0479} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0479}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0689r\_0479}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0689}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0479}}\right)}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0689}]}{\mathrm{kms\_s\_0689r\_0479}}\right) + \left(1+\frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0479}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0479}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{767}
$$

Table 484: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0479	Keq_r_0479		1.732		☑
Vmax_r_0479	Vmax_r_0479		0.087		☑
kmp_s_0122r-_0479	kmp_s_0122r_0479		0.549		☑
kmp_s_0400r-_0479	kmp_s_0400r_0479		1.719		☑
kmp_s_1207r-_0479	kmp_s_1207r_0479		0.549		☑
kms_s_0309r-_0479	kms_s_0309r_0479		0.549		☑
kms_s_0446r-_0479	kms_s_0446r_0479		1.092		☑
kms_s_0689r-_0479	kms_s_0689r_0479		0.549		☑

7.121 Reaction r_0484

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name fructose-bisphosphate aldolase

Notes GENE_ASSOCIATION:YKL060C

Reaction equation

$$\mathrm{s\_0537} \xrightleftharpoons{\mathrm{s\_0537,\ s\_0731,\ s\_0735}} \mathrm{s\_0731} + \mathrm{s\_0735} \quad (768)$$

Reactant

Table 485: Properties of each reactant.

Id	Name	SBO
s_0537	D-fructose 1,6-bisphosphate [intracellular]	

Modifiers

Table 486: Properties of each modifier.

Id	Name	SBO
s_0537	D-fructose 1,6-bisphosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0735	glycerone phosphate [intracellular]	

Products

Table 487: Properties of each product.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0735	glycerone phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{121} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_121}\left(\mathrm{Keq\_r\_0484}, \mathrm{Vmax\_r\_0484}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0731r\_0484}, \mathrm{kmp\_s\_0735r\_0484}, \mathrm{kms\_s\_0537r\_0484}, [\mathrm{s\_0537}], [\mathrm{s\_0731}], [\mathrm{s\_0735}]\right) \quad (769)$$

$$\text{function\_121}(\text{Keq\_r\_0484}, \text{Vmax\_r\_0484}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0731r\_0484}, \text{kmp\_s\_0735r\_0484}, \text{kms\_s\_0537r\_0484}, [\text{s\_0537}], [\text{s\_0731}], [\text{s\_0735}]) = \frac{\text{Vmax\_r\_0484} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0537r\_0484}}\right)^1 \cdot \left([\text{s\_0537}]^1 - \frac{[\text{s\_0731}]^1 \cdot [\text{s\_0735}]^1}{\text{Keq\_r\_0484}}\right)}{1+\frac{[\text{s\_0537}]}{\text{kms\_s\_0537r\_0484}} + \left(1+\frac{[\text{s\_0731}]}{\text{kmp\_s\_0731r\_0484}}\right) \cdot \left(1+\frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0484}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{770}$$

$$\text{function\_121}(\text{Keq\_r\_0484}, \text{Vmax\_r\_0484}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0731r\_0484}, \text{kmp\_s\_0735r\_0484}, \text{kms\_s\_0537r\_0484}, [\text{s\_0537}], [\text{s\_0731}], [\text{s\_0735}]) = \frac{\text{Vmax\_r\_0484} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0537r\_0484}}\right)^1 \cdot \left([\text{s\_0537}]^1 - \frac{[\text{s\_0731}]^1 \cdot [\text{s\_0735}]^1}{\text{Keq\_r\_0484}}\right)}{1+\frac{[\text{s\_0537}]}{\text{kms\_s\_0537r\_0484}} + \left(1+\frac{[\text{s\_0731}]}{\text{kmp\_s\_0731r\_0484}}\right) \cdot \left(1+\frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0484}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{771}$$

Table 488: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0484	Keq_r_0484		0.045		☑
Vmax_r_0484	Vmax_r_0484		5.510		☑
kmp_s_0731r-_0484	kmp_s_0731r_0484		0.044		☑
kmp_s_0735r-_0484	kmp_s_0735r_0484		0.602		☑
kms_s_0537r-_0484	kms_s_0537r_0484		1.343		☑

7.122 Reaction r_0485

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name fumarase

Notes GENE_ASSOCIATION:YPL262W

Reaction equation

$$\text{s\_0069} \xrightleftharpoons{\text{s\_0069, s\_0692, s\_1434\_b}} \text{s\_0692} + \text{s\_1434\_b} \tag{772}$$

Reactant

Table 489: Properties of each reactant.

Id	Name	SBO
s_0069	(S)-malate(2-) [intracellular]	

Modifiers

Table 490: Properties of each modifier.

Id	Name	SBO
s_0069	(S)-malate(2-) [intracellular]	
s_0692	fumarate(2-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 491: Properties of each product.

Id	Name	SBO
s_0692	fumarate(2-) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{122} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_122}\left(\mathrm{Keq\_r\_0485}, \mathrm{Vmax\_r\_0485}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0692r\_0485}, \mathrm{kmp\_s\_1434\_br\_0485}, \mathrm{kms\_s\_0069r\_0485}, [\mathrm{s\_0069}], [\mathrm{s\_0692}], [\mathrm{s\_1434\_b}]\right) \quad (773)$$

$$\mathrm{function\_122}\left(\mathrm{Keq\_r\_0485}, \mathrm{Vmax\_r\_0485}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0692r\_0485}, \mathrm{kmp\_s\_1434\_br\_0485}, \mathrm{kms\_s\_0069r\_0485}, [\mathrm{s\_0069}], [\mathrm{s\_0692}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0485} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0069r\_0485}}\right)^{1} \cdot \left([\mathrm{s\_0069}]^{1} - \frac{[\mathrm{s\_0692}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0485}}\right)}{1 + \frac{[\mathrm{s\_0069}]}{\mathrm{kms\_s\_0069r\_0485}} + \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kmp\_s\_0692r\_0485}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0485}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (774)$$

$$\text{function\_122}(\text{Keq\_r\_0485}, \text{Vmax\_r\_0485}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0692r\_0485}, \text{kmp\_s\_1434\_br\_0485}, \text{kms\_s\_0069r\_0485}, [\text{s\_0069}], [\text{s\_0692}], [\text{s\_1434\_b}]) = \frac{\text{Vmax\_r\_0485} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0069r\_0485}}\right)^1 \cdot \left([\text{s\_0069}]^1 - \frac{[\text{s\_0692}]^1 \cdot [\text{s\_1434\_b}]^1}{\text{Keq\_r\_0485}}\right)}{1 + \frac{[\text{s\_0069}]}{\text{kms\_s\_0069r\_0485}} + \left(1 + \frac{[\text{s\_0692}]}{\text{kmp\_s\_0692r\_0485}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0485}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{775}$$

Table 492: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0485	Keq_r_0485		0.604		☑
Vmax_r_0485	Vmax_r_0485		2.084		☑
kmp_s_0692r-_0485	kmp_s_0692r_0485		0.549		☑
kmp_s_1434-_br_0485	kmp_s_1434_br-_0485		0.549		☑
kms_s_0069r-_0485	kms_s_0069r_0485		0.549		☑

7.123 Reaction r_0488

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name fumarate reductase

Notes GENE_ASSOCIATION:(YJR051W or (YDR178W and YJL045W and YKL141W and YLL041C) or (YDR178W and YKL141W and YKL148C and YLL041C)) or YEL047C

Reaction equation

$$\text{s\_0659} + \text{s\_0692} \xrightleftharpoons{\text{s\_0657, s\_0659, s\_0692, s\_1338}} \text{s\_0657} + \text{s\_1338} \tag{776}$$

Reactants

Table 493: Properties of each reactant.

Id	Name	SBO
s_0659	FADH2 [intracellular]	
s_0692	fumarate(2-) [intracellular]	

Modifiers

Table 494: Properties of each modifier.

Id	Name	SBO
s_0657	FAD [intracellular]	
s_0659	FADH2 [intracellular]	
s_0692	fumarate(2-) [intracellular]	
s_1338	succinate(2-) [intracellular]	

Products

Table 495: Properties of each product.

Id	Name	SBO
s_0657	FAD [intracellular]	
s_1338	succinate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{123} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_123}(\mathrm{Keq\_r\_0488}, \mathrm{Vmax\_r\_0488}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0657r\_0488}, \mathrm{kmp\_s\_1338r\_0488}, \mathrm{kms\_s\_0659r\_0488}, \mathrm{kms\_s\_0692r\_0488}, [\mathrm{s\_0657}], [\mathrm{s\_0659}], [\mathrm{s\_0692}], [\mathrm{s\_1338}]) \quad (777)$$

$$\mathrm{function\_123}(\mathrm{Keq\_r\_0488}, \mathrm{Vmax\_r\_0488}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0657r\_0488}, \mathrm{kmp\_s\_1338r\_0488}, \mathrm{kms\_s\_0659r\_0488}, \mathrm{kms\_s\_0692r\_0488}, [\mathrm{s\_0657}], [\mathrm{s\_0659}], [\mathrm{s\_0692}], [\mathrm{s\_1338}]) = \frac{\mathrm{Vmax\_r\_0488} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0659r\_0488}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0692r\_0488}}\right)^{1} \cdot \left([\mathrm{s\_0659}]^{1} \cdot [\mathrm{s\_0692}]^{1} - \frac{[\mathrm{s\_0657}]^{1} \cdot [\mathrm{s\_1338}]^{1}}{\mathrm{Keq\_r\_0488}}\right)}{\left(1 + \frac{[\mathrm{s\_0659}]}{\mathrm{kms\_s\_0659r\_0488}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kms\_s\_0692r\_0488}}\right) + \left(1 + \frac{[\mathrm{s\_0657}]}{\mathrm{kmp\_s\_0657r\_0488}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1338}]}{\mathrm{kmp\_s\_1338r\_0488}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (778)$$

$$\mathrm{function\_123}(\mathrm{Keq\_r\_0488}, \mathrm{Vmax\_r\_0488}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0657r\_0488}, \mathrm{kmp\_s\_1338r\_0488}, \mathrm{kms\_s\_0659r\_0488}, \mathrm{kms\_s\_0692r\_0488}, [\mathrm{s\_0657}], [\mathrm{s\_0659}], [\mathrm{s\_0692}], [\mathrm{s\_1338}]) = \frac{\mathrm{Vmax\_r\_0488} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0659r\_0488}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0692r\_0488}}\right)^{1} \cdot \left([\mathrm{s\_0659}]^{1} \cdot [\mathrm{s\_0692}]^{1} - \frac{[\mathrm{s\_0657}]^{1} \cdot [\mathrm{s\_1338}]^{1}}{\mathrm{Keq\_r\_0488}}\right)}{\left(1 + \frac{[\mathrm{s\_0659}]}{\mathrm{kms\_s\_0659r\_0488}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0692}]}{\mathrm{kms\_s\_0692r\_0488}}\right) + \left(1 + \frac{[\mathrm{s\_0657}]}{\mathrm{kmp\_s\_0657r\_0488}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1338}]}{\mathrm{kmp\_s\_1338r\_0488}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (779)$$

Table 496: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0488	Keq_r_0488		1.100		☑
Vmax_r_0488	Vmax_r_0488		4.520		☑
kmp_s_0657r-_0488	kmp_s_0657r_0488		0.549		☑
kmp_s_1338r-_0488	kmp_s_1338r_0488		0.549		☑
kms_s_0659r-_0488	kms_s_0659r_0488		0.549		☑
kms_s_0692r-_0488	kms_s_0692r_0488		0.549		☑

7.124 Reaction r_0496

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name geranyltranstransferase

Notes GENE_ASSOCIATION:YJL167W

Reaction equation

$$\mathrm{s\_0712} + \mathrm{s\_0850} \xrightleftharpoons{\mathrm{s\_0195,\ s\_0605,\ s\_0712,\ s\_0850}} \mathrm{s\_0195} + \mathrm{s\_0605} \qquad (780)$$

Reactants

Table 497: Properties of each reactant.

Id	Name	SBO
s_0712	geranyl diphosphate [intracellular]	
s_0850	isopentenyl diphosphate [intracellular]	

Modifiers

Table 498: Properties of each modifier.

Id	Name	SBO
s_0195	2-trans,6-trans-farnesyl diphosphate [intracellular]	
s_0605	diphosphate [intracellular]	
s_0712	geranyl diphosphate [intracellular]	

Id	Name	SBO
s_0850	isopentenyl diphosphate [intracellular]	

Products

Table 499: Properties of each product.

Id	Name	SBO
s_0195	2-trans,6-trans-farnesyl diphosphate [intracellular]	
s_0605	diphosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{124} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_124}(\mathrm{Keq\_r\_0496}, \mathrm{Vmax\_r\_0496}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0195r\_0496}, \mathrm{kmp\_s\_0605r\_0496}, \mathrm{kms\_s\_0712r\_0496}, \mathrm{kms\_s\_0850r\_0496}, [\mathrm{s\_0195}], [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}]) \quad (781)$$

$$\mathrm{function\_124}(\mathrm{Keq\_r\_0496}, \mathrm{Vmax\_r\_0496}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0195r\_0496}, \mathrm{kmp\_s\_0605r\_0496}, \mathrm{kms\_s\_0712r\_0496}, \mathrm{kms\_s\_0850r\_0496}, [\mathrm{s\_0195}], [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}]) = \frac{\mathrm{Vmax\_r\_0496} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0712r\_0496}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0850r\_0496}}\right)^{1} \cdot \left([\mathrm{s\_0712}]^{1} \cdot [\mathrm{s\_0850}]^{1} - \frac{[\mathrm{s\_0195}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0496}}\right)}{\left(1+\frac{[\mathrm{s\_0712}]}{\mathrm{kms\_s\_0712r\_0496}}\right) \cdot \left(1+\frac{[\mathrm{s\_0850}]}{\mathrm{kms\_s\_0850r\_0496}}\right) + \left(1+\frac{[\mathrm{s\_0195}]}{\mathrm{kmp\_s\_0195r\_0496}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0496}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (782)$$

$$\mathrm{function\_124}(\mathrm{Keq\_r\_0496}, \mathrm{Vmax\_r\_0496}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0195r\_0496}, \mathrm{kmp\_s\_0605r\_0496}, \mathrm{kms\_s\_0712r\_0496}, \mathrm{kms\_s\_0850r\_0496}, [\mathrm{s\_0195}], [\mathrm{s\_0605}], [\mathrm{s\_0712}], [\mathrm{s\_0850}]) = \frac{\mathrm{Vmax\_r\_0496} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0712r\_0496}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0850r\_0496}}\right)^{1} \cdot \left([\mathrm{s\_0712}]^{1} \cdot [\mathrm{s\_0850}]^{1} - \frac{[\mathrm{s\_0195}]^{1} \cdot [\mathrm{s\_0605}]^{1}}{\mathrm{Keq\_r\_0496}}\right)}{\left(1+\frac{[\mathrm{s\_0712}]}{\mathrm{kms\_s\_0712r\_0496}}\right) \cdot \left(1+\frac{[\mathrm{s\_0850}]}{\mathrm{kms\_s\_0850r\_0496}}\right) + \left(1+\frac{[\mathrm{s\_0195}]}{\mathrm{kmp\_s\_0195r\_0496}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0496}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (783)$$

Table 500: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0496	Keq_r_0496		1.100		☑
Vmax_r_0496	Vmax_r_0496		0.059		☑
kmp_s_0195r_0496	kmp_s_0195r_0496		0.549		☑
kmp_s_0605r_0496	kmp_s_0605r_0496		0.549		☑
kms_s_0712r_0496	kms_s_0712r_0496		0.549		☑
kms_s_0850r_0496	kms_s_0850r_0496		0.549		☑

7.125 Reaction r_0499

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name glucokinase

Notes GENE_ASSOCIATION:YCL040W

Reaction equation

$$s\_0446 + s\_0545 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0455,\ s\_0545,\ s\_0763\_b} s\_0400 + s\_0455 + s\_0763\_b \tag{784}$$

Reactants

Table 501: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0545	D-glucose [intracellular]	

Modifiers

Table 502: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	

Id	Name	SBO
s_0455	beta-D-glucose 6-phosphate [intracellular]	
s_0545	D-glucose [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 503: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0455	beta-D-glucose 6-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{125} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_125}(\mathrm{Keq\_r\_0499}, \mathrm{Vmax\_r\_0499}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0499}, \mathrm{kmp\_s\_0455r\_0499}, \mathrm{kmp\_s\_0763\_br\_0499}, \mathrm{kms\_s\_0446r\_0499}, \mathrm{kms\_s\_0545r\_0499}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0455}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) \tag{785}$$

$$\mathrm{function\_125}(\mathrm{Keq\_r\_0499}, \mathrm{Vmax\_r\_0499}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0499}, \mathrm{kmp\_s\_0455r\_0499}, \mathrm{kmp\_s\_0763\_br\_0499}, \mathrm{kms\_s\_0446r\_0499}, \mathrm{kms\_s\_0545r\_0499}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0455}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0499} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0499}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0545r\_0499}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0545}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0455}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0499}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0545}]}{\mathrm{kms\_s\_0545r\_0499}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0455}]}{\mathrm{kmp\_s\_0455r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0499}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{786}$$

$$\mathrm{function\_125}(\mathrm{Keq\_r\_0499}, \mathrm{Vmax\_r\_0499}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0499}, \mathrm{kmp\_s\_0455r\_0499}, \mathrm{kmp\_s\_0763\_br\_0499}, \mathrm{kms\_s\_0446r\_0499}, \mathrm{kms\_s\_0545r\_0499}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0455}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0499} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0499}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0545r\_0499}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0545}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0455}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0499}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0545}]}{\mathrm{kms\_s\_0545r\_0499}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0455}]}{\mathrm{kmp\_s\_0455r\_0499}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0499}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{787}$$

Table 504: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0499	Keq_r_0499		4.778		☑
Vmax_r_0499	Vmax_r_0499		72.479		☑
kmp_s_0400r-_0499	kmp_s_0400r_0499		1.719		☑
kmp_s_0455r-_0499	kmp_s_0455r_0499		0.496		☑
kmp_s_0763-_br_0499	kmp_s_0763_br-_0499		0.549		☑
kms_s_0446r-_0499	kms_s_0446r_0499		1.092		☑
kms_s_0545r-_0499	kms_s_0545r_0499		0.099		☑

7.126 Reaction r_0504

This is a reversible reaction of one reactant forming one product influenced by five modifiers.

Name glucose-6-phosphate isomerase

Notes GENE_ASSOCIATION:YBR196C

Reaction equation

$$\text{s\_0455} \xrightleftharpoons{\text{s\_0455, s\_0545, s\_0455, s\_0539, s\_0545}} \text{s\_0539} \tag{788}$$

Reactant

Table 505: Properties of each reactant.

Id	Name	SBO
s_0455	beta-D-glucose 6-phosphate [intracellular]	

Modifiers

Table 506: Properties of each modifier.

Id	Name	SBO
s_0455	beta-D-glucose 6-phosphate [intracellular]	
s_0545	D-glucose [intracellular]	

Id	Name	SBO
s_0455	beta-D-glucose 6-phosphate [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	
s_0545	D-glucose [intracellular]	

Product

Table 507: Properties of each product.

Id	Name	SBO
s_0539	D-fructose 6-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{126} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_126}(\mathrm{Vmax\_r\_0504}, \mathrm{kms\_s\_0455r\_0504}, [\mathrm{s\_0455}], [\mathrm{s\_0539}], \mathrm{Keq\_r\_0504}, \mathrm{kmp\_s\_0539r\_0504}, \mathrm{vol}(\mathrm{intracellular}), [\mathrm{s\_0455}], \mathrm{kmI\_s\_0455mr\_0504}, [\mathrm{s\_0545}], \mathrm{kmI\_s\_0glumr\_0504}) \tag{789}$$

$$\mathrm{function\_126}(\mathrm{Vmax\_r\_0504}, \mathrm{kms\_s\_0455r\_0504}, [\mathrm{s\_0455}], [\mathrm{s\_0539}], \mathrm{Keq\_r\_0504}, \mathrm{kmp\_s\_0539r\_0504}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{s\_0455m}, \mathrm{kmI\_s\_0455mr\_0504}, \mathrm{s\_0glum}, \mathrm{kmI\_s\_0glumr\_0504}) = \frac{\mathrm{Vmax\_r\_0504} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0455r\_0504}}\right)^{1} \cdot \left([\mathrm{s\_0455}]^{1} - \frac{[\mathrm{s\_0539}]^{1}}{\mathrm{Keq\_r\_0504}}\right)}{1 + \frac{[\mathrm{s\_0455}]}{\mathrm{kms\_s\_0455r\_0504}} + 1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0504}} + \left(1 + \frac{\mathrm{s\_0455m}}{\mathrm{kmI\_s\_0455mr\_0504}}\right) \cdot \left(1 + \frac{\mathrm{s\_0glum}}{\mathrm{kmI\_s\_0glumr\_0504}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{790}$$

$$\mathrm{function\_126}(\mathrm{Vmax\_r\_0504}, \mathrm{kms\_s\_0455r\_0504}, [\mathrm{s\_0455}], [\mathrm{s\_0539}], \mathrm{Keq\_r\_0504}, \mathrm{kmp\_s\_0539r\_0504}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{s\_0455m}, \mathrm{kmI\_s\_0455mr\_0504}, \mathrm{s\_0glum}, \mathrm{kmI\_s\_0glumr\_0504}) = \frac{\mathrm{Vmax\_r\_0504} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0455r\_0504}}\right)^{1} \cdot \left([\mathrm{s\_0455}]^{1} - \frac{[\mathrm{s\_0539}]^{1}}{\mathrm{Keq\_r\_0504}}\right)}{1 + \frac{[\mathrm{s\_0455}]}{\mathrm{kms\_s\_0455r\_0504}} + 1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0504}} + \left(1 + \frac{\mathrm{s\_0455m}}{\mathrm{kmI\_s\_0455mr\_0504}}\right) \cdot \left(1 + \frac{\mathrm{s\_0glum}}{\mathrm{kmI\_s\_0glumr\_0504}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{791}$$

Table 508: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0504	Vmax_r_0504		15.712		☑
kms_s_0455r-_0504	kms_s_0455r_0504		0.496		☑
Keq_r_0504	Keq_r_0504		0.290		☑
kmp_s_0539r-_0504	kmp_s_0539r_0504		0.105		☑
intracellular	intracellular		1.000		☑
kmI_s-_0455mr_0504	kmI_s_0455mr-_0504		0.700		☑
kmI_s-_0glumr_0504	kmI_s_0glumr-_0504		0.700		☑

7.127 Reaction r_0505

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name glucose-6-phosphate isomerase_2

Notes GENE_ASSOCIATION:YBR196C

Reaction equation

$$s\_0410 \xrightleftharpoons{s\_0410,\ s\_0539} s\_0539 \tag{792}$$

Reactant

Table 509: Properties of each reactant.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	

Modifiers

Table 510: Properties of each modifier.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	

Product

Table 511: Properties of each product.

Id	Name	SBO
s_0539	D-fructose 6-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{127} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_127}(\mathrm{Keq\_r\_0505}, \mathrm{Vmax\_r\_0505}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0539r\_0505}, \mathrm{kms\_s\_0410r\_0505}, [\mathrm{s\_0410}], [\mathrm{s\_0539}]) \quad (793)$$

$$\mathrm{function\_127}(\mathrm{Keq\_r\_0505}, \mathrm{Vmax\_r\_0505}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0539r\_0505}, \mathrm{kms\_s\_0410r\_0505}, [\mathrm{s\_0410}], [\mathrm{s\_0539}]) = \frac{\mathrm{Vmax\_r\_0505} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0505}}\right)^1 \cdot \left([\mathrm{s\_0410}]^1 - \frac{[\mathrm{s\_0539}]^1}{\mathrm{Keq\_r\_0505}}\right)}{1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0505}} + 1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0505}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (794)$$

$$\mathrm{function\_127}(\mathrm{Keq\_r\_0505}, \mathrm{Vmax\_r\_0505}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0539r\_0505}, \mathrm{kms\_s\_0410r\_0505}, [\mathrm{s\_0410}], [\mathrm{s\_0539}]) = \frac{\mathrm{Vmax\_r\_0505} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0505}}\right)^1 \cdot \left([\mathrm{s\_0410}]^1 - \frac{[\mathrm{s\_0539}]^1}{\mathrm{Keq\_r\_0505}}\right)}{1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0505}} + 1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kmp\_s\_0539r\_0505}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (795)$$

Table 512: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0505	Keq_r_0505		0.290		☑
Vmax_r_0505	Vmax_r_0505		0.753		☑
kmp_s_0539r_0505	kmp_s_0539r_0505		0.105		☑
kms_s_0410r_0505	kms_s_0410r_0505		0.549		☑

7.128 Reaction r_0506

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name glutamate 5-kinase

Notes GENE_ASSOCIATION:YDR300C

Reaction equation

$$s\_0446 + s\_0899 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0894,\ s\_0899} s\_0400 + s\_0894 \tag{796}$$

Reactants

Table 513: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 514: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0894	L-gamma-glutamyl phosphate [intracellular]	
s_0899	L-glutamate [intracellular]	

Products

Table 515: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0894	L-gamma-glutamyl phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{128} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_128}(\mathrm{Keq\_r\_0506}, \mathrm{Vmax\_r\_0506}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0506}, \mathrm{kmp\_s\_0894r\_0506}, \mathrm{kms\_s\_0446r\_0506}, \mathrm{kms\_s\_0899r\_0506}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0894}], [\mathrm{s\_0899}]) \quad (797)$$

$$\mathrm{function\_128}(\mathrm{Keq\_r\_0506}, \mathrm{Vmax\_r\_0506}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0506}, \mathrm{kmp\_s\_0894r\_0506}, \mathrm{kms\_s\_0446r\_0506}, \mathrm{kms\_s\_0899r\_0506}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0894}], [\mathrm{s\_0899}]) = \frac{\mathrm{Vmax\_r\_0506} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0506}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0506}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0899}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0894}]^1}{\mathrm{Keq\_r\_0506}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0506}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0506}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0506}}\right) \cdot \left(1+\frac{[\mathrm{s\_0894}]}{\mathrm{kmp\_s\_0894r\_0506}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (798)$$

$$\mathrm{function\_128}(\mathrm{Keq\_r\_0506}, \mathrm{Vmax\_r\_0506}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0506}, \mathrm{kmp\_s\_0894r\_0506}, \mathrm{kms\_s\_0446r\_0506}, \mathrm{kms\_s\_0899r\_0506}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0894}], [\mathrm{s\_0899}]) = \frac{\mathrm{Vmax\_r\_0506} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0506}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0506}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0899}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0894}]^1}{\mathrm{Keq\_r\_0506}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0506}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0506}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0506}}\right) \cdot \left(1+\frac{[\mathrm{s\_0894}]}{\mathrm{kmp\_s\_0894r\_0506}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (799)$$

Table 516: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0506`	Keq_r_0506		1.732		☑
`Vmax_r_0506`	Vmax_r_0506		0.550		☑
`kmp_s_0400r_0506`	kmp_s_0400r_0506		1.719		☑
`kmp_s_0894r_0506`	kmp_s_0894r_0506		0.549		☑
`kms_s_0446r_0506`	kms_s_0446r_0506		1.092		☑
`kms_s_0899r_0506`	kms_s_0899r_0506		0.549		☑

7.129 Reaction `r_0509`

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name glutamate dehydrogenase (NADP)

Notes GENE_ASSOCIATION:(YAL062W or YOR375C)

Reaction equation

$$\text{s\_0185} + \text{s\_0430} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0185, s\_0430, s\_0763\_b, s\_0899, s\_1091, s\_1096, s\_1434\_b}} \text{s\_0899} + \text{s\_1091} \quad (800)$$

Reactants

Table 517: Properties of each reactant.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0430	ammonium [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 518: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0430	ammonium [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 519: Properties of each product.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{129} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_129}\left(\mathrm{Keq\_r\_0509}, \mathrm{Vmax\_r\_0509}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0509}, \mathrm{kmp\_s\_1091r\_0509}, \mathrm{kmp\_s\_1434\_br\_0509}, \mathrm{kms\_s\_0185r\_0509}, \mathrm{kms\_s\_0430r\_0509}, \mathrm{kms\_s\_0763\_br\_0509}, \mathrm{kms\_s\_1096r\_0509}, [\mathrm{s\_0185}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) \quad (801)$$

$$\mathrm{function\_129}\left(\mathrm{Keq\_r\_0509}, \mathrm{Vmax\_r\_0509}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0509}, \mathrm{kmp\_s\_1091r\_0509}, \mathrm{kmp\_s\_1434\_br\_0509}, \mathrm{kms\_s\_0185r\_0509}, \mathrm{kms\_s\_0430r\_0509}, \mathrm{kms\_s\_0763\_br\_0509}, \mathrm{kms\_s\_1096r\_0509}, [\mathrm{s\_0185}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0509} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0430r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0509}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0899}]}{\cdots}\right.}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0509}}\right) + \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0509}}\right) \cdot \cdots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (802)$$

$$\mathrm{function\_129}\left(\mathrm{Keq\_r\_0509}, \mathrm{Vmax\_r\_0509}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0509}, \mathrm{kmp\_s\_1091r\_0509}, \mathrm{kmp\_s\_1434\_br\_0509}, \mathrm{kms\_s\_0185r\_0509}, \mathrm{kms\_s\_0430r\_0509}, \mathrm{kms\_s\_0763\_br\_0509}, \mathrm{kms\_s\_1096r\_0509}, [\mathrm{s\_0185}], [\mathrm{s\_0430}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0509} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0430r\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0509}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0509}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0899}]}{\cdots}\right.}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0509}}\right) + \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0509}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0509}}\right) \cdot \cdots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (803)$$

Table 520: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0509`	Keq_r_0509		2.004		☑
`Vmax_r_0509`	Vmax_r_0509		38.203		☑
`kmp_s_0899r_0509`	kmp_s_0899r_0509		0.549		☑
`kmp_s_1091r_0509`	kmp_s_1091r_0509		0.549		☑
`kmp_s_1434_br_0509`	kmp_s_1434_br_0509		0.549		☑
`kms_s_0185r_0509`	kms_s_0185r_0509		0.549		☑
`kms_s_0430r_0509`	kms_s_0430r_0509		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0763-_br_0509	kms_s_0763_br-_0509		0.549		☑
kms_s_1096r-_0509	kms_s_1096r_0509		0.549		☑

7.130 Reaction r_0510

This is a reversible reaction of four reactants forming two products influenced by six modifiers.

Name glutamate synthase (NADH2)

Notes GENE_ASSOCIATION:YDL171C

Reaction equation

$$s\_0185 + s\_0763\_b + s\_0907 + s\_1087 \xrightleftharpoons{s\_0185,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1082,\ s\_1087} 2\, s\_0899 + s\_1082 \quad (804)$$

Reactants

Table 521: Properties of each reactant.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 522: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 523: Properties of each product.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{130} = & \mathrm{vol}\left(\mathrm{intracellular}\right) \\ & \cdot \mathrm{function\_130}\left(\mathrm{Keq\_r\_0510}, \mathrm{Vmax\_r\_0510}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0510}, \right. \\ & \mathrm{kmp\_s\_1082r\_0510}, \mathrm{kms\_s\_0185r\_0510}, \mathrm{kms\_s\_0763\_br\_0510}, \mathrm{kms\_s\_0907r\_0510}, \\ & \left. \mathrm{kms\_s\_1087r\_0510}, [\mathrm{s\_0185}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \end{aligned} \tag{805}$$

$$\begin{aligned} & \mathrm{function\_130}\left(\mathrm{Keq\_r\_0510}, \mathrm{Vmax\_r\_0510}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0510}, \right. \\ & \mathrm{kmp\_s\_1082r\_0510}, \mathrm{kms\_s\_0185r\_0510}, \mathrm{kms\_s\_0763\_br\_0510}, \mathrm{kms\_s\_0907r\_0510}, \\ & \left. \mathrm{kms\_s\_1087r\_0510}, [\mathrm{s\_0185}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \\ & = \frac{\mathrm{Vmax\_r\_0510} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0510}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0899}]^{2} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0}} \right.}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0510}}\right) + \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0510}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \end{aligned} \tag{806}$$

$$\begin{aligned} & \mathrm{function\_130}\left(\mathrm{Keq\_r\_0510}, \mathrm{Vmax\_r\_0510}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0899r\_0510}, \right. \\ & \mathrm{kmp\_s\_1082r\_0510}, \mathrm{kms\_s\_0185r\_0510}, \mathrm{kms\_s\_0763\_br\_0510}, \mathrm{kms\_s\_0907r\_0510}, \\ & \left. \mathrm{kms\_s\_1087r\_0510}, [\mathrm{s\_0185}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \\ & = \frac{\mathrm{Vmax\_r\_0510} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0510}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0510}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0899}]^{2} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0}} \right.}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0510}}\right) + \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0510}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0510}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \end{aligned} \tag{807}$$

Table 524: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0510	Keq_r_0510		34.726		☑
Vmax_r_0510	Vmax_r_0510		31.559		☑
kmp_s_0899r-_0510	kmp_s_0899r_0510		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1082r-_0510	kmp_s_1082r_0510		1.503		☑
kms_s_0185r-_0510	kms_s_0185r_0510		0.549		☑
kms_s_0763-_br_0510	kms_s_0763_br-_0510		0.549		☑
kms_s_0907r-_0510	kms_s_0907r_0510		0.549		☑
kms_s_1087r-_0510	kms_s_1087r_0510		0.087		☑

7.131 Reaction r_0512

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name glutamate-5-semialdehyde dehydrogenase

Notes GENE_ASSOCIATION:YOR323C

Reaction equation

$$\text{s\_0763\_b} + \text{s\_0894} + \text{s\_1087} \xrightleftharpoons{\text{s\_0763\_b, s\_0894, s\_0905, s\_1082, s\_1087, s\_1207}} \text{s\_0905} + \text{s\_1082} + \text{s\_1207} \quad (808)$$

Reactants

Table 525: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0894	L-gamma-glutamyl phosphate [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 526: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0894	L-gamma-glutamyl phosphate [intracellular]	
s_0905	L-glutamic 5-semialdehyde [intracellular]	

Id	Name	SBO
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 527: Properties of each product.

Id	Name	SBO
s_0905	L-glutamic 5-semialdehyde [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{131} = &\mathrm{vol}\left(\mathrm{intracellular}\right) \\ &\cdot \mathrm{function\_131}\left(\mathrm{Keq\_r\_0512}, \mathrm{Vmax\_r\_0512}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0905r\_0512}, \right. \\ &\mathrm{kmp\_s\_1082r\_0512}, \mathrm{kmp\_s\_1207r\_0512}, \mathrm{kms\_s\_0763\_br\_0512}, \mathrm{kms\_s\_0894r\_0512}, \\ &\left. \mathrm{kms\_s\_1087r\_0512}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0894}], [\mathrm{s\_0905}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1207}]\right) \end{aligned} \tag{809}$$

$$\begin{aligned} &\mathrm{function\_131}\left(\mathrm{Keq\_r\_0512}, \mathrm{Vmax\_r\_0512}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0905r\_0512}, \right. \\ &\mathrm{kmp\_s\_1082r\_0512}, \mathrm{kmp\_s\_1207r\_0512}, \mathrm{kms\_s\_0763\_br\_0512}, \mathrm{kms\_s\_0894r\_0512}, \\ &\left. \mathrm{kms\_s\_1087r\_0512}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0894}], [\mathrm{s\_0905}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1207}]\right) \\ &= \frac{\mathrm{Vmax\_r\_0512} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0894r\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0512}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0894}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0905}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0512}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_0894}]}{\mathrm{kms\_s\_0894r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0512}}\right) + \left(1+\frac{[\mathrm{s\_0905}]}{\mathrm{kmp\_s\_0905r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0512}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \end{aligned} \tag{810}$$

$$\begin{aligned} &\mathrm{function\_131}\left(\mathrm{Keq\_r\_0512}, \mathrm{Vmax\_r\_0512}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0905r\_0512}, \right. \\ &\mathrm{kmp\_s\_1082r\_0512}, \mathrm{kmp\_s\_1207r\_0512}, \mathrm{kms\_s\_0763\_br\_0512}, \mathrm{kms\_s\_0894r\_0512}, \\ &\left. \mathrm{kms\_s\_1087r\_0512}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0894}], [\mathrm{s\_0905}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1207}]\right) \\ &= \frac{\mathrm{Vmax\_r\_0512} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0894r\_0512}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0512}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0894}]^{1} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_0905}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0512}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_0894}]}{\mathrm{kms\_s\_0894r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0512}}\right) + \left(1+\frac{[\mathrm{s\_0905}]}{\mathrm{kmp\_s\_0905r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0512}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0512}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \end{aligned} \tag{811}$$

Table 528: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0512	Keq_r_0512		19.065		☑
Vmax_r_0512	Vmax_r_0512		1.178		☑
kmp_s_0905r-_0512	kmp_s_0905r_0512		0.549		☑
kmp_s_1082r-_0512	kmp_s_1082r_0512		1.503		☑
kmp_s_1207r-_0512	kmp_s_1207r_0512		0.549		☑
kms_s_0763-_br_0512	kms_s_0763_br-_0512		0.549		☑
kms_s_0894r-_0512	kms_s_0894r_0512		0.549		☑
kms_s_1087r-_0512	kms_s_1087r_0512		0.087		☑

7.132 Reaction r_0514

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name glutamine phosphoribosyldiphosphate amidotransferase

Notes GENE_ASSOCIATION:YMR300C

Reaction equation

$$\text{s\_0331} + \text{s\_0907} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0331, s\_0333, s\_0605, s\_0899, s\_0907, s\_1434\_b}} \text{s\_0333} + \text{s\_0605} + \text{s\_0899} \quad (812)$$

Reactants

Table 529: Properties of each reactant.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 530: Properties of each modifier.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0333	5-phospho-beta-D-ribosylamine [intracellular]	
s_0605	diphosphate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 531: Properties of each product.

Id	Name	SBO
s_0333	5-phospho-beta-D-ribosylamine [intracellular]	
s_0605	diphosphate [intracellular]	
s_0899	L-glutamate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{132} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_132}(\mathrm{Keq\_r\_0514}, \mathrm{Vmax\_r\_0514}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0333r\_0514}, \mathrm{kmp\_s\_0605r\_0514}, \mathrm{kmp\_s\_0899r\_0514}, \mathrm{kms\_s\_0331r\_0514}, \mathrm{kms\_s\_0907r\_0514}, \mathrm{kms\_s\_1434\_br\_0514}, [\mathrm{s\_0331}], [\mathrm{s\_0333}], [\mathrm{s\_0605}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]) \tag{813}$$

$$\mathrm{function\_132}(\mathrm{Keq\_r\_0514}, \mathrm{Vmax\_r\_0514}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0333r\_0514}, \mathrm{kmp\_s\_0605r\_0514}, \mathrm{kmp\_s\_0899r\_0514}, \mathrm{kms\_s\_0331r\_0514}, \mathrm{kms\_s\_0907r\_0514}, \mathrm{kms\_s\_1434\_br\_0514}, [\mathrm{s\_0331}], [\mathrm{s\_0333}], [\mathrm{s\_0605}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0514} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0514}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0333}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0899}]^{1}}{\mathrm{Keq\_r\_0514}}\right)}{\left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0514}}\right) + \left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kmp\_s\_0333r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0514}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{814}$$

$$\mathrm{function\_132}(\mathrm{Keq\_r\_0514}, \mathrm{Vmax\_r\_0514}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0333r\_0514}, \mathrm{kmp\_s\_0605r\_0514}, \mathrm{kmp\_s\_0899r\_0514}, \mathrm{kms\_s\_0331r\_0514}, \mathrm{kms\_s\_0907r\_0514}, \mathrm{kms\_s\_1434\_br\_0514}, [\mathrm{s\_0331}], [\mathrm{s\_0333}], [\mathrm{s\_0605}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0514} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0331r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0514}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0514}}\right)^{1} \cdot \left([\mathrm{s\_0331}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0333}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0899}]^{1}}{\mathrm{Keq\_r\_0514}}\right)}{\left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kms\_s\_0331r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0514}}\right) + \left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kmp\_s\_0333r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0514}}\right) \cdot \left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kmp\_s\_0899r\_0514}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{815}$$

Table 532: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0514	Keq_r_0514		1.100		☑
Vmax_r_0514	Vmax_r_0514		1.002		☑
kmp_s_0333r-_0514	kmp_s_0333r_0514		0.549		☑
kmp_s_0605r-_0514	kmp_s_0605r_0514		0.549		☑
kmp_s_0899r-_0514	kmp_s_0899r_0514		0.549		☑
kms_s_0331r-_0514	kms_s_0331r_0514		0.549		☑
kms_s_0907r-_0514	kms_s_0907r_0514		0.549		☑
kms_s_1434-_br_0514	kms_s_1434_br-_0514		0.549		☑

7.133 Reaction r_0515

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name glutamine synthetase

Notes GENE_ASSOCIATION:YPR035W

Reaction equation

$$s\_0430 + s\_0446 + s\_0899 \xrightleftharpoons{s\_0400,\ s\_0430,\ s\_0446,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1207} s\_0400 + s\_0763\_b + s\_0907 + \quad (816)$$

Reactants

Table 533: Properties of each reactant.

Id	Name	SBO
s_0430	ammonium [intracellular]	
s_0446	ATP [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 534: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0430	ammonium [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 535: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{133} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_133}\left(\mathrm{Keq\_r\_0515}, \mathrm{Vmax\_r\_0515}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0515}, \mathrm{kmp\_s\_0763\_br\_0515}, \mathrm{kmp\_s\_0907r\_0515}, \mathrm{kmp\_s\_1207r\_0515}, \mathrm{kms\_s\_0430r\_0515}, \mathrm{kms\_s\_0446r\_0515}, \mathrm{kms\_s\_0899r\_0515}, [\mathrm{s\_0400}], [\mathrm{s\_0430}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1207}]\right) \tag{817}$$

$$\mathrm{function\_133}\left(\mathrm{Keq\_r\_0515}, \mathrm{Vmax\_r\_0515}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0515}, \mathrm{kmp\_s\_0763\_br\_0515}, \mathrm{kmp\_s\_0907r\_0515}, \mathrm{kmp\_s\_1207r\_0515}, \mathrm{kms\_s\_0430r\_0515}, \mathrm{kms\_s\_0446r\_0515}, \mathrm{kms\_s\_0899r\_0515}, [\mathrm{s\_0400}], [\mathrm{s\_0430}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1207}]\right) \tag{818}$$

$$= \frac{\mathrm{Vmax\_r\_0515} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0430r\_0515}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0515}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0515}}\right)^{1} \cdot \left([\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0515}}\right.}{\left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kms\_s\_0430r\_0515}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0515}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0515}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0515}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0515}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kmp\_s\_0907r\_0515}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\begin{aligned}&\text{function\_133}\left(\text{Keq\_r\_0515}, \text{Vmax\_r\_0515}, \text{vol}\left(\text{intracellular}\right),\right.\\&\text{kmp\_s\_0400r\_0515}, \text{kmp\_s\_0763\_br\_0515}, \text{kmp\_s\_0907r\_0515},\\&\text{kmp\_s\_1207r\_0515}, \text{kms\_s\_0430r\_0515}, \text{kms\_s\_0446r\_0515}, \text{kms\_s\_0899r\_0515},\\&\left.[\text{s\_0400}], [\text{s\_0430}], [\text{s\_0446}], [\text{s\_0763\_b}], [\text{s\_0899}], [\text{s\_0907}], [\text{s\_1207}]\right)\\&= \frac{\text{Vmax\_r\_0515} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0430r\_0515}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0515}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0515}}\right)^{1} \cdot \left([\text{s\_0430}]^{1} \cdot [\text{s\_0446}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0907}]^{1} \cdot [\text{s}}{\text{Keq\_r\_0515}}\right.}{\left(1 + \frac{[\text{s\_0430}]}{\text{kms\_s\_0430r\_0515}}\right) \cdot \left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0515}}\right) \cdot \left(1 + \frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0515}}\right) + \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0515}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0515}}\right) \cdot \left(1 + \frac{[\text{s\_0907}]}{\text{kmp\_s\_0907r\_0515}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{819}$$

Table 536: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0515`	Keq_r_0515		0.951		☑
`Vmax_r_0515`	Vmax_r_0515		53.383		☑
`kmp_s_0400r-_0515`	kmp_s_0400r_0515		1.719		☑
`kmp_s_0763-_br_0515`	kmp_s_0763_br-_0515		0.549		☑
`kmp_s_0907r-_0515`	kmp_s_0907r_0515		0.549		☑
`kmp_s_1207r-_0515`	kmp_s_1207r_0515		0.549		☑
`kms_s_0430r-_0515`	kms_s_0430r_0515		0.549		☑
`kms_s_0446r-_0515`	kms_s_0446r_0515		1.092		☑
`kms_s_0899r-_0515`	kms_s_0899r_0515		0.549		☑

7.134 Reaction `r_0525`

This is a reversible reaction of three reactants forming three products influenced by seven modifiers.

Name glyceraldehyde-3-phosphate dehydrogenase

Notes GENE_ASSOCIATION:(YGR192C or YJL052W or YJR009C)

Reaction equation

$$\text{s\_0731} + \text{s\_1082} + \text{s\_1207} \xrightleftharpoons{\text{s\_0731, s\_0731, s\_1082, s\_1207, s\_0265, s\_0763\_b, s\_1087}} \text{s\_0265} + \text{s\_0763\_b} + \text{s\_1087} \tag{820}$$

Reactants

Table 537: Properties of each reactant.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1207	phosphate [intracellular]	

Modifiers

Table 538: Properties of each modifier.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1207	phosphate [intracellular]	
s_0265	3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 539: Properties of each product.

Id	Name	SBO
s_0265	3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{134} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_134}\left(\mathrm{Vmax\_r\_0525}, \mathrm{kms\_s\_0731r\_0525}, \mathrm{kms\_s\_1082r\_0525}, \mathrm{kms\_s\_1207r\_0525}, [\mathrm{s\_0731}], [\mathrm{s\_1082}], [\mathrm{s\_1207}], [\mathrm{s\_0265}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1087}], \mathrm{Keq\_r\_0525}, \mathrm{kmp\_s\_0265r\_0525}, \mathrm{kmp\_s\_0763\_br\_0525}, \mathrm{kmp\_s\_1087r\_0525}, [\mathrm{s\_0731}], \mathrm{kmI\_s\_0731mr\_0525}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) \tag{821}$$

$$\begin{aligned}
&\text{function_134}\left(\text{Vmax_r_0525}, \text{kms_s_0731r_0525}, \text{kms_s_1082r_0525},\right.\\
&\text{kms_s_1207r_0525}, [\text{s_0731}], [\text{s_1082}], [\text{s_1207}], [\text{s_0265}], [\text{s_0763_b}],\\
&[\text{s_1087}], \text{Keq_r_0525}, \text{kmp_s_0265r_0525}, \text{kmp_s_0763_br_0525},\\
&\left.\text{kmp_s_1087r_0525}, \text{s_0731m}, \text{kmI_s_0731mr_0525}, \text{vol}\left(\text{intracellular}\right)\right)\\
&= \frac{\text{Vmax_r_0525} \cdot \frac{\left(\frac{1}{\text{kms_s_0731r_0525}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1082r_0525}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1207r_0525}}\right)^{1} \cdot \left([\text{s_0731}]^{1} \cdot [\text{s_1082}]^{1} \cdot [\text{s_1207}]^{1} - \frac{[\text{s_0265}]^{1} \cdot [\text{s_0763_b}]^{1} \cdot [\text{s_1087}\cdots}{\text{Keq_r_0525}}\cdots\right.}{\left(1+\frac{[\text{s_0731}]}{\text{kms_s_0731r_0525}}\right) \cdot \left(1+\frac{[\text{s_1082}]}{\text{kms_s_1082r_0525}}\right) \cdot \left(1+\frac{[\text{s_1207}]}{\text{kms_s_1207r_0525}}\right) + \left(1+\frac{[\text{s_0265}]}{\text{kmp_s_0265r_0525}}\right) \cdot \left(1+\frac{[\text{s_0763_b}]}{\text{kmp_s_0763_br_0525}}\right) \cdot \left(1+\frac{[\text{s_1087}]}{\text{kmp_s_1087r_0525}}\right) - \cdots}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{822}$$

$$\begin{aligned}
&\text{function_134}\left(\text{Vmax_r_0525}, \text{kms_s_0731r_0525}, \text{kms_s_1082r_0525},\right.\\
&\text{kms_s_1207r_0525}, [\text{s_0731}], [\text{s_1082}], [\text{s_1207}], [\text{s_0265}], [\text{s_0763_b}],\\
&[\text{s_1087}], \text{Keq_r_0525}, \text{kmp_s_0265r_0525}, \text{kmp_s_0763_br_0525},\\
&\left.\text{kmp_s_1087r_0525}, \text{s_0731m}, \text{kmI_s_0731mr_0525}, \text{vol}\left(\text{intracellular}\right)\right)\\
&= \frac{\text{Vmax_r_0525} \cdot \frac{\left(\frac{1}{\text{kms_s_0731r_0525}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1082r_0525}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1207r_0525}}\right)^{1} \cdot \left([\text{s_0731}]^{1} \cdot [\text{s_1082}]^{1} \cdot [\text{s_1207}]^{1} - \frac{[\text{s_0265}]^{1} \cdot [\text{s_0763_b}]^{1} \cdot [\text{s_1087}\cdots}{\text{Keq_r_0525}}\cdots\right.}{\left(1+\frac{[\text{s_0731}]}{\text{kms_s_0731r_0525}}\right) \cdot \left(1+\frac{[\text{s_1082}]}{\text{kms_s_1082r_0525}}\right) \cdot \left(1+\frac{[\text{s_1207}]}{\text{kms_s_1207r_0525}}\right) + \left(1+\frac{[\text{s_0265}]}{\text{kmp_s_0265r_0525}}\right) \cdot \left(1+\frac{[\text{s_0763_b}]}{\text{kmp_s_0763_br_0525}}\right) \cdot \left(1+\frac{[\text{s_1087}]}{\text{kmp_s_1087r_0525}}\right) - \cdots}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{823}$$

Table 540: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0525	Vmax_r_0525		69.589		☑
kms_s_0731r_0525	kms_s_0731r_0525		0.044		☑
kms_s_1082r_0525	kms_s_1082r_0525		1.503		☑
kms_s_1207r_0525	kms_s_1207r_0525		0.549		☑
Keq_r_0525	Keq_r_0525		3200.000		☑
kmp_s_0265r_0525	kmp_s_0265r_0525		$1.08759 \cdot 10^{-4}$		☑
kmp_s_0763_br_0525	kmp_s_0763_br_0525		0.549		☑
kmp_s_1087r_0525	kmp_s_1087r_0525		0.087		☑
kmI_s_0731mr_0525	kmI_s_0731mr_0525		0.001		☑

7.135 Reaction r_0526

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name glycerol dehydrogenase (NADP-dependent)

Notes GENE_ASSOCIATION:YOR120W

Reaction equation

$$s\_0732 + s\_1091 \xrightleftharpoons{s\_0732,\ s\_0734,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0734 + s\_0763\_b + s\_1096 \quad (824)$$

Reactants

Table 541: Properties of each reactant.

Id	Name	SBO
s_0732	glycerol [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 542: Properties of each modifier.

Id	Name	SBO
s_0732	glycerol [intracellular]	
s_0734	glycerone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 543: Properties of each product.

Id	Name	SBO
s_0734	glycerone [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{135} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_135}(\mathrm{Keq\_r\_0526}, \mathrm{Vmax\_r\_0526}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0734r\_0526}, \mathrm{kmp\_s\_0763\_br\_0526}, \mathrm{kmp\_s\_1096r\_0526}, \mathrm{kms\_s\_0732r\_0526}, \mathrm{kms\_s\_1091r\_0526}, [\mathrm{s\_0732}], [\mathrm{s\_0734}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (825)$$

$$\mathrm{function\_135}(\mathrm{Keq\_r\_0526}, \mathrm{Vmax\_r\_0526}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0734r\_0526}, \mathrm{kmp\_s\_0763\_br\_0526}, \mathrm{kmp\_s\_1096r\_0526}, \mathrm{kms\_s\_0732r\_0526}, \mathrm{kms\_s\_1091r\_0526}, [\mathrm{s\_0732}], [\mathrm{s\_0734}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0526} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0732r\_0526}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0526}}\right)^{1} \cdot \left([\mathrm{s\_0732}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0734}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0526}}\right)}{\left(1+\frac{[\mathrm{s\_0732}]}{\mathrm{kms\_s\_0732r\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0526}}\right) + \left(1+\frac{[\mathrm{s\_0734}]}{\mathrm{kmp\_s\_0734r\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0526}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (826)$$

$$\mathrm{function\_135}(\mathrm{Keq\_r\_0526}, \mathrm{Vmax\_r\_0526}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0734r\_0526}, \mathrm{kmp\_s\_0763\_br\_0526}, \mathrm{kmp\_s\_1096r\_0526}, \mathrm{kms\_s\_0732r\_0526}, \mathrm{kms\_s\_1091r\_0526}, [\mathrm{s\_0732}], [\mathrm{s\_0734}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0526} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0732r\_0526}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0526}}\right)^{1} \cdot \left([\mathrm{s\_0732}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0734}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0526}}\right)}{\left(1+\frac{[\mathrm{s\_0732}]}{\mathrm{kms\_s\_0732r\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0526}}\right) + \left(1+\frac{[\mathrm{s\_0734}]}{\mathrm{kmp\_s\_0734r\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0526}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0526}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (827)$$

Table 544: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0526	Keq_r_0526		2.210		☑
Vmax_r_0526	Vmax_r_0526		5.481		☑
kmp_s_0734r_0526	kmp_s_0734r_0526		0.549		☑
kmp_s_0763_br_0526	kmp_s_0763_br_0526		0.549		☑
kmp_s_1096r_0526	kmp_s_1096r_0526		0.549		☑
kms_s_0732r_0526	kms_s_0732r_0526		0.150		☑
kms_s_1091r_0526	kms_s_1091r_0526		0.549		☑

7.136 Reaction r_0528

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name glycerol-3-phosphatase

Notes GENE_ASSOCIATION:(YER062C or YIL053W)

Reaction equation

$$\text{s\_1315} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0732, s\_1207, s\_1315, s\_1434\_b}} \text{s\_0732} + \text{s\_1207} \tag{828}$$

Reactants

Table 545: Properties of each reactant.

Id	Name	SBO
s_1315	sn-glycerol 3-phosphate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 546: Properties of each modifier.

Id	Name	SBO
s_0732	glycerol [intracellular]	
s_1207	phosphate [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 547: Properties of each product.

Id	Name	SBO
s_0732	glycerol [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{136} = \text{vol}(\text{intracellular}) \cdot \text{function\_136}(\text{Keq\_r\_0528}, \text{Vmax\_r\_0528}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0732r\_0528}, \text{kmp\_s\_1207r\_0528}, \text{kms\_s\_1315r\_0528}, \text{kms\_s\_1434\_br\_0528}, [\text{s\_0732}], [\text{s\_1207}], [\text{s\_1315}], [\text{s\_1434\_b}]) \tag{829}$$

$$\begin{aligned}&\text{function\_136}\left(\text{Keq\_r\_0528}, \text{Vmax\_r\_0528}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0732r\_0528}, \text{kmp\_s\_1207r\_0528}, \text{kms\_s\_1315r\_0528},\\&\quad\quad\left.\text{kms\_s\_1434\_br\_0528}, [\text{s\_0732}], [\text{s\_1207}], [\text{s\_1315}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0528} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1315r\_0528}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0528}}\right)^{1} \cdot \left([\text{s\_1315}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0732}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0528}}\right)}{\left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0528}}\right) + \left(1+\frac{[\text{s\_0732}]}{\text{kmp\_s\_0732r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0528}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{830}$$

$$\begin{aligned}&\text{function\_136}\left(\text{Keq\_r\_0528}, \text{Vmax\_r\_0528}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0732r\_0528}, \text{kmp\_s\_1207r\_0528}, \text{kms\_s\_1315r\_0528},\\&\quad\quad\left.\text{kms\_s\_1434\_br\_0528}, [\text{s\_0732}], [\text{s\_1207}], [\text{s\_1315}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0528} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1315r\_0528}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0528}}\right)^{1} \cdot \left([\text{s\_1315}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0732}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0528}}\right)}{\left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0528}}\right) + \left(1+\frac{[\text{s\_0732}]}{\text{kmp\_s\_0732r\_0528}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0528}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{831}$$

Table 548: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0528	Keq_r_0528		0.013		☑
Vmax_r_0528	Vmax_r_0528		3.488		☑
kmp_s_0732r-_0528	kmp_s_0732r_0528		0.150		☑
kmp_s_1207r-_0528	kmp_s_1207r_0528		0.549		☑
kms_s_1315r-_0528	kms_s_1315r_0528		12.851		☑
kms_s_1434-_br_0528	kms_s_1434_br-_0528		0.549		☑

7.137 Reaction r_0529

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name glycerol-3-phosphate dehydrogenase (fad)

Notes GENE_ASSOCIATION:YIL155C

Reaction equation

$$\text{s\_0657} + \text{s\_1315} \xrightleftharpoons{\text{s\_0657, s\_0659, s\_0735, s\_1315}} \text{s\_0659} + \text{s\_0735} \tag{832}$$

Reactants

Table 549: Properties of each reactant.

Id	Name	SBO
s_0657	FAD [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Modifiers

Table 550: Properties of each modifier.

Id	Name	SBO
s_0657	FAD [intracellular]	
s_0659	FADH2 [intracellular]	
s_0735	glycerone phosphate [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Products

Table 551: Properties of each product.

Id	Name	SBO
s_0659	FADH2 [intracellular]	
s_0735	glycerone phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{137} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_137}\left(\mathrm{Keq\_r\_0529}, \mathrm{Vmax\_r\_0529}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0659r\_0529}, \mathrm{kmp\_s\_0735r\_0529}, \mathrm{kms\_s\_0657r\_0529}, \mathrm{kms\_s\_1315r\_0529}, [\mathrm{s\_0657}], [\mathrm{s\_0659}], [\mathrm{s\_0735}], [\mathrm{s\_1315}]\right) \tag{833}$$

$$\text{function\_137}\left(\text{Keq\_r\_0529}, \text{Vmax\_r\_0529}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0659r\_0529}, \text{kmp\_s\_0735r\_0529}, \text{kms\_s\_0657r\_0529}, \text{kms\_s\_1315r\_0529}, [\text{s\_0657}], [\text{s\_0659}], [\text{s\_0735}], [\text{s\_1315}]\right) = \frac{\text{Vmax\_r\_0529} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0657r\_0529}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0529}}\right)^{1} \cdot \left([\text{s\_0657}]^{1} \cdot [\text{s\_1315}]^{1} - \frac{[\text{s\_0659}]^{1} \cdot [\text{s\_0735}]^{1}}{\text{Keq\_r\_0529}}\right)}{\left(1 + \frac{[\text{s\_0657}]}{\text{kms\_s\_0657r\_0529}}\right) \cdot \left(1 + \frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0529}}\right) + \left(1 + \frac{[\text{s\_0659}]}{\text{kmp\_s\_0659r\_0529}}\right) \cdot \left(1 + \frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0529}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (834)$$

$$\text{function\_137}\left(\text{Keq\_r\_0529}, \text{Vmax\_r\_0529}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0659r\_0529}, \text{kmp\_s\_0735r\_0529}, \text{kms\_s\_0657r\_0529}, \text{kms\_s\_1315r\_0529}, [\text{s\_0657}], [\text{s\_0659}], [\text{s\_0735}], [\text{s\_1315}]\right) = \frac{\text{Vmax\_r\_0529} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0657r\_0529}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0529}}\right)^{1} \cdot \left([\text{s\_0657}]^{1} \cdot [\text{s\_1315}]^{1} - \frac{[\text{s\_0659}]^{1} \cdot [\text{s\_0735}]^{1}}{\text{Keq\_r\_0529}}\right)}{\left(1 + \frac{[\text{s\_0657}]}{\text{kms\_s\_0657r\_0529}}\right) \cdot \left(1 + \frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0529}}\right) + \left(1 + \frac{[\text{s\_0659}]}{\text{kmp\_s\_0659r\_0529}}\right) \cdot \left(1 + \frac{[\text{s\_0735}]}{\text{kmp\_s\_0735r\_0529}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (835)$$

Table 552: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0529	Keq_r_0529		0.052		☑
Vmax_r_0529	Vmax_r_0529		4.520		☑
kmp_s_0659r_0529	kmp_s_0659r_0529		0.549		☑
kmp_s_0735r_0529	kmp_s_0735r_0529		0.602		☑
kms_s_0657r_0529	kms_s_0657r_0529		0.549		☑
kms_s_1315r_0529	kms_s_1315r_0529		12.851		☑

7.138 Reaction r_0530

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name glycerol-3-phosphate dehydrogenase (NAD)

Notes GENE_ASSOCIATION:(YDL022W or YOL059W) or YOL059W

Reaction equation

$$\mathrm{s\_0735} + \mathrm{s\_0763\_b} + \mathrm{s\_1087} \xrightleftharpoons[]{\mathrm{s\_0735,\ s\_0763\_b,\ s\_1082,\ s\_1087,\ s\_1315}} \mathrm{s\_1082} + \mathrm{s\_1315} \quad (836)$$

Reactants

Table 553: Properties of each reactant.

Id	Name	SBO
s_0735	glycerone phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 554: Properties of each modifier.

Id	Name	SBO
s_0735	glycerone phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Products

Table 555: Properties of each product.

Id	Name	SBO
s_1082	NAD(+) [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{138} = \mathrm{vol}\,(\mathrm{intracellular}) \cdot \mathrm{function\_138}\,(\mathrm{Keq\_r\_0530}, \mathrm{Vmax\_r\_0530}, \mathrm{vol}\,(\mathrm{intracellular})\,, \mathrm{kmp\_s\_1082r\_0530}, \mathrm{kmp\_s\_1315r\_0530}, \mathrm{kms\_s\_0735r\_0530}, \mathrm{kms\_s\_0763\_br\_0530}, \mathrm{kms\_s\_1087r\_0530}, [\mathrm{s\_0735}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1315}]) \quad (837)$$

$$\begin{aligned}
&\text{function_138}\left(\text{Keq_r_0530}, \text{Vmax_r_0530}, \text{vol}\left(\text{intracellular}\right), \text{kmp_s_1082r_0530},\right.\\
&\text{kmp_s_1315r_0530}, \text{kms_s_0735r_0530}, \text{kms_s_0763_br_0530},\\
&\left.\text{kms_s_1087r_0530}, [\text{s_0735}], [\text{s_0763_b}], [\text{s_1082}], [\text{s_1087}], [\text{s_1315}]\right)\\
&= \frac{\text{Vmax_r_0530} \cdot \frac{\left(\frac{1}{\text{kms_s_0735r_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_0763_br_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1087r_0530}}\right)^{1} \cdot \left([\text{s_0735}]^{1} \cdot [\text{s_0763_b}]^{1} \cdot [\text{s_1087}]^{1} - \frac{[\text{s_1082}]^{1} \cdot [\text{s_1315}]^{1}}{\text{Keq_r_0530}}\right)}{\left(1+\frac{[\text{s_0735}]}{\text{kms_s_0735r_0530}}\right) \cdot \left(1+\frac{[\text{s_0763_b}]}{\text{kms_s_0763_br_0530}}\right) \cdot \left(1+\frac{[\text{s_1087}]}{\text{kms_s_1087r_0530}}\right) + \left(1+\frac{[\text{s_1082}]}{\text{kmp_s_1082r_0530}}\right) \cdot \left(1+\frac{[\text{s_1315}]}{\text{kmp_s_1315r_0530}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{838}$$

$$\begin{aligned}
&\text{function_138}\left(\text{Keq_r_0530}, \text{Vmax_r_0530}, \text{vol}\left(\text{intracellular}\right), \text{kmp_s_1082r_0530},\right.\\
&\text{kmp_s_1315r_0530}, \text{kms_s_0735r_0530}, \text{kms_s_0763_br_0530},\\
&\left.\text{kms_s_1087r_0530}, [\text{s_0735}], [\text{s_0763_b}], [\text{s_1082}], [\text{s_1087}], [\text{s_1315}]\right)\\
&= \frac{\text{Vmax_r_0530} \cdot \frac{\left(\frac{1}{\text{kms_s_0735r_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_0763_br_0530}}\right)^{1} \cdot \left(\frac{1}{\text{kms_s_1087r_0530}}\right)^{1} \cdot \left([\text{s_0735}]^{1} \cdot [\text{s_0763_b}]^{1} \cdot [\text{s_1087}]^{1} - \frac{[\text{s_1082}]^{1} \cdot [\text{s_1315}]^{1}}{\text{Keq_r_0530}}\right)}{\left(1+\frac{[\text{s_0735}]}{\text{kms_s_0735r_0530}}\right) \cdot \left(1+\frac{[\text{s_0763_b}]}{\text{kms_s_0763_br_0530}}\right) \cdot \left(1+\frac{[\text{s_1087}]}{\text{kms_s_1087r_0530}}\right) + \left(1+\frac{[\text{s_1082}]}{\text{kmp_s_1082r_0530}}\right) \cdot \left(1+\frac{[\text{s_1315}]}{\text{kmp_s_1315r_0530}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{839}$$

Table 556: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0530	Keq_r_0530		741.470		☑
Vmax_r_0530	Vmax_r_0530		12.584		☑
kmp_s_1082r_0530	kmp_s_1082r_0530		1.503		☑
kmp_s_1315r_0530	kmp_s_1315r_0530		12.851		☑
kms_s_0735r_0530	kms_s_0735r_0530		0.602		☑
kms_s_0763_br_0530	kms_s_0763_br_0530		0.549		☑
kms_s_1087r_0530	kms_s_1087r_0530		0.087		☑

7.139 Reaction r_0534

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name glycerol-3-phosphate/dihydroxyacetone phosphate acyltransferase

Notes GENE_ASSOCIATION:(YBL011W or YKR067W) or YKR067W

Reaction equation

$$s\_0386 + s\_1315 \xrightleftharpoons{s\_0083,\ s\_0386,\ s\_0514,\ s\_0763\_b,\ s\_1315} s\_0083 + s\_0514 + 2\,s\_0763\_b \tag{840}$$

Reactants

Table 557: Properties of each reactant.

Id	Name	SBO
s_0386	acyl-CoA [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Modifiers

Table 558: Properties of each modifier.

Id	Name	SBO
s_0083	1-acyl-sn-glycerol 3-phosphate [intracellular]	
s_0386	acyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1315	sn-glycerol 3-phosphate [intracellular]	

Products

Table 559: Properties of each product.

Id	Name	SBO
s_0083	1-acyl-sn-glycerol 3-phosphate [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{139} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_139}\left(\mathrm{Keq\_r\_0534}, \mathrm{Vmax\_r\_0534}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \\ & \mathrm{kmp\_s\_0083r\_0534}, \mathrm{kmp\_s\_0514r\_0534}, \mathrm{kmp\_s\_0763\_br\_0534}, \mathrm{kms\_s\_0386r\_0534}, \\ & \left.\mathrm{kms\_s\_1315r\_0534}, [\mathrm{s\_0083}], [\mathrm{s\_0386}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1315}]\right) \end{aligned} \tag{841}$$

$$\text{function\_139}(\text{Keq\_r\_0534}, \text{Vmax\_r\_0534}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0083r\_0534}, \text{kmp\_s\_0514r\_0534}, \text{kmp\_s\_0763\_br\_0534}, \text{kms\_s\_0386r\_0534}, \text{kms\_s\_1315r\_0534}, [\text{s\_0083}], [\text{s\_0386}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1315}]) = \frac{\text{Vmax\_r\_0534} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0386r\_0534}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0534}}\right)^1 \cdot \left([\text{s\_0386}]^1 \cdot [\text{s\_1315}]^1 - \frac{[\text{s\_0083}]^1 \cdot [\text{s\_0514}]^1 \cdot [\text{s\_0763\_b}]^2}{\text{Keq\_r\_0534}}\right)}{\left(1+\frac{[\text{s\_0386}]}{\text{kms\_s\_0386r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0534}}\right) + \left(1+\frac{[\text{s\_0083}]}{\text{kmp\_s\_0083r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0534}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{842}$$

$$\text{function\_139}(\text{Keq\_r\_0534}, \text{Vmax\_r\_0534}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0083r\_0534}, \text{kmp\_s\_0514r\_0534}, \text{kmp\_s\_0763\_br\_0534}, \text{kms\_s\_0386r\_0534}, \text{kms\_s\_1315r\_0534}, [\text{s\_0083}], [\text{s\_0386}], [\text{s\_0514}], [\text{s\_0763\_b}], [\text{s\_1315}]) = \frac{\text{Vmax\_r\_0534} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0386r\_0534}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1315r\_0534}}\right)^1 \cdot \left([\text{s\_0386}]^1 \cdot [\text{s\_1315}]^1 - \frac{[\text{s\_0083}]^1 \cdot [\text{s\_0514}]^1 \cdot [\text{s\_0763\_b}]^2}{\text{Keq\_r\_0534}}\right)}{\left(1+\frac{[\text{s\_0386}]}{\text{kms\_s\_0386r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_1315}]}{\text{kms\_s\_1315r\_0534}}\right) + \left(1+\frac{[\text{s\_0083}]}{\text{kmp\_s\_0083r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kmp\_s\_0514r\_0534}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0534}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{843}$$

Table 560: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0534	Keq_r_0534		0.014		☑
Vmax_r_0534	Vmax_r_0534		0.042		☑
kmp_s_0083r_0534	kmp_s_0083r_0534		0.549		☑
kmp_s_0514r_0534	kmp_s_0514r_0534		0.549		☑
kmp_s_0763_br_0534	kmp_s_0763_br_0534		0.549		☑
kms_s_0386r_0534	kms_s_0386r_0534		0.549		☑
kms_s_1315r_0534	kms_s_1315r_0534		12.851		☑

7.140 Reaction r_0538

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name glycine cleavage system

Notes GENE_ASSOCIATION:(YAL044C and YDR019C and YFL018C and YMR189W)

Reaction equation

$$s\_0309 + s\_0740 + s\_1082 \xrightleftharpoons{s\_0307,\ s\_0309,\ s\_0430,\ s\_0470,\ s\_0740,\ s\_1082,\ s\_1087} s\_0307 + s\_0430 + s\_0470 + s\_10 \quad (844)$$

Reactants

Table 561: Properties of each reactant.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0740	glycine [intracellular]	
s_1082	NAD(+) [intracellular]	

Modifiers

Table 562: Properties of each modifier.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0430	ammonium [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0740	glycine [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 563: Properties of each product.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0430	ammonium [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{140} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_140}\left(\mathrm{Keq\_r\_0538}, \mathrm{Vmax\_r\_0538}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.$$
$$\mathrm{kmp\_s\_0307r\_0538}, \mathrm{kmp\_s\_0430r\_0538}, \mathrm{kmp\_s\_0470r\_0538}, \mathrm{kmp\_s\_1087r\_0538},$$
$$\mathrm{kms\_s\_0309r\_0538}, \mathrm{kms\_s\_0740r\_0538}, \mathrm{kms\_s\_1082r\_0538}, [\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0430}],$$
$$\left.[\mathrm{s\_0470}], [\mathrm{s\_0740}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \tag{845}$$

$$\mathrm{function\_140}\left(\mathrm{Keq\_r\_0538}, \mathrm{Vmax\_r\_0538}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \tag{846}$$
$$\mathrm{kmp\_s\_0307r\_0538}, \mathrm{kmp\_s\_0430r\_0538}, \mathrm{kmp\_s\_0470r\_0538},$$
$$\mathrm{kmp\_s\_1087r\_0538}, \mathrm{kms\_s\_0309r\_0538}, \mathrm{kms\_s\_0740r\_0538}, \mathrm{kms\_s\_1082r\_0538},$$
$$\left.[\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0430}], [\mathrm{s\_0470}], [\mathrm{s\_0740}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right)$$
$$= \frac{\mathrm{Vmax\_r\_0538} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0538}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0740}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1}}{\mathrm{Keq\_r\_0538}}\right.}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0538}}\right) + \left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kmp\_s\_0307r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0538}}\right) \cdot \left(\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\mathrm{function\_140}\left(\mathrm{Keq\_r\_0538}, \mathrm{Vmax\_r\_0538}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \tag{847}$$
$$\mathrm{kmp\_s\_0307r\_0538}, \mathrm{kmp\_s\_0430r\_0538}, \mathrm{kmp\_s\_0470r\_0538},$$
$$\mathrm{kmp\_s\_1087r\_0538}, \mathrm{kms\_s\_0309r\_0538}, \mathrm{kms\_s\_0740r\_0538}, \mathrm{kms\_s\_1082r\_0538},$$
$$\left.[\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0430}], [\mathrm{s\_0470}], [\mathrm{s\_0740}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right)$$
$$= \frac{\mathrm{Vmax\_r\_0538} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0309r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0538}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0538}}\right)^{1} \cdot \left([\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0740}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0430}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1}}{\mathrm{Keq\_r\_0538}}\right.}{\left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kms\_s\_0309r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0538}}\right) + \left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kmp\_s\_0307r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0538}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0538}}\right) \cdot \left(\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

Table 564: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0538	Keq_r_0538		0.063		☑
Vmax_r_0538	Vmax_r_0538		9.589		☑
kmp_s_0307r_0538	kmp_s_0307r_0538		0.549		☑
kmp_s_0430r_0538	kmp_s_0430r_0538		0.549		☑
kmp_s_0470r_0538	kmp_s_0470r_0538		1.000		☑
kmp_s_1087r_0538	kmp_s_1087r_0538		0.087		☑
kms_s_0309r_0538	kms_s_0309r_0538		0.549		☑
kms_s_0740r_0538	kms_s_0740r_0538		0.549		☑
kms_s_1082r_0538	kms_s_1082r_0538		1.503		☑

7.141 Reaction r_0539

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name glycine hydroxymethyltransferase

Notes GENE_ASSOCIATION:YLR058C or YBR263W

Reaction equation

$$s\_0307 + s\_0740 + s\_1434\_b \xrightleftharpoons{s\_0307,\ s\_0309,\ s\_0740,\ s\_0943,\ s\_1434\_b} s\_0309 + s\_0943 \quad (848)$$

Reactants

Table 565: Properties of each reactant.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0740	glycine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 566: Properties of each modifier.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0740	glycine [intracellular]	
s_0943	L-serine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 567: Properties of each product.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0943	L-serine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{141} = \mathrm{vol}\,(\mathrm{intracellular}) \cdot \mathrm{function\_141}\,(\mathrm{Keq\_r\_0539}, \mathrm{Vmax\_r\_0539}, \mathrm{vol}\,(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0539}, \mathrm{kmp\_s\_0943r\_0539}, \mathrm{kms\_s\_0307r\_0539}, \mathrm{kms\_s\_0740r\_0539}, \mathrm{kms\_s\_1434\_br\_0539}, [\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0740}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) \quad (849)$$

$$\mathrm{function\_141}\,(\mathrm{Keq\_r\_0539}, \mathrm{Vmax\_r\_0539}, \mathrm{vol}\,(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0539}, \mathrm{kmp\_s\_0943r\_0539}, \mathrm{kms\_s\_0307r\_0539}, \mathrm{kms\_s\_0740r\_0539}, \mathrm{kms\_s\_1434\_br\_0539}, [\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0740}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0539} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0539}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0539}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0539}}\right)^1 \cdot \left([\mathrm{s\_0307}]^1 \cdot [\mathrm{s\_0740}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_0943}]^1}{\mathrm{Keq\_r\_0539}}\right)}{\left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0539}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kmp\_s\_0943r\_0539}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (850)$$

$$\mathrm{function\_141}\,(\mathrm{Keq\_r\_0539}, \mathrm{Vmax\_r\_0539}, \mathrm{vol}\,(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0539}, \mathrm{kmp\_s\_0943r\_0539}, \mathrm{kms\_s\_0307r\_0539}, \mathrm{kms\_s\_0740r\_0539}, \mathrm{kms\_s\_1434\_br\_0539}, [\mathrm{s\_0307}], [\mathrm{s\_0309}], [\mathrm{s\_0740}], [\mathrm{s\_0943}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0539} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0539}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0539}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0539}}\right)^1 \cdot \left([\mathrm{s\_0307}]^1 \cdot [\mathrm{s\_0740}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_0943}]^1}{\mathrm{Keq\_r\_0539}}\right)}{\left(1+\frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0539}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0539}}\right) \cdot \left(1+\frac{[\mathrm{s\_0943}]}{\mathrm{kmp\_s\_0943r\_0539}}\right) - 1}}{\mathrm{vol}\,(\mathrm{intracellular})} \quad (851)$$

Table 568: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0539	Keq_r_0539		2.004		☑
Vmax_r_0539	Vmax_r_0539		2.214		☑
kmp_s_0309r-_0539	kmp_s_0309r_0539		0.549		☑
kmp_s_0943r-_0539	kmp_s_0943r_0539		0.549		☑
kms_s_0307r-_0539	kms_s_0307r_0539		0.549		☑
kms_s_0740r-_0539	kms_s_0740r_0539		0.549		☑
kms_s_1434-_br_0539	kms_s_1434_br-_0539		0.549		☑

7.142 Reaction r_0547

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name glycogen (starch) synthase

Notes GENE_ASSOCIATION:((YFR015C and YJL137C) or (YFR015C and YKR058W) or (YJL137C and YLR258W) or (YKR058W and YLR258W))

Reaction equation

$$s\_1415 + s\_1434\_b \xrightleftharpoons{s\_0438,\ s\_0763\_b,\ s\_1411,\ s\_1415,\ s\_1434\_b} s\_0438 + s\_0763\_b + s\_1411 \quad (852)$$

Reactants

Table 569: Properties of each reactant.

Id	Name	SBO
s_1415	UDP-D-glucose [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 570: Properties of each modifier.

Id	Name	SBO
s_0438	amylose [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	
s_1415	UDP-D-glucose [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 571: Properties of each product.

Id	Name	SBO
s_0438	amylose [intracellular]	
s_0763_b	H+ [intracellular]	
s_1411	UDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{142} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_142}\left(\mathrm{Keq\_r\_0547}, \mathrm{Vmax\_r\_0547}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0438r\_0547}, \mathrm{kmp\_s\_0763\_br\_0547}, \mathrm{kmp\_s\_1411r\_0547}, \mathrm{kms\_s\_1415r\_0547}, \mathrm{kms\_s\_1434\_br\_0547}, [\mathrm{s\_0438}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}], [\mathrm{s\_1434\_b}]\right) \quad (853)$$

$$\mathrm{function\_142}\left(\mathrm{Keq\_r\_0547}, \mathrm{Vmax\_r\_0547}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0438r\_0547}, \mathrm{kmp\_s\_0763\_br\_0547}, \mathrm{kmp\_s\_1411r\_0547}, \mathrm{kms\_s\_1415r\_0547}, \mathrm{kms\_s\_1434\_br\_0547}, [\mathrm{s\_0438}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0547} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0547}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0547}}\right)^{1} \cdot \left([\mathrm{s\_1415}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0438}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0547}}\right)}{\left(1 + \frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0547}}\right) + \left(1 + \frac{[\mathrm{s\_0438}]}{\mathrm{kmp\_s\_0438r\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0547}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (854)$$

$$\mathrm{function\_142}\left(\mathrm{Keq\_r\_0547}, \mathrm{Vmax\_r\_0547}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0438r\_0547}, \mathrm{kmp\_s\_0763\_br\_0547}, \mathrm{kmp\_s\_1411r\_0547}, \mathrm{kms\_s\_1415r\_0547}, \mathrm{kms\_s\_1434\_br\_0547}, [\mathrm{s\_0438}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1411}], [\mathrm{s\_1415}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0547} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1415r\_0547}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0547}}\right)^{1} \cdot \left([\mathrm{s\_1415}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0438}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1411}]^{1}}{\mathrm{Keq\_r\_0547}}\right)}{\left(1 + \frac{[\mathrm{s\_1415}]}{\mathrm{kms\_s\_1415r\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0547}}\right) + \left(1 + \frac{[\mathrm{s\_0438}]}{\mathrm{kmp\_s\_0438r\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0547}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kmp\_s\_1411r\_0547}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (855)$$

Table 572: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0547`	Keq_r_0547		0.604		☑
`Vmax_r_0547`	Vmax_r_0547		3.485		☑
`kmp_s_0438r-_0547`	kmp_s_0438r_0547		0.549		☑
`kmp_s_0763-_br_0547`	kmp_s_0763_br-_0547		0.549		☑
`kmp_s_1411r-_0547`	kmp_s_1411r_0547		0.549		☑
`kms_s_1415r-_0547`	kms_s_1415r_0547		0.549		☑
`kms_s_1434-_br_0547`	kms_s_1434_br-_0547		0.549		☑

7.143 Reaction r_0551

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name GMP synthase

Notes GENE_ASSOCIATION:YMR217W

Reaction equation

$$s\_0306 + s\_0446 + s\_0907 + s\_1434\_b \xrightleftharpoons{s\_0306,\ s\_0434,\ s\_0446,\ s\_0605,\ s\_0752,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1434\_b} \quad (856)$$

Reactants

Table 573: Properties of each reactant.

Id	Name	SBO
s_0306	5'-xanthylic acid [intracellular]	
s_0446	ATP [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 574: Properties of each modifier.

Id	Name	SBO
s_0306	5'-xanthylic acid [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0752	GMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 575: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0752	GMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{143} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_143}\left(\mathrm{Keq\_r\_0551}, \mathrm{Vmax\_r\_0551}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0551}, \mathrm{kmp\_s\_0605r\_0551}, \mathrm{kmp\_s\_0752r\_0551}, \mathrm{kmp\_s\_0763\_br\_0551}, \mathrm{kmp\_s\_0899r\_0551}, \mathrm{kms\_s\_0306r\_0551}, \mathrm{kms\_s\_0446r\_0551}, \mathrm{kms\_s\_0907r\_0551}, \mathrm{kms\_s\_1434\_br\_0551}, [\mathrm{s\_0306}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0752}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) \tag{857}$$

$$\mathrm{function\_143}\left(\mathrm{Keq\_r\_0551}, \mathrm{Vmax\_r\_0551}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0551}, \mathrm{kmp\_s\_0605r\_0551}, \mathrm{kmp\_s\_0752r\_0551}, \mathrm{kmp\_s\_0763\_br\_0551}, \mathrm{kmp\_s\_0899r\_0551}, \mathrm{kms\_s\_0306r\_0551}, \mathrm{kms\_s\_0446r\_0551}, \mathrm{kms\_s\_0907r\_0551}, \mathrm{kms\_s\_1434\_br\_0551}, [\mathrm{s\_0306}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0752}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0551} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0306r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0551}}\right)^{1} \cdot \left([\mathrm{s\_0306}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_14}\right.}{\left(1 + \frac{[\mathrm{s\_0306}]}{\mathrm{kms\_s\_0306r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0551}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0551}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{858}$$

$$\mathrm{function\_143}\left(\mathrm{Keq\_r\_0551}, \mathrm{Vmax\_r\_0551}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0434r\_0551}, \mathrm{kmp\_s\_0605r\_0551}, \mathrm{kmp\_s\_0752r\_0551}, \mathrm{kmp\_s\_0763\_br\_0551}, \mathrm{kmp\_s\_0899r\_0551}, \mathrm{kms\_s\_0306r\_0551}, \mathrm{kms\_s\_0446r\_0551}, \mathrm{kms\_s\_0907r\_0551}, \mathrm{kms\_s\_1434\_br\_0551}, [\mathrm{s\_0306}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0752}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0551} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0306r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0551}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0551}}\right)^{1} \cdot \left([\mathrm{s\_0306}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0907}]^{1} \cdot [\mathrm{s\_14}\right.}{\left(1 + \frac{[\mathrm{s\_0306}]}{\mathrm{kms\_s\_0306r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0551}}\right) + \left(1 + \frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0551}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0551}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{859}$$

Table 576: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0551	Keq_r_0551		0.382		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0551	Vmax_r_0551		1.572		☑
kmp_s_0434r-_0551	kmp_s_0434r_0551		1.260		☑
kmp_s_0605r-_0551	kmp_s_0605r_0551		0.549		☑
kmp_s_0752r-_0551	kmp_s_0752r_0551		0.549		☑
kmp_s_0763-_br_0551	kmp_s_0763_br-_0551		0.549		☑
kmp_s_0899r-_0551	kmp_s_0899r_0551		0.549		☑
kms_s_0306r-_0551	kms_s_0306r_0551		0.549		☑
kms_s_0446r-_0551	kms_s_0446r_0551		1.092		☑
kms_s_0907r-_0551	kms_s_0907r_0551		0.549		☑
kms_s_1434-_br_0551	kms_s_1434_br-_0551		0.549		☑

7.144 Reaction r_0562

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name GTP cyclohydrolase II

Notes GENE_ASSOCIATION:YBL033C

Reaction equation

$$\text{s\_0755} + 3\,\text{s\_1434\_b} \xrightleftharpoons{\text{s\_0145, s\_0605, s\_0689, s\_0755, s\_0763\_b, s\_1434\_b}} \text{s\_0145} + \text{s\_0605} + \text{s\_0689} + 2\,\text{s\_0763\_b} \quad (860)$$

Reactants

Table 577: Properties of each reactant.

Id	Name	SBO
s_0755	GTP [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 578: Properties of each modifier.

Id	Name	SBO
s_0145	2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]	
s_0605	diphosphate [intracellular]	
s_0689	formate [intracellular]	
s_0755	GTP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 579: Properties of each product.

Id	Name	SBO
s_0145	2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]	
s_0605	diphosphate [intracellular]	
s_0689	formate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{144} = &\ \mathrm{vol}\left(\mathrm{intracellular}\right) \\
&\cdot \mathrm{function\_144}\left(\mathrm{Keq\_r\_0562}, \mathrm{Vmax\_r\_0562}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0145r\_0562}, \right. \\
&\quad \mathrm{kmp\_s\_0605r\_0562}, \mathrm{kmp\_s\_0689r\_0562}, \mathrm{kmp\_s\_0763\_br\_0562}, \mathrm{kms\_s\_0755r\_0562}, \\
&\quad \left. \mathrm{kms\_s\_1434\_br\_0562}, [\mathrm{s\_0145}], [\mathrm{s\_0605}], [\mathrm{s\_0689}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right)
\end{aligned}
\tag{861}
$$

$$
\begin{aligned}
&\mathrm{function\_144}\left(\mathrm{Keq\_r\_0562}, \mathrm{Vmax\_r\_0562}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0145r\_0562}, \right. \\
&\mathrm{kmp\_s\_0605r\_0562}, \mathrm{kmp\_s\_0689r\_0562}, \mathrm{kmp\_s\_0763\_br\_0562}, \mathrm{kms\_s\_0755r\_0562}, \\
&\left. \mathrm{kms\_s\_1434\_br\_0562}, [\mathrm{s\_0145}], [\mathrm{s\_0605}], [\mathrm{s\_0689}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) \\
&= \frac{\mathrm{Vmax\_r\_0562} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0755r\_0562}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0562}}\right)^{3} \cdot \left([\mathrm{s\_0755}]^{1} \cdot [\mathrm{s\_1434\_b}]^{3} - \frac{[\mathrm{s\_0145}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0689}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2}}{\mathrm{Keq\_r\_0562}}\right)}{\left(1 + \frac{[\mathrm{s\_0755}]}{\mathrm{kms\_s\_0755r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0562}}\right) + \left(1 + \frac{[\mathrm{s\_0145}]}{\mathrm{kmp\_s\_0145r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0562}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{862}
$$

$$\begin{aligned}&\mathrm{function\_144}\left(\mathrm{Keq\_r\_0562}, \mathrm{Vmax\_r\_0562}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0145r\_0562},\right.\\&\mathrm{kmp\_s\_0605r\_0562}, \mathrm{kmp\_s\_0689r\_0562}, \mathrm{kmp\_s\_0763\_br\_0562}, \mathrm{kms\_s\_0755r\_0562},\\&\left.\mathrm{kms\_s\_1434\_br\_0562}, [\mathrm{s\_0145}], [\mathrm{s\_0605}], [\mathrm{s\_0689}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right)\\&= \frac{\mathrm{Vmax\_r\_0562} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0755r\_0562}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0562}}\right)^{3} \cdot \left([\mathrm{s\_0755}]^{1} \cdot [\mathrm{s\_1434\_b}]^{3} - \frac{[\mathrm{s\_0145}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0689}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2}}{\mathrm{Keq\_r\_0562}}\right)}{\left(1 + \frac{[\mathrm{s\_0755}]}{\mathrm{kms\_s\_0755r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0562}}\right) + \left(1 + \frac{[\mathrm{s\_0145}]}{\mathrm{kmp\_s\_0145r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0689}]}{\mathrm{kmp\_s\_0689r\_0562}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0562}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \quad (863)$$

Table 580: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0562	Keq_r_0562		0.604		☑
Vmax_r_0562	Vmax_r_0562		0.010		☑
kmp_s_0145r-_0562	kmp_s_0145r_0562		0.549		☑
kmp_s_0605r-_0562	kmp_s_0605r_0562		0.549		☑
kmp_s_0689r-_0562	kmp_s_0689r_0562		0.549		☑
kmp_s_0763-_br_0562	kmp_s_0763_br-_0562		0.549		☑
kms_s_0755r-_0562	kms_s_0755r_0562		0.549		☑
kms_s_1434-_br_0562	kms_s_1434_br-_0562		0.549		☑

7.145 Reaction r_0567

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name guanylate kinase (GMP:ATP)

Notes GENE_ASSOCIATION:YDR454C

Reaction equation

$$\mathrm{s\_0446} + \mathrm{s\_0752} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_0706,\ s\_0752}} \mathrm{s\_0400} + \mathrm{s\_0706} \quad (864)$$

Reactants

Table 581: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0752	GMP [intracellular]	

Modifiers

Table 582: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0706	GDP [intracellular]	
s_0752	GMP [intracellular]	

Products

Table 583: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0706	GDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{145} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_145}\left(\mathrm{Keq\_r\_0567}, \mathrm{Vmax\_r\_0567}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0567}, \mathrm{kmp\_s\_0706r\_0567}, \mathrm{kms\_s\_0446r\_0567}, \mathrm{kms\_s\_0752r\_0567}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0706}], [\mathrm{s\_0752}]\right) \quad (865)$$

$$\mathrm{function\_145}\left(\mathrm{Keq\_r\_0567}, \mathrm{Vmax\_r\_0567}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0567}, \mathrm{kmp\_s\_0706r\_0567}, \mathrm{kms\_s\_0446r\_0567}, \mathrm{kms\_s\_0752r\_0567}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0706}], [\mathrm{s\_0752}]\right) = \frac{\mathrm{Vmax\_r\_0567} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0567}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0752r\_0567}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0752}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0706}]^{1}}{\mathrm{Keq\_r\_0567}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0567}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0752}]}{\mathrm{kms\_s\_0752r\_0567}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0567}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0567}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (866)$$

$$\begin{aligned}&\text{function\_145}\left(\text{Keq\_r\_0567}, \text{Vmax\_r\_0567}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0400r\_0567}, \text{kmp\_s\_0706r\_0567}, \text{kms\_s\_0446r\_0567},\\&\quad\left.\text{kms\_s\_0752r\_0567}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0706}], [\text{s\_0752}]\right)\\&= \frac{\text{Vmax\_r\_0567} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0567}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0752r\_0567}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0752}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0706}]^{1}}{\text{Keq\_r\_0567}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0567}}\right) \cdot \left(1+\frac{[\text{s\_0752}]}{\text{kms\_s\_0752r\_0567}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0567}}\right) \cdot \left(1+\frac{[\text{s\_0706}]}{\text{kmp\_s\_0706r\_0567}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{867}$$

Table 584: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0567	Keq_r_0567		1.732		☑
Vmax_r_0567	Vmax_r_0567		0.008		☑
kmp_s_0400r-_0567	kmp_s_0400r_0567		1.719		☑
kmp_s_0706r-_0567	kmp_s_0706r_0567		0.549		☑
kms_s_0446r-_0567	kms_s_0446r_0567		1.092		☑
kms_s_0752r-_0567	kms_s_0752r_0567		0.549		☑

7.146 Reaction r_0568

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name guanylate kinase (GMP:dATP)

Notes GENE_ASSOCIATION:YDR454C

Reaction equation

$$\text{s\_0566} + \text{s\_0752} \xrightleftharpoons{\text{s\_0562, s\_0566, s\_0706, s\_0752}} \text{s\_0562} + \text{s\_0706} \tag{868}$$

Reactants

Table 585: Properties of each reactant.

Id	Name	SBO
s_0566	dATP [intracellular]	
s_0752	GMP [intracellular]	

Modifiers

Table 586: Properties of each modifier.

Id	Name	SBO
s_0562	dADP [intracellular]	
s_0566	dATP [intracellular]	
s_0706	GDP [intracellular]	
s_0752	GMP [intracellular]	

Products

Table 587: Properties of each product.

Id	Name	SBO
s_0562	dADP [intracellular]	
s_0706	GDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{146} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_146}(\mathrm{Keq\_r\_0568}, \mathrm{Vmax\_r\_0568}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0568}, \mathrm{kmp\_s\_0706r\_0568}, \mathrm{kms\_s\_0566r\_0568}, \mathrm{kms\_s\_0752r\_0568}, [\mathrm{s\_0562}], [\mathrm{s\_0566}], [\mathrm{s\_0706}], [\mathrm{s\_0752}]) \quad (869)$$

$$\mathrm{function\_146}(\mathrm{Keq\_r\_0568}, \mathrm{Vmax\_r\_0568}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0568}, \mathrm{kmp\_s\_0706r\_0568}, \mathrm{kms\_s\_0566r\_0568}, \mathrm{kms\_s\_0752r\_0568}, [\mathrm{s\_0562}], [\mathrm{s\_0566}], [\mathrm{s\_0706}], [\mathrm{s\_0752}]) = \frac{\mathrm{Vmax\_r\_0568} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0566r\_0568}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0752r\_0568}}\right)^1 \cdot \left([\mathrm{s\_0566}]^1 \cdot [\mathrm{s\_0752}]^1 - \frac{[\mathrm{s\_0562}]^1 \cdot [\mathrm{s\_0706}]^1}{\mathrm{Keq\_r\_0568}}\right)}{\left(1+\frac{[\mathrm{s\_0566}]}{\mathrm{kms\_s\_0566r\_0568}}\right) \cdot \left(1+\frac{[\mathrm{s\_0752}]}{\mathrm{kms\_s\_0752r\_0568}}\right) + \left(1+\frac{[\mathrm{s\_0562}]}{\mathrm{kmp\_s\_0562r\_0568}}\right) \cdot \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0568}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (870)$$

$$\mathrm{function\_146}(\mathrm{Keq\_r\_0568}, \mathrm{Vmax\_r\_0568}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0568}, \mathrm{kmp\_s\_0706r\_0568}, \mathrm{kms\_s\_0566r\_0568}, \mathrm{kms\_s\_0752r\_0568}, [\mathrm{s\_0562}], [\mathrm{s\_0566}], [\mathrm{s\_0706}], [\mathrm{s\_0752}]) = \frac{\mathrm{Vmax\_r\_0568} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0566r\_0568}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0752r\_0568}}\right)^1 \cdot \left([\mathrm{s\_0566}]^1 \cdot [\mathrm{s\_0752}]^1 - \frac{[\mathrm{s\_0562}]^1 \cdot [\mathrm{s\_0706}]^1}{\mathrm{Keq\_r\_0568}}\right)}{\left(1+\frac{[\mathrm{s\_0566}]}{\mathrm{kms\_s\_0566r\_0568}}\right) \cdot \left(1+\frac{[\mathrm{s\_0752}]}{\mathrm{kms\_s\_0752r\_0568}}\right) + \left(1+\frac{[\mathrm{s\_0562}]}{\mathrm{kmp\_s\_0562r\_0568}}\right) \cdot \left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kmp\_s\_0706r\_0568}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (871)$$

Table 588: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0568	Keq_r_0568		1.100		☑
Vmax_r_0568	Vmax_r_0568		0.008		☑
kmp_s_0562r-_0568	kmp_s_0562r_0568		0.549		☑
kmp_s_0706r-_0568	kmp_s_0706r_0568		0.549		☑
kms_s_0566r-_0568	kms_s_0566r_0568		0.549		☑
kms_s_0752r-_0568	kms_s_0752r_0568		0.549		☑

7.147 Reaction r_0573

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name hexokinase (D-glucose:ATP)

Notes GENE_ASSOCIATION:(YCL040W or YFR053C or YGL253W)

Reaction equation

$$\mathrm{s\_0446} + \mathrm{s\_0545} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0410,\ s\_0446,\ s\_0545,\ s\_0763\_b}} \mathrm{s\_0400} + \mathrm{s\_0410} + \mathrm{s\_0763\_b} \tag{872}$$

Reactants

Table 589: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0545	D-glucose [intracellular]	

Modifiers

Table 590: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0545	D-glucose [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 591: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{147} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_147}(\mathrm{Keq\_r\_0573}, \mathrm{Vmax\_r\_0573}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0573}, \mathrm{kmp\_s\_0410r\_0573}, \mathrm{kmp\_s\_0763\_br\_0573}, \mathrm{kms\_s\_0446r\_0573}, \mathrm{kms\_s\_0545r\_0573}, [\mathrm{s\_0400}], [\mathrm{s\_0410}], [\mathrm{s\_0446}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) \quad (873)$$

$$\mathrm{function\_147}(\mathrm{Keq\_r\_0573}, \mathrm{Vmax\_r\_0573}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0573}, \mathrm{kmp\_s\_0410r\_0573}, \mathrm{kmp\_s\_0763\_br\_0573}, \mathrm{kms\_s\_0446r\_0573}, \mathrm{kms\_s\_0545r\_0573}, [\mathrm{s\_0400}], [\mathrm{s\_0410}], [\mathrm{s\_0446}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0573} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0573}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0545r\_0573}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0545}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0410}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0573}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0545}]}{\mathrm{kms\_s\_0545r\_0573}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kmp\_s\_0410r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0573}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (874)$$

$$\mathrm{function\_147}(\mathrm{Keq\_r\_0573}, \mathrm{Vmax\_r\_0573}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0573}, \mathrm{kmp\_s\_0410r\_0573}, \mathrm{kmp\_s\_0763\_br\_0573}, \mathrm{kms\_s\_0446r\_0573}, \mathrm{kms\_s\_0545r\_0573}, [\mathrm{s\_0400}], [\mathrm{s\_0410}], [\mathrm{s\_0446}], [\mathrm{s\_0545}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0573} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0573}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0545r\_0573}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0545}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0410}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0573}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0545}]}{\mathrm{kms\_s\_0545r\_0573}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kmp\_s\_0410r\_0573}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0573}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (875)$$

Table 592: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0573	Keq_r_0573		2000.000		☑
Vmax_r_0573	Vmax_r_0573		1.996		☑
kmp_s_0400r-_0573	kmp_s_0400r_0573		1.719		☑
kmp_s_0410r-_0573	kmp_s_0410r_0573		0.549		☑
kmp_s_0763-_br_0573	kmp_s_0763_br-_0573		0.549		☑
kms_s_0446r-_0573	kms_s_0446r_0573		1.092		☑
kms_s_0545r-_0573	kms_s_0545r_0573		0.099		☑

7.148 Reaction r_0575

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name histidinol dehydrogenase

Notes GENE_ASSOCIATION:YCL030C

Reaction equation

$$\mathrm{s\_0915} + 2\,\mathrm{s\_1082} + \mathrm{s\_1434\_b} \xrightleftharpoons[]{\mathrm{s\_0763\_b},\ \mathrm{s\_0911},\ \mathrm{s\_0915},\ \mathrm{s\_1082},\ \mathrm{s\_1087},\ \mathrm{s\_1434\_b}} 3\,\mathrm{s\_0763\_b} + \mathrm{s\_0911} + 2\,\mathrm{s\_1087} \quad (876)$$

Reactants

Table 593: Properties of each reactant.

Id	Name	SBO
s_0915	L-histidinol [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 594: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0911	L-histidine [intracellular]	
s_0915	L-histidinol [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 595: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0911	L-histidine [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{148} = & \operatorname{vol}(\text{intracellular}) \\ & \cdot \text{function\_148}(\text{Keq\_r\_0575}, \text{Vmax\_r\_0575}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0763\_br\_0575}, \\ & \text{kmp\_s\_0911r\_0575}, \text{kmp\_s\_1087r\_0575}, \text{kms\_s\_0915r\_0575}, \text{kms\_s\_1082r\_0575}, \\ & \text{kms\_s\_1434\_br\_0575}, [\text{s\_0763\_b}], [\text{s\_0911}], [\text{s\_0915}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1434\_b}]) \end{aligned} \tag{877}$$

$$\begin{aligned} & \text{function\_148}(\text{Keq\_r\_0575}, \text{Vmax\_r\_0575}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0763\_br\_0575}, \\ & \text{kmp\_s\_0911r\_0575}, \text{kmp\_s\_1087r\_0575}, \text{kms\_s\_0915r\_0575}, \text{kms\_s\_1082r\_0575}, \\ & \text{kms\_s\_1434\_br\_0575}, [\text{s\_0763\_b}], [\text{s\_0911}], [\text{s\_0915}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1434\_b}]) \\ = & \frac{\text{Vmax\_r\_0575} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0915r\_0575}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0575}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0575}}\right)^{1} \cdot \left([\text{s\_0915}]^{1} \cdot [\text{s\_1082}]^{2} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0763\_b}]^{3} \cdot [\text{s\_0911}]^{1} \cdot [\text{s\_1087}]^{2}}{\text{Keq\_r\_0575}}\right)}{\left(1+\frac{[\text{s\_0915}]}{\text{kms\_s\_0915r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0575}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0575}}\right) \cdot \left(1+\frac{[\text{s\_0911}]}{\text{kmp\_s\_0911r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kmp\_s\_1087r\_0575}}\right)}}{\operatorname{vol}(\text{intracellular})} \end{aligned} \tag{878}$$

$$\begin{aligned} & \text{function\_148}(\text{Keq\_r\_0575}, \text{Vmax\_r\_0575}, \operatorname{vol}(\text{intracellular}), \text{kmp\_s\_0763\_br\_0575}, \\ & \text{kmp\_s\_0911r\_0575}, \text{kmp\_s\_1087r\_0575}, \text{kms\_s\_0915r\_0575}, \text{kms\_s\_1082r\_0575}, \\ & \text{kms\_s\_1434\_br\_0575}, [\text{s\_0763\_b}], [\text{s\_0911}], [\text{s\_0915}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1434\_b}]) \\ = & \frac{\text{Vmax\_r\_0575} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0915r\_0575}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0575}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0575}}\right)^{1} \cdot \left([\text{s\_0915}]^{1} \cdot [\text{s\_1082}]^{2} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0763\_b}]^{3} \cdot [\text{s\_0911}]^{1} \cdot [\text{s\_1087}]^{2}}{\text{Keq\_r\_0575}}\right)}{\left(1+\frac{[\text{s\_0915}]}{\text{kms\_s\_0915r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0575}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0575}}\right) \cdot \left(1+\frac{[\text{s\_0911}]}{\text{kmp\_s\_0911r\_0575}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kmp\_s\_1087r\_0575}}\right)}}{\operatorname{vol}(\text{intracellular})} \end{aligned} \tag{879}$$

Table 596: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0575	Keq_r_0575		0.001		☑
Vmax_r_0575	Vmax_r_0575		0.688		☑
kmp_s_0763-_br_0575	kmp_s_0763_br-_0575		0.549		☑
kmp_s_0911r-_0575	kmp_s_0911r_0575		0.549		☑
kmp_s_1087r-_0575	kmp_s_1087r_0575		0.087		☑
kms_s_0915r-_0575	kms_s_0915r_0575		0.549		☑
kms_s_1082r-_0575	kms_s_1082r_0575		1.503		☑
kms_s_1434-_br_0575	kms_s_1434_br-_0575		0.549		☑

7.149 Reaction r_0576

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name histidinol-phosphatase

Notes GENE_ASSOCIATION:YFR025C

Reaction equation

$$\text{s\_0916} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0915, s\_0916, s\_1207, s\_1434\_b}} \text{s\_0915} + \text{s\_1207} \tag{880}$$

Reactants

Table 597: Properties of each reactant.

Id	Name	SBO
s_0916	L-histidinol phosphate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 598: Properties of each modifier.

Id	Name	SBO
s_0915	L-histidinol [intracellular]	
s_0916	L-histidinol phosphate [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 599: Properties of each product.

Id	Name	SBO
s_0915	L-histidinol [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{149} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_149}(\mathrm{Keq\_r\_0576}, \mathrm{Vmax\_r\_0576}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0915r\_0576}, \mathrm{kmp\_s\_1207r\_0576}, \mathrm{kms\_s\_0916r\_0576}, \mathrm{kms\_s\_1434\_br\_0576}, [\mathrm{s\_0915}], [\mathrm{s\_0916}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \quad (881)$$

$$\mathrm{function\_149}(\mathrm{Keq\_r\_0576}, \mathrm{Vmax\_r\_0576}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0915r\_0576}, \mathrm{kmp\_s\_1207r\_0576}, \mathrm{kms\_s\_0916r\_0576}, \mathrm{kms\_s\_1434\_br\_0576}, [\mathrm{s\_0915}], [\mathrm{s\_0916}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0576} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0916r\_0576}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0576}}\right)^1 \cdot \left([\mathrm{s\_0916}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0915}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0576}}\right)}{\left(1+\frac{[\mathrm{s\_0916}]}{\mathrm{kms\_s\_0916r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0576}}\right) + \left(1+\frac{[\mathrm{s\_0915}]}{\mathrm{kmp\_s\_0915r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0576}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (882)$$

$$\mathrm{function\_149}(\mathrm{Keq\_r\_0576}, \mathrm{Vmax\_r\_0576}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0915r\_0576}, \mathrm{kmp\_s\_1207r\_0576}, \mathrm{kms\_s\_0916r\_0576}, \mathrm{kms\_s\_1434\_br\_0576}, [\mathrm{s\_0915}], [\mathrm{s\_0916}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0576} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0916r\_0576}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0576}}\right)^1 \cdot \left([\mathrm{s\_0916}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0915}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0576}}\right)}{\left(1+\frac{[\mathrm{s\_0916}]}{\mathrm{kms\_s\_0916r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0576}}\right) + \left(1+\frac{[\mathrm{s\_0915}]}{\mathrm{kmp\_s\_0915r\_0576}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0576}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (883)$$

Table 600: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0576	Keq_r_0576		1.100		☑
Vmax_r_0576	Vmax_r_0576		0.321		☑
kmp_s_0915r-_0576	kmp_s_0915r_0576		0.549		☑
kmp_s_1207r-_0576	kmp_s_1207r_0576		0.549		☑
kms_s_0916r-_0576	kms_s_0916r_0576		0.549		☑
kms_s_1434-_br_0576	kms_s_1434_br-_0576		0.549		☑

7.150 Reaction r_0577

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name histidinol-phosphate transaminase

Notes GENE_ASSOCIATION:YIL116W

Reaction equation

$$s\_0212 + s\_0899 \xrightleftharpoons{s\_0185,\ s\_0212,\ s\_0899,\ s\_0916} s\_0185 + s\_0916 \tag{884}$$

Reactants

Table 601: Properties of each reactant.

Id	Name	SBO
s_0212	3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 602: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0212	3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]	
s_0899	L-glutamate [intracellular]	

Id	Name	SBO
s_0916	L-histidinol phosphate [intracellular]	

Products

Table 603: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0916	L-histidinol phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{150} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_150}(\mathrm{Keq\_r\_0577}, \mathrm{Vmax\_r\_0577}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0577}, \mathrm{kmp\_s\_0916r\_0577}, \mathrm{kms\_s\_0212r\_0577}, \mathrm{kms\_s\_0899r\_0577}, [\mathrm{s\_0185}], [\mathrm{s\_0212}], [\mathrm{s\_0899}], [\mathrm{s\_0916}]) \tag{885}$$

$$\mathrm{function\_150}(\mathrm{Keq\_r\_0577}, \mathrm{Vmax\_r\_0577}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0577}, \mathrm{kmp\_s\_0916r\_0577}, \mathrm{kms\_s\_0212r\_0577}, \mathrm{kms\_s\_0899r\_0577}, [\mathrm{s\_0185}], [\mathrm{s\_0212}], [\mathrm{s\_0899}], [\mathrm{s\_0916}]) = \frac{\mathrm{Vmax\_r\_0577} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0212r\_0577}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0577}}\right)^{1} \cdot \left([\mathrm{s\_0212}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0916}]^{1}}{\mathrm{Keq\_r\_0577}}\right)}{\left(1 + \frac{[\mathrm{s\_0212}]}{\mathrm{kms\_s\_0212r\_0577}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0577}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0577}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0916}]}{\mathrm{kmp\_s\_0916r\_0577}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{886}$$

$$\mathrm{function\_150}(\mathrm{Keq\_r\_0577}, \mathrm{Vmax\_r\_0577}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0577}, \mathrm{kmp\_s\_0916r\_0577}, \mathrm{kms\_s\_0212r\_0577}, \mathrm{kms\_s\_0899r\_0577}, [\mathrm{s\_0185}], [\mathrm{s\_0212}], [\mathrm{s\_0899}], [\mathrm{s\_0916}]) = \frac{\mathrm{Vmax\_r\_0577} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0212r\_0577}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0577}}\right)^{1} \cdot \left([\mathrm{s\_0212}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0916}]^{1}}{\mathrm{Keq\_r\_0577}}\right)}{\left(1 + \frac{[\mathrm{s\_0212}]}{\mathrm{kms\_s\_0212r\_0577}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0577}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0577}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0916}]}{\mathrm{kmp\_s\_0916r\_0577}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{887}$$

Table 604: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0577	Keq_r_0577		1.100		☑
Vmax_r_0577	Vmax_r_0577		0.321		☑
kmp_s_0185r-_0577	kmp_s_0185r_0577		0.549		☑
kmp_s_0916r-_0577	kmp_s_0916r_0577		0.549		☑
kms_s_0212r-_0577	kms_s_0212r_0577		0.549		☑
kms_s_0899r-_0577	kms_s_0899r_0577		0.549		☑

7.151 Reaction r_0581

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name homoacontinate hydratase

Notes GENE_ASSOCIATION:YDR234W

Reaction equation

$$\text{s\_0468} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0468, s\_0800, s\_1434\_b}} \text{s\_0800} \tag{888}$$

Reactants

Table 605: Properties of each reactant.

Id	Name	SBO
s_0468	but-1-ene-1,2,4-tricarboxylic acid [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 606: Properties of each modifier.

Id	Name	SBO
s_0468	but-1-ene-1,2,4-tricarboxylic acid [intracellular]	
s_0800	homoisocitrate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Product

Table 607: Properties of each product.

Id	Name	SBO
s_0800	homoisocitrate(3-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{151} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_151}\left(\mathrm{Keq\_r\_0581}, \mathrm{Vmax\_r\_0581}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0800r\_0581}, \mathrm{kms\_s\_0468r\_0581}, \mathrm{kms\_s\_1434\_br\_0581}, [\mathrm{s\_0468}], [\mathrm{s\_0800}], [\mathrm{s\_1434\_b}]\right) \quad (889)$$

$$\mathrm{function\_151}\left(\mathrm{Keq\_r\_0581}, \mathrm{Vmax\_r\_0581}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0800r\_0581}, \mathrm{kms\_s\_0468r\_0581}, \mathrm{kms\_s\_1434\_br\_0581}, [\mathrm{s\_0468}], [\mathrm{s\_0800}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0581} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0468r\_0581}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0581}}\right)^{1} \cdot \left([\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0800}]^{1}}{\mathrm{Keq\_r\_0581}}\right)}{\left(1 + \frac{[\mathrm{s\_0468}]}{\mathrm{kms\_s\_0468r\_0581}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0581}}\right) + 1 + \frac{[\mathrm{s\_0800}]}{\mathrm{kmp\_s\_0800r\_0581}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (890)$$

$$\mathrm{function\_151}\left(\mathrm{Keq\_r\_0581}, \mathrm{Vmax\_r\_0581}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0800r\_0581}, \mathrm{kms\_s\_0468r\_0581}, \mathrm{kms\_s\_1434\_br\_0581}, [\mathrm{s\_0468}], [\mathrm{s\_0800}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0581} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0468r\_0581}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0581}}\right)^{1} \cdot \left([\mathrm{s\_0468}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0800}]^{1}}{\mathrm{Keq\_r\_0581}}\right)}{\left(1 + \frac{[\mathrm{s\_0468}]}{\mathrm{kms\_s\_0468r\_0581}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0581}}\right) + 1 + \frac{[\mathrm{s\_0800}]}{\mathrm{kmp\_s\_0800r\_0581}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (891)$$

Table 608: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0581	Keq_r_0581		2.004		☑
Vmax_r_0581	Vmax_r_0581		0.732		☑
kmp_s_0800r-_0581	kmp_s_0800r_0581		0.549		☑
kms_s_0468r-_0581	kms_s_0468r_0581		0.549		☑
kms_s_1434-_br_0581	kms_s_1434_br-_0581		0.549		☑

7.152 Reaction r_0582

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name homocitrate synthase

Notes GENE_ASSOCIATION: or (YDL131W or YDL182W)

Reaction equation

$$s\_0185 + s\_0380 + s\_1434\_b \xrightleftharpoons{s\_0185,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_0798,\ s\_1434\_b} s\_0514 + s\_0763\_b + s\_0798 \quad (892)$$

Reactants

Table 609: Properties of each reactant.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 610: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_0798	homocitrate(3-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 611: Properties of each product.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_0798	homocitrate(3-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{152} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_152}\left(\mathrm{Keq\_r\_0582}, \mathrm{Vmax\_r\_0582}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0582}, \mathrm{kmp\_s\_0763\_br\_0582}, \mathrm{kmp\_s\_0798r\_0582}, \mathrm{kms\_s\_0185r\_0582}, \mathrm{kms\_s\_0380r\_0582}, \mathrm{kms\_s\_1434\_br\_0582}, [\mathrm{s\_0185}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]\right) \tag{893}$$

$$\mathrm{function\_152}\left(\mathrm{Keq\_r\_0582}, \mathrm{Vmax\_r\_0582}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0582}, \mathrm{kmp\_s\_0763\_br\_0582}, \mathrm{kmp\_s\_0798r\_0582}, \mathrm{kms\_s\_0185r\_0582}, \mathrm{kms\_s\_0380r\_0582}, \mathrm{kms\_s\_1434\_br\_0582}, [\mathrm{s\_0185}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0582} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0582}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0798}]^{1}}{\mathrm{Keq\_r\_0582}}\right)}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0582}}\right) + \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0798}]}{\mathrm{kmp\_s\_0798r\_0582}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{894}$$

$$\mathrm{function\_152}\left(\mathrm{Keq\_r\_0582}, \mathrm{Vmax\_r\_0582}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0514r\_0582}, \mathrm{kmp\_s\_0763\_br\_0582}, \mathrm{kmp\_s\_0798r\_0582}, \mathrm{kms\_s\_0185r\_0582}, \mathrm{kms\_s\_0380r\_0582}, \mathrm{kms\_s\_1434\_br\_0582}, [\mathrm{s\_0185}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0798}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0582} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0185r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0582}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0582}}\right)^{1} \cdot \left([\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0798}]^{1}}{\mathrm{Keq\_r\_0582}}\right)}{\left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kms\_s\_0185r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0582}}\right) + \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0582}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0798}]}{\mathrm{kmp\_s\_0798r\_0582}}\right.}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{895}$$

Table 612: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0582	Keq_r_0582		1.100		☑
Vmax_r_0582	Vmax_r_0582		2.195		☑
kmp_s_0514r-_0582	kmp_s_0514r_0582		0.549		☑
kmp_s_0763-_br_0582	kmp_s_0763_br-_0582		0.549		☑
kmp_s_0798r-_0582	kmp_s_0798r_0582		0.549		☑
kms_s_0185r-_0582	kms_s_0185r_0582		0.549		☑
kms_s_0380r-_0582	kms_s_0380r_0582		0.549		☑
kms_s_1434-_br_0582	kms_s_1434_br-_0582		0.549		☑

7.153 Reaction r_0585

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name homoisocitrate dehydrogenase

Notes GENE_ASSOCIATION:YIL094C

Reaction equation

$$s\_0800 + s\_1082 \xrightleftharpoons{s\_0180,\ s\_0763\_b,\ s\_0800,\ s\_1082,\ s\_1087} s\_0180 + s\_0763\_b + s\_1087 \quad (896)$$

Reactants

Table 613: Properties of each reactant.

Id	Name	SBO
s_0800	homoisocitrate(3-) [intracellular]	
s_1082	NAD(+) [intracellular]	

Modifiers

Table 614: Properties of each modifier.

Id	Name	SBO
s_0180	2-oxaloglutaric acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_0800	homoisocitrate(3-) [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 615: Properties of each product.

Id	Name	SBO
s_0180	2-oxaloglutaric acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{153} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_153}\left(\mathrm{Keq\_r\_0585}, \mathrm{Vmax\_r\_0585}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0180r\_0585}, \mathrm{kmp\_s\_0763\_br\_0585}, \mathrm{kmp\_s\_1087r\_0585}, \mathrm{kms\_s\_0800r\_0585}, \mathrm{kms\_s\_1082r\_0585}, [\mathrm{s\_0180}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0800}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) \quad (897)$$

$$\mathrm{function\_153}\left(\mathrm{Keq\_r\_0585}, \mathrm{Vmax\_r\_0585}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0180r\_0585}, \mathrm{kmp\_s\_0763\_br\_0585}, \mathrm{kmp\_s\_1087r\_0585}, \mathrm{kms\_s\_0800r\_0585}, \mathrm{kms\_s\_1082r\_0585}, [\mathrm{s\_0180}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0800}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0585} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0800r\_0585}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0585}}\right)^{1} \cdot \left([\mathrm{s\_0800}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0585}}\right)}{\left(1 + \frac{[\mathrm{s\_0800}]}{\mathrm{kms\_s\_0800r\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0585}}\right) + \left(1 + \frac{[\mathrm{s\_0180}]}{\mathrm{kmp\_s\_0180r\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0585}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (898)$$

$$\mathrm{function\_153}\left(\mathrm{Keq\_r\_0585}, \mathrm{Vmax\_r\_0585}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0180r\_0585}, \mathrm{kmp\_s\_0763\_br\_0585}, \mathrm{kmp\_s\_1087r\_0585}, \mathrm{kms\_s\_0800r\_0585}, \mathrm{kms\_s\_1082r\_0585}, [\mathrm{s\_0180}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0800}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]\right) = \frac{\mathrm{Vmax\_r\_0585} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0800r\_0585}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0585}}\right)^{1} \cdot \left([\mathrm{s\_0800}]^{1} \cdot [\mathrm{s\_1082}]^{1} - \frac{[\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0585}}\right)}{\left(1 + \frac{[\mathrm{s\_0800}]}{\mathrm{kms\_s\_0800r\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0585}}\right) + \left(1 + \frac{[\mathrm{s\_0180}]}{\mathrm{kmp\_s\_0180r\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0585}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0585}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (899)$$

Table 616: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0585	Keq_r_0585		0.035		☑
Vmax_r_0585	Vmax_r_0585		1.609		☑
kmp_s_0180r_0585	kmp_s_0180r_0585		0.549		☑
kmp_s_0763_br_0585	kmp_s_0763_br_0585		0.549		☑
kmp_s_1087r_0585	kmp_s_1087r_0585		0.087		☑
kms_s_0800r_0585	kms_s_0800r_0585		0.549		☑
kms_s_1082r_0585	kms_s_1082r_0585		1.503		☑

7.154 Reaction r_0586

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name homoserine dehydrogenase (NADH)

Notes GENE_ASSOCIATION:YJR139C

Reaction equation

$$s\_0763\_b + s\_0886 + s\_1087 \xrightleftharpoons{s\_0763\_b,\ s\_0886,\ s\_0919,\ s\_1082,\ s\_1087} s\_0919 + s\_1082 \quad (900)$$

Reactants

Table 617: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0886	L-aspartate 4-semialdehyde [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 618: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0886	L-aspartate 4-semialdehyde [intracellular]	
s_0919	L-homoserine [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Products

Table 619: Properties of each product.

Id	Name	SBO
s_0919	L-homoserine [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{154} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_154}(\mathrm{Keq\_r\_0586}, \mathrm{Vmax\_r\_0586}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0919r\_0586}, \mathrm{kmp\_s\_1082r\_0586}, \mathrm{kms\_s\_0763\_br\_0586}, \mathrm{kms\_s\_0886r\_0586}, \mathrm{kms\_s\_1087r\_0586}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_0919}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) \quad (901)$$

$$\mathrm{function\_154}(\mathrm{Keq\_r\_0586}, \mathrm{Vmax\_r\_0586}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0919r\_0586}, \mathrm{kmp\_s\_1082r\_0586}, \mathrm{kms\_s\_0763\_br\_0586}, \mathrm{kms\_s\_0886r\_0586}, \mathrm{kms\_s\_1087r\_0586}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_0919}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0586} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0586}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0886r\_0586}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0586}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_0886}]^1 \cdot [\mathrm{s\_1087}]^1 - \frac{[\mathrm{s\_0919}]^1 \cdot [\mathrm{s\_1082}]^1}{\mathrm{Keq\_r\_0586}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_0886}]}{\mathrm{kms\_s\_0886r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0586}}\right) + \left(1+\frac{[\mathrm{s\_0919}]}{\mathrm{kmp\_s\_0919r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0586}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (902)$$

$$\mathrm{function\_154}(\mathrm{Keq\_r\_0586}, \mathrm{Vmax\_r\_0586}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0919r\_0586}, \mathrm{kmp\_s\_1082r\_0586}, \mathrm{kms\_s\_0763\_br\_0586}, \mathrm{kms\_s\_0886r\_0586}, \mathrm{kms\_s\_1087r\_0586}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0886}], [\mathrm{s\_0919}], [\mathrm{s\_1082}], [\mathrm{s\_1087}]) = \frac{\mathrm{Vmax\_r\_0586} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0586}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0886r\_0586}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0586}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_0886}]^1 \cdot [\mathrm{s\_1087}]^1 - \frac{[\mathrm{s\_0919}]^1 \cdot [\mathrm{s\_1082}]^1}{\mathrm{Keq\_r\_0586}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_0886}]}{\mathrm{kms\_s\_0886r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0586}}\right) + \left(1+\frac{[\mathrm{s\_0919}]}{\mathrm{kmp\_s\_0919r\_0586}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0586}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (903)$$

Table 620: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0586	Keq_r_0586		34.726		☑
Vmax_r_0586	Vmax_r_0586		9.813		☑
kmp_s_0919r_0586	kmp_s_0919r_0586		0.549		☑
kmp_s_1082r_0586	kmp_s_1082r_0586		1.503		☑
kms_s_0763_br_0586	kms_s_0763_br_0586		0.549		☑
kms_s_0886r_0586	kms_s_0886r_0586		0.549		☑
kms_s_1087r_0586	kms_s_1087r_0586		0.087		☑

7.155 Reaction r_0588

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name homoserine kinase

Notes GENE_ASSOCIATION:YHR025W

Reaction equation

$$\text{s\_0446} + \text{s\_0919} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0763\_b, s\_0919, s\_1122}} \text{s\_0400} + \text{s\_0763\_b} + \text{s\_1122} \tag{904}$$

Reactants

Table 621: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0919	L-homoserine [intracellular]	

Modifiers

Table 622: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0919	L-homoserine [intracellular]	
s_1122	O-phospho-L-homoserine [intracellular]	

Products

Table 623: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1122	O-phospho-L-homoserine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{155} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_155}\left(\mathrm{Keq\_r\_0588}, \mathrm{Vmax\_r\_0588}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0588}, \mathrm{kmp\_s\_0763\_br\_0588}, \mathrm{kmp\_s\_1122r\_0588}, \mathrm{kms\_s\_0446r\_0588}, \mathrm{kms\_s\_0919r\_0588}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0919}], [\mathrm{s\_1122}]\right) \tag{905}$$

$$\mathrm{function\_155}\left(\mathrm{Keq\_r\_0588}, \mathrm{Vmax\_r\_0588}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0588}, \mathrm{kmp\_s\_0763\_br\_0588}, \mathrm{kmp\_s\_1122r\_0588}, \mathrm{kms\_s\_0446r\_0588}, \mathrm{kms\_s\_0919r\_0588}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0919}], [\mathrm{s\_1122}]\right) = \frac{\mathrm{Vmax\_r\_0588} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0588}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0919r\_0588}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0919}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1122}]^{1}}{\mathrm{Keq\_r\_0588}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0919}]}{\mathrm{kms\_s\_0919r\_0588}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1122}]}{\mathrm{kmp\_s\_1122r\_0588}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{906}$$

$$\mathrm{function\_155}\left(\mathrm{Keq\_r\_0588}, \mathrm{Vmax\_r\_0588}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0588}, \mathrm{kmp\_s\_0763\_br\_0588}, \mathrm{kmp\_s\_1122r\_0588}, \mathrm{kms\_s\_0446r\_0588}, \mathrm{kms\_s\_0919r\_0588}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0919}], [\mathrm{s\_1122}]\right) = \frac{\mathrm{Vmax\_r\_0588} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0588}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0919r\_0588}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0919}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1122}]^{1}}{\mathrm{Keq\_r\_0588}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0919}]}{\mathrm{kms\_s\_0919r\_0588}}\right) + \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0588}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1122}]}{\mathrm{kmp\_s\_1122r\_0588}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{907}$$

Table 624: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0588	Keq_r_0588		0.951		☑
Vmax_r_0588	Vmax_r_0588		8.760		☑
kmp_s_0400r-_0588	kmp_s_0400r_0588		1.719		☑
kmp_s_0763-_br_0588	kmp_s_0763_br-_0588		0.549		☑
kmp_s_1122r-_0588	kmp_s_1122r_0588		0.549		☑
kms_s_0446r-_0588	kms_s_0446r_0588		1.092		☑
kms_s_0919r-_0588	kms_s_0919r_0588		0.549		☑

7.156 Reaction r_0589

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name homoserine O-trans-acetylase

Notes GENE_ASSOCIATION:YNL277W

Reaction equation

$$s\_0380 + s\_0919 \xrightleftharpoons{s\_0380,\ s\_0514,\ s\_0919,\ s\_1117} s\_0514 + s\_1117 \tag{908}$$

Reactants

Table 625: Properties of each reactant.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0919	L-homoserine [intracellular]	

Modifiers

Table 626: Properties of each modifier.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0919	L-homoserine [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Products

Table 627: Properties of each product.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{156} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_156}(\mathrm{Keq\_r\_0589}, \mathrm{Vmax\_r\_0589}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0589}, \mathrm{kmp\_s\_1117r\_0589}, \mathrm{kms\_s\_0380r\_0589}, \mathrm{kms\_s\_0919r\_0589}, [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0919}], [\mathrm{s\_1117}]) \quad (909)$$

$$\mathrm{function\_156}(\mathrm{Keq\_r\_0589}, \mathrm{Vmax\_r\_0589}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0589}, \mathrm{kmp\_s\_1117r\_0589}, \mathrm{kms\_s\_0380r\_0589}, \mathrm{kms\_s\_0919r\_0589}, [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0919}], [\mathrm{s\_1117}]) = \frac{\mathrm{Vmax\_r\_0589} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0589}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0919r\_0589}}\right)^1 \cdot \left([\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_0919}]^1 - \frac{[\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_1117}]^1}{\mathrm{Keq\_r\_0589}}\right)}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0589}}\right) \cdot \left(1+\frac{[\mathrm{s\_0919}]}{\mathrm{kms\_s\_0919r\_0589}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0589}}\right) \cdot \left(1+\frac{[\mathrm{s\_1117}]}{\mathrm{kmp\_s\_1117r\_0589}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (910)$$

$$\mathrm{function\_156}(\mathrm{Keq\_r\_0589}, \mathrm{Vmax\_r\_0589}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0514r\_0589}, \mathrm{kmp\_s\_1117r\_0589}, \mathrm{kms\_s\_0380r\_0589}, \mathrm{kms\_s\_0919r\_0589}, [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0919}], [\mathrm{s\_1117}]) = \frac{\mathrm{Vmax\_r\_0589} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0380r\_0589}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0919r\_0589}}\right)^1 \cdot \left([\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_0919}]^1 - \frac{[\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_1117}]^1}{\mathrm{Keq\_r\_0589}}\right)}{\left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0589}}\right) \cdot \left(1+\frac{[\mathrm{s\_0919}]}{\mathrm{kms\_s\_0919r\_0589}}\right) + \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0589}}\right) \cdot \left(1+\frac{[\mathrm{s\_1117}]}{\mathrm{kmp\_s\_1117r\_0589}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (911)$$

Table 628: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0589	Keq_r_0589		1.100		☑
Vmax_r_0589	Vmax_r_0589		0.672		☑
kmp_s_0514r-_0589	kmp_s_0514r_0589		0.549		☑
kmp_s_1117r-_0589	kmp_s_1117r_0589		0.549		☑
kms_s_0380r-_0589	kms_s_0380r_0589		0.549		☑
kms_s_0919r-_0589	kms_s_0919r_0589		0.549		☑

7.157 Reaction r_0598

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name hydroxymethylglutaryl CoA reductase

Notes GENE_ASSOCIATION:(YLR450W or YML075C)

Reaction equation

$$s\_0225 + 2\,s\_0763\_b + 2\,s\_1096 \xrightleftharpoons{s\_0031,\ s\_0225,\ s\_0514,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0031 + s\_0514 + 2\,s\_1091 \quad (912)$$

Reactants

Table 629: Properties of each reactant.

Id	Name	SBO
s_0225	3-hydroxy-3-methylglutaryl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 630: Properties of each modifier.

Id	Name	SBO
s_0031	(R)-mevalonate [intracellular]	
s_0225	3-hydroxy-3-methylglutaryl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 631: Properties of each product.

Id	Name	SBO
s_0031	(R)-mevalonate [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{157} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_157}\left(\mathrm{Keq\_r\_0598}, \mathrm{Vmax\_r\_0598}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0031r\_0598}, \mathrm{kmp\_s\_0514r\_0598}, \mathrm{kmp\_s\_1091r\_0598}, \mathrm{kms\_s\_0225r\_0598}, \mathrm{kms\_s\_0763\_br\_0598}, \mathrm{kms\_s\_1096r\_0598}, [\mathrm{s\_0031}], [\mathrm{s\_0225}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \quad (913)$$

$$\mathrm{function\_157}\left(\mathrm{Keq\_r\_0598}, \mathrm{Vmax\_r\_0598}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0031r\_0598}, \mathrm{kmp\_s\_0514r\_0598}, \mathrm{kmp\_s\_1091r\_0598}, \mathrm{kms\_s\_0225r\_0598}, \mathrm{kms\_s\_0763\_br\_0598}, \mathrm{kms\_s\_1096r\_0598}, [\mathrm{s\_0031}], [\mathrm{s\_0225}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0598} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0225r\_0598}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0598}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0598}}\right)^{2} \cdot \left([\mathrm{s\_0225}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{2} - \frac{[\mathrm{s\_0031}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1091}]^{2}}{\mathrm{Keq\_r\_0598}}\right)}{\left(1+\frac{[\mathrm{s\_0225}]}{\mathrm{kms\_s\_0225r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0598}}\right) + \left(1+\frac{[\mathrm{s\_0031}]}{\mathrm{kmp\_s\_0031r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0598}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (914)$$

$$\mathrm{function\_157}\left(\mathrm{Keq\_r\_0598}, \mathrm{Vmax\_r\_0598}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0031r\_0598}, \mathrm{kmp\_s\_0514r\_0598}, \mathrm{kmp\_s\_1091r\_0598}, \mathrm{kms\_s\_0225r\_0598}, \mathrm{kms\_s\_0763\_br\_0598}, \mathrm{kms\_s\_1096r\_0598}, [\mathrm{s\_0031}], [\mathrm{s\_0225}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0598} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0225r\_0598}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0598}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0598}}\right)^{2} \cdot \left([\mathrm{s\_0225}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{2} - \frac{[\mathrm{s\_0031}]^{1} \cdot [\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1091}]^{2}}{\mathrm{Keq\_r\_0598}}\right)}{\left(1+\frac{[\mathrm{s\_0225}]}{\mathrm{kms\_s\_0225r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0598}}\right) + \left(1+\frac{[\mathrm{s\_0031}]}{\mathrm{kmp\_s\_0031r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0598}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0598}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (915)$$

Table 632: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0598	Keq_r_0598		2.004		☑
Vmax_r_0598	Vmax_r_0598		0.376		☑
kmp_s_0031r_0598	kmp_s_0031r_0598		0.549		☑
kmp_s_0514r_0598	kmp_s_0514r_0598		0.549		☑
kmp_s_1091r_0598	kmp_s_1091r_0598		0.549		☑
kms_s_0225r_0598	kms_s_0225r_0598		0.549		☑
kms_s_0763_br_0598	kms_s_0763_br_0598		0.549		☑
kms_s_1096r_0598	kms_s_1096r_0598		0.549		☑

7.158 Reaction r_0599

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name hydroxymethylglutaryl CoA synthase

Notes GENE_ASSOCIATION:YML126C

Reaction equation

$$s\_0374 + s\_0380 + s\_1434\_b \xrightleftharpoons{s\_0225,\ s\_0374,\ s\_0380,\ s\_0514,\ s\_0763\_b,\ s\_1434\_b} s\_0225 + s\_0514 + s\_0763\_b \quad (916)$$

Reactants

Table 633: Properties of each reactant.

Id	Name	SBO
s_0374	acetoacetyl-CoA [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 634: Properties of each modifier.

Id	Name	SBO
s_0225	3-hydroxy-3-methylglutaryl-CoA [intracellular]	
s_0374	acetoacetyl-CoA [intracellular]	
s_0380	acetyl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 635: Properties of each product.

Id	Name	SBO
s_0225	3-hydroxy-3-methylglutaryl-CoA [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{158} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_158}(\mathrm{Keq\_r\_0599}, \mathrm{Vmax\_r\_0599}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0225r\_0599}, \mathrm{kmp\_s\_0514r\_0599}, \mathrm{kmp\_s\_0763\_br\_0599}, \mathrm{kms\_s\_0374r\_0599}, \mathrm{kms\_s\_0380r\_0599}, \mathrm{kms\_s\_1434\_br\_0599}, [\mathrm{s\_0225}], [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) \tag{917}$$

$$\mathrm{function\_158}(\mathrm{Keq\_r\_0599}, \mathrm{Vmax\_r\_0599}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0225r\_0599}, \mathrm{kmp\_s\_0514r\_0599}, \mathrm{kmp\_s\_0763\_br\_0599}, \mathrm{kms\_s\_0374r\_0599}, \mathrm{kms\_s\_0380r\_0599}, \mathrm{kms\_s\_1434\_br\_0599}, [\mathrm{s\_0225}], [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0599} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0374r\_0599}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0599}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0599}}\right)^1 \cdot \left([\mathrm{s\_0374}]^1 \cdot [\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0225}]^1 \cdot [\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0599}}\right)}{\left(1+\frac{[\mathrm{s\_0374}]}{\mathrm{kms\_s\_0374r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0599}}\right) + \left(1+\frac{[\mathrm{s\_0225}]}{\mathrm{kmp\_s\_0225r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0599}}\right)}}{\mathrm{vol}(\mathrm{intracellular})} \tag{918}$$

$$\mathrm{function\_158}(\mathrm{Keq\_r\_0599}, \mathrm{Vmax\_r\_0599}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0225r\_0599}, \mathrm{kmp\_s\_0514r\_0599}, \mathrm{kmp\_s\_0763\_br\_0599}, \mathrm{kms\_s\_0374r\_0599}, \mathrm{kms\_s\_0380r\_0599}, \mathrm{kms\_s\_1434\_br\_0599}, [\mathrm{s\_0225}], [\mathrm{s\_0374}], [\mathrm{s\_0380}], [\mathrm{s\_0514}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0599} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0374r\_0599}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0380r\_0599}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0599}}\right)^1 \cdot \left([\mathrm{s\_0374}]^1 \cdot [\mathrm{s\_0380}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0225}]^1 \cdot [\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0599}}\right)}{\left(1+\frac{[\mathrm{s\_0374}]}{\mathrm{kms\_s\_0374r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kms\_s\_0380r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0599}}\right) + \left(1+\frac{[\mathrm{s\_0225}]}{\mathrm{kmp\_s\_0225r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0599}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0599}}\right)}}{\mathrm{vol}(\mathrm{intracellular})} \tag{919}$$

Table 636: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0599	Keq_r_0599		1.100		☑
Vmax_r_0599	Vmax_r_0599		0.376		☑
kmp_s_0225r-_0599	kmp_s_0225r_0599		0.549		☑
kmp_s_0514r-_0599	kmp_s_0514r_0599		0.549		☑
kmp_s_0763-_br_0599	kmp_s_0763_br-_0599		0.549		☑
kms_s_0374r-_0599	kms_s_0374r_0599		0.549		☑
kms_s_0380r-_0599	kms_s_0380r_0599		0.549		☑
kms_s_1434-_br_0599	kms_s_1434_br-_0599		0.549		☑

7.159 Reaction r_0604

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name Imidazole-glycerol-3-phosphate synthase

Notes GENE_ASSOCIATION:YBR248C

Reaction equation

$$\text{s\_0315} + \text{s\_0907} \xrightleftharpoons{\text{s\_0315, s\_0317, s\_0532, s\_0763\_b, s\_0899, s\_0907}} \text{s\_0317} + \text{s\_0532} + \text{s\_0763\_b} + \text{s\_0899} \quad (920)$$

Reactants

Table 637: Properties of each reactant.

Id	Name
s_0315	5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4-c
s_0907	L-glutamine [intracellular]

Modifiers

Table 638: Properties of each modifier.

Id	Name
s_0315	5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]
s_0532	D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]
s_0763_b	H+ [intracellular]
s_0899	L-glutamate [intracellular]
s_0907	L-glutamine [intracellular]

Products

Table 639: Properties of each product.

Id	Name	SBO
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	
s_0532	D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{159} = & \text{vol}(\text{intracellular}) \\ & \cdot \text{function\_159}(\text{Keq\_r\_0604}, \text{Vmax\_r\_0604}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0317r\_0604}, \\ & \text{kmp\_s\_0532r\_0604}, \text{kmp\_s\_0763\_br\_0604}, \text{kmp\_s\_0899r\_0604}, \text{kms\_s\_0315r\_0604}, \\ & \text{kms\_s\_0907r\_0604}, [\text{s\_0315}], [\text{s\_0317}], [\text{s\_0532}], [\text{s\_0763\_b}], [\text{s\_0899}], [\text{s\_0907}]) \end{aligned} \tag{921}$$

$$\begin{aligned} & \text{function\_159}(\text{Keq\_r\_0604}, \text{Vmax\_r\_0604}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0317r\_0604}, \\ & \text{kmp\_s\_0532r\_0604}, \text{kmp\_s\_0763\_br\_0604}, \text{kmp\_s\_0899r\_0604}, \text{kms\_s\_0315r\_0604}, \\ & \text{kms\_s\_0907r\_0604}, [\text{s\_0315}], [\text{s\_0317}], [\text{s\_0532}], [\text{s\_0763\_b}], [\text{s\_0899}], [\text{s\_0907}]) \\ = & \frac{\text{Vmax\_r\_0604} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0315r\_0604}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0907r\_0604}}\right)^{1} \cdot \left([\text{s\_0315}]^{1} \cdot [\text{s\_0907}]^{1} - \frac{[\text{s\_0317}]^{1} \cdot [\text{s\_0532}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0899}]^{1}}{\text{Keq\_r\_0604}}\right)}{\left(1+\frac{[\text{s\_0315}]}{\text{kms\_s\_0315r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0604}}\right) + \left(1+\frac{[\text{s\_0317}]}{\text{kmp\_s\_0317r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0532}]}{\text{kmp\_s\_0532r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kmp\_s\_0899r\_0604}}\right) \cdot}}{\text{vol}(\text{intracellular})} \end{aligned} \tag{922}$$

$$\begin{aligned} & \text{function\_159}(\text{Keq\_r\_0604}, \text{Vmax\_r\_0604}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0317r\_0604}, \\ & \text{kmp\_s\_0532r\_0604}, \text{kmp\_s\_0763\_br\_0604}, \text{kmp\_s\_0899r\_0604}, \text{kms\_s\_0315r\_0604}, \\ & \text{kms\_s\_0907r\_0604}, [\text{s\_0315}], [\text{s\_0317}], [\text{s\_0532}], [\text{s\_0763\_b}], [\text{s\_0899}], [\text{s\_0907}]) \\ = & \frac{\text{Vmax\_r\_0604} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0315r\_0604}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0907r\_0604}}\right)^{1} \cdot \left([\text{s\_0315}]^{1} \cdot [\text{s\_0907}]^{1} - \frac{[\text{s\_0317}]^{1} \cdot [\text{s\_0532}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0899}]^{1}}{\text{Keq\_r\_0604}}\right)}{\left(1+\frac{[\text{s\_0315}]}{\text{kms\_s\_0315r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0604}}\right) + \left(1+\frac{[\text{s\_0317}]}{\text{kmp\_s\_0317r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0532}]}{\text{kmp\_s\_0532r\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0604}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kmp\_s\_0899r\_0604}}\right) \cdot}}{\text{vol}(\text{intracellular})} \end{aligned} \tag{923}$$

Table 640: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0604	Keq_r_0604		0.332		☑
Vmax_r_0604	Vmax_r_0604		0.872		☑
kmp_s_0317r-_0604	kmp_s_0317r_0604		0.549		☑
kmp_s_0532r-_0604	kmp_s_0532r_0604		0.549		☑
kmp_s_0763-_br_0604	kmp_s_0763_br-_0604		0.549		☑
kmp_s_0899r-_0604	kmp_s_0899r_0604		0.549		☑
kms_s_0315r-_0604	kms_s_0315r_0604		0.549		☑
kms_s_0907r-_0604	kms_s_0907r_0604		0.549		☑

7.160 Reaction r_0605

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name imidazoleglycerol-phosphate dehydratase

Notes GENE_ASSOCIATION:YOR202W

Reaction equation

$$\text{s\_0532} \xrightleftharpoons{\text{s\_0212, s\_0532, s\_1434\_b}} \text{s\_0212} + \text{s\_1434\_b} \tag{924}$$

Reactant

Table 641: Properties of each reactant.

Id	Name	SBO
s_0532	D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]	

Modifiers

Table 642: Properties of each modifier.

Id	Name	SBO
s_0212	3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]	
s_0532	D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 643: Properties of each product.

Id	Name	SBO
s_0212	3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{160} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_160}\left(\mathrm{Keq\_r\_0605}, \mathrm{Vmax\_r\_0605}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0212r\_0605}, \mathrm{kmp\_s\_1434\_br\_0605}, \mathrm{kms\_s\_0532r\_0605}, [\mathrm{s\_0212}], [\mathrm{s\_0532}], [\mathrm{s\_1434\_b}]\right) \tag{925}$$

$$\mathrm{function\_160}\left(\mathrm{Keq\_r\_0605}, \mathrm{Vmax\_r\_0605}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0212r\_0605}, \mathrm{kmp\_s\_1434\_br\_0605}, \mathrm{kms\_s\_0532r\_0605}, [\mathrm{s\_0212}], [\mathrm{s\_0532}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0605} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0532r\_0605}}\right)^{1} \cdot \left([\mathrm{s\_0532}]^{1} - \frac{[\mathrm{s\_0212}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0605}}\right)}{1 + \frac{[\mathrm{s\_0532}]}{\mathrm{kms\_s\_0532r\_0605}} + \left(1 + \frac{[\mathrm{s\_0212}]}{\mathrm{kmp\_s\_0212r\_0605}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0605}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{926}$$

$$\mathrm{function\_160}\left(\mathrm{Keq\_r\_0605}, \mathrm{Vmax\_r\_0605}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0212r\_0605}, \mathrm{kmp\_s\_1434\_br\_0605}, \mathrm{kms\_s\_0532r\_0605}, [\mathrm{s\_0212}], [\mathrm{s\_0532}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0605} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0532r\_0605}}\right)^{1} \cdot \left([\mathrm{s\_0532}]^{1} - \frac{[\mathrm{s\_0212}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0605}}\right)}{1 + \frac{[\mathrm{s\_0532}]}{\mathrm{kms\_s\_0532r\_0605}} + \left(1 + \frac{[\mathrm{s\_0212}]}{\mathrm{kmp\_s\_0212r\_0605}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0605}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{927}$$

Table 644: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0605`	Keq_r_0605		0.604		☑
`Vmax_r_0605`	Vmax_r_0605		0.229		☑
`kmp_s_0212r-_0605`	kmp_s_0212r_0605		0.549		☑
`kmp_s_1434-_br_0605`	kmp_s_1434_br-_0605		0.549		☑
`kms_s_0532r-_0605`	kms_s_0532r_0605		0.549		☑

7.161 Reaction `r_0606`

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name IMP cyclohydrolase

Notes GENE_ASSOCIATION:(YLR028C or YMR120C)

Reaction equation

$$\mathrm{s\_0325} \xrightleftharpoons{\mathrm{s\_0325,\ s\_0816,\ s\_1434\_b}} \mathrm{s\_0816} + \mathrm{s\_1434\_b} \tag{928}$$

Reactant

Table 645: Properties of each reactant.

Id	Name	SBO
s_0325	5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	

Modifiers

Table 646: Properties of each modifier.

Id	Name	SBO
s_0325	5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	
s_0816	IMP [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 647: Properties of each product.

Id	Name	SBO
s_0816	IMP [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{161} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_161}\left(\mathrm{Keq\_r\_0606}, \mathrm{Vmax\_r\_0606}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0816r\_0606}, \mathrm{kmp\_s\_1434\_br\_0606}, \mathrm{kms\_s\_0325r\_0606}, [\mathrm{s\_0325}], [\mathrm{s\_0816}], [\mathrm{s\_1434\_b}]\right) \quad (929)$$

$$\mathrm{function\_161}\left(\mathrm{Keq\_r\_0606}, \mathrm{Vmax\_r\_0606}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0816r\_0606}, \mathrm{kmp\_s\_1434\_br\_0606}, \mathrm{kms\_s\_0325r\_0606}, [\mathrm{s\_0325}], [\mathrm{s\_0816}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0606} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0325r\_0606}}\right)^{1} \cdot \left([\mathrm{s\_0325}]^{1} - \frac{[\mathrm{s\_0816}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0606}}\right)}{1 + \frac{[\mathrm{s\_0325}]}{\mathrm{kms\_s\_0325r\_0606}} + \left(1 + \frac{[\mathrm{s\_0816}]}{\mathrm{kmp\_s\_0816r\_0606}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0606}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (930)$$

$$\text{function\_161}\left(\text{Keq\_r\_0606}, \text{Vmax\_r\_0606}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0816r\_0606}, \text{kmp\_s\_1434\_br\_0606}, \text{kms\_s\_0325r\_0606}, [\text{s\_0325}], [\text{s\_0816}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0606} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0325r\_0606}}\right)^{1} \cdot \left([\text{s\_0325}]^{1} - \frac{[\text{s\_0816}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0606}}\right)}{1 + \frac{[\text{s\_0325}]}{\text{kms\_s\_0325r\_0606}} + \left(1 + \frac{[\text{s\_0816}]}{\text{kmp\_s\_0816r\_0606}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0606}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{931}$$

Table 648: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0606	Keq_r_0606		0.604		☑
Vmax_r_0606	Vmax_r_0606		0.561		☑
kmp_s_0816r_0606	kmp_s_0816r_0606		0.549		☑
kmp_s_1434_br_0606	kmp_s_1434_br_0606		0.549		☑
kms_s_0325r_0606	kms_s_0325r_0606		0.549		☑

7.162 Reaction r_0607

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name IMP dehydrogenase

Notes GENE_ASSOCIATION:(YHR216W or YLR432W)

Reaction equation

$$\text{s\_0816} + \text{s\_1082} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0306, s\_0763\_b, s\_0816, s\_1082, s\_1087, s\_1434\_b}} \text{s\_0306} + \text{s\_0763\_b} + \text{s\_1087} \tag{932}$$

Reactants

Table 649: Properties of each reactant.

Id	Name	SBO
s_0816	IMP [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 650: Properties of each modifier.

Id	Name	SBO
s_0306	5'-xanthylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_0816	IMP [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 651: Properties of each product.

Id	Name	SBO
s_0306	5'-xanthylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{162} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_162}\left(\mathrm{Keq\_r\_0607}, \mathrm{Vmax\_r\_0607}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0306r\_0607}, \mathrm{kmp\_s\_0763\_br\_0607}, \mathrm{kmp\_s\_1087r\_0607}, \mathrm{kms\_s\_0816r\_0607}, \mathrm{kms\_s\_1082r\_0607}, \mathrm{kms\_s\_1434\_br\_0607}, [\mathrm{s\_0306}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1434\_b}]\right) \tag{933}$$

$$\mathrm{function\_162}\left(\mathrm{Keq\_r\_0607}, \mathrm{Vmax\_r\_0607}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0306r\_0607}, \mathrm{kmp\_s\_0763\_br\_0607}, \mathrm{kmp\_s\_1087r\_0607}, \mathrm{kms\_s\_0816r\_0607}, \mathrm{kms\_s\_1082r\_0607}, \mathrm{kms\_s\_1434\_br\_0607}, [\mathrm{s\_0306}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0607} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0816r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0607}}\right)^{1} \cdot \left([\mathrm{s\_0816}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0306}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0607}}\right)}{\left(1 + \frac{[\mathrm{s\_0816}]}{\mathrm{kms\_s\_0816r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0607}}\right) + \left(1 + \frac{[\mathrm{s\_0306}]}{\mathrm{kmp\_s\_0306r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0607}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{934}$$

$$\begin{aligned}&\mathrm{function\_162}\left(\mathrm{Keq\_r\_0607}, \mathrm{Vmax\_r\_0607}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0306r\_0607},\right.\\&\mathrm{kmp\_s\_0763\_br\_0607}, \mathrm{kmp\_s\_1087r\_0607}, \mathrm{kms\_s\_0816r\_0607}, \mathrm{kms\_s\_1082r\_0607},\\&\left.\mathrm{kms\_s\_1434\_br\_0607}, [\mathrm{s\_0306}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0816}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1434\_b}]\right)\\&= \frac{\mathrm{Vmax\_r\_0607} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0816r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0607}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0607}}\right)^{1} \cdot \left([\mathrm{s\_0816}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0306}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0607}}\right)}{\left(1 + \frac{[\mathrm{s\_0816}]}{\mathrm{kms\_s\_0816r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0607}}\right) + \left(1 + \frac{[\mathrm{s\_0306}]}{\mathrm{kmp\_s\_0306r\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0607}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0607}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{935}$$

Table 652: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0607	Keq_r_0607		0.063		☑
Vmax_r_0607	Vmax_r_0607		0.502		☑
kmp_s_0306r_0607	kmp_s_0306r_0607		0.549		☑
kmp_s_0763_br_0607	kmp_s_0763_br_0607		0.549		☑
kmp_s_1087r_0607	kmp_s_1087r_0607		0.087		☑
kms_s_0816r_0607	kms_s_0816r_0607		0.549		☑
kms_s_1082r_0607	kms_s_1082r_0607		1.503		☑
kms_s_1434_br_0607	kms_s_1434_br_0607		0.549		☑

7.163 Reaction r_0608

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name indole-3-glycerol-phosphate synthase

Notes GENE_ASSOCIATION:YKL211C

Reaction equation

$$\mathrm{s\_0078} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0078,\ s\_0088,\ s\_0470,\ s\_0763\_b,\ s\_1434\_b}} \mathrm{s\_0088} + \mathrm{s\_0470} + \mathrm{s\_1434\_b} \tag{936}$$

Reactants

Table 653: Properties of each reactant.

Id	Name	SBO
s_0078	1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Modifiers

Table 654: Properties of each modifier.

Id	Name	SBO
s_0078	1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]	
s_0088	1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 655: Properties of each product.

Id	Name	SBO
s_0088	1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{163} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_163}(\mathrm{Keq\_r\_0608}, \mathrm{Vmax\_r\_0608}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0088r\_0608}, \mathrm{kmp\_s\_0470r\_0608}, \mathrm{kmp\_s\_1434\_br\_0608}, \mathrm{kms\_s\_0078r\_0608}, \mathrm{kms\_s\_0763\_br\_0608}, [\mathrm{s\_0078}], [\mathrm{s\_0088}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) \quad (937)$$

$$\mathrm{function\_163}(\mathrm{Keq\_r\_0608}, \mathrm{Vmax\_r\_0608}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0088r\_0608}, \mathrm{kmp\_s\_0470r\_0608}, \mathrm{kmp\_s\_1434\_br\_0608}, \mathrm{kms\_s\_0078r\_0608}, \mathrm{kms\_s\_0763\_br\_0608}, [\mathrm{s\_0078}], [\mathrm{s\_0088}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0608} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0078r\_0608}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0608}}\right)^{1} \cdot \left([\mathrm{s\_0078}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0088}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0608}}\right)}{\left(1 + \frac{[\mathrm{s\_0078}]}{\mathrm{kms\_s\_0078r\_0608}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0608}}\right) + \left(1 + \frac{[\mathrm{s\_0088}]}{\mathrm{kmp\_s\_0088r\_0608}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0608}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0608}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (938)$$

$$\begin{aligned}&\text{function\_163}\left(\text{Keq\_r\_0608}, \text{Vmax\_r\_0608}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0088r\_0608},\right.\\&\text{kmp\_s\_0470r\_0608}, \text{kmp\_s\_1434\_br\_0608}, \text{kms\_s\_0078r\_0608},\\&\left.\text{kms\_s\_0763\_br\_0608}, [\text{s\_0078}], [\text{s\_0088}], [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1434\_b}]\right)\\&=\frac{\text{Vmax\_r\_0608}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0078r\_0608}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0763\_br\_0608}}\right)^{1}\cdot\left([\text{s\_0078}]^{1}\cdot[\text{s\_0763\_b}]^{1}-\frac{[\text{s\_0088}]^{1}\cdot[\text{s\_0470}]^{1}\cdot[\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0608}}\right)}{\left(1+\frac{[\text{s\_0078}]}{\text{kms\_s\_0078r\_0608}}\right)\cdot\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0608}}\right)+\left(1+\frac{[\text{s\_0088}]}{\text{kmp\_s\_0088r\_0608}}\right)\cdot\left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0608}}\right)\cdot\left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0608}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{939}$$

Table 656: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0608	Keq_r_0608		1.100		☑
Vmax_r_0608	Vmax_r_0608		0.188		☑
kmp_s_0088r-_0608	kmp_s_0088r_0608		0.549		☑
kmp_s_0470r-_0608	kmp_s_0470r_0608		1.000		☑
kmp_s_1434-_br_0608	kmp_s_1434_br-_0608		0.549		☑
kms_s_0078r-_0608	kms_s_0078r_0608		0.549		☑
kms_s_0763-_br_0608	kms_s_0763_br-_0608		0.549		☑

7.164 Reaction r_0610

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name inorganic diphosphatase

Notes GENE_ASSOCIATION:YBR011C or YMR267W

Reaction equation

$$\text{s\_0605}+\text{s\_1434\_b}\xrightleftharpoons{\text{s\_0605, s\_0763\_b, s\_1207, s\_1434\_b}}\text{s\_0763\_b}+2\,\text{s\_1207} \tag{940}$$

Reactants

Table 657: Properties of each reactant.

Id	Name	SBO
s_0605	diphosphate [intracellular]	

Id	Name	SBO
s_1434_b	water [intracellular]	

Modifiers

Table 658: Properties of each modifier.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 659: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{164} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_164}(\mathrm{Keq\_r\_0610}, \mathrm{Vmax\_r\_0610}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0610}, \mathrm{kmp\_s\_1207r\_0610}, \mathrm{kms\_s\_0605r\_0610}, \mathrm{kms\_s\_1434\_br\_0610}, [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \tag{941}$$

$$\mathrm{function\_164}(\mathrm{Keq\_r\_0610}, \mathrm{Vmax\_r\_0610}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0610}, \mathrm{kmp\_s\_1207r\_0610}, \mathrm{kms\_s\_0605r\_0610}, \mathrm{kms\_s\_1434\_br\_0610}, [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0610} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0605r\_0610}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0610}}\right)^{1} \cdot \left([\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1207}]^{2}}{\mathrm{Keq\_r\_0610}}\right)}{\left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0610}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0610}}\right) + \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0610}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0610}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{942}$$

$$\begin{aligned}&\mathrm{function\_164}\left(\mathrm{Keq\_r\_0610}, \mathrm{Vmax\_r\_0610}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\&\quad\mathrm{kmp\_s\_0763\_br\_0610}, \mathrm{kmp\_s\_1207r\_0610}, \mathrm{kms\_s\_0605r\_0610},\\&\quad\left.\mathrm{kms\_s\_1434\_br\_0610}, [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right)\\&= \frac{\mathrm{Vmax\_r\_0610} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0605r\_0610}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0610}}\right)^{1} \cdot \left([\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1207}]^{2}}{\mathrm{Keq\_r\_0610}}\right)}{\left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kms\_s\_0605r\_0610}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0610}}\right) + \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0610}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0610}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{943}$$

Table 660: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0610	Keq_r_0610		0.604		☑
Vmax_r_0610	Vmax_r_0610		3.203		☑
kmp_s_0763-_br_0610	kmp_s_0763_br-_0610		0.549		☑
kmp_s_1207r-_0610	kmp_s_1207r_0610		0.549		☑
kms_s_0605r-_0610	kms_s_0605r_0610		0.549		☑
kms_s_1434-_br_0610	kms_s_1434_br-_0610		0.549		☑

7.165 Reaction r_0618

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name inositolphosphotransferase

Notes GENE_ASSOCIATION:YDR072C

Reaction equation

$$\mathrm{s\_0128} + \mathrm{s\_1013} \xrightleftharpoons{\mathrm{s\_0128},\ \mathrm{s\_0824},\ \mathrm{s\_1013}} \mathrm{s\_0824} \tag{944}$$

Reactants

Table 661: Properties of each reactant.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_1013	mannosylinositol phosphorylceramide [intracellular]	

Modifiers

Table 662: Properties of each modifier.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_0824	inositol phosphomannosylinositol phosphoceramide [intracellular]	
s_1013	mannosylinositol phosphorylceramide [intracellular]	

Product

Table 663: Properties of each product.

Id	Name	SBO
s_0824	inositol phosphomannosylinositol phosphoceramide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{165} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_165}(\mathrm{Keq\_r\_0618}, \mathrm{Vmax\_r\_0618}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0824r\_0618}, \mathrm{kms\_s\_0128r\_0618}, \mathrm{kms\_s\_1013r\_0618}, [\mathrm{s\_0128}], [\mathrm{s\_0824}], [\mathrm{s\_1013}]) \tag{945}$$

$$\mathrm{function\_165}(\mathrm{Keq\_r\_0618}, \mathrm{Vmax\_r\_0618}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0824r\_0618}, \mathrm{kms\_s\_0128r\_0618}, \mathrm{kms\_s\_1013r\_0618}, [\mathrm{s\_0128}], [\mathrm{s\_0824}], [\mathrm{s\_1013}]) = \frac{\mathrm{Vmax\_r\_0618} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0618}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1013r\_0618}}\right)^1 \cdot \left([\mathrm{s\_0128}]^1 \cdot [\mathrm{s\_1013}]^1 - \frac{[\mathrm{s\_0824}]^1}{\mathrm{Keq\_r\_0618}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0618}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1013}]}{\mathrm{kms\_s\_1013r\_0618}}\right) + 1 + \frac{[\mathrm{s\_0824}]}{\mathrm{kmp\_s\_0824r\_0618}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{946}$$

$$\mathrm{function\_165}(\mathrm{Keq\_r\_0618}, \mathrm{Vmax\_r\_0618}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0824r\_0618}, \mathrm{kms\_s\_0128r\_0618}, \mathrm{kms\_s\_1013r\_0618}, [\mathrm{s\_0128}], [\mathrm{s\_0824}], [\mathrm{s\_1013}]) = \frac{\mathrm{Vmax\_r\_0618} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0618}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1013r\_0618}}\right)^1 \cdot \left([\mathrm{s\_0128}]^1 \cdot [\mathrm{s\_1013}]^1 - \frac{[\mathrm{s\_0824}]^1}{\mathrm{Keq\_r\_0618}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0618}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1013}]}{\mathrm{kms\_s\_1013r\_0618}}\right) + 1 + \frac{[\mathrm{s\_0824}]}{\mathrm{kmp\_s\_0824r\_0618}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{947}$$

Table 664: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0618	Keq_r_0618		2.004		☑
Vmax_r_0618	Vmax_r_0618		0.001		☑
kmp_s_0824r-_0618	kmp_s_0824r_0618		0.549		☑
kms_s_0128r-_0618	kms_s_0128r_0618		0.549		☑
kms_s_1013r-_0618	kms_s_1013r_0618		0.549		☑

7.166 Reaction r_0621

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name IPC synthase

Notes GENE_ASSOCIATION:YKL004W

Reaction equation

$$s\_0128 + s\_1060 \xrightleftharpoons{s\_0128,\ s\_0828,\ s\_1060} s\_0828 \quad (948)$$

Reactants

Table 665: Properties of each reactant.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_1060	N-(24-hydroxytetracosanyl)sphinganine [intracellular]	

Modifiers

Table 666: Properties of each modifier.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_0828	inositol-P-ceramide B [intracellular]	
s_1060	N-(24-hydroxytetracosanyl)sphinganine [intracellular]	

Product

Table 667: Properties of each product.

Id	Name	SBO
s_0828	inositol-P-ceramide B [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{166} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_166}\left(\mathrm{Keq\_r\_0621}, \mathrm{Vmax\_r\_0621}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0828r\_0621}, \mathrm{kms\_s\_0128r\_0621}, \mathrm{kms\_s\_1060r\_0621}, [\mathrm{s\_0128}], [\mathrm{s\_0828}], [\mathrm{s\_1060}]\right) \quad (949)$$

$$\mathrm{function\_166}\left(\mathrm{Keq\_r\_0621}, \mathrm{Vmax\_r\_0621}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0828r\_0621}, \mathrm{kms\_s\_0128r\_0621}, \mathrm{kms\_s\_1060r\_0621}, [\mathrm{s\_0128}], [\mathrm{s\_0828}], [\mathrm{s\_1060}]\right) = \frac{\mathrm{Vmax\_r\_0621} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0621}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1060r\_0621}}\right)^{1} \cdot \left([\mathrm{s\_0128}]^{1} \cdot [\mathrm{s\_1060}]^{1} - \frac{[\mathrm{s\_0828}]^{1}}{\mathrm{Keq\_r\_0621}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0621}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1060}]}{\mathrm{kms\_s\_1060r\_0621}}\right) + 1 + \frac{[\mathrm{s\_0828}]}{\mathrm{kmp\_s\_0828r\_0621}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (950)$$

$$\mathrm{function\_166}\left(\mathrm{Keq\_r\_0621}, \mathrm{Vmax\_r\_0621}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0828r\_0621}, \mathrm{kms\_s\_0128r\_0621}, \mathrm{kms\_s\_1060r\_0621}, [\mathrm{s\_0128}], [\mathrm{s\_0828}], [\mathrm{s\_1060}]\right) = \frac{\mathrm{Vmax\_r\_0621} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0621}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1060r\_0621}}\right)^{1} \cdot \left([\mathrm{s\_0128}]^{1} \cdot [\mathrm{s\_1060}]^{1} - \frac{[\mathrm{s\_0828}]^{1}}{\mathrm{Keq\_r\_0621}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0621}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1060}]}{\mathrm{kms\_s\_1060r\_0621}}\right) + 1 + \frac{[\mathrm{s\_0828}]}{\mathrm{kmp\_s\_0828r\_0621}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (951)$$

Table 668: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0621	Keq_r_0621		2.004		☑
Vmax_r_0621	Vmax_r_0621		0.001		☑
kmp_s_0828r-_0621	kmp_s_0828r_0621		0.549		☑
kms_s_0128r-_0621	kms_s_0128r_0621		0.549		☑
kms_s_1060r-_0621	kms_s_1060r_0621		0.549		☑

7.167 Reaction r_0630

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name isocitrate dehydrogenase (NADP)

Notes GENE_ASSOCIATION:YLR174W or YDL066W or YNL009W

Reaction equation

$$s\_0847 + s\_1091 \xrightleftharpoons{s\_0185,\ s\_0470,\ s\_0847,\ s\_1091,\ s\_1096} s\_0185 + s\_0470 + s\_1096 \qquad (952)$$

Reactants

Table 669: Properties of each reactant.

Id	Name	SBO
s_0847	isocitrate(3-) [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 670: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0847	isocitrate(3-) [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 671: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{167} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_167}\left(\mathrm{Keq\_r\_0630}, \mathrm{Vmax\_r\_0630}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0630}, \mathrm{kmp\_s\_0470r\_0630}, \mathrm{kmp\_s\_1096r\_0630}, \mathrm{kms\_s\_0847r\_0630}, \mathrm{kms\_s\_1091r\_0630}, [\mathrm{s\_0185}], [\mathrm{s\_0470}], [\mathrm{s\_0847}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \quad (953)$$

$$\mathrm{function\_167}\left(\mathrm{Keq\_r\_0630}, \mathrm{Vmax\_r\_0630}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0630}, \mathrm{kmp\_s\_0470r\_0630}, \mathrm{kmp\_s\_1096r\_0630}, \mathrm{kms\_s\_0847r\_0630}, \mathrm{kms\_s\_1091r\_0630}, [\mathrm{s\_0185}], [\mathrm{s\_0470}], [\mathrm{s\_0847}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0630} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0847r\_0630}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0630}}\right)^1 \cdot \left([\mathrm{s\_0847}]^1 \cdot [\mathrm{s\_1091}]^1 - \frac{[\mathrm{s\_0185}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0630}}\right)}{\left(1 + \frac{[\mathrm{s\_0847}]}{\mathrm{kms\_s\_0847r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0630}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0630}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (954)$$

$$\mathrm{function\_167}\left(\mathrm{Keq\_r\_0630}, \mathrm{Vmax\_r\_0630}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0630}, \mathrm{kmp\_s\_0470r\_0630}, \mathrm{kmp\_s\_1096r\_0630}, \mathrm{kms\_s\_0847r\_0630}, \mathrm{kms\_s\_1091r\_0630}, [\mathrm{s\_0185}], [\mathrm{s\_0470}], [\mathrm{s\_0847}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0630} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0847r\_0630}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0630}}\right)^1 \cdot \left([\mathrm{s\_0847}]^1 \cdot [\mathrm{s\_1091}]^1 - \frac{[\mathrm{s\_0185}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0630}}\right)}{\left(1 + \frac{[\mathrm{s\_0847}]}{\mathrm{kms\_s\_0847r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0630}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0630}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0630}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (955)$$

Table 672: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0630`	Keq_r_0630		1.100		☑
`Vmax_r_0630`	Vmax_r_0630		6.982		☑
`kmp_s_0185r_0630`	kmp_s_0185r_0630		0.549		☑
`kmp_s_0470r_0630`	kmp_s_0470r_0630		1.000		☑
`kmp_s_1096r_0630`	kmp_s_1096r_0630		0.549		☑
`kms_s_0847r_0630`	kms_s_0847r_0630		0.549		☑
`kms_s_1091r_0630`	kms_s_1091r_0630		0.549		☑

7.168 Reaction r_0633

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name isocitrate lyase

Notes GENE_ASSOCIATION:YER065C

Reaction equation

$$\text{s\_0847} \xrightleftharpoons{\text{s\_0749, s\_0847, s\_1338}} \text{s\_0749} + \text{s\_1338} \tag{956}$$

Reactant

Table 673: Properties of each reactant.

Id	Name	SBO
s_0847	isocitrate(3-) [intracellular]	

Modifiers

Table 674: Properties of each modifier.

Id	Name	SBO
s_0749	glyoxylate [intracellular]	
s_0847	isocitrate(3-) [intracellular]	
s_1338	succinate(2-) [intracellular]	

Products

Table 675: Properties of each product.

Id	Name	SBO
s_0749	glyoxylate [intracellular]	
s_1338	succinate(2-) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{168} = \text{vol}(\text{intracellular}) \cdot \text{function\_168}(\text{Keq\_r\_0633}, \text{Vmax\_r\_0633}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0749r\_0633}, \text{kmp\_s\_1338r\_0633}, \text{kms\_s\_0847r\_0633}, [\text{s\_0749}], [\text{s\_0847}], [\text{s\_1338}]) \tag{957}$$

$$\text{function\_168}\left(\text{Keq\_r\_0633}, \text{Vmax\_r\_0633}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0749r\_0633}, \text{kmp\_s\_1338r\_0633}, \text{kms\_s\_0847r\_0633}, [\text{s\_0749}], [\text{s\_0847}], [\text{s\_1338}]\right) = \frac{\text{Vmax\_r\_0633} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0847r\_0633}}\right)^1 \cdot \left([\text{s\_0847}]^1 - \frac{[\text{s\_0749}]^1 \cdot [\text{s\_1338}]^1}{\text{Keq\_r\_0633}}\right)}{1+\frac{[\text{s\_0847}]}{\text{kms\_s\_0847r\_0633}}+\left(1+\frac{[\text{s\_0749}]}{\text{kmp\_s\_0749r\_0633}}\right)\cdot\left(1+\frac{[\text{s\_1338}]}{\text{kmp\_s\_1338r\_0633}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \tag{958}$$

$$\text{function\_168}\left(\text{Keq\_r\_0633}, \text{Vmax\_r\_0633}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0749r\_0633}, \text{kmp\_s\_1338r\_0633}, \text{kms\_s\_0847r\_0633}, [\text{s\_0749}], [\text{s\_0847}], [\text{s\_1338}]\right) = \frac{\text{Vmax\_r\_0633} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0847r\_0633}}\right)^1 \cdot \left([\text{s\_0847}]^1 - \frac{[\text{s\_0749}]^1 \cdot [\text{s\_1338}]^1}{\text{Keq\_r\_0633}}\right)}{1+\frac{[\text{s\_0847}]}{\text{kms\_s\_0847r\_0633}}+\left(1+\frac{[\text{s\_0749}]}{\text{kmp\_s\_0749r\_0633}}\right)\cdot\left(1+\frac{[\text{s\_1338}]}{\text{kmp\_s\_1338r\_0633}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)} \tag{959}$$

Table 676: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0633	Keq_r_0633		0.604		☑
Vmax_r_0633	Vmax_r_0633		1.226		☑
kmp_s_0749r-_0633	kmp_s_0749r_0633		0.549		☑
kmp_s_1338r-_0633	kmp_s_1338r_0633		0.549		☑
kms_s_0847r-_0633	kms_s_0847r_0633		0.549		☑

7.169 Reaction r_0634

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name isoleucine transaminase

Notes GENE_ASSOCIATION:YJR148W or YHR208W

Reaction equation

$$\text{s\_0058} + \text{s\_0899} \xrightleftharpoons{\text{s\_0058, s\_0185, s\_0899, s\_0920}} \text{s\_0185} + \text{s\_0920} \tag{960}$$

Reactants

Table 677: Properties of each reactant.

Id	Name	SBO
s_0058	(S)-3-methyl-2-oxopentanoate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 678: Properties of each modifier.

Id	Name	SBO
s_0058	(S)-3-methyl-2-oxopentanoate [intracellular]	
s_0185	2-oxoglutarate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0920	L-isoleucine [intracellular]	

Products

Table 679: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0920	L-isoleucine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{169} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_169}\left(\mathrm{Keq\_r\_0634}, \mathrm{Vmax\_r\_0634}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0634}, \mathrm{kmp\_s\_0920r\_0634}, \mathrm{kms\_s\_0058r\_0634}, \mathrm{kms\_s\_0899r\_0634}, [\mathrm{s\_0058}], [\mathrm{s\_0185}], [\mathrm{s\_0899}], [\mathrm{s\_0920}]\right) \quad (961)$$

$$\mathrm{function\_169}\left(\mathrm{Keq\_r\_0634}, \mathrm{Vmax\_r\_0634}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0634}, \mathrm{kmp\_s\_0920r\_0634}, \mathrm{kms\_s\_0058r\_0634}, \mathrm{kms\_s\_0899r\_0634}, [\mathrm{s\_0058}], [\mathrm{s\_0185}], [\mathrm{s\_0899}], [\mathrm{s\_0920}]\right) = \frac{\mathrm{Vmax\_r\_0634} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0058r\_0634}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0634}}\right)^{1} \cdot \left([\mathrm{s\_0058}]^{1} \cdot [\mathrm{s\_0899}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0920}]^{1}}{\mathrm{Keq\_r\_0634}}\right)}{\left(1 + \frac{[\mathrm{s\_0058}]}{\mathrm{kms\_s\_0058r\_0634}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0634}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0634}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0920}]}{\mathrm{kmp\_s\_0920r\_0634}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (962)$$

$$\text{function\_169}(\text{Keq\_r\_0634}, \text{Vmax\_r\_0634}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0185r\_0634}, \text{kmp\_s\_0920r\_0634}, \text{kms\_s\_0058r\_0634}, \text{kms\_s\_0899r\_0634}, [\text{s\_0058}], [\text{s\_0185}], [\text{s\_0899}], [\text{s\_0920}]) = \frac{\text{Vmax\_r\_0634} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0058r\_0634}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0634}}\right)^{1} \cdot \left([\text{s\_0058}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0920}]^{1}}{\text{Keq\_r\_0634}}\right)}{\left(1+\frac{[\text{s\_0058}]}{\text{kms\_s\_0058r\_0634}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0634}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0634}}\right) \cdot \left(1+\frac{[\text{s\_0920}]}{\text{kmp\_s\_0920r\_0634}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{963}$$

Table 680: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0634	Keq_r_0634		1.100		☑
Vmax_r_0634	Vmax_r_0634		0.733		☑
kmp_s_0185r-_0634	kmp_s_0185r_0634		0.549		☑
kmp_s_0920r-_0634	kmp_s_0920r_0634		0.549		☑
kms_s_0058r-_0634	kms_s_0058r_0634		0.549		☑
kms_s_0899r-_0634	kms_s_0899r_0634		0.549		☑

7.170 Reaction r_0638

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name isopentenyl-diphosphate D-isomerase

Notes GENE_ASSOCIATION:YPL117C

Reaction equation

$$\text{s\_0850} \xrightleftharpoons{\text{s\_0850, s\_1257}} \text{s\_1257} \tag{964}$$

Reactant

Table 681: Properties of each reactant.

Id	Name	SBO
s_0850	isopentenyl diphosphate [intracellular]	

Modifiers

Table 682: Properties of each modifier.

Id	Name	SBO
s_0850	isopentenyl diphosphate [intracellular]	
s_1257	prenyl diphosphate [intracellular]	

Product

Table 683: Properties of each product.

Id	Name	SBO
s_1257	prenyl diphosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{170} = \text{vol}(\text{intracellular}) \cdot \text{function\_170}(\text{Keq\_r\_0638}, \text{Vmax\_r\_0638}, \text{vol}(\text{intracellular}), \text{kmp\_s\_1257r\_0638}, \text{kms\_s\_0850r\_0638}, [\text{s\_0850}], [\text{s\_1257}]) \tag{965}$$

$$\text{function\_170}(\text{Keq\_r\_0638}, \text{Vmax\_r\_0638}, \text{vol}(\text{intracellular}), \text{kmp\_s\_1257r\_0638}, \text{kms\_s\_0850r\_0638}, [\text{s\_0850}], [\text{s\_1257}]) = \frac{\text{Vmax\_r\_0638} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0850r\_0638}}\right)^1 \cdot \left([\text{s\_0850}]^1 - \frac{[\text{s\_1257}]^1}{\text{Keq\_r\_0638}}\right)}{1 + \frac{[\text{s\_0850}]}{\text{kms\_s\_0850r\_0638}} + 1 + \frac{[\text{s\_1257}]}{\text{kmp\_s\_1257r\_0638}} - 1}}{\text{vol}(\text{intracellular})} \tag{966}$$

$$\text{function\_170}(\text{Keq\_r\_0638}, \text{Vmax\_r\_0638}, \text{vol}(\text{intracellular}), \text{kmp\_s\_1257r\_0638}, \text{kms\_s\_0850r\_0638}, [\text{s\_0850}], [\text{s\_1257}]) = \frac{\text{Vmax\_r\_0638} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0850r\_0638}}\right)^1 \cdot \left([\text{s\_0850}]^1 - \frac{[\text{s\_1257}]^1}{\text{Keq\_r\_0638}}\right)}{1 + \frac{[\text{s\_0850}]}{\text{kms\_s\_0850r\_0638}} + 1 + \frac{[\text{s\_1257}]}{\text{kmp\_s\_1257r\_0638}} - 1}}{\text{vol}(\text{intracellular})} \tag{967}$$

Table 684: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0638	Keq_r_0638		1.100		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0638	Vmax_r_0638		0.025		☑
kmp_s_1257r-_0638	kmp_s_1257r_0638		0.549		☑
kms_s_0850r-_0638	kms_s_0850r_0638		0.549		☑

7.171 Reaction r_0640

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name ketol-acid reductoisomerase (2-aceto-2-hydroxybutanoate)

Notes GENE_ASSOCIATION:YLR355C

Reaction equation

$$\text{s\_0042} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0007, s\_0042, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0007} + \text{s\_1091} \tag{968}$$

Reactants

Table 685: Properties of each reactant.

Id	Name	SBO
s_0042	(S)-2-acetyl-2-hydroxybutanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 686: Properties of each modifier.

Id	Name	SBO
s_0007	(2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]	
s_0042	(S)-2-acetyl-2-hydroxybutanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 687: Properties of each product.

Id	Name	SBO
s_0007	(2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{171} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_171}(\mathrm{Keq\_r\_0640}, \mathrm{Vmax\_r\_0640}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0007r\_0640}, \mathrm{kmp\_s\_1091r\_0640}, \mathrm{kms\_s\_0042r\_0640}, \mathrm{kms\_s\_0763\_br\_0640}, \mathrm{kms\_s\_1096r\_0640}, [\mathrm{s\_0007}], [\mathrm{s\_0042}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (969)$$

$$\mathrm{function\_171}(\mathrm{Keq\_r\_0640}, \mathrm{Vmax\_r\_0640}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0007r\_0640}, \mathrm{kmp\_s\_1091r\_0640}, \mathrm{kms\_s\_0042r\_0640}, \mathrm{kms\_s\_0763\_br\_0640}, \mathrm{kms\_s\_1096r\_0640}, [\mathrm{s\_0007}], [\mathrm{s\_0042}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0640} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0042r\_0640}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0640}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0640}}\right)^1 \cdot \left([\mathrm{s\_0042}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0007}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0640}}\right)}{\left(1+\frac{[\mathrm{s\_0042}]}{\mathrm{kms\_s\_0042r\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0640}}\right) + \left(1+\frac{[\mathrm{s\_0007}]}{\mathrm{kmp\_s\_0007r\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0640}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (970)$$

$$\mathrm{function\_171}(\mathrm{Keq\_r\_0640}, \mathrm{Vmax\_r\_0640}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0007r\_0640}, \mathrm{kmp\_s\_1091r\_0640}, \mathrm{kms\_s\_0042r\_0640}, \mathrm{kms\_s\_0763\_br\_0640}, \mathrm{kms\_s\_1096r\_0640}, [\mathrm{s\_0007}], [\mathrm{s\_0042}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0640} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0042r\_0640}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0640}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0640}}\right)^1 \cdot \left([\mathrm{s\_0042}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0007}]^1 \cdot [\mathrm{s\_1091}]^1}{\mathrm{Keq\_r\_0640}}\right)}{\left(1+\frac{[\mathrm{s\_0042}]}{\mathrm{kms\_s\_0042r\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0640}}\right) + \left(1+\frac{[\mathrm{s\_0007}]}{\mathrm{kmp\_s\_0007r\_0640}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0640}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (971)$$

Table 688: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0640	Keq_r_0640		2.004		☑
Vmax_r_0640	Vmax_r_0640		1.152		☑
kmp_s_0007r-_0640	kmp_s_0007r_0640		0.549		☑
kmp_s_1091r-_0640	kmp_s_1091r_0640		0.549		☑
kms_s_0042r-_0640	kms_s_0042r_0640		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0763-_br_0640	kms_s_0763_br-_0640		0.549		☑
kms_s_1096r-_0640	kms_s_1096r_0640		0.549		☑

7.172 Reaction r_0647

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name L-alanine transaminase

Notes GENE_ASSOCIATION:YLR089C

Reaction equation

$$\mathrm{s\_0899} + \mathrm{s\_1277} \xrightleftharpoons[]{\mathrm{s\_0185,\ s\_0863,\ s\_0899,\ s\_1277}} \mathrm{s\_0185} + \mathrm{s\_0863} \tag{972}$$

Reactants

Table 689: Properties of each reactant.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 690: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0863	L-alanine [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 691: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0863	L-alanine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{172} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_172}\left(\mathrm{Keq\_r\_0647}, \mathrm{Vmax\_r\_0647}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0647}, \mathrm{kmp\_s\_0863r\_0647}, \mathrm{kms\_s\_0899r\_0647}, \mathrm{kms\_s\_1277r\_0647}, [\mathrm{s\_0185}], [\mathrm{s\_0863}], [\mathrm{s\_0899}], [\mathrm{s\_1277}]\right) \tag{973}$$

$$\mathrm{function\_172}\left(\mathrm{Keq\_r\_0647}, \mathrm{Vmax\_r\_0647}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0647}, \mathrm{kmp\_s\_0863r\_0647}, \mathrm{kms\_s\_0899r\_0647}, \mathrm{kms\_s\_1277r\_0647}, [\mathrm{s\_0185}], [\mathrm{s\_0863}], [\mathrm{s\_0899}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0647} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0647}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0647}}\right)^{1} \cdot \left([\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0863}]^{1}}{\mathrm{Keq\_r\_0647}}\right)}{\left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0647}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0863}]}{\mathrm{kmp\_s\_0863r\_0647}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{974}$$

$$\mathrm{function\_172}\left(\mathrm{Keq\_r\_0647}, \mathrm{Vmax\_r\_0647}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0647}, \mathrm{kmp\_s\_0863r\_0647}, \mathrm{kms\_s\_0899r\_0647}, \mathrm{kms\_s\_1277r\_0647}, [\mathrm{s\_0185}], [\mathrm{s\_0863}], [\mathrm{s\_0899}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0647} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0647}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0647}}\right)^{1} \cdot \left([\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0185}]^{1} \cdot [\mathrm{s\_0863}]^{1}}{\mathrm{Keq\_r\_0647}}\right)}{\left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0647}}\right) + \left(1 + \frac{[\mathrm{s\_0185}]}{\mathrm{kmp\_s\_0185r\_0647}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0863}]}{\mathrm{kmp\_s\_0863r\_0647}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{975}$$

Table 692: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0647	Keq_r_0647		9.967		☑
Vmax_r_0647	Vmax_r_0647		3.249		☑
kmp_s_0185r-_0647	kmp_s_0185r_0647		0.549		☑
kmp_s_0863r-_0647	kmp_s_0863r_0647		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0899r-_0647	kms_s_0899r_0647		0.549		☑
kms_s_1277r-_0647	kms_s_1277r_0647		0.061		☑

7.173 Reaction r_0650

This is a reversible reaction of four reactants forming four products influenced by eight modifiers.

Name L-aminoadipate-semialdehyde dehydrogenase (NADH)

Notes GENE_ASSOCIATION:(YBR115C and YGL154C)

Reaction equation

$$s\_0446 + s\_0763\_b + s\_0861 + s\_1087 \xrightleftharpoons{s\_0434,\ s\_0446,\ s\_0605,\ s\_0763\_b,\ s\_0861,\ s\_0867,\ s\_1082,\ s\_1087} s\_0434 + s \tag{976}$$

Reactants

Table 693: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0861	L-2-aminoadipate(2-) [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 694: Properties of each modifier.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0861	L-2-aminoadipate(2-) [intracellular]	
s_0867	L-allysine [intracellular]	
s_1082	NAD(+) [intracellular]	

Id	Name	SBO
s_1087	NADH [intracellular]	

Products

Table 695: Properties of each product.

Id	Name	SBO
s_0434	AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0867	L-allysine [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{173} = \text{vol}(\text{intracellular}) \cdot \text{function\_173}(\text{Keq\_r\_0650}, \text{Vmax\_r\_0650}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0650}, \text{kmp\_s\_0605r\_0650}, \text{kmp\_s\_0867r\_0650}, \text{kmp\_s\_1082r\_0650}, \text{kms\_s\_0446r\_0650}, \text{kms\_s\_0763\_br\_0650}, \text{kms\_s\_0861r\_0650}, \text{kms\_s\_1087r\_0650}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_0861}], [\text{s\_0867}], [\text{s\_1082}], [\text{s\_1087}]) \quad (977)$$

$$\text{function\_173}(\text{Keq\_r\_0650}, \text{Vmax\_r\_0650}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0650}, \text{kmp\_s\_0605r\_0650}, \text{kmp\_s\_0867r\_0650}, \text{kmp\_s\_1082r\_0650}, \text{kms\_s\_0446r\_0650}, \text{kms\_s\_0763\_br\_0650}, \text{kms\_s\_0861r\_0650}, \text{kms\_s\_1087r\_0650}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_0861}], [\text{s\_0867}], [\text{s\_1082}], [\text{s\_1087}]) = \frac{\text{Vmax\_r\_0650} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0861r\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0650}}\right)^1 \cdot \left([\text{s\_0446}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_0861}]^1 \cdot [\text{s\_1087}]^1 \cdot\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0861}]}{\text{kms\_s\_0861r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0650}}\right) + \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0650}}\right) \cdot}}{\text{vol}(\text{intracellular})} \quad (978)$$

$$\text{function\_173}(\text{Keq\_r\_0650}, \text{Vmax\_r\_0650}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0434r\_0650}, \text{kmp\_s\_0605r\_0650}, \text{kmp\_s\_0867r\_0650}, \text{kmp\_s\_1082r\_0650}, \text{kms\_s\_0446r\_0650}, \text{kms\_s\_0763\_br\_0650}, \text{kms\_s\_0861r\_0650}, \text{kms\_s\_1087r\_0650}, [\text{s\_0434}], [\text{s\_0446}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_0861}], [\text{s\_0867}], [\text{s\_1082}], [\text{s\_1087}]) = \frac{\text{Vmax\_r\_0650} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0861r\_0650}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0650}}\right)^1 \cdot \left([\text{s\_0446}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_0861}]^1 \cdot [\text{s\_1087}]^1 \cdot\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0861}]}{\text{kms\_s\_0861r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0650}}\right) + \left(1+\frac{[\text{s\_0434}]}{\text{kmp\_s\_0434r\_0650}}\right) \cdot \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0650}}\right) \cdot}}{\text{vol}(\text{intracellular})} \quad (979)$$

Table 696: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0650	Keq_r_0650		21.989		☑
Vmax_r_0650	Vmax_r_0650		4.535		☑
kmp_s_0434r_0650	kmp_s_0434r_0650		1.260		☑
kmp_s_0605r_0650	kmp_s_0605r_0650		0.549		☑
kmp_s_0867r_0650	kmp_s_0867r_0650		0.549		☑
kmp_s_1082r_0650	kmp_s_1082r_0650		1.503		☑
kms_s_0446r_0650	kms_s_0446r_0650		1.092		☑
kms_s_0763_br_0650	kms_s_0763_br_0650		0.549		☑
kms_s_0861r_0650	kms_s_0861r_0650		0.549		☑
kms_s_1087r_0650	kms_s_1087r_0650		0.087		☑

7.174 Reaction r_0657

This is a reversible reaction of one reactant forming three products influenced by four modifiers.

Name L-glutamate 5-semialdehyde dehydratase

Notes GENE_ASSOCIATION:

Reaction equation

$$s\_0905 \xrightleftharpoons{s\_0120,\ s\_0763\_b,\ s\_0905,\ s\_1434\_b} s\_0120 + s\_0763\_b + s\_1434\_b \quad (980)$$

Reactant

Table 697: Properties of each reactant.

Id	Name	SBO
s_0905	L-glutamic 5-semialdehyde [intracellular]	

Modifiers

Table 698: Properties of each modifier.

Id	Name	SBO
s_0120	1-pyrroline-5-carboxylate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0905	L-glutamic 5-semialdehyde [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 699: Properties of each product.

Id	Name	SBO
s_0120	1-pyrroline-5-carboxylate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{174} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_174}(\mathrm{Keq\_r\_0657}, \mathrm{Vmax\_r\_0657}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0120r\_0657}, \mathrm{kmp\_s\_0763\_br\_0657}, \mathrm{kmp\_s\_1434\_br\_0657}, \mathrm{kms\_s\_0905r\_0657}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0905}], [\mathrm{s\_1434\_b}]) \tag{981}$$

$$\mathrm{function\_174}(\mathrm{Keq\_r\_0657}, \mathrm{Vmax\_r\_0657}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0120r\_0657}, \mathrm{kmp\_s\_0763\_br\_0657}, \mathrm{kmp\_s\_1434\_br\_0657}, \mathrm{kms\_s\_0905r\_0657}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0905}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0657} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0905r\_0657}}\right)^{1} \cdot \left([\mathrm{s\_0905}]^{1} - \frac{[\mathrm{s\_0120}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0657}}\right)}{1 + \frac{[\mathrm{s\_0905}]}{\mathrm{kms\_s\_0905r\_0657}} + \left(1 + \frac{[\mathrm{s\_0120}]}{\mathrm{kmp\_s\_0120r\_0657}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0657}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0657}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{982}$$

$$\mathrm{function\_174}(\mathrm{Keq\_r\_0657}, \mathrm{Vmax\_r\_0657}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0120r\_0657}, \mathrm{kmp\_s\_0763\_br\_0657}, \mathrm{kmp\_s\_1434\_br\_0657}, \mathrm{kms\_s\_0905r\_0657}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0905}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0657} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0905r\_0657}}\right)^{1} \cdot \left([\mathrm{s\_0905}]^{1} - \frac{[\mathrm{s\_0120}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1}}{\mathrm{Keq\_r\_0657}}\right)}{1 + \frac{[\mathrm{s\_0905}]}{\mathrm{kms\_s\_0905r\_0657}} + \left(1 + \frac{[\mathrm{s\_0120}]}{\mathrm{kmp\_s\_0120r\_0657}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0657}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0657}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{983}$$

Table 700: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0657	Keq_r_0657		0.332		☑
Vmax_r_0657	Vmax_r_0657		0.707		☑
kmp_s_0120r-_0657	kmp_s_0120r_0657		0.549		☑
kmp_s_0763-_br_0657	kmp_s_0763_br-_0657		0.549		☑
kmp_s_1434-_br_0657	kmp_s_1434_br-_0657		0.549		☑
kms_s_0905r-_0657	kms_s_0905r_0657		0.549		☑

7.175 Reaction r_0660

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name L-hydroxyproline dehydrogenase (NADP)

Notes GENE_ASSOCIATION:YHR037W

Reaction equation

$$s\_1091 + s\_1379 \xrightleftharpoons{s\_0118,\ s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1379} s\_0118 + 2\,s\_0763\_b + s\_1096 \quad (984)$$

Reactants

Table 701: Properties of each reactant.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1379	trans-4-hydroxy-L-proline [intracellular]	

Modifiers

Table 702: Properties of each modifier.

Id	Name	SBO
s_0118	1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1379	trans-4-hydroxy-L-proline [intracellular]	

Products

Table 703: Properties of each product.

Id	Name	SBO
s_0118	1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{175} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_175}(\mathrm{Keq\_r\_0660}, \mathrm{Vmax\_r\_0660}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0118r\_0660}, \mathrm{kmp\_s\_0763\_br\_0660}, \mathrm{kmp\_s\_1096r\_0660}, \mathrm{kms\_s\_1091r\_0660}, \mathrm{kms\_s\_1379r\_0660}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1379}]) \tag{985}$$

$$\mathrm{function\_175}(\mathrm{Keq\_r\_0660}, \mathrm{Vmax\_r\_0660}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0118r\_0660}, \mathrm{kmp\_s\_0763\_br\_0660}, \mathrm{kmp\_s\_1096r\_0660}, \mathrm{kms\_s\_1091r\_0660}, \mathrm{kms\_s\_1379r\_0660}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1379}]) = \frac{\mathrm{Vmax\_r\_0660} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1091r\_0660}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1379r\_0660}}\right)^{1} \cdot \left([\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1379}]^{1} - \frac{[\mathrm{s\_0118}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0660}}\right)}{\left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_1379}]}{\mathrm{kms\_s\_1379r\_0660}}\right) + \left(1+\frac{[\mathrm{s\_0118}]}{\mathrm{kmp\_s\_0118r\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0660}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{986}$$

$$\mathrm{function\_175}(\mathrm{Keq\_r\_0660}, \mathrm{Vmax\_r\_0660}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0118r\_0660}, \mathrm{kmp\_s\_0763\_br\_0660}, \mathrm{kmp\_s\_1096r\_0660}, \mathrm{kms\_s\_1091r\_0660}, \mathrm{kms\_s\_1379r\_0660}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1379}]) = \frac{\mathrm{Vmax\_r\_0660} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1091r\_0660}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1379r\_0660}}\right)^{1} \cdot \left([\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1379}]^{1} - \frac{[\mathrm{s\_0118}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0660}}\right)}{\left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_1379}]}{\mathrm{kms\_s\_1379r\_0660}}\right) + \left(1+\frac{[\mathrm{s\_0118}]}{\mathrm{kmp\_s\_0118r\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0660}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0660}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{987}$$

Table 704: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0660	Keq_r_0660		0.332		☑
Vmax_r_0660	Vmax_r_0660		3.303		☑
kmp_s_0118r-_0660	kmp_s_0118r_0660		0.549		☑
kmp_s_0763-_br_0660	kmp_s_0763_br-_0660		0.549		☑
kmp_s_1096r-_0660	kmp_s_1096r_0660		0.549		☑
kms_s_1091r-_0660	kms_s_1091r_0660		0.549		☑
kms_s_1379r-_0660	kms_s_1379r_0660		0.549		☑

7.176 Reaction r_0661

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name L-hydroxyproline reductase (NAD)

Notes GENE_ASSOCIATION:YER023W

Reaction equation

$$\mathrm{s\_0118} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1087} \xrightleftharpoons{\mathrm{s\_0118,\ s\_0763\_b,\ s\_1082,\ s\_1087,\ s\_1379}} \mathrm{s\_1082} + \mathrm{s\_1379} \tag{988}$$

Reactants

Table 705: Properties of each reactant.

Id	Name	SBO
s_0118	1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	

Modifiers

Table 706: Properties of each modifier.

Id	Name	SBO
s_0118	1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1379	trans-4-hydroxy-L-proline [intracellular]	

Products

Table 707: Properties of each product.

Id	Name	SBO
s_1082	NAD(+) [intracellular]	
s_1379	trans-4-hydroxy-L-proline [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{176} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_176}\left(\mathrm{Keq\_r\_0661}, \mathrm{Vmax\_r\_0661}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1082r\_0661}, \mathrm{kmp\_s\_1379r\_0661}, \mathrm{kms\_s\_0118r\_0661}, \mathrm{kms\_s\_0763\_br\_0661}, \mathrm{kms\_s\_1087r\_0661}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1379}]\right) \tag{989}$$

$$\begin{gathered}\mathrm{function\_176}\left(\mathrm{Keq\_r\_0661}, \mathrm{Vmax\_r\_0661}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1082r\_0661}, \mathrm{kmp\_s\_1379r\_0661}, \mathrm{kms\_s\_0118r\_0661}, \mathrm{kms\_s\_0763\_br\_0661}, \mathrm{kms\_s\_1087r\_0661}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1379}]\right) \\ = \frac{\mathrm{Vmax\_r\_0661} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0118r\_0661}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0661}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0661}}\right)^{1} \cdot \left([\mathrm{s\_0118}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1379}]^{1}}{\mathrm{Keq\_r\_0661}}\right)}{\left(1 + \frac{[\mathrm{s\_0118}]}{\mathrm{kms\_s\_0118r\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0661}}\right) + \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1379}]}{\mathrm{kmp\_s\_1379r\_0661}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{gathered} \tag{990}$$

$$\begin{gathered}\mathrm{function\_176}\left(\mathrm{Keq\_r\_0661}, \mathrm{Vmax\_r\_0661}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1082r\_0661}, \mathrm{kmp\_s\_1379r\_0661}, \mathrm{kms\_s\_0118r\_0661}, \mathrm{kms\_s\_0763\_br\_0661}, \mathrm{kms\_s\_1087r\_0661}, [\mathrm{s\_0118}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1379}]\right) \\ = \frac{\mathrm{Vmax\_r\_0661} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0118r\_0661}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0661}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0661}}\right)^{1} \cdot \left([\mathrm{s\_0118}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1087}]^{1} - \frac{[\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1379}]^{1}}{\mathrm{Keq\_r\_0661}}\right)}{\left(1 + \frac{[\mathrm{s\_0118}]}{\mathrm{kms\_s\_0118r\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0661}}\right) + \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0661}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1379}]}{\mathrm{kmp\_s\_1379r\_0661}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{gathered} \tag{991}$$

Table 708: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0661	Keq_r_0661		63.254		☑
Vmax_r_0661	Vmax_r_0661		3.303		☑
kmp_s_1082r-_0661	kmp_s_1082r_0661		1.503		☑
kmp_s_1379r-_0661	kmp_s_1379r_0661		0.549		☑
kms_s_0118r-_0661	kms_s_0118r_0661		0.549		☑
kms_s_0763-_br_0661	kms_s_0763_br-_0661		0.549		☑
kms_s_1087r-_0661	kms_s_1087r_0661		0.087		☑

7.177 Reaction r_0667

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name L-threonine deaminase

Notes GENE_ASSOCIATION:YCL064C or YER086W

Reaction equation

$$\text{s\_0949} \xrightleftharpoons{\text{s\_0183, s\_0430, s\_0949}} \text{s\_0183} + \text{s\_0430} \tag{992}$$

Reactant

Table 709: Properties of each reactant.

Id	Name	SBO
s_0949	L-threonine [intracellular]	

Modifiers

Table 710: Properties of each modifier.

Id	Name	SBO
s_0183	2-oxobutanoate [intracellular]	
s_0430	ammonium [intracellular]	

Id	Name	SBO
s_0949	L-threonine [intracellular]	

Products

Table 711: Properties of each product.

Id	Name	SBO
s_0183	2-oxobutanoate [intracellular]	
s_0430	ammonium [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{177} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_177}\left(\mathrm{Keq\_r\_0667}, \mathrm{Vmax\_r\_0667}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0667}, \mathrm{kmp\_s\_0430r\_0667}, \mathrm{kms\_s\_0949r\_0667}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0949}]\right) \quad (993)$$

$$\mathrm{function\_177}\left(\mathrm{Keq\_r\_0667}, \mathrm{Vmax\_r\_0667}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0667}, \mathrm{kmp\_s\_0430r\_0667}, \mathrm{kms\_s\_0949r\_0667}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0949}]\right) = \frac{\mathrm{Vmax\_r\_0667} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0949r\_0667}}\right)^{1} \cdot \left([\mathrm{s\_0949}]^{1} - \frac{[\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0430}]^{1}}{\mathrm{Keq\_r\_0667}}\right)}{1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kms\_s\_0949r\_0667}} + \left(1 + \frac{[\mathrm{s\_0183}]}{\mathrm{kmp\_s\_0183r\_0667}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0667}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (994)$$

$$\mathrm{function\_177}\left(\mathrm{Keq\_r\_0667}, \mathrm{Vmax\_r\_0667}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0183r\_0667}, \mathrm{kmp\_s\_0430r\_0667}, \mathrm{kms\_s\_0949r\_0667}, [\mathrm{s\_0183}], [\mathrm{s\_0430}], [\mathrm{s\_0949}]\right) = \frac{\mathrm{Vmax\_r\_0667} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0949r\_0667}}\right)^{1} \cdot \left([\mathrm{s\_0949}]^{1} - \frac{[\mathrm{s\_0183}]^{1} \cdot [\mathrm{s\_0430}]^{1}}{\mathrm{Keq\_r\_0667}}\right)}{1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kms\_s\_0949r\_0667}} + \left(1 + \frac{[\mathrm{s\_0183}]}{\mathrm{kmp\_s\_0183r\_0667}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0430}]}{\mathrm{kmp\_s\_0430r\_0667}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (995)$$

Table 712: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0667	Keq_r_0667		0.332		☑
Vmax_r_0667	Vmax_r_0667		0.196		☑
kmp_s_0183r-_0667	kmp_s_0183r_0667		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0430r-_0667	kmp_s_0430r_0667		0.549		☑
kms_s_0949r-_0667	kms_s_0949r_0667		1.000		☑

7.178 Reaction r_0673

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name lanosterol synthase

Notes GENE_ASSOCIATION:YHR072W

Reaction equation

$$\text{s\_0040} \xrightleftharpoons{\text{s\_0040, s\_0963}} \text{s\_0963} \tag{996}$$

Reactant

Table 713: Properties of each reactant.

Id	Name	SBO
s_0040	(S)-2,3-epoxysqualene [intracellular]	

Modifiers

Table 714: Properties of each modifier.

Id	Name	SBO
s_0040	(S)-2,3-epoxysqualene [intracellular]	
s_0963	lanosterol [intracellular]	

Product

Table 715: Properties of each product.

Id	Name	SBO
s_0963	lanosterol [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{178} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_178}(\mathrm{Keq\_r\_0673}, \mathrm{Vmax\_r\_0673}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0963r\_0673}, \mathrm{kms\_s\_0040r\_0673}, [\mathrm{s\_0040}], [\mathrm{s\_0963}]) \quad (997)$$

$$\mathrm{function\_178}(\mathrm{Keq\_r\_0673}, \mathrm{Vmax\_r\_0673}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0963r\_0673}, \mathrm{kms\_s\_0040r\_0673}, [\mathrm{s\_0040}], [\mathrm{s\_0963}]) = \frac{\mathrm{Vmax\_r\_0673} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0040r\_0673}}\right)^{1} \cdot \left([\mathrm{s\_0040}]^{1} - \frac{[\mathrm{s\_0963}]^{1}}{\mathrm{Keq\_r\_0673}}\right)}{1 + \frac{[\mathrm{s\_0040}]}{\mathrm{kms\_s\_0040r\_0673}} + 1 + \frac{[\mathrm{s\_0963}]}{\mathrm{kmp\_s\_0963r\_0673}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (998)$$

$$\mathrm{function\_178}(\mathrm{Keq\_r\_0673}, \mathrm{Vmax\_r\_0673}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0963r\_0673}, \mathrm{kms\_s\_0040r\_0673}, [\mathrm{s\_0040}], [\mathrm{s\_0963}]) = \frac{\mathrm{Vmax\_r\_0673} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0040r\_0673}}\right)^{1} \cdot \left([\mathrm{s\_0040}]^{1} - \frac{[\mathrm{s\_0963}]^{1}}{\mathrm{Keq\_r\_0673}}\right)}{1 + \frac{[\mathrm{s\_0040}]}{\mathrm{kms\_s\_0040r\_0673}} + 1 + \frac{[\mathrm{s\_0963}]}{\mathrm{kmp\_s\_0963r\_0673}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (999)$$

Table 716: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0673	Keq_r_0673		1.100		☑
Vmax_r_0673	Vmax_r_0673		0.013		☑
kmp_s_0963r-_0673	kmp_s_0963r_0673		0.549		☑
kms_s_0040r-_0673	kms_s_0040r_0673		0.549		☑

7.179 Reaction r_0674

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name leucine transaminase

Notes GENE_ASSOCIATION:YJR148W or YHR208W

Reaction equation

$$\mathrm{s\_0297} + \mathrm{s\_0899} \xrightleftharpoons{\mathrm{s\_0185,\ s\_0297,\ s\_0899,\ s\_0925}} \mathrm{s\_0185} + \mathrm{s\_0925} \quad (1000)$$

Reactants

Table 717: Properties of each reactant.

Id	Name	SBO
s_0297	4-methyl-2-oxopentanoate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 718: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0297	4-methyl-2-oxopentanoate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0925	L-leucine [intracellular]	

Products

Table 719: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0925	L-leucine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{179} = \mathrm{vol}\,(\mathrm{intracellular}) \cdot \mathrm{function\_179}\,(\mathrm{Keq\_r\_0674}, \mathrm{Vmax\_r\_0674}, \mathrm{vol}\,(\mathrm{intracellular}), \mathrm{kmp\_s\_0185r\_0674}, \mathrm{kmp\_s\_0925r\_0674}, \mathrm{kms\_s\_0297r\_0674}, \mathrm{kms\_s\_0899r\_0674}, [\mathrm{s\_0185}], [\mathrm{s\_0297}], [\mathrm{s\_0899}], [\mathrm{s\_0925}]) \quad (1001)$$

$$\begin{aligned}&\text{function\_179}\left(\text{Keq\_r\_0674}, \text{Vmax\_r\_0674}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0185r\_0674}, \text{kmp\_s\_0925r\_0674}, \text{kms\_s\_0297r\_0674},\\&\quad\quad\left.\text{kms\_s\_0899r\_0674}, [\text{s\_0185}], [\text{s\_0297}], [\text{s\_0899}], [\text{s\_0925}]\right)\\&=\frac{\text{Vmax\_r\_0674}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0297r\_0674}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0899r\_0674}}\right)^{1}\cdot\left([\text{s\_0297}]^{1}\cdot[\text{s\_0899}]^{1}-\frac{[\text{s\_0185}]^{1}\cdot[\text{s\_0925}]^{1}}{\text{Keq\_r\_0674}}\right)}{\left(1+\frac{[\text{s\_0297}]}{\text{kms\_s\_0297r\_0674}}\right)\cdot\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0674}}\right)+\left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0674}}\right)\cdot\left(1+\frac{[\text{s\_0925}]}{\text{kmp\_s\_0925r\_0674}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1002}$$

$$\begin{aligned}&\text{function\_179}\left(\text{Keq\_r\_0674}, \text{Vmax\_r\_0674}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0185r\_0674}, \text{kmp\_s\_0925r\_0674}, \text{kms\_s\_0297r\_0674},\\&\quad\quad\left.\text{kms\_s\_0899r\_0674}, [\text{s\_0185}], [\text{s\_0297}], [\text{s\_0899}], [\text{s\_0925}]\right)\\&=\frac{\text{Vmax\_r\_0674}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0297r\_0674}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0899r\_0674}}\right)^{1}\cdot\left([\text{s\_0297}]^{1}\cdot[\text{s\_0899}]^{1}-\frac{[\text{s\_0185}]^{1}\cdot[\text{s\_0925}]^{1}}{\text{Keq\_r\_0674}}\right)}{\left(1+\frac{[\text{s\_0297}]}{\text{kms\_s\_0297r\_0674}}\right)\cdot\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0674}}\right)+\left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0674}}\right)\cdot\left(1+\frac{[\text{s\_0925}]}{\text{kmp\_s\_0925r\_0674}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1003}$$

Table 720: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0674`	Keq_r_0674		1.100		☑
`Vmax_r_0674`	Vmax_r_0674		1.070		☑
`kmp_s_0185r_0674`	kmp_s_0185r_0674		0.549		☑
`kmp_s_0925r_0674`	kmp_s_0925r_0674		0.549		☑
`kms_s_0297r_0674`	kms_s_0297r_0674		0.549		☑
`kms_s_0899r_0674`	kms_s_0899r_0674		0.549		☑

7.180 Reaction r_0688

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name malate dehydrogenase

Notes GENE_ASSOCIATION:YOL126C or YKL085W or YDL078C

Reaction equation

$$\mathrm{s\_0763\_b} + \mathrm{s\_1087} + \mathrm{s\_1156} \xrightleftharpoons[]{\mathrm{s\_0069},\ \mathrm{s\_0763\_b},\ \mathrm{s\_1082},\ \mathrm{s\_1087},\ \mathrm{s\_1156}} \mathrm{s\_0069} + \mathrm{s\_1082} \tag{1004}$$

Reactants

Table 721: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	

Modifiers

Table 722: Properties of each modifier.

Id	Name	SBO
s_0069	(S)-malate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	

Products

Table 723: Properties of each product.

Id	Name	SBO
s_0069	(S)-malate(2-) [intracellular]	
s_1082	NAD(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{180} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_180}\left(\mathrm{Keq\_r\_0688}, \mathrm{Vmax\_r\_0688}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0069r\_0688}, \mathrm{kmp\_s\_1082r\_0688}, \mathrm{kms\_s\_0763\_br\_0688}, \mathrm{kms\_s\_1087r\_0688}, \mathrm{kms\_s\_1156r\_0688}, [\mathrm{s\_0069}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1156}]\right) \tag{1005}$$

$$\begin{aligned} & \text{function\_180}\left(\text{Keq\_r\_0688}, \text{Vmax\_r\_0688}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0069r\_0688}, \right. \\ & \text{kmp\_s\_1082r\_0688}, \text{kms\_s\_0763\_br\_0688}, \text{kms\_s\_1087r\_0688}, \\ & \left. \text{kms\_s\_1156r\_0688}, [\text{s\_0069}], [\text{s\_0763\_b}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1156}]\right) \\ & = \frac{\text{Vmax\_r\_0688} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0688}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0688}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1156r\_0688}}\right)^1 \cdot \left([\text{s\_0763\_b}]^1 \cdot [\text{s\_1087}]^1 \cdot [\text{s\_1156}]^1 - \frac{[\text{s\_0069}]^1 \cdot [\text{s\_1082}]^1}{\text{Keq\_r\_0688}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1156}]}{\text{kms\_s\_1156r\_0688}}\right) + \left(1+\frac{[\text{s\_0069}]}{\text{kmp\_s\_0069r\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0688}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \end{aligned} \tag{1006}$$

$$\begin{aligned} & \text{function\_180}\left(\text{Keq\_r\_0688}, \text{Vmax\_r\_0688}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0069r\_0688}, \right. \\ & \text{kmp\_s\_1082r\_0688}, \text{kms\_s\_0763\_br\_0688}, \text{kms\_s\_1087r\_0688}, \\ & \left. \text{kms\_s\_1156r\_0688}, [\text{s\_0069}], [\text{s\_0763\_b}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1156}]\right) \\ & = \frac{\text{Vmax\_r\_0688} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0688}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1087r\_0688}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1156r\_0688}}\right)^1 \cdot \left([\text{s\_0763\_b}]^1 \cdot [\text{s\_1087}]^1 \cdot [\text{s\_1156}]^1 - \frac{[\text{s\_0069}]^1 \cdot [\text{s\_1082}]^1}{\text{Keq\_r\_0688}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1087}]}{\text{kms\_s\_1087r\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1156}]}{\text{kms\_s\_1156r\_0688}}\right) + \left(1+\frac{[\text{s\_0069}]}{\text{kmp\_s\_0069r\_0688}}\right) \cdot \left(1+\frac{[\text{s\_1082}]}{\text{kmp\_s\_1082r\_0688}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \end{aligned} \tag{1007}$$

Table 724: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0688	Keq_r_0688		34.726		☑
Vmax_r_0688	Vmax_r_0688		4.586		☑
kmp_s_0069r-_0688	kmp_s_0069r_0688		0.549		☑
kmp_s_1082r-_0688	kmp_s_1082r_0688		1.503		☑
kms_s_0763-_br_0688	kms_s_0763_br-_0688		0.549		☑
kms_s_1087r-_0688	kms_s_1087r_0688		0.087		☑
kms_s_1156r-_0688	kms_s_1156r_0688		0.549		☑

7.181 Reaction r_0697

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name mannose-1-phosphate guanylyltransferase

Notes GENE_ASSOCIATION:YDL055C

Reaction equation

$$\mathrm{s\_0553} + \mathrm{s\_0755} + \mathrm{s\_0763\_b} \xrightleftharpoons{\mathrm{s\_0553,\ s\_0605,\ s\_0710,\ s\_0755,\ s\_0763\_b}} \mathrm{s\_0605} + \mathrm{s\_0710} \tag{1008}$$

Reactants

Table 725: Properties of each reactant.

Id	Name	SBO
s_0553	D-mannose 1-phosphate [intracellular]	
s_0755	GTP [intracellular]	
s_0763_b	H+ [intracellular]	

Modifiers

Table 726: Properties of each modifier.

Id	Name	SBO
s_0553	D-mannose 1-phosphate [intracellular]	
s_0605	diphosphate [intracellular]	
s_0710	GDP-alpha-D-mannose [intracellular]	
s_0755	GTP [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 727: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_0710	GDP-alpha-D-mannose [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{181} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_181}(\mathrm{Keq\_r\_0697}, \mathrm{Vmax\_r\_0697}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0697}, \mathrm{kmp\_s\_0710r\_0697}, \mathrm{kms\_s\_0553r\_0697}, \mathrm{kms\_s\_0755r\_0697}, \mathrm{kms\_s\_0763\_br\_0697}, [\mathrm{s\_0553}], [\mathrm{s\_0605}], [\mathrm{s\_0710}], [\mathrm{s\_0755}], [\mathrm{s\_0763\_b}]) \tag{1009}$$

$$\text{function\_181}\left(\text{Keq\_r\_0697}, \text{Vmax\_r\_0697}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0605r\_0697}, \text{kmp\_s\_0710r\_0697}, \text{kms\_s\_0553r\_0697}, \text{kms\_s\_0755r\_0697}, \text{kms\_s\_0763\_br\_0697}, [\text{s\_0553}], [\text{s\_0605}], [\text{s\_0710}], [\text{s\_0755}], [\text{s\_0763\_b}]\right) = \frac{\text{Vmax\_r\_0697} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0553r\_0697}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0755r\_0697}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0697}}\right)^{1} \cdot \left([\text{s\_0553}]^{1} \cdot [\text{s\_0755}]^{1} \cdot [\text{s\_0763\_b}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_0710}]^{1}}{\text{Keq\_r\_0697}}\right)}{\left(1+\frac{[\text{s\_0553}]}{\text{kms\_s\_0553r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0755}]}{\text{kms\_s\_0755r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0697}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0710}]}{\text{kmp\_s\_0710r\_0697}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (1010)$$

$$\text{function\_181}\left(\text{Keq\_r\_0697}, \text{Vmax\_r\_0697}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0605r\_0697}, \text{kmp\_s\_0710r\_0697}, \text{kms\_s\_0553r\_0697}, \text{kms\_s\_0755r\_0697}, \text{kms\_s\_0763\_br\_0697}, [\text{s\_0553}], [\text{s\_0605}], [\text{s\_0710}], [\text{s\_0755}], [\text{s\_0763\_b}]\right) = \frac{\text{Vmax\_r\_0697} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0553r\_0697}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0755r\_0697}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0697}}\right)^{1} \cdot \left([\text{s\_0553}]^{1} \cdot [\text{s\_0755}]^{1} \cdot [\text{s\_0763\_b}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_0710}]^{1}}{\text{Keq\_r\_0697}}\right)}{\left(1+\frac{[\text{s\_0553}]}{\text{kms\_s\_0553r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0755}]}{\text{kms\_s\_0755r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0697}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0697}}\right) \cdot \left(1+\frac{[\text{s\_0710}]}{\text{kmp\_s\_0710r\_0697}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (1011)$$

Table 728: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0697`	Keq_r_0697		2.004		☑
`Vmax_r_0697`	Vmax_r_0697		5.518		☑
`kmp_s_0605r_0697`	kmp_s_0605r_0697		0.549		☑
`kmp_s_0710r_0697`	kmp_s_0710r_0697		0.549		☑
`kms_s_0553r_0697`	kms_s_0553r_0697		0.549		☑
`kms_s_0755r_0697`	kms_s_0755r_0697		0.549		☑
`kms_s_0763_br_0697`	kms_s_0763_br_0697		0.549		☑

7.182 Reaction `r_0698`

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name mannose-6-phosphate isomerase

Notes GENE_ASSOCIATION:YER003C

Reaction equation

$$\text{s\_0539} \xrightleftharpoons{\text{s\_0539, s\_0554}} \text{s\_0554} \quad (1012)$$

Reactant

Table 729: Properties of each reactant.

Id	Name	SBO
s_0539	D-fructose 6-phosphate [intracellular]	

Modifiers

Table 730: Properties of each modifier.

Id	Name	SBO
s_0539	D-fructose 6-phosphate [intracellular]	
s_0554	D-mannose 6-phosphate [intracellular]	

Product

Table 731: Properties of each product.

Id	Name	SBO
s_0554	D-mannose 6-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{182} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_182}(\mathrm{Keq\_r\_0698}, \mathrm{Vmax\_r\_0698}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0554r\_0698}, \mathrm{kms\_s\_0539r\_0698}, [\mathrm{s\_0539}], [\mathrm{s\_0554}]) \tag{1013}$$

$$\mathrm{function\_182}(\mathrm{Keq\_r\_0698}, \mathrm{Vmax\_r\_0698}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0554r\_0698}, \mathrm{kms\_s\_0539r\_0698}, [\mathrm{s\_0539}], [\mathrm{s\_0554}]) = \frac{\mathrm{Vmax\_r\_0698} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0539r\_0698}}\right)^{1} \cdot \left([\mathrm{s\_0539}]^{1} - \frac{[\mathrm{s\_0554}]^{1}}{\mathrm{Keq\_r\_0698}}\right)}{1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_0698}} + 1 + \frac{[\mathrm{s\_0554}]}{\mathrm{kmp\_s\_0554r\_0698}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1014}$$

$$\mathrm{function\_182}(\mathrm{Keq\_r\_0698}, \mathrm{Vmax\_r\_0698}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0554r\_0698}, \mathrm{kms\_s\_0539r\_0698}, [\mathrm{s\_0539}], [\mathrm{s\_0554}]) = \frac{\mathrm{Vmax\_r\_0698} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0539r\_0698}}\right)^{1} \cdot \left([\mathrm{s\_0539}]^{1} - \frac{[\mathrm{s\_0554}]^{1}}{\mathrm{Keq\_r\_0698}}\right)}{1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_0698}} + 1 + \frac{[\mathrm{s\_0554}]}{\mathrm{kmp\_s\_0554r\_0698}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1015}$$

Table 732: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0698	Keq_r_0698		5.776		☑
Vmax_r_0698	Vmax_r_0698		1.505		☑
kmp_s_0554r-_0698	kmp_s_0554r_0698		0.549		☑
kms_s_0539r-_0698	kms_s_0539r_0698		0.105		☑

7.183 Reaction r_0699

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name methenyltetrahydrifikate cyclohydrolase

Notes GENE_ASSOCIATION:YBR084W or YGR204W

Reaction equation

$$s\_0015 + s\_1434\_b \xrightleftharpoons{s\_0015,\ s\_0122,\ s\_0763\_b,\ s\_1434\_b} s\_0122 + s\_0763\_b \quad (1016)$$

Reactants

Table 733: Properties of each reactant.

Id	Name	SBO
s_0015	(6R)-5,10-methenyltetrahydrofolic acid [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 734: Properties of each modifier.

Id	Name	SBO
s_0015	(6R)-5,10-methenyltetrahydrofolic acid [intracellular]	
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 735: Properties of each product.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{183} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_183}\left(\mathrm{Keq\_r\_0699}, \mathrm{Vmax\_r\_0699}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0699}, \mathrm{kmp\_s\_0763\_br\_0699}, \mathrm{kms\_s\_0015r\_0699}, \mathrm{kms\_s\_1434\_br\_0699}, [\mathrm{s\_0015}], [\mathrm{s\_0122}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) \tag{1017}$$

$$\mathrm{function\_183}\left(\mathrm{Keq\_r\_0699}, \mathrm{Vmax\_r\_0699}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0699}, \mathrm{kmp\_s\_0763\_br\_0699}, \mathrm{kms\_s\_0015r\_0699}, \mathrm{kms\_s\_1434\_br\_0699}, [\mathrm{s\_0015}], [\mathrm{s\_0122}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0699} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0015r\_0699}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0699}}\right)^{1} \cdot \left([\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0699}}\right)}{\left(1 + \frac{[\mathrm{s\_0015}]}{\mathrm{kms\_s\_0015r\_0699}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0699}}\right) + \left(1 + \frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0699}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0699}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1018}$$

$$\mathrm{function\_183}\left(\mathrm{Keq\_r\_0699}, \mathrm{Vmax\_r\_0699}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0122r\_0699}, \mathrm{kmp\_s\_0763\_br\_0699}, \mathrm{kms\_s\_0015r\_0699}, \mathrm{kms\_s\_1434\_br\_0699}, [\mathrm{s\_0015}], [\mathrm{s\_0122}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0699} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0015r\_0699}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0699}}\right)^{1} \cdot \left([\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0699}}\right)}{\left(1 + \frac{[\mathrm{s\_0015}]}{\mathrm{kms\_s\_0015r\_0699}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0699}}\right) + \left(1 + \frac{[\mathrm{s\_0122}]}{\mathrm{kmp\_s\_0122r\_0699}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0699}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1019}$$

Table 736: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0699	Keq_r_0699		1.100		☑
Vmax_r_0699	Vmax_r_0699		1.217		☑
kmp_s_0122r-_0699	kmp_s_0122r_0699		0.549		☑
kmp_s_0763-_br_0699	kmp_s_0763_br-_0699		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0015r-_0699	kms_s_0015r_0699		0.549		☑
kms_s_1434-_br_0699	kms_s_1434_br-_0699		0.549		☑

7.184 Reaction r_0701

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name methionine adenosyltransferase

Notes GENE_ASSOCIATION:(YDR502C or YLR180W)

Reaction equation

$$\text{s\_0446} + \text{s\_0933} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0446, s\_0605, s\_0933, s\_1207, s\_1293, s\_1434\_b}} \text{s\_0605} + \text{s\_1207} + \text{s\_1293} \quad (1020)$$

Reactants

Table 737: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0933	L-methionine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 738: Properties of each modifier.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0933	L-methionine [intracellular]	
s_1207	phosphate [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 739: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_1207	phosphate [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{184} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_184}\left(\mathrm{Keq\_r\_0701}, \mathrm{Vmax\_r\_0701}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0701}, \mathrm{kmp\_s\_1207r\_0701}, \mathrm{kmp\_s\_1293r\_0701}, \mathrm{kms\_s\_0446r\_0701}, \mathrm{kms\_s\_0933r\_0701}, \mathrm{kms\_s\_1434\_br\_0701}, [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0933}], [\mathrm{s\_1207}], [\mathrm{s\_1293}], [\mathrm{s\_1434\_b}]\right) \tag{1021}$$

$$\mathrm{function\_184}\left(\mathrm{Keq\_r\_0701}, \mathrm{Vmax\_r\_0701}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0701}, \mathrm{kmp\_s\_1207r\_0701}, \mathrm{kmp\_s\_1293r\_0701}, \mathrm{kms\_s\_0446r\_0701}, \mathrm{kms\_s\_0933r\_0701}, \mathrm{kms\_s\_1434\_br\_0701}, [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0933}], [\mathrm{s\_1207}], [\mathrm{s\_1293}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0701} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0933r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0701}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0933}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1293}]^{1}}{\mathrm{Keq\_r\_0701}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0933}]}{\mathrm{kms\_s\_0933r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0701}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1293}]}{\mathrm{kmp\_s\_1293r\_0701}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1022}$$

$$\mathrm{function\_184}\left(\mathrm{Keq\_r\_0701}, \mathrm{Vmax\_r\_0701}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0701}, \mathrm{kmp\_s\_1207r\_0701}, \mathrm{kmp\_s\_1293r\_0701}, \mathrm{kms\_s\_0446r\_0701}, \mathrm{kms\_s\_0933r\_0701}, \mathrm{kms\_s\_1434\_br\_0701}, [\mathrm{s\_0446}], [\mathrm{s\_0605}], [\mathrm{s\_0933}], [\mathrm{s\_1207}], [\mathrm{s\_1293}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0701} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0933r\_0701}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0701}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0933}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1293}]^{1}}{\mathrm{Keq\_r\_0701}}\right)}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0933}]}{\mathrm{kms\_s\_0933r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0701}}\right) + \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0701}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1293}]}{\mathrm{kmp\_s\_1293r\_0701}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1023}$$

Table 740: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0701	Keq_r_0701		0.553		☑
Vmax_r_0701	Vmax_r_0701		0.141		☑
kmp_s_0605r-_0701	kmp_s_0605r_0701		0.549		☑
kmp_s_1207r-_0701	kmp_s_1207r_0701		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1293r-_0701	kmp_s_1293r_0701		0.549		☑
kms_s_0446r-_0701	kms_s_0446r_0701		1.092		☑
kms_s_0933r-_0701	kms_s_0933r_0701		0.549		☑
kms_s_1434-_br_0701	kms_s_1434_br-_0701		0.549		☑

7.185 Reaction r_0702

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name methionine synthase

Notes GENE_ASSOCIATION:YER091C

Reaction equation

$$\mathrm{s\_0328} + \mathrm{s\_0917} \xrightleftharpoons{\mathrm{s\_0309,\ s\_0328,\ s\_0763\_b,\ s\_0917,\ s\_0933}} \mathrm{s\_0309} + \mathrm{s\_0763\_b} + \mathrm{s\_0933} \tag{1024}$$

Reactants

Table 741: Properties of each reactant.

Id	Name	SBO
s_0328	5-methyltetrahydrofolate(2-) [intracellular]	
s_0917	L-homocysteine [intracellular]	

Modifiers

Table 742: Properties of each modifier.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0328	5-methyltetrahydrofolate(2-) [intracellular]	
s_0763_b	H+ [intracellular]	
s_0917	L-homocysteine [intracellular]	
s_0933	L-methionine [intracellular]	

Products

Table 743: Properties of each product.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_0933	L-methionine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{185} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_185}(\mathrm{Keq\_r\_0702}, \mathrm{Vmax\_r\_0702}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0702}, \mathrm{kmp\_s\_0763\_br\_0702}, \mathrm{kmp\_s\_0933r\_0702}, \mathrm{kms\_s\_0328r\_0702}, \mathrm{kms\_s\_0917r\_0702}, [\mathrm{s\_0309}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0917}], [\mathrm{s\_0933}]) \tag{1025}$$

$$\mathrm{function\_185}(\mathrm{Keq\_r\_0702}, \mathrm{Vmax\_r\_0702}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0702}, \mathrm{kmp\_s\_0763\_br\_0702}, \mathrm{kmp\_s\_0933r\_0702}, \mathrm{kms\_s\_0328r\_0702}, \mathrm{kms\_s\_0917r\_0702}, [\mathrm{s\_0309}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0917}], [\mathrm{s\_0933}]) = \frac{\mathrm{Vmax\_r\_0702} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0328r\_0702}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0917r\_0702}}\right)^1 \cdot \left([\mathrm{s\_0328}]^1 \cdot [\mathrm{s\_0917}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_0933}]^1}{\mathrm{Keq\_r\_0702}}\right)}{\left(1+\frac{[\mathrm{s\_0328}]}{\mathrm{kms\_s\_0328r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kms\_s\_0917r\_0702}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0933}]}{\mathrm{kmp\_s\_0933r\_0702}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1026}$$

$$\mathrm{function\_185}(\mathrm{Keq\_r\_0702}, \mathrm{Vmax\_r\_0702}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0702}, \mathrm{kmp\_s\_0763\_br\_0702}, \mathrm{kmp\_s\_0933r\_0702}, \mathrm{kms\_s\_0328r\_0702}, \mathrm{kms\_s\_0917r\_0702}, [\mathrm{s\_0309}], [\mathrm{s\_0328}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0917}], [\mathrm{s\_0933}]) = \frac{\mathrm{Vmax\_r\_0702} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0328r\_0702}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0917r\_0702}}\right)^1 \cdot \left([\mathrm{s\_0328}]^1 \cdot [\mathrm{s\_0917}]^1 - \frac{[\mathrm{s\_0309}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_0933}]^1}{\mathrm{Keq\_r\_0702}}\right)}{\left(1+\frac{[\mathrm{s\_0328}]}{\mathrm{kms\_s\_0328r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0917}]}{\mathrm{kms\_s\_0917r\_0702}}\right) + \left(1+\frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0702}}\right) \cdot \left(1+\frac{[\mathrm{s\_0933}]}{\mathrm{kmp\_s\_0933r\_0702}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1027}$$

Table 744: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0702	Keq_r_0702		0.604		☑
Vmax_r_0702	Vmax_r_0702		0.439		☑
kmp_s_0309r-_0702	kmp_s_0309r_0702		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763-_br_0702	kmp_s_0763_br-_0702		0.549		☑
kmp_s_0933r-_0702	kmp_s_0933r_0702		0.549		☑
kms_s_0328r-_0702	kms_s_0328r_0702		0.549		☑
kms_s_0917r-_0702	kms_s_0917r_0702		0.549		☑

7.186 Reaction r_0707

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name methylenetetrahydrofolate dehydrogenase (NADP)

Notes GENE_ASSOCIATION:YGR204W or YBR084W

Reaction equation

$$\mathrm{s\_0307} + \mathrm{s\_1091} \xrightleftharpoons{\mathrm{s\_0015,\ s\_0307,\ s\_1091,\ s\_1096}} \mathrm{s\_0015} + \mathrm{s\_1096} \tag{1028}$$

Reactants

Table 745: Properties of each reactant.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 746: Properties of each modifier.

Id	Name	SBO
s_0015	(6R)-5,10-methenyltetrahydrofolic acid [intracellular]	
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 747: Properties of each product.

Id	Name	SBO
s_0015	(6R)-5,10-methenyltetrahydrofolic acid [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{186} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_186}\left(\mathrm{Keq\_r\_0707}, \mathrm{Vmax\_r\_0707}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0015r\_0707}, \mathrm{kmp\_s\_1096r\_0707}, \mathrm{kms\_s\_0307r\_0707}, \mathrm{kms\_s\_1091r\_0707}, [\mathrm{s\_0015}], [\mathrm{s\_0307}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \quad (1029)$$

$$\mathrm{function\_186}\left(\mathrm{Keq\_r\_0707}, \mathrm{Vmax\_r\_0707}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0015r\_0707}, \mathrm{kmp\_s\_1096r\_0707}, \mathrm{kms\_s\_0307r\_0707}, \mathrm{kms\_s\_1091r\_0707}, [\mathrm{s\_0015}], [\mathrm{s\_0307}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0707} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0707}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0707}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0707}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0707}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0707}}\right) + \left(1 + \frac{[\mathrm{s\_0015}]}{\mathrm{kmp\_s\_0015r\_0707}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0707}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1030)$$

$$\mathrm{function\_186}\left(\mathrm{Keq\_r\_0707}, \mathrm{Vmax\_r\_0707}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0015r\_0707}, \mathrm{kmp\_s\_1096r\_0707}, \mathrm{kms\_s\_0307r\_0707}, \mathrm{kms\_s\_1091r\_0707}, [\mathrm{s\_0015}], [\mathrm{s\_0307}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0707} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_0707}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0707}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0015}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0707}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_0707}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0707}}\right) + \left(1 + \frac{[\mathrm{s\_0015}]}{\mathrm{kmp\_s\_0015r\_0707}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0707}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1031)$$

Table 748: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0707	Keq_r_0707		1.100		☑
Vmax_r_0707	Vmax_r_0707		1.217		☑
kmp_s_0015r-_0707	kmp_s_0015r_0707		0.549		☑
kmp_s_1096r-_0707	kmp_s_1096r_0707		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0307r-_0707	kms_s_0307r_0707		0.549		☑
kms_s_1091r-_0707	kms_s_1091r_0707		0.549		☑

7.187 Reaction r_0712

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name mevalonate kinase (ctp)

Notes GENE_ASSOCIATION:YMR208W

Reaction equation

$$\text{s\_0031} + \text{s\_0521} \xrightleftharpoons{\text{s\_0022, s\_0031, s\_0481, s\_0521, s\_0763\_b}} \text{s\_0022} + \text{s\_0481} + \text{s\_0763\_b} \tag{1032}$$

Reactants

Table 749: Properties of each reactant.

Id	Name	SBO
s_0031	(R)-mevalonate [intracellular]	
s_0521	CTP [intracellular]	

Modifiers

Table 750: Properties of each modifier.

Id	Name	SBO
s_0022	(R)-5-phosphomevalonic acid [intracellular]	
s_0031	(R)-mevalonate [intracellular]	
s_0481	CDP [intracellular]	
s_0521	CTP [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 751: Properties of each product.

Id	Name	SBO
s_0022	(R)-5-phosphomevalonic acid [intracellular]	
s_0481	CDP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{187} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_187}\left(\mathrm{Keq\_r\_0712}, \mathrm{Vmax\_r\_0712}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0022r\_0712}, \mathrm{kmp\_s\_0481r\_0712}, \mathrm{kmp\_s\_0763\_br\_0712}, \mathrm{kms\_s\_0031r\_0712}, \mathrm{kms\_s\_0521r\_0712}, [\mathrm{s\_0022}], [\mathrm{s\_0031}], [\mathrm{s\_0481}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}]\right) \tag{1033}$$

$$\mathrm{function\_187}\left(\mathrm{Keq\_r\_0712}, \mathrm{Vmax\_r\_0712}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0022r\_0712}, \mathrm{kmp\_s\_0481r\_0712}, \mathrm{kmp\_s\_0763\_br\_0712}, \mathrm{kms\_s\_0031r\_0712}, \mathrm{kms\_s\_0521r\_0712}, [\mathrm{s\_0022}], [\mathrm{s\_0031}], [\mathrm{s\_0481}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}]\right) = \frac{\mathrm{Vmax\_r\_0712} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0031r\_0712}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0521r\_0712}}\right)^{1} \cdot \left([\mathrm{s\_0031}]^{1} \cdot [\mathrm{s\_0521}]^{1} - \frac{[\mathrm{s\_0022}]^{1} \cdot [\mathrm{s\_0481}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0712}}\right)}{\left(1 + \frac{[\mathrm{s\_0031}]}{\mathrm{kms\_s\_0031r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0712}}\right) + \left(1 + \frac{[\mathrm{s\_0022}]}{\mathrm{kmp\_s\_0022r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0481}]}{\mathrm{kmp\_s\_0481r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0712}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1034}$$

$$\mathrm{function\_187}\left(\mathrm{Keq\_r\_0712}, \mathrm{Vmax\_r\_0712}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0022r\_0712}, \mathrm{kmp\_s\_0481r\_0712}, \mathrm{kmp\_s\_0763\_br\_0712}, \mathrm{kms\_s\_0031r\_0712}, \mathrm{kms\_s\_0521r\_0712}, [\mathrm{s\_0022}], [\mathrm{s\_0031}], [\mathrm{s\_0481}], [\mathrm{s\_0521}], [\mathrm{s\_0763\_b}]\right) = \frac{\mathrm{Vmax\_r\_0712} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0031r\_0712}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0521r\_0712}}\right)^{1} \cdot \left([\mathrm{s\_0031}]^{1} \cdot [\mathrm{s\_0521}]^{1} - \frac{[\mathrm{s\_0022}]^{1} \cdot [\mathrm{s\_0481}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0712}}\right)}{\left(1 + \frac{[\mathrm{s\_0031}]}{\mathrm{kms\_s\_0031r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0521}]}{\mathrm{kms\_s\_0521r\_0712}}\right) + \left(1 + \frac{[\mathrm{s\_0022}]}{\mathrm{kmp\_s\_0022r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0481}]}{\mathrm{kmp\_s\_0481r\_0712}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0712}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1035}$$

Table 752: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0712	Keq_r_0712		0.604		☑
Vmax_r_0712	Vmax_r_0712		0.276		☑
kmp_s_0022r-_0712	kmp_s_0022r_0712		0.549		☑
kmp_s_0481r-_0712	kmp_s_0481r_0712		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763-_br_0712	kmp_s_0763_br-_0712		0.549		☑
kms_s_0031r-_0712	kms_s_0031r_0712		0.549		☑
kms_s_0521r-_0712	kms_s_0521r_0712		0.549		☑

7.188 Reaction r_0715

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name mevalonate pyrophoshate decarboxylase

Notes GENE_ASSOCIATION:YNR043W

Reaction equation

$$\text{s\_0021} + \text{s\_0446} \xrightleftharpoons{\text{s\_0021, s\_0400, s\_0446, s\_0470, s\_0850, s\_1207}} \text{s\_0400} + \text{s\_0470} + \text{s\_0850} + \text{s\_1207} \quad (1036)$$

Reactants

Table 753: Properties of each reactant.

Id	Name	SBO
s_0021	(R)-5-diphosphomevalonic acid [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 754: Properties of each modifier.

Id	Name	SBO
s_0021	(R)-5-diphosphomevalonic acid [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0850	isopentenyl diphosphate [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 755: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0850	isopentenyl diphosphate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{188} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_188}\left(\mathrm{Keq\_r\_0715}, \mathrm{Vmax\_r\_0715}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0715}, \mathrm{kmp\_s\_0470r\_0715}, \mathrm{kmp\_s\_0850r\_0715}, \mathrm{kmp\_s\_1207r\_0715}, \mathrm{kms\_s\_0021r\_0715}, \mathrm{kms\_s\_0446r\_0715}, [\mathrm{s\_0021}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0470}], [\mathrm{s\_0850}], [\mathrm{s\_1207}]\right) \quad (1037)$$

$$\mathrm{function\_188}\left(\mathrm{Keq\_r\_0715}, \mathrm{Vmax\_r\_0715}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0715}, \mathrm{kmp\_s\_0470r\_0715}, \mathrm{kmp\_s\_0850r\_0715}, \mathrm{kmp\_s\_1207r\_0715}, \mathrm{kms\_s\_0021r\_0715}, \mathrm{kms\_s\_0446r\_0715}, [\mathrm{s\_0021}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0470}], [\mathrm{s\_0850}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0715} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0021r\_0715}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0715}}\right)^1 \cdot \left([\mathrm{s\_0021}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0850}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0715}}\right)}{\left(1+\frac{[\mathrm{s\_0021}]}{\mathrm{kms\_s\_0021r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0715}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0850}]}{\mathrm{kmp\_s\_0850r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0715}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1038)$$

$$\mathrm{function\_188}\left(\mathrm{Keq\_r\_0715}, \mathrm{Vmax\_r\_0715}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0715}, \mathrm{kmp\_s\_0470r\_0715}, \mathrm{kmp\_s\_0850r\_0715}, \mathrm{kmp\_s\_1207r\_0715}, \mathrm{kms\_s\_0021r\_0715}, \mathrm{kms\_s\_0446r\_0715}, [\mathrm{s\_0021}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0470}], [\mathrm{s\_0850}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0715} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0021r\_0715}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0715}}\right)^1 \cdot \left([\mathrm{s\_0021}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0850}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0715}}\right)}{\left(1+\frac{[\mathrm{s\_0021}]}{\mathrm{kms\_s\_0021r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0715}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_0850}]}{\mathrm{kmp\_s\_0850r\_0715}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0715}}\right) -}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1039)$$

Table 756: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0715	Keq_r_0715		0.951		☑
Vmax_r_0715	Vmax_r_0715		0.477		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0400r-_0715	kmp_s_0400r_0715		1.719		☑
kmp_s_0470r-_0715	kmp_s_0470r_0715		1.000		☑
kmp_s_0850r-_0715	kmp_s_0850r_0715		0.549		☑
kmp_s_1207r-_0715	kmp_s_1207r_0715		0.549		☑
kms_s_0021r-_0715	kms_s_0021r_0715		0.549		☑
kms_s_0446r-_0715	kms_s_0446r_0715		1.092		☑

7.189 Reaction r_0719

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name microsomal beta-keto-reductase

Notes GENE_ASSOCIATION:YBR159W

Reaction equation

$$\text{s\_0046} + \text{s\_1091} \xrightleftharpoons{\text{s\_0046, s\_0247, s\_0763\_b, s\_1091, s\_1096}} \text{s\_0247} + \text{s\_0763\_b} + \text{s\_1096} \quad (1040)$$

Reactants

Table 757: Properties of each reactant.

Id	Name	SBO
s_0046	(S)-3-hydroxyhexacosanoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 758: Properties of each modifier.

Id	Name	SBO
s_0046	(S)-3-hydroxyhexacosanoyl-CoA [intracellular]	
s_0247	3-oxohexacosanoyl-CoA [intracellular]	

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 759: Properties of each product.

Id	Name	SBO
s_0247	3-oxohexacosanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{189} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_189}(\mathrm{Keq\_r\_0719}, \mathrm{Vmax\_r\_0719}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0247r\_0719}, \mathrm{kmp\_s\_0763\_br\_0719}, \mathrm{kmp\_s\_1096r\_0719}, \mathrm{kms\_s\_0046r\_0719}, \mathrm{kms\_s\_1091r\_0719}, [\mathrm{s\_0046}], [\mathrm{s\_0247}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (1041)$$

$$\mathrm{function\_189}(\mathrm{Keq\_r\_0719}, \mathrm{Vmax\_r\_0719}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0247r\_0719}, \mathrm{kmp\_s\_0763\_br\_0719}, \mathrm{kmp\_s\_1096r\_0719}, \mathrm{kms\_s\_0046r\_0719}, \mathrm{kms\_s\_1091r\_0719}, [\mathrm{s\_0046}], [\mathrm{s\_0247}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0719} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0046r\_0719}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0719}}\right)^{1} \cdot \left([\mathrm{s\_0046}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0247}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0719}}\right)}{\left(1 + \frac{[\mathrm{s\_0046}]}{\mathrm{kms\_s\_0046r\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0719}}\right) + \left(1 + \frac{[\mathrm{s\_0247}]}{\mathrm{kmp\_s\_0247r\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0719}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1042)$$

$$\mathrm{function\_189}(\mathrm{Keq\_r\_0719}, \mathrm{Vmax\_r\_0719}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0247r\_0719}, \mathrm{kmp\_s\_0763\_br\_0719}, \mathrm{kmp\_s\_1096r\_0719}, \mathrm{kms\_s\_0046r\_0719}, \mathrm{kms\_s\_1091r\_0719}, [\mathrm{s\_0046}], [\mathrm{s\_0247}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0719} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0046r\_0719}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0719}}\right)^{1} \cdot \left([\mathrm{s\_0046}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0247}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0719}}\right)}{\left(1 + \frac{[\mathrm{s\_0046}]}{\mathrm{kms\_s\_0046r\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0719}}\right) + \left(1 + \frac{[\mathrm{s\_0247}]}{\mathrm{kmp\_s\_0247r\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0719}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0719}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1043)$$

Table 760: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0719	Keq_r_0719		0.604		☑
Vmax_r_0719	Vmax_r_0719		3.303		☑
kmp_s_0247r-_0719	kmp_s_0247r_0719		0.549		☑
kmp_s_0763-_br_0719	kmp_s_0763_br-_0719		0.549		☑
kmp_s_1096r-_0719	kmp_s_1096r_0719		0.549		☑
kms_s_0046r-_0719	kms_s_0046r_0719		0.549		☑
kms_s_1091r-_0719	kms_s_1091r_0719		0.549		☑

7.190 Reaction r_0720

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name microsomal beta-keto-reductase_2

Notes GENE_ASSOCIATION:YBR159W

Reaction equation

$$s\_0052 + s\_1091 \xrightleftharpoons{s\_0052,\ s\_0257,\ s\_0763\_b,\ s\_1091,\ s\_1096} s\_0257 + s\_0763\_b + s\_1096 \tag{1044}$$

Reactants

Table 761: Properties of each reactant.

Id	Name	SBO
s_0052	(S)-3-hydroxypalmitoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 762: Properties of each modifier.

Id	Name	SBO
s_0052	(S)-3-hydroxypalmitoyl-CoA [intracellular]	
s_0257	3-oxopalmitoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 763: Properties of each product.

Id	Name	SBO
s_0257	3-oxopalmitoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{190} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_190}\left(\mathrm{Keq\_r\_0720}, \mathrm{Vmax\_r\_0720}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0257r\_0720}, \mathrm{kmp\_s\_0763\_br\_0720}, \mathrm{kmp\_s\_1096r\_0720}, \mathrm{kms\_s\_0052r\_0720}, \mathrm{kms\_s\_1091r\_0720}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) \quad (1045)$$

$$\mathrm{function\_190}\left(\mathrm{Keq\_r\_0720}, \mathrm{Vmax\_r\_0720}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0257r\_0720}, \mathrm{kmp\_s\_0763\_br\_0720}, \mathrm{kmp\_s\_1096r\_0720}, \mathrm{kms\_s\_0052r\_0720}, \mathrm{kms\_s\_1091r\_0720}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0720} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0052r\_0720}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0720}}\right)^{1} \cdot \left([\mathrm{s\_0052}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0257}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0720}}\right)}{\left(1+\frac{[\mathrm{s\_0052}]}{\mathrm{kms\_s\_0052r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0720}}\right) + \left(1+\frac{[\mathrm{s\_0257}]}{\mathrm{kmp\_s\_0257r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0720}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1046)$$

$$\mathrm{function\_190}\left(\mathrm{Keq\_r\_0720}, \mathrm{Vmax\_r\_0720}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0257r\_0720}, \mathrm{kmp\_s\_0763\_br\_0720}, \mathrm{kmp\_s\_1096r\_0720}, \mathrm{kms\_s\_0052r\_0720}, \mathrm{kms\_s\_1091r\_0720}, [\mathrm{s\_0052}], [\mathrm{s\_0257}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]\right) = \frac{\mathrm{Vmax\_r\_0720} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0052r\_0720}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0720}}\right)^{1} \cdot \left([\mathrm{s\_0052}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0257}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0720}}\right)}{\left(1+\frac{[\mathrm{s\_0052}]}{\mathrm{kms\_s\_0052r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0720}}\right) + \left(1+\frac{[\mathrm{s\_0257}]}{\mathrm{kmp\_s\_0257r\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0720}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0720}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1047)$$

Table 764: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0720	Keq_r_0720		0.604		☑
Vmax_r_0720	Vmax_r_0720		3.303		☑
kmp_s_0257r-_0720	kmp_s_0257r_0720		0.549		☑
kmp_s_0763-_br_0720	kmp_s_0763_br-_0720		0.549		☑
kmp_s_1096r-_0720	kmp_s_1096r_0720		0.549		☑
kms_s_0052r-_0720	kms_s_0052r_0720		0.549		☑
kms_s_1091r-_0720	kms_s_1091r_0720		0.549		☑

7.191 Reaction r_0721

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name microsomal beta-keto-reductase_3

Notes GENE_ASSOCIATION:YBR159W

Reaction equation

$$\mathrm{s\_0234} + \mathrm{s\_1091} \xrightleftharpoons[]{\mathrm{s\_0234,\ s\_0254,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0254} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \tag{1048}$$

Reactants

Table 765: Properties of each reactant.

Id	Name	SBO
s_0234	3-hydroxyoctadecanoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 766: Properties of each modifier.

Id	Name	SBO
s_0234	3-hydroxyoctadecanoyl-CoA [intracellular]	
s_0254	3-oxooctadecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 767: Properties of each product.

Id	Name	SBO
s_0254	3-oxooctadecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{191} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_191}(\mathrm{Keq\_r\_0721}, \mathrm{Vmax\_r\_0721}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0254r\_0721}, \mathrm{kmp\_s\_0763\_br\_0721}, \mathrm{kmp\_s\_1096r\_0721}, \mathrm{kms\_s\_0234r\_0721}, \mathrm{kms\_s\_1091r\_0721}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{1049}$$

$$\mathrm{function\_191}(\mathrm{Keq\_r\_0721}, \mathrm{Vmax\_r\_0721}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0254r\_0721}, \mathrm{kmp\_s\_0763\_br\_0721}, \mathrm{kmp\_s\_1096r\_0721}, \mathrm{kms\_s\_0234r\_0721}, \mathrm{kms\_s\_1091r\_0721}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0721} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0234r\_0721}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0721}}\right)^{1} \cdot \left([\mathrm{s\_0234}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0254}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0721}}\right)}{\left(1+\frac{[\mathrm{s\_0234}]}{\mathrm{kms\_s\_0234r\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0721}}\right) + \left(1+\frac{[\mathrm{s\_0254}]}{\mathrm{kmp\_s\_0254r\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0721}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1050}$$

$$\mathrm{function\_191}(\mathrm{Keq\_r\_0721}, \mathrm{Vmax\_r\_0721}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0254r\_0721}, \mathrm{kmp\_s\_0763\_br\_0721}, \mathrm{kmp\_s\_1096r\_0721}, \mathrm{kms\_s\_0234r\_0721}, \mathrm{kms\_s\_1091r\_0721}, [\mathrm{s\_0234}], [\mathrm{s\_0254}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0721} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0234r\_0721}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0721}}\right)^{1} \cdot \left([\mathrm{s\_0234}]^{1} \cdot [\mathrm{s\_1091}]^{1} - \frac{[\mathrm{s\_0254}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1}}{\mathrm{Keq\_r\_0721}}\right)}{\left(1+\frac{[\mathrm{s\_0234}]}{\mathrm{kms\_s\_0234r\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0721}}\right) + \left(1+\frac{[\mathrm{s\_0254}]}{\mathrm{kmp\_s\_0254r\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0721}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0721}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1051}$$

Table 768: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0721	Keq_r_0721		0.604		☑
Vmax_r_0721	Vmax_r_0721		3.303		☑
kmp_s_0254r-_0721	kmp_s_0254r_0721		0.549		☑
kmp_s_0763-_br_0721	kmp_s_0763_br-_0721		0.549		☑
kmp_s_1096r-_0721	kmp_s_1096r_0721		0.549		☑
kms_s_0234r-_0721	kms_s_0234r_0721		0.549		☑
kms_s_1091r-_0721	kms_s_1091r_0721		0.549		☑

7.192 Reaction r_0722

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name microsomal beta-keto-reductase_4

Notes GENE_ASSOCIATION:YBR159W

Reaction equation

$$\mathrm{s\_0055} + \mathrm{s\_1091} \xrightleftharpoons{\mathrm{s\_0055,\ s\_0261,\ s\_0763\_b,\ s\_1091,\ s\_1096}} \mathrm{s\_0261} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \tag{1052}$$

Reactants

Table 769: Properties of each reactant.

Id	Name	SBO
s_0055	(S)-3-hydroxytetradecanoyl-CoA [intracellular]	
s_1091	NADP(+) [intracellular]	

Modifiers

Table 770: Properties of each modifier.

Id	Name	SBO
s_0055	(S)-3-hydroxytetradecanoyl-CoA [intracellular]	
s_0261	3-oxotetradecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 771: Properties of each product.

Id	Name	SBO
s_0261	3-oxotetradecanoyl-CoA [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{192} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_192}(\mathrm{Keq\_r\_0722}, \mathrm{Vmax\_r\_0722}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0261r\_0722}, \mathrm{kmp\_s\_0763\_br\_0722}, \mathrm{kmp\_s\_1096r\_0722}, \mathrm{kms\_s\_0055r\_0722}, \mathrm{kms\_s\_1091r\_0722}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \tag{1053}$$

$$\mathrm{function\_192}(\mathrm{Keq\_r\_0722}, \mathrm{Vmax\_r\_0722}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0261r\_0722}, \mathrm{kmp\_s\_0763\_br\_0722}, \mathrm{kmp\_s\_1096r\_0722}, \mathrm{kms\_s\_0055r\_0722}, \mathrm{kms\_s\_1091r\_0722}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0722} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0055r\_0722}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0722}}\right)^1 \cdot \left([\mathrm{s\_0055}]^1 \cdot [\mathrm{s\_1091}]^1 - \frac{[\mathrm{s\_0261}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0722}}\right)}{\left(1+\frac{[\mathrm{s\_0055}]}{\mathrm{kms\_s\_0055r\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0722}}\right) + \left(1+\frac{[\mathrm{s\_0261}]}{\mathrm{kmp\_s\_0261r\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0722}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1054}$$

$$\mathrm{function\_192}(\mathrm{Keq\_r\_0722}, \mathrm{Vmax\_r\_0722}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0261r\_0722}, \mathrm{kmp\_s\_0763\_br\_0722}, \mathrm{kmp\_s\_1096r\_0722}, \mathrm{kms\_s\_0055r\_0722}, \mathrm{kms\_s\_1091r\_0722}, [\mathrm{s\_0055}], [\mathrm{s\_0261}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0722} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0055r\_0722}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1091r\_0722}}\right)^1 \cdot \left([\mathrm{s\_0055}]^1 \cdot [\mathrm{s\_1091}]^1 - \frac{[\mathrm{s\_0261}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0722}}\right)}{\left(1+\frac{[\mathrm{s\_0055}]}{\mathrm{kms\_s\_0055r\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0722}}\right) + \left(1+\frac{[\mathrm{s\_0261}]}{\mathrm{kmp\_s\_0261r\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0722}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0722}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1055}$$

Table 772: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0722	Keq_r_0722		0.604		☑
Vmax_r_0722	Vmax_r_0722		3.303		☑
kmp_s_0261r-_0722	kmp_s_0261r_0722		0.549		☑
kmp_s_0763-_br_0722	kmp_s_0763_br-_0722		0.549		☑
kmp_s_1096r-_0722	kmp_s_1096r_0722		0.549		☑
kms_s_0055r-_0722	kms_s_0055r_0722		0.549		☑
kms_s_1091r-_0722	kms_s_1091r_0722		0.549		☑

7.193 Reaction r_0723

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name MIPC synthase

Notes GENE_ASSOCIATION:(YBR036C and YPL057C)

Reaction equation

$$\mathrm{s\_0710} + \mathrm{s\_0828} \xrightleftharpoons{\mathrm{s\_0710,\ s\_0828,\ s\_1013}} \mathrm{s\_1013} \tag{1056}$$

Reactants

Table 773: Properties of each reactant.

Id	Name	SBO
s_0710	GDP-alpha-D-mannose [intracellular]	
s_0828	inositol-P-ceramide B [intracellular]	

Modifiers

Table 774: Properties of each modifier.

Id	Name	SBO
s_0710	GDP-alpha-D-mannose [intracellular]	

Id	Name	SBO
s_0828	inositol-P-ceramide B [intracellular]	
s_1013	mannosylinositol phosphorylceramide [intracellular]	

Product

Table 775: Properties of each product.

Id	Name	SBO
s_1013	mannosylinositol phosphorylceramide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{193} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_193}\left(\mathrm{Keq\_r\_0723}, \mathrm{Vmax\_r\_0723}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1013r\_0723}, \mathrm{kms\_s\_0710r\_0723}, \mathrm{kms\_s\_0828r\_0723}, [\mathrm{s\_0710}], [\mathrm{s\_0828}], [\mathrm{s\_1013}]\right) \quad (1057)$$

$$\mathrm{function\_193}\left(\mathrm{Keq\_r\_0723}, \mathrm{Vmax\_r\_0723}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1013r\_0723}, \mathrm{kms\_s\_0710r\_0723}, \mathrm{kms\_s\_0828r\_0723}, [\mathrm{s\_0710}], [\mathrm{s\_0828}], [\mathrm{s\_1013}]\right) = \frac{\mathrm{Vmax\_r\_0723} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0710r\_0723}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0828r\_0723}}\right)^{1} \cdot \left([\mathrm{s\_0710}]^{1} \cdot [\mathrm{s\_0828}]^{1} - \frac{[\mathrm{s\_1013}]^{1}}{\mathrm{Keq\_r\_0723}}\right)}{\left(1 + \frac{[\mathrm{s\_0710}]}{\mathrm{kms\_s\_0710r\_0723}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0828}]}{\mathrm{kms\_s\_0828r\_0723}}\right) + 1 + \frac{[\mathrm{s\_1013}]}{\mathrm{kmp\_s\_1013r\_0723}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1058)$$

$$\mathrm{function\_193}\left(\mathrm{Keq\_r\_0723}, \mathrm{Vmax\_r\_0723}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1013r\_0723}, \mathrm{kms\_s\_0710r\_0723}, \mathrm{kms\_s\_0828r\_0723}, [\mathrm{s\_0710}], [\mathrm{s\_0828}], [\mathrm{s\_1013}]\right) = \frac{\mathrm{Vmax\_r\_0723} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0710r\_0723}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0828r\_0723}}\right)^{1} \cdot \left([\mathrm{s\_0710}]^{1} \cdot [\mathrm{s\_0828}]^{1} - \frac{[\mathrm{s\_1013}]^{1}}{\mathrm{Keq\_r\_0723}}\right)}{\left(1 + \frac{[\mathrm{s\_0710}]}{\mathrm{kms\_s\_0710r\_0723}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0828}]}{\mathrm{kms\_s\_0828r\_0723}}\right) + 1 + \frac{[\mathrm{s\_1013}]}{\mathrm{kmp\_s\_1013r\_0723}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1059)$$

Table 776: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0723	Keq_r_0723		2.004		☑
Vmax_r_0723	Vmax_r_0723		0.001		☑
kmp_s_1013r_0723	kmp_s_1013r_0723		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0710r-_0723	kms_s_0710r_0723		0.549		☑
kms_s_0828r-_0723	kms_s_0828r_0723		0.549		☑

7.194 Reaction r_0725

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name myo-inositol 1-phosphatase

Notes GENE_ASSOCIATION:(YDR287W or YHR046C)

Reaction equation

$$\text{s\_0128} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0128, s\_1020, s\_1207, s\_1434\_b}} \text{s\_1020} + \text{s\_1207} \tag{1060}$$

Reactants

Table 777: Properties of each reactant.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 778: Properties of each modifier.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_1020	myo-inositol [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 779: Properties of each product.

Id	Name	SBO
s_1020	myo-inositol [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{194} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_194}\left(\mathrm{Keq\_r\_0725}, \mathrm{Vmax\_r\_0725}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1020r\_0725}, \mathrm{kmp\_s\_1207r\_0725}, \mathrm{kms\_s\_0128r\_0725}, \mathrm{kms\_s\_1434\_br\_0725}, [\mathrm{s\_0128}], [\mathrm{s\_1020}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \quad (1061)$$

$$\mathrm{function\_194}\left(\mathrm{Keq\_r\_0725}, \mathrm{Vmax\_r\_0725}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1020r\_0725}, \mathrm{kmp\_s\_1207r\_0725}, \mathrm{kms\_s\_0128r\_0725}, \mathrm{kms\_s\_1434\_br\_0725}, [\mathrm{s\_0128}], [\mathrm{s\_1020}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0725} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0725}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0725}}\right)^{1} \cdot \left([\mathrm{s\_0128}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_1020}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0725}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0725}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0725}}\right) + \left(1 + \frac{[\mathrm{s\_1020}]}{\mathrm{kmp\_s\_1020r\_0725}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0725}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1062)$$

$$\mathrm{function\_194}\left(\mathrm{Keq\_r\_0725}, \mathrm{Vmax\_r\_0725}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1020r\_0725}, \mathrm{kmp\_s\_1207r\_0725}, \mathrm{kms\_s\_0128r\_0725}, \mathrm{kms\_s\_1434\_br\_0725}, [\mathrm{s\_0128}], [\mathrm{s\_1020}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0725} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0128r\_0725}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0725}}\right)^{1} \cdot \left([\mathrm{s\_0128}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_1020}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0725}}\right)}{\left(1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kms\_s\_0128r\_0725}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0725}}\right) + \left(1 + \frac{[\mathrm{s\_1020}]}{\mathrm{kmp\_s\_1020r\_0725}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0725}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1063)$$

Table 780: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0725	Keq_r_0725		1.100		☑
Vmax_r_0725	Vmax_r_0725		0.007		☑
kmp_s_1020r-_0725	kmp_s_1020r_0725		0.549		☑
kmp_s_1207r-_0725	kmp_s_1207r_0725		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0128r-_0725	kms_s_0128r_0725		0.549		☑
kms_s_1434-_br_0725	kms_s_1434_br-_0725		0.549		☑

7.195 Reaction r_0726

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name myo-inositol-1-phosphate synthase

Notes GENE_ASSOCIATION:YJL153C

Reaction equation

$$\text{s\_0410} \xrightleftharpoons{\text{s\_0128, s\_0410}} \text{s\_0128} \tag{1064}$$

Reactant

Table 781: Properties of each reactant.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	

Modifiers

Table 782: Properties of each modifier.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	

Product

Table 783: Properties of each product.

Id	Name	SBO
s_0128	1D-myo-inositol 1-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{195} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_195}(\mathrm{Keq\_r\_0726}, \mathrm{Vmax\_r\_0726}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0128r\_0726}, \mathrm{kms\_s\_0410r\_0726}, [\mathrm{s\_0128}], [\mathrm{s\_0410}]) \quad (1065)$$

$$\mathrm{function\_195}(\mathrm{Keq\_r\_0726}, \mathrm{Vmax\_r\_0726}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0128r\_0726}, \mathrm{kms\_s\_0410r\_0726}, [\mathrm{s\_0128}], [\mathrm{s\_0410}]) = \frac{\mathrm{Vmax\_r\_0726} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0726}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} - \frac{[\mathrm{s\_0128}]^{1}}{\mathrm{Keq\_r\_0726}}\right)}{1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0726}} + 1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kmp\_s\_0128r\_0726}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1066)$$

$$\mathrm{function\_195}(\mathrm{Keq\_r\_0726}, \mathrm{Vmax\_r\_0726}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0128r\_0726}, \mathrm{kms\_s\_0410r\_0726}, [\mathrm{s\_0128}], [\mathrm{s\_0410}]) = \frac{\mathrm{Vmax\_r\_0726} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0410r\_0726}}\right)^{1} \cdot \left([\mathrm{s\_0410}]^{1} - \frac{[\mathrm{s\_0128}]^{1}}{\mathrm{Keq\_r\_0726}}\right)}{1 + \frac{[\mathrm{s\_0410}]}{\mathrm{kms\_s\_0410r\_0726}} + 1 + \frac{[\mathrm{s\_0128}]}{\mathrm{kmp\_s\_0128r\_0726}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1067)$$

Table 784: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0726	Keq_r_0726		1.100		☑
Vmax_r_0726	Vmax_r_0726		0.004		☑
kmp_s_0128r-_0726	kmp_s_0128r_0726		0.549		☑
kms_s_0410r-_0726	kms_s_0410r_0726		0.549		☑

7.196 Reaction r_0728

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name N-acetyl-g-glutamyl-phosphate reductase

Notes GENE_ASSOCIATION:YER069W

Reaction equation

$$s\_0763\_b + s\_1070 + s\_1096 \xrightleftharpoons{s\_0149,\ s\_0763\_b,\ s\_1070,\ s\_1091,\ s\_1096,\ s\_1207} s\_0149 + s\_1091 + s\_1207 \quad (1068)$$

Reactants

Table 785: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1070	N-acetyl-L-gamma-glutamyl phosphate [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 786: Properties of each modifier.

Id	Name	SBO
s_0149	2-acetamido-5-oxopentanoate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1070	N-acetyl-L-gamma-glutamyl phosphate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 787: Properties of each product.

Id	Name	SBO
s_0149	2-acetamido-5-oxopentanoate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{196} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_196}(\mathrm{Keq\_r\_0728}, \mathrm{Vmax\_r\_0728}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0149r\_0728}, \mathrm{kmp\_s\_1091r\_0728}, \mathrm{kmp\_s\_1207r\_0728}, \mathrm{kms\_s\_0763\_br\_0728}, \mathrm{kms\_s\_1070r\_0728}, \mathrm{kms\_s\_1096r\_0728}, [\mathrm{s\_0149}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1070}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]) \tag{1069}$$

$$\mathrm{function\_196}(\mathrm{Keq\_r\_0728}, \mathrm{Vmax\_r\_0728}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0149r\_0728}, \mathrm{kmp\_s\_1091r\_0728}, \mathrm{kmp\_s\_1207r\_0728}, \mathrm{kms\_s\_0763\_br\_0728}, \mathrm{kms\_s\_1070r\_0728}, \mathrm{kms\_s\_1096r\_0728}, [\mathrm{s\_0149}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1070}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0728} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0728}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1070r\_0728}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0728}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1070}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0149}]^1 \cdot [\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0728}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1070}]}{\mathrm{kms\_s\_1070r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0728}}\right) + \left(1+\frac{[\mathrm{s\_0149}]}{\mathrm{kmp\_s\_0149r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0728}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1070}$$

$$\mathrm{function\_196}(\mathrm{Keq\_r\_0728}, \mathrm{Vmax\_r\_0728}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0149r\_0728}, \mathrm{kmp\_s\_1091r\_0728}, \mathrm{kmp\_s\_1207r\_0728}, \mathrm{kms\_s\_0763\_br\_0728}, \mathrm{kms\_s\_1070r\_0728}, \mathrm{kms\_s\_1096r\_0728}, [\mathrm{s\_0149}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1070}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0728} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0728}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1070r\_0728}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0728}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1070}]^1 \cdot [\mathrm{s\_1096}]^1 - \frac{[\mathrm{s\_0149}]^1 \cdot [\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0728}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1070}]}{\mathrm{kms\_s\_1070r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0728}}\right) + \left(1+\frac{[\mathrm{s\_0149}]}{\mathrm{kmp\_s\_0149r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0728}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0728}}\right) -}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1071}$$

Table 788: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0728	Keq_r_0728		1.100		☑
Vmax_r_0728	Vmax_r_0728		1.244		☑
kmp_s_0149r_0728	kmp_s_0149r_0728		0.549		☑
kmp_s_1091r_0728	kmp_s_1091r_0728		0.549		☑
kmp_s_1207r_0728	kmp_s_1207r_0728		0.549		☑
kms_s_0763_br_0728	kms_s_0763_br_0728		0.549		☑
kms_s_1070r_0728	kms_s_1070r_0728		0.549		☑
kms_s_1096r_0728	kms_s_1096r_0728		0.549		☑

7.197 Reaction r_0765

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name non-enzymatic reaction

Notes GENE_ASSOCIATION:

Reaction equation

$$s\_0180 + s\_0763\_b \xrightleftharpoons{s\_0180,\ s\_0181,\ s\_0470,\ s\_0763\_b} s\_0181 + s\_0470 \tag{1072}$$

Reactants

Table 789: Properties of each reactant.

Id	Name	SBO
s_0180	2-oxaloglutaric acid [intracellular]	
s_0763_b	H+ [intracellular]	

Modifiers

Table 790: Properties of each modifier.

Id	Name	SBO
s_0180	2-oxaloglutaric acid [intracellular]	
s_0181	2-oxoadipic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 791: Properties of each product.

Id	Name	SBO
s_0181	2-oxoadipic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{197} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_197}(\mathrm{Keq\_r\_0765}, \mathrm{Vmax\_r\_0765}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0181r\_0765}, \mathrm{kmp\_s\_0470r\_0765}, \mathrm{kms\_s\_0180r\_0765}, \mathrm{kms\_s\_0763\_br\_0765}, [\mathrm{s\_0180}], [\mathrm{s\_0181}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) \tag{1073}$$

$$\mathrm{function\_197}(\mathrm{Keq\_r\_0765}, \mathrm{Vmax\_r\_0765}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0181r\_0765}, \mathrm{kmp\_s\_0470r\_0765}, \mathrm{kms\_s\_0180r\_0765}, \mathrm{kms\_s\_0763\_br\_0765}, [\mathrm{s\_0180}], [\mathrm{s\_0181}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0765} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0180r\_0765}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0765}}\right)^{1} \cdot \left([\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0181}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0765}}\right)}{\left(1 + \frac{[\mathrm{s\_0180}]}{\mathrm{kms\_s\_0180r\_0765}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0765}}\right) + \left(1 + \frac{[\mathrm{s\_0181}]}{\mathrm{kmp\_s\_0181r\_0765}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0765}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1074}$$

$$\mathrm{function\_197}(\mathrm{Keq\_r\_0765}, \mathrm{Vmax\_r\_0765}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0181r\_0765}, \mathrm{kmp\_s\_0470r\_0765}, \mathrm{kms\_s\_0180r\_0765}, \mathrm{kms\_s\_0763\_br\_0765}, [\mathrm{s\_0180}], [\mathrm{s\_0181}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0765} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0180r\_0765}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0765}}\right)^{1} \cdot \left([\mathrm{s\_0180}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} - \frac{[\mathrm{s\_0181}]^{1} \cdot [\mathrm{s\_0470}]^{1}}{\mathrm{Keq\_r\_0765}}\right)}{\left(1 + \frac{[\mathrm{s\_0180}]}{\mathrm{kms\_s\_0180r\_0765}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0765}}\right) + \left(1 + \frac{[\mathrm{s\_0181}]}{\mathrm{kmp\_s\_0181r\_0765}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0765}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1075}$$

Table 792: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0765	Keq_r_0765		2.004		☑
Vmax_r_0765	Vmax_r_0765		1.024		☑
kmp_s_0181r-_0765	kmp_s_0181r_0765		0.549		☑
kmp_s_0470r-_0765	kmp_s_0470r_0765		1.000		☑
kms_s_0180r-_0765	kms_s_0180r_0765		0.549		☑
kms_s_0763-_br_0765	kms_s_0763_br-_0765		0.549		☑

7.198 Reaction r_0771

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name nucleoside-diphosphate kinase (ATP:CDP)

Notes GENE_ASSOCIATION:YKL067W

Reaction equation

$$s\_0400 + s\_0521 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0481,\ s\_0521} s\_0446 + s\_0481 \tag{1076}$$

Reactants

Table 793: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0521	CTP [intracellular]	

Modifiers

Table 794: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0481	CDP [intracellular]	
s_0521	CTP [intracellular]	

Products

Table 795: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0481	CDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{198} = \text{vol}(\text{intracellular}) \cdot \text{function\_198}(\text{Keq\_r\_0771}, \text{Vmax\_r\_0771}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0446r\_0771}, \text{kmp\_s\_0481r\_0771}, \text{kms\_s\_0400r\_0771}, \text{kms\_s\_0521r\_0771}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0481}], [\text{s\_0521}]) \tag{1077}$$

$$\begin{aligned}
&\mathrm{function_198}\left(\mathrm{Keq_r_0771}, \mathrm{Vmax_r_0771}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\
&\quad \mathrm{kmp_s_0446r_0771}, \mathrm{kmp_s_0481r_0771}, \mathrm{kms_s_0400r_0771},\\
&\quad\quad \left.\mathrm{kms_s_0521r_0771}, [\mathrm{s_0400}], [\mathrm{s_0446}], [\mathrm{s_0481}], [\mathrm{s_0521}]\right)\\
&= \frac{\mathrm{Vmax_r_0771} \cdot \frac{\left(\frac{1}{\mathrm{kms_s_0400r_0771}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_0521r_0771}}\right)^{1} \cdot \left([\mathrm{s_0400}]^{1} \cdot [\mathrm{s_0521}]^{1} - \frac{[\mathrm{s_0446}]^{1} \cdot [\mathrm{s_0481}]^{1}}{\mathrm{Keq_r_0771}}\right)}{\left(1 + \frac{[\mathrm{s_0400}]}{\mathrm{kms_s_0400r_0771}}\right) \cdot \left(1 + \frac{[\mathrm{s_0521}]}{\mathrm{kms_s_0521r_0771}}\right) + \left(1 + \frac{[\mathrm{s_0446}]}{\mathrm{kmp_s_0446r_0771}}\right) \cdot \left(1 + \frac{[\mathrm{s_0481}]}{\mathrm{kmp_s_0481r_0771}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{1078}$$

$$\begin{aligned}
&\mathrm{function_198}\left(\mathrm{Keq_r_0771}, \mathrm{Vmax_r_0771}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\
&\quad \mathrm{kmp_s_0446r_0771}, \mathrm{kmp_s_0481r_0771}, \mathrm{kms_s_0400r_0771},\\
&\quad\quad \left.\mathrm{kms_s_0521r_0771}, [\mathrm{s_0400}], [\mathrm{s_0446}], [\mathrm{s_0481}], [\mathrm{s_0521}]\right)\\
&= \frac{\mathrm{Vmax_r_0771} \cdot \frac{\left(\frac{1}{\mathrm{kms_s_0400r_0771}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_0521r_0771}}\right)^{1} \cdot \left([\mathrm{s_0400}]^{1} \cdot [\mathrm{s_0521}]^{1} - \frac{[\mathrm{s_0446}]^{1} \cdot [\mathrm{s_0481}]^{1}}{\mathrm{Keq_r_0771}}\right)}{\left(1 + \frac{[\mathrm{s_0400}]}{\mathrm{kms_s_0400r_0771}}\right) \cdot \left(1 + \frac{[\mathrm{s_0521}]}{\mathrm{kms_s_0521r_0771}}\right) + \left(1 + \frac{[\mathrm{s_0446}]}{\mathrm{kmp_s_0446r_0771}}\right) \cdot \left(1 + \frac{[\mathrm{s_0481}]}{\mathrm{kmp_s_0481r_0771}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{1079}$$

Table 796: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0771	Keq_r_0771		0.699		☑
Vmax_r_0771	Vmax_r_0771		0.015		☑
kmp_s_0446r_0771	kmp_s_0446r_0771		1.092		☑
kmp_s_0481r_0771	kmp_s_0481r_0771		0.549		☑
kms_s_0400r_0771	kms_s_0400r_0771		1.719		☑
kms_s_0521r_0771	kms_s_0521r_0771		0.549		☑

7.199 Reaction r_0779

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name nucleoside-diphosphate kinase (ATP:UDP)

Notes GENE_ASSOCIATION:YKL067W

Reaction equation

$$\mathrm{s\_0446} + \mathrm{s\_1411} \xrightleftharpoons{\mathrm{s\_0400,\ s\_0446,\ s\_1411,\ s\_1430}} \mathrm{s\_0400} + \mathrm{s\_1430} \tag{1080}$$

Reactants

Table 797: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1411	UDP [intracellular]	

Modifiers

Table 798: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_1411	UDP [intracellular]	
s_1430	UTP [intracellular]	

Products

Table 799: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_1430	UTP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{199} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_199}\left(\mathrm{Keq\_r\_0779}, \mathrm{Vmax\_r\_0779}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0779}, \mathrm{kmp\_s\_1430r\_0779}, \mathrm{kms\_s\_0446r\_0779}, \mathrm{kms\_s\_1411r\_0779}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_1411}], [\mathrm{s\_1430}]\right) \quad (1081)$$

$$\begin{aligned}&\text{function\_199}\left(\text{Keq\_r\_0779}, \text{Vmax\_r\_0779}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0400r\_0779}, \text{kmp\_s\_1430r\_0779}, \text{kms\_s\_0446r\_0779},\\&\quad\quad\left.\text{kms\_s\_1411r\_0779}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_1411}], [\text{s\_1430}]\right)\\&=\frac{\text{Vmax\_r\_0779}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0446r\_0779}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1411r\_0779}}\right)^{1}\cdot\left([\text{s\_0446}]^{1}\cdot[\text{s\_1411}]^{1}-\frac{[\text{s\_0400}]^{1}\cdot[\text{s\_1430}]^{1}}{\text{Keq\_r\_0779}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0779}}\right)\cdot\left(1+\frac{[\text{s\_1411}]}{\text{kms\_s\_1411r\_0779}}\right)+\left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0779}}\right)\cdot\left(1+\frac{[\text{s\_1430}]}{\text{kmp\_s\_1430r\_0779}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned}\tag{1082}$$

$$\begin{aligned}&\text{function\_199}\left(\text{Keq\_r\_0779}, \text{Vmax\_r\_0779}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0400r\_0779}, \text{kmp\_s\_1430r\_0779}, \text{kms\_s\_0446r\_0779},\\&\quad\quad\left.\text{kms\_s\_1411r\_0779}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_1411}], [\text{s\_1430}]\right)\\&=\frac{\text{Vmax\_r\_0779}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0446r\_0779}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_1411r\_0779}}\right)^{1}\cdot\left([\text{s\_0446}]^{1}\cdot[\text{s\_1411}]^{1}-\frac{[\text{s\_0400}]^{1}\cdot[\text{s\_1430}]^{1}}{\text{Keq\_r\_0779}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0779}}\right)\cdot\left(1+\frac{[\text{s\_1411}]}{\text{kms\_s\_1411r\_0779}}\right)+\left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0779}}\right)\cdot\left(1+\frac{[\text{s\_1430}]}{\text{kmp\_s\_1430r\_0779}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned}\tag{1083}$$

Table 800: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0779`	Keq_r_0779		1.732		☑
`Vmax_r_0779`	Vmax_r_0779		7.384		☑
`kmp_s_0400r_0779`	kmp_s_0400r_0779		1.719		☑
`kmp_s_1430r_0779`	kmp_s_1430r_0779		0.549		☑
`kms_s_0446r_0779`	kms_s_0446r_0779		1.092		☑
`kms_s_1411r_0779`	kms_s_1411r_0779		0.549		☑

7.200 Reaction `r_0783`

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name O-acetylhomoserine (thiol)-lyase

Notes GENE_ASSOCIATION:YLR303W

Reaction equation

$$s\_0805 + s\_1117 \xrightleftharpoons{s\_0369,\ s\_0763\_b,\ s\_0805,\ s\_0917,\ s\_1117} s\_0369 + s\_0763\_b + s\_0917 \quad (1084)$$

Reactants

Table 801: Properties of each reactant.

Id	Name	SBO
s_0805	hydrogen sulfide [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Modifiers

Table 802: Properties of each modifier.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0805	hydrogen sulfide [intracellular]	
s_0917	L-homocysteine [intracellular]	
s_1117	O-acetyl-L-homoserine [intracellular]	

Products

Table 803: Properties of each product.

Id	Name	SBO
s_0369	acetate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0917	L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{200} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_200}\left(\mathrm{Keq\_r\_0783}, \mathrm{Vmax\_r\_0783}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0369r\_0783}, \mathrm{kmp\_s\_0763\_br\_0783}, \mathrm{kmp\_s\_0917r\_0783}, \mathrm{kms\_s\_0805r\_0783}, \mathrm{kms\_s\_1117r\_0783}, [\mathrm{s\_0369}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0805}], [\mathrm{s\_0917}], [\mathrm{s\_1117}]\right) \quad (1085)$$

$$\begin{aligned}&\text{function\_200}\left(\text{Keq\_r\_0783}, \text{Vmax\_r\_0783}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0369r\_0783},\right.\\&\text{kmp\_s\_0763\_br\_0783}, \text{kmp\_s\_0917r\_0783}, \text{kms\_s\_0805r\_0783},\\&\left.\text{kms\_s\_1117r\_0783}, [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_0805}], [\text{s\_0917}], [\text{s\_1117}]\right)\\&= \frac{\text{Vmax\_r\_0783} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0805r\_0783}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1117r\_0783}}\right)^{1} \cdot \left([\text{s\_0805}]^{1} \cdot [\text{s\_1117}]^{1} - \frac{[\text{s\_0369}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0917}]^{1}}{\text{Keq\_r\_0783}}\right)}{\left(1+\frac{[\text{s\_0805}]}{\text{kms\_s\_0805r\_0783}}\right) \cdot \left(1+\frac{[\text{s\_1117}]}{\text{kms\_s\_1117r\_0783}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0783}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0783}}\right) \cdot \left(1+\frac{[\text{s\_0917}]}{\text{kmp\_s\_0917r\_0783}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1086}$$

$$\begin{aligned}&\text{function\_200}\left(\text{Keq\_r\_0783}, \text{Vmax\_r\_0783}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0369r\_0783},\right.\\&\text{kmp\_s\_0763\_br\_0783}, \text{kmp\_s\_0917r\_0783}, \text{kms\_s\_0805r\_0783},\\&\left.\text{kms\_s\_1117r\_0783}, [\text{s\_0369}], [\text{s\_0763\_b}], [\text{s\_0805}], [\text{s\_0917}], [\text{s\_1117}]\right)\\&= \frac{\text{Vmax\_r\_0783} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0805r\_0783}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1117r\_0783}}\right)^{1} \cdot \left([\text{s\_0805}]^{1} \cdot [\text{s\_1117}]^{1} - \frac{[\text{s\_0369}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0917}]^{1}}{\text{Keq\_r\_0783}}\right)}{\left(1+\frac{[\text{s\_0805}]}{\text{kms\_s\_0805r\_0783}}\right) \cdot \left(1+\frac{[\text{s\_1117}]}{\text{kms\_s\_1117r\_0783}}\right) + \left(1+\frac{[\text{s\_0369}]}{\text{kmp\_s\_0369r\_0783}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0783}}\right) \cdot \left(1+\frac{[\text{s\_0917}]}{\text{kmp\_s\_0917r\_0783}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1087}$$

Table 804: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0783	Keq_r_0783		0.604		☑
Vmax_r_0783	Vmax_r_0783		0.624		☑
kmp_s_0369r_0783	kmp_s_0369r_0783		0.549		☑
kmp_s_0763_br_0783	kmp_s_0763_br_0783		0.549		☑
kmp_s_0917r_0783	kmp_s_0917r_0783		0.549		☑
kms_s_0805r_0783	kms_s_0805r_0783		0.549		☑
kms_s_1117r_0783	kms_s_1117r_0783		0.549		☑

7.201 Reaction r_0789

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ornithine carbamoyltransferase

Notes GENE_ASSOCIATION:YJL088W

Reaction equation

$$\text{s\_0469} + \text{s\_1151} \xrightleftharpoons{\text{s\_0469, s\_0763\_b, s\_0887, s\_1151, s\_1207}} \text{s\_0763\_b} + \text{s\_0887} + \text{s\_1207} \quad (1088)$$

Reactants

Table 805: Properties of each reactant.

Id	Name	SBO
s_0469	carbamoyl phosphate [intracellular]	
s_1151	ornithine [intracellular]	

Modifiers

Table 806: Properties of each modifier.

Id	Name	SBO
s_0469	carbamoyl phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0887	L-citrulline [intracellular]	
s_1151	ornithine [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 807: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0887	L-citrulline [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{201} = \text{vol}(\text{intracellular}) \cdot \text{function\_201}(\text{Keq\_r\_0789}, \text{Vmax\_r\_0789}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0763\_br\_0789}, \text{kmp\_s\_0887r\_0789}, \text{kmp\_s\_1207r\_0789}, \text{kms\_s\_0469r\_0789}, \text{kms\_s\_1151r\_0789}, [\text{s\_0469}], [\text{s\_0763\_b}], [\text{s\_0887}], [\text{s\_1151}], [\text{s\_1207}]) \quad (1089)$$

$$\begin{aligned}&\text{function\_201}\left(\text{Keq\_r\_0789}, \text{Vmax\_r\_0789}, \text{vol}\left(\text{intracellular}\right),\right.\\&\text{kmp\_s\_0763\_br\_0789}, \text{kmp\_s\_0887r\_0789}, \text{kmp\_s\_1207r\_0789}, \text{kms\_s\_0469r\_0789},\\&\left.\text{kms\_s\_1151r\_0789}, [\text{s\_0469}], [\text{s\_0763\_b}], [\text{s\_0887}], [\text{s\_1151}], [\text{s\_1207}]\right)\\&= \frac{\text{Vmax\_r\_0789} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0469r\_0789}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1151r\_0789}}\right)^{1} \cdot \left([\text{s\_0469}]^{1} \cdot [\text{s\_1151}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_0887}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0789}}\right)}{\left(1+\frac{[\text{s\_0469}]}{\text{kms\_s\_0469r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1151}]}{\text{kms\_s\_1151r\_0789}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0789}}\right) \cdot \left(1+\frac{[\text{s\_0887}]}{\text{kmp\_s\_0887r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0789}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1090}$$

$$\begin{aligned}&\text{function\_201}\left(\text{Keq\_r\_0789}, \text{Vmax\_r\_0789}, \text{vol}\left(\text{intracellular}\right),\right.\\&\text{kmp\_s\_0763\_br\_0789}, \text{kmp\_s\_0887r\_0789}, \text{kmp\_s\_1207r\_0789}, \text{kms\_s\_0469r\_0789},\\&\left.\text{kms\_s\_1151r\_0789}, [\text{s\_0469}], [\text{s\_0763\_b}], [\text{s\_0887}], [\text{s\_1151}], [\text{s\_1207}]\right)\\&= \frac{\text{Vmax\_r\_0789} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0469r\_0789}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1151r\_0789}}\right)^{1} \cdot \left([\text{s\_0469}]^{1} \cdot [\text{s\_1151}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_0887}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_0789}}\right)}{\left(1+\frac{[\text{s\_0469}]}{\text{kms\_s\_0469r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1151}]}{\text{kms\_s\_1151r\_0789}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0789}}\right) \cdot \left(1+\frac{[\text{s\_0887}]}{\text{kmp\_s\_0887r\_0789}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_0789}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1091}$$

Table 808: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0789	Keq_r_0789		0.604		☑
Vmax_r_0789	Vmax_r_0789		0.912		☑
kmp_s_0763_br_0789	kmp_s_0763_br_0789		0.549		☑
kmp_s_0887r_0789	kmp_s_0887r_0789		0.549		☑
kmp_s_1207r_0789	kmp_s_1207r_0789		0.549		☑
kms_s_0469r_0789	kms_s_0469r_0789		0.549		☑
kms_s_1151r_0789	kms_s_1151r_0789		0.549		☑

7.202 Reaction r_0791

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name ornithine transacetylase

Notes GENE_ASSOCIATION:YMR062C

Reaction equation

$$\text{s\_0899} + \text{s\_1051} \xrightleftharpoons{\text{s\_0899, s\_1051, s\_1071, s\_1151}} \text{s\_1071} + \text{s\_1151} \tag{1092}$$

Reactants

Table 809: Properties of each reactant.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1051	N(2)-acetyl-L-ornithine [intracellular]	

Modifiers

Table 810: Properties of each modifier.

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_1051	N(2)-acetyl-L-ornithine [intracellular]	
s_1071	N-acetyl-L-glutamate(2-) [intracellular]	
s_1151	ornithine [intracellular]	

Products

Table 811: Properties of each product.

Id	Name	SBO
s_1071	N-acetyl-L-glutamate(2-) [intracellular]	
s_1151	ornithine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{202} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_202}\left(\mathrm{Keq\_r\_0791}, \mathrm{Vmax\_r\_0791}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1071r\_0791}, \mathrm{kmp\_s\_1151r\_0791}, \mathrm{kms\_s\_0899r\_0791}, \mathrm{kms\_s\_1051r\_0791}, [\mathrm{s\_0899}], [\mathrm{s\_1051}], [\mathrm{s\_1071}], [\mathrm{s\_1151}]\right) \quad (1093)$$

$$\begin{aligned}&\mathrm{function\_202}\left(\mathrm{Keq\_r\_0791}, \mathrm{Vmax\_r\_0791}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\&\quad\mathrm{kmp\_s\_1071r\_0791}, \mathrm{kmp\_s\_1151r\_0791}, \mathrm{kms\_s\_0899r\_0791},\\&\quad\left.\mathrm{kms\_s\_1051r\_0791}, [\mathrm{s\_0899}], [\mathrm{s\_1051}], [\mathrm{s\_1071}], [\mathrm{s\_1151}]\right)\\&=\frac{\mathrm{Vmax\_r\_0791}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0791}}\right)^{1}\cdot\left(\frac{1}{\mathrm{kms\_s\_1051r\_0791}}\right)^{1}\cdot\left([\mathrm{s\_0899}]^{1}\cdot[\mathrm{s\_1051}]^{1}-\frac{[\mathrm{s\_1071}]^{1}\cdot[\mathrm{s\_1151}]^{1}}{\mathrm{Keq\_r\_0791}}\right)}{\left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0791}}\right)\cdot\left(1+\frac{[\mathrm{s\_1051}]}{\mathrm{kms\_s\_1051r\_0791}}\right)+\left(1+\frac{[\mathrm{s\_1071}]}{\mathrm{kmp\_s\_1071r\_0791}}\right)\cdot\left(1+\frac{[\mathrm{s\_1151}]}{\mathrm{kmp\_s\_1151r\_0791}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{1094}$$

$$\begin{aligned}&\mathrm{function\_202}\left(\mathrm{Keq\_r\_0791}, \mathrm{Vmax\_r\_0791}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\&\quad\mathrm{kmp\_s\_1071r\_0791}, \mathrm{kmp\_s\_1151r\_0791}, \mathrm{kms\_s\_0899r\_0791},\\&\quad\left.\mathrm{kms\_s\_1051r\_0791}, [\mathrm{s\_0899}], [\mathrm{s\_1051}], [\mathrm{s\_1071}], [\mathrm{s\_1151}]\right)\\&=\frac{\mathrm{Vmax\_r\_0791}\cdot\frac{\left(\frac{1}{\mathrm{kms\_s\_0899r\_0791}}\right)^{1}\cdot\left(\frac{1}{\mathrm{kms\_s\_1051r\_0791}}\right)^{1}\cdot\left([\mathrm{s\_0899}]^{1}\cdot[\mathrm{s\_1051}]^{1}-\frac{[\mathrm{s\_1071}]^{1}\cdot[\mathrm{s\_1151}]^{1}}{\mathrm{Keq\_r\_0791}}\right)}{\left(1+\frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0791}}\right)\cdot\left(1+\frac{[\mathrm{s\_1051}]}{\mathrm{kms\_s\_1051r\_0791}}\right)+\left(1+\frac{[\mathrm{s\_1071}]}{\mathrm{kmp\_s\_1071r\_0791}}\right)\cdot\left(1+\frac{[\mathrm{s\_1151}]}{\mathrm{kmp\_s\_1151r\_0791}}\right)-1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}\end{aligned} \tag{1095}$$

Table 812: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0791	Keq_r_0791		1.100		☑
Vmax_r_0791	Vmax_r_0791		0.581		☑
kmp_s_1071r-_0791	kmp_s_1071r_0791		0.549		☑
kmp_s_1151r-_0791	kmp_s_1151r_0791		0.549		☑
kms_s_0899r-_0791	kms_s_0899r_0791		0.549		☑
kms_s_1051r-_0791	kms_s_1051r_0791		0.549		☑

7.203 Reaction r_0793

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name orotate phosphoribosyltransferase

Notes GENE_ASSOCIATION:(YML106W or YMR271C)

Reaction equation

$$\mathrm{s\_0331}+\mathrm{s\_1154} \xrightleftharpoons{\mathrm{s\_0331,\ s\_0605,\ s\_1154,\ s\_1155}} \mathrm{s\_0605}+\mathrm{s\_1155} \tag{1096}$$

Reactants

Table 813: Properties of each reactant.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_1154	orotate [intracellular]	

Modifiers

Table 814: Properties of each modifier.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0605	diphosphate [intracellular]	
s_1154	orotate [intracellular]	
s_1155	orotidine 5'-(dihydrogen phosphate) [intracellular]	

Products

Table 815: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_1155	orotidine 5'-(dihydrogen phosphate) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{203} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_203}\left(\mathrm{Keq\_r\_0793}, \mathrm{Vmax\_r\_0793}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0605r\_0793}, \mathrm{kmp\_s\_1155r\_0793}, \mathrm{kms\_s\_0331r\_0793}, \mathrm{kms\_s\_1154r\_0793}, [\mathrm{s\_0331}], [\mathrm{s\_0605}], [\mathrm{s\_1154}], [\mathrm{s\_1155}]\right) \quad (1097)$$

$$\text{function\_203}(\text{Keq\_r\_0793}, \text{Vmax\_r\_0793}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0605r\_0793}, \text{kmp\_s\_1155r\_0793}, \text{kms\_s\_0331r\_0793}, \text{kms\_s\_1154r\_0793}, [\text{s\_0331}], [\text{s\_0605}], [\text{s\_1154}], [\text{s\_1155}]) = \frac{\text{Vmax\_r\_0793} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0331r\_0793}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1154r\_0793}}\right)^{1} \cdot \left([\text{s\_0331}]^{1} \cdot [\text{s\_1154}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_1155}]^{1}}{\text{Keq\_r\_0793}}\right)}{\left(1 + \frac{[\text{s\_0331}]}{\text{kms\_s\_0331r\_0793}}\right) \cdot \left(1 + \frac{[\text{s\_1154}]}{\text{kms\_s\_1154r\_0793}}\right) + \left(1 + \frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0793}}\right) \cdot \left(1 + \frac{[\text{s\_1155}]}{\text{kmp\_s\_1155r\_0793}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1098}$$

$$\text{function\_203}(\text{Keq\_r\_0793}, \text{Vmax\_r\_0793}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0605r\_0793}, \text{kmp\_s\_1155r\_0793}, \text{kms\_s\_0331r\_0793}, \text{kms\_s\_1154r\_0793}, [\text{s\_0331}], [\text{s\_0605}], [\text{s\_1154}], [\text{s\_1155}]) = \frac{\text{Vmax\_r\_0793} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0331r\_0793}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1154r\_0793}}\right)^{1} \cdot \left([\text{s\_0331}]^{1} \cdot [\text{s\_1154}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_1155}]^{1}}{\text{Keq\_r\_0793}}\right)}{\left(1 + \frac{[\text{s\_0331}]}{\text{kms\_s\_0331r\_0793}}\right) \cdot \left(1 + \frac{[\text{s\_1154}]}{\text{kms\_s\_1154r\_0793}}\right) + \left(1 + \frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0793}}\right) \cdot \left(1 + \frac{[\text{s\_1155}]}{\text{kmp\_s\_1155r\_0793}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1099}$$

Table 816: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0793	Keq_r_0793		1.100		☑
Vmax_r_0793	Vmax_r_0793		0.526		☑
kmp_s_0605r_0793	kmp_s_0605r_0793		0.549		☑
kmp_s_1155r_0793	kmp_s_1155r_0793		0.549		☑
kms_s_0331r_0793	kms_s_0331r_0793		0.549		☑
kms_s_1154r_0793	kms_s_1154r_0793		0.549		☑

7.204 Reaction r_0794

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name orotidine-5'-phosphate decarboxylase

Notes GENE_ASSOCIATION:YEL021W

Reaction equation

$$\text{s\_0763\_b} + \text{s\_1155} \xrightleftharpoons{\text{s\_0470, s\_0763\_b, s\_1155, s\_1417}} \text{s\_0470} + \text{s\_1417} \tag{1100}$$

Reactants

Table 817: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1155	orotidine 5'-(dihydrogen phosphate) [intracellular]	

Modifiers

Table 818: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_1155	orotidine 5'-(dihydrogen phosphate) [intracellular]	
s_1417	UMP [intracellular]	

Products

Table 819: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_1417	UMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{204} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_204}(\mathrm{Keq\_r\_0794}, \mathrm{Vmax\_r\_0794}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0794}, \mathrm{kmp\_s\_1417r\_0794}, \mathrm{kms\_s\_0763\_br\_0794}, \mathrm{kms\_s\_1155r\_0794}, [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1155}], [\mathrm{s\_1417}]) \tag{1101}$$

$$\begin{aligned}&\text{function\_204}\left(\text{Keq\_r\_0794}, \text{Vmax\_r\_0794}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0470r\_0794}, \text{kmp\_s\_1417r\_0794}, \text{kms\_s\_0763\_br\_0794},\\&\quad\quad\left.\text{kms\_s\_1155r\_0794}, [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1155}], [\text{s\_1417}]\right)\\&= \frac{\text{Vmax\_r\_0794} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0794}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1155r\_0794}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1155}]^{1} - \frac{[\text{s\_0470}]^{1} \cdot [\text{s\_1417}]^{1}}{\text{Keq\_r\_0794}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1155}]}{\text{kms\_s\_1155r\_0794}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1417}]}{\text{kmp\_s\_1417r\_0794}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1102}$$

$$\begin{aligned}&\text{function\_204}\left(\text{Keq\_r\_0794}, \text{Vmax\_r\_0794}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0470r\_0794}, \text{kmp\_s\_1417r\_0794}, \text{kms\_s\_0763\_br\_0794},\\&\quad\quad\left.\text{kms\_s\_1155r\_0794}, [\text{s\_0470}], [\text{s\_0763\_b}], [\text{s\_1155}], [\text{s\_1417}]\right)\\&= \frac{\text{Vmax\_r\_0794} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_0794}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1155r\_0794}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1155}]^{1} - \frac{[\text{s\_0470}]^{1} \cdot [\text{s\_1417}]^{1}}{\text{Keq\_r\_0794}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1155}]}{\text{kms\_s\_1155r\_0794}}\right) + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0794}}\right) \cdot \left(1+\frac{[\text{s\_1417}]}{\text{kmp\_s\_1417r\_0794}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1103}$$

Table 820: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0794	Keq_r_0794		2.004		☑
Vmax_r_0794	Vmax_r_0794		0.526		☑
kmp_s_0470r-_0794	kmp_s_0470r_0794		1.000		☑
kmp_s_1417r-_0794	kmp_s_1417r_0794		0.549		☑
kms_s_0763-_br_0794	kms_s_0763_br-_0794		0.549		☑
kms_s_1155r-_0794	kms_s_1155r_0794		0.549		☑

7.205 Reaction r_0825

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phenylalanine transaminase

Notes GENE_ASSOCIATION:(YGL202W or YHR137W)

Reaction equation

$$\text{s\_0859} + \text{s\_0899} \xrightleftharpoons{\text{s\_0185, s\_0859, s\_0899, s\_0936}} \text{s\_0185} + \text{s\_0936} \tag{1104}$$

Reactants

Table 821: Properties of each reactant.

Id	Name	SBO
s_0859	keto-phenylpyruvate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 822: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0859	keto-phenylpyruvate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0936	L-phenylalanine [intracellular]	

Products

Table 823: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0936	L-phenylalanine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{205} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_205}\left(\mathrm{Keq\_r\_0825}, \mathrm{Vmax\_r\_0825}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0825}, \mathrm{kmp\_s\_0936r\_0825}, \mathrm{kms\_s\_0859r\_0825}, \mathrm{kms\_s\_0899r\_0825}, [\mathrm{s\_0185}], [\mathrm{s\_0859}], [\mathrm{s\_0899}], [\mathrm{s\_0936}]\right) \quad (1105)$$

$$\begin{aligned}&\text{function\_205}\left(\text{Keq\_r\_0825}, \text{Vmax\_r\_0825}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad \text{kmp\_s\_0185r\_0825}, \text{kmp\_s\_0936r\_0825}, \text{kms\_s\_0859r\_0825},\\&\quad\quad \left.\text{kms\_s\_0899r\_0825}, [\text{s\_0185}], [\text{s\_0859}], [\text{s\_0899}], [\text{s\_0936}]\right)\\&= \frac{\text{Vmax\_r\_0825} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0859r\_0825}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0825}}\right)^{1} \cdot \left([\text{s\_0859}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0936}]^{1}}{\text{Keq\_r\_0825}}\right)}{\left(1+\frac{[\text{s\_0859}]}{\text{kms\_s\_0859r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0825}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0936}]}{\text{kmp\_s\_0936r\_0825}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1106}$$

$$\begin{aligned}&\text{function\_205}\left(\text{Keq\_r\_0825}, \text{Vmax\_r\_0825}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad \text{kmp\_s\_0185r\_0825}, \text{kmp\_s\_0936r\_0825}, \text{kms\_s\_0859r\_0825},\\&\quad\quad \left.\text{kms\_s\_0899r\_0825}, [\text{s\_0185}], [\text{s\_0859}], [\text{s\_0899}], [\text{s\_0936}]\right)\\&= \frac{\text{Vmax\_r\_0825} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0859r\_0825}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0899r\_0825}}\right)^{1} \cdot \left([\text{s\_0859}]^{1} \cdot [\text{s\_0899}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0936}]^{1}}{\text{Keq\_r\_0825}}\right)}{\left(1+\frac{[\text{s\_0859}]}{\text{kms\_s\_0859r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_0825}}\right) + \left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0825}}\right) \cdot \left(1+\frac{[\text{s\_0936}]}{\text{kmp\_s\_0936r\_0825}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1107}$$

Table 824: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0825	Keq_r_0825		1.100		☑
Vmax_r_0825	Vmax_r_0825		0.489		☑
kmp_s_0185r-_0825	kmp_s_0185r_0825		0.549		☑
kmp_s_0936r-_0825	kmp_s_0936r_0825		0.549		☑
kms_s_0859r-_0825	kms_s_0859r_0825		0.549		☑
kms_s_0899r-_0825	kms_s_0899r_0825		0.549		☑

7.206 Reaction r_0831

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphatidylethanolamine methyltransferase

Notes GENE_ASSOCIATION:YJR073C or YGR157W

Reaction equation

$$\mathrm{s\_1233} + \mathrm{s\_1293} \xrightleftharpoons{\mathrm{s\_0763\_b,\ s\_1226,\ s\_1233,\ s\_1290,\ s\_1293}} \mathrm{s\_0763\_b} + \mathrm{s\_1226} + \mathrm{s\_1290} \tag{1108}$$

Reactants

Table 825: Properties of each reactant.

Id	Name	SBO
s_1233	phosphatidylethanolamine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Modifiers

Table 826: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1226	phosphatidyl-N-methylethanolamine [intracellular]	
s_1233	phosphatidylethanolamine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Products

Table 827: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1226	phosphatidyl-N-methylethanolamine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{206} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_206}\left(\mathrm{Keq\_r\_0831}, \mathrm{Vmax\_r\_0831}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0763\_br\_0831}, \mathrm{kmp\_s\_1226r\_0831}, \mathrm{kmp\_s\_1290r\_0831}, \mathrm{kms\_s\_1233r\_0831}, \mathrm{kms\_s\_1293r\_0831}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1226}], [\mathrm{s\_1233}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]\right) \tag{1109}$$

$$\begin{aligned}&\text{function\_206}\left(\text{Keq\_r\_0831}, \text{Vmax\_r\_0831}, \text{vol}\left(\text{intracellular}\right),\right.\\&\text{kmp\_s\_0763\_br\_0831}, \text{kmp\_s\_1226r\_0831}, \text{kmp\_s\_1290r\_0831}, \text{kms\_s\_1233r\_0831},\\&\left.\text{kms\_s\_1293r\_0831}, [\text{s\_0763\_b}], [\text{s\_1226}], [\text{s\_1233}], [\text{s\_1290}], [\text{s\_1293}]\right)\\&= \frac{\text{Vmax\_r\_0831} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1233r\_0831}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0831}}\right)^{1} \cdot \left([\text{s\_1233}]^{1} \cdot [\text{s\_1293}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_1226}]^{1} \cdot [\text{s\_1290}]^{1}}{\text{Keq\_r\_0831}}\right)}{\left(1+\frac{[\text{s\_1233}]}{\text{kms\_s\_1233r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0831}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1226}]}{\text{kmp\_s\_1226r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0831}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1110}$$

$$\begin{aligned}&\text{function\_206}\left(\text{Keq\_r\_0831}, \text{Vmax\_r\_0831}, \text{vol}\left(\text{intracellular}\right),\right.\\&\text{kmp\_s\_0763\_br\_0831}, \text{kmp\_s\_1226r\_0831}, \text{kmp\_s\_1290r\_0831}, \text{kms\_s\_1233r\_0831},\\&\left.\text{kms\_s\_1293r\_0831}, [\text{s\_0763\_b}], [\text{s\_1226}], [\text{s\_1233}], [\text{s\_1290}], [\text{s\_1293}]\right)\\&= \frac{\text{Vmax\_r\_0831} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1233r\_0831}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1293r\_0831}}\right)^{1} \cdot \left([\text{s\_1233}]^{1} \cdot [\text{s\_1293}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_1226}]^{1} \cdot [\text{s\_1290}]^{1}}{\text{Keq\_r\_0831}}\right)}{\left(1+\frac{[\text{s\_1233}]}{\text{kms\_s\_1233r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0831}}\right) + \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1226}]}{\text{kmp\_s\_1226r\_0831}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0831}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1111}$$

Table 828: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0831	Keq_r_0831		0.604		☑
Vmax_r_0831	Vmax_r_0831		0.019		☑
kmp_s_0763_br_0831	kmp_s_0763_br_0831		0.549		☑
kmp_s_1226r_0831	kmp_s_1226r_0831		0.549		☑
kmp_s_1290r_0831	kmp_s_1290r_0831		0.549		☑
kms_s_1233r_0831	kms_s_1233r_0831		0.549		☑
kms_s_1293r_0831	kms_s_1293r_0831		0.549		☑

7.207 Reaction r_0847

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphatidylinositol synthase

Notes GENE_ASSOCIATION:YPR113W

Reaction equation

$$\mathrm{s\_0485} + \mathrm{s\_1020} \xrightleftharpoons{\mathrm{s\_0090,\ s\_0485,\ s\_0511,\ s\_0763\_b,\ s\_1020}} \mathrm{s\_0090} + \mathrm{s\_0511} + 2\,\mathrm{s\_0763\_b} \quad (1112)$$

Reactants

Table 829: Properties of each reactant.

Id	Name	SBO
s_0485	CDP-diacylglycerol [intracellular]	
s_1020	myo-inositol [intracellular]	

Modifiers

Table 830: Properties of each modifier.

Id	Name	SBO
s_0090	1-phosphatidyl-1D-myo-inositol [intracellular]	
s_0485	CDP-diacylglycerol [intracellular]	
s_0511	CMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1020	myo-inositol [intracellular]	

Products

Table 831: Properties of each product.

Id	Name	SBO
s_0090	1-phosphatidyl-1D-myo-inositol [intracellular]	
s_0511	CMP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{207} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_207}\left(\mathrm{Keq\_r\_0847}, \mathrm{Vmax\_r\_0847}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0090r\_0847}, \mathrm{kmp\_s\_0511r\_0847}, \mathrm{kmp\_s\_0763\_br\_0847}, \mathrm{kms\_s\_0485r\_0847}, \mathrm{kms\_s\_1020r\_0847}, [\mathrm{s\_0090}], [\mathrm{s\_0485}], [\mathrm{s\_0511}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1020}]\right) \quad (1113)$$

$$\begin{aligned}&\text{function\_207}\left(\text{Keq\_r\_0847}, \text{Vmax\_r\_0847}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0090r\_0847}, \right.\\&\text{kmp\_s\_0511r\_0847}, \text{kmp\_s\_0763\_br\_0847}, \text{kms\_s\_0485r\_0847},\\&\left.\text{kms\_s\_1020r\_0847}, [\text{s\_0090}], [\text{s\_0485}], [\text{s\_0511}], [\text{s\_0763\_b}], [\text{s\_1020}]\right)\\&= \frac{\text{Vmax\_r\_0847} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0485r\_0847}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1020r\_0847}}\right)^{1} \cdot \left([\text{s\_0485}]^{1} \cdot [\text{s\_1020}]^{1} - \frac{[\text{s\_0090}]^{1} \cdot [\text{s\_0511}]^{1} \cdot [\text{s\_0763\_b}]^{2}}{\text{Keq\_r\_0847}}\right)}{\left(1+\frac{[\text{s\_0485}]}{\text{kms\_s\_0485r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_1020}]}{\text{kms\_s\_1020r\_0847}}\right) + \left(1+\frac{[\text{s\_0090}]}{\text{kmp\_s\_0090r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0847}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1114}$$

$$\begin{aligned}&\text{function\_207}\left(\text{Keq\_r\_0847}, \text{Vmax\_r\_0847}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0090r\_0847}, \right.\\&\text{kmp\_s\_0511r\_0847}, \text{kmp\_s\_0763\_br\_0847}, \text{kms\_s\_0485r\_0847},\\&\left.\text{kms\_s\_1020r\_0847}, [\text{s\_0090}], [\text{s\_0485}], [\text{s\_0511}], [\text{s\_0763\_b}], [\text{s\_1020}]\right)\\&= \frac{\text{Vmax\_r\_0847} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0485r\_0847}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1020r\_0847}}\right)^{1} \cdot \left([\text{s\_0485}]^{1} \cdot [\text{s\_1020}]^{1} - \frac{[\text{s\_0090}]^{1} \cdot [\text{s\_0511}]^{1} \cdot [\text{s\_0763\_b}]^{2}}{\text{Keq\_r\_0847}}\right)}{\left(1+\frac{[\text{s\_0485}]}{\text{kms\_s\_0485r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_1020}]}{\text{kms\_s\_1020r\_0847}}\right) + \left(1+\frac{[\text{s\_0090}]}{\text{kmp\_s\_0090r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0511}]}{\text{kmp\_s\_0511r\_0847}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0847}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1115}$$

Table 832: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0847	Keq_r_0847		0.332		☑
Vmax_r_0847	Vmax_r_0847		0.010		☑
kmp_s_0090r-_0847	kmp_s_0090r_0847		0.549		☑
kmp_s_0511r-_0847	kmp_s_0511r_0847		0.549		☑
kmp_s_0763-_br_0847	kmp_s_0763_br-_0847		0.549		☑
kms_s_0485r-_0847	kms_s_0485r_0847		0.549		☑
kms_s_1020r-_0847	kms_s_1020r_0847		0.549		☑

7.208 Reaction r_0850

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name phosphatidylserine decarboxylase

Notes GENE_ASSOCIATION:YNL169C or YGR170W or YGR170W

Reaction equation

$$\text{s\_1219} \xrightleftharpoons{\text{s\_0470, s\_1219, s\_1233}} \text{s\_0470} + \text{s\_1233} \tag{1116}$$

Reactant

Table 833: Properties of each reactant.

Id	Name	SBO
s_1219	phosphatidyl-L-serine [intracellular]	

Modifiers

Table 834: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_1219	phosphatidyl-L-serine [intracellular]	
s_1233	phosphatidylethanolamine [intracellular]	

Products

Table 835: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_1233	phosphatidylethanolamine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{208} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_208}(\mathrm{Keq\_r\_0850}, \mathrm{Vmax\_r\_0850}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0850}, \mathrm{kmp\_s\_1233r\_0850}, \mathrm{kms\_s\_1219r\_0850}, [\mathrm{s\_0470}], [\mathrm{s\_1219}], [\mathrm{s\_1233}]) \quad (1117)$$

$$\mathrm{function\_208}(\mathrm{Keq\_r\_0850}, \mathrm{Vmax\_r\_0850}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0850}, \mathrm{kmp\_s\_1233r\_0850}, \mathrm{kms\_s\_1219r\_0850}, [\mathrm{s\_0470}], [\mathrm{s\_1219}], [\mathrm{s\_1233}]) = \frac{\mathrm{Vmax\_r\_0850} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1219r\_0850}}\right)^{1} \cdot \left([\mathrm{s\_1219}]^{1} - \frac{[\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1233}]^{1}}{\mathrm{Keq\_r\_0850}}\right)}{1 + \frac{[\mathrm{s\_1219}]}{\mathrm{kms\_s\_1219r\_0850}} + \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0850}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1233}]}{\mathrm{kmp\_s\_1233r\_0850}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1118)$$

$$\begin{aligned}&\text{function\_208}(\text{Keq\_r\_0850}, \text{Vmax\_r\_0850}, \text{vol}(\text{intracellular}),\\&\text{kmp\_s\_0470r\_0850}, \text{kmp\_s\_1233r\_0850}, \text{kms\_s\_1219r\_0850}, [\text{s\_0470}], [\text{s\_1219}],\\&[\text{s\_1233}]) = \frac{\text{Vmax\_r\_0850} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1219r\_0850}}\right)^1 \cdot \left([\text{s\_1219}]^1 - \frac{[\text{s\_0470}]^1 \cdot [\text{s\_1233}]^1}{\text{Keq\_r\_0850}}\right)}{1+\frac{[\text{s\_1219}]}{\text{kms\_s\_1219r\_0850}} + \left(1+\frac{[\text{s\_0470}]}{\text{kmp\_s\_0470r\_0850}}\right) \cdot \left(1+\frac{[\text{s\_1233}]}{\text{kmp\_s\_1233r\_0850}}\right) - 1}}{\text{vol}(\text{intracellular})}\end{aligned} \tag{1119}$$

Table 836: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0850	Keq_r_0850		1.100		☑
Vmax_r_0850	Vmax_r_0850		0.011		☑
kmp_s_0470r-_0850	kmp_s_0470r_0850		1.000		☑
kmp_s_1233r-_0850	kmp_s_1233r_0850		0.549		☑
kms_s_1219r-_0850	kms_s_1219r_0850		0.549		☑

7.209 Reaction r_0853

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphatidylserine synthase

Notes GENE_ASSOCIATION:YER026C

Reaction equation

$$\text{s\_0485} + \text{s\_0943} \xrightleftharpoons{\text{s\_0485, s\_0511, s\_0763\_b, s\_0943, s\_1219}} \text{s\_0511} + 2\,\text{s\_0763\_b} + \text{s\_1219} \tag{1120}$$

Reactants

Table 837: Properties of each reactant.

Id	Name	SBO
s_0485	CDP-diacylglycerol [intracellular]	
s_0943	L-serine [intracellular]	

Modifiers

Table 838: Properties of each modifier.

Id	Name	SBO
s_0485	CDP-diacylglycerol [intracellular]	
s_0511	CMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0943	L-serine [intracellular]	
s_1219	phosphatidyl-L-serine [intracellular]	

Products

Table 839: Properties of each product.

Id	Name	SBO
s_0511	CMP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1219	phosphatidyl-L-serine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{209} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_209}(\mathrm{Keq\_r\_0853}, \mathrm{Vmax\_r\_0853}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0511r\_0853}, \mathrm{kmp\_s\_0763\_br\_0853}, \mathrm{kmp\_s\_1219r\_0853}, \mathrm{kms\_s\_0485r\_0853}, \mathrm{kms\_s\_0943r\_0853}, [\mathrm{s\_0485}], [\mathrm{s\_0511}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0943}], [\mathrm{s\_1219}]) \quad (1121)$$

$$\mathrm{function\_209}(\mathrm{Keq\_r\_0853}, \mathrm{Vmax\_r\_0853}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0511r\_0853}, \mathrm{kmp\_s\_0763\_br\_0853}, \mathrm{kmp\_s\_1219r\_0853}, \mathrm{kms\_s\_0485r\_0853}, \mathrm{kms\_s\_0943r\_0853}, [\mathrm{s\_0485}], [\mathrm{s\_0511}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0943}], [\mathrm{s\_1219}]) = \frac{\mathrm{Vmax\_r\_0853} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0485r\_0853}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0943r\_0853}}\right)^1 \cdot \left([\mathrm{s\_0485}]^1 \cdot [\mathrm{s\_0943}]^1 - \frac{[\mathrm{s\_0511}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1219}]^1}{\mathrm{Keq\_r\_0853}}\right)}{\left(1 + \frac{[\mathrm{s\_0485}]}{\mathrm{kms\_s\_0485r\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0853}}\right) + \left(1 + \frac{[\mathrm{s\_0511}]}{\mathrm{kmp\_s\_0511r\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1219}]}{\mathrm{kmp\_s\_1219r\_0853}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1122)$$

$$\mathrm{function\_209}(\mathrm{Keq\_r\_0853}, \mathrm{Vmax\_r\_0853}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0511r\_0853}, \mathrm{kmp\_s\_0763\_br\_0853}, \mathrm{kmp\_s\_1219r\_0853}, \mathrm{kms\_s\_0485r\_0853}, \mathrm{kms\_s\_0943r\_0853}, [\mathrm{s\_0485}], [\mathrm{s\_0511}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0943}], [\mathrm{s\_1219}]) = \frac{\mathrm{Vmax\_r\_0853} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0485r\_0853}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0943r\_0853}}\right)^1 \cdot \left([\mathrm{s\_0485}]^1 \cdot [\mathrm{s\_0943}]^1 - \frac{[\mathrm{s\_0511}]^1 \cdot [\mathrm{s\_0763\_b}]^2 \cdot [\mathrm{s\_1219}]^1}{\mathrm{Keq\_r\_0853}}\right)}{\left(1 + \frac{[\mathrm{s\_0485}]}{\mathrm{kms\_s\_0485r\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0853}}\right) + \left(1 + \frac{[\mathrm{s\_0511}]}{\mathrm{kmp\_s\_0511r\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0853}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1219}]}{\mathrm{kmp\_s\_1219r\_0853}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1123)$$

Table 840: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0853	Keq_r_0853		0.332		☑
Vmax_r_0853	Vmax_r_0853		0.027		☑
kmp_s_0511r-_0853	kmp_s_0511r_0853		0.549		☑
kmp_s_0763-_br_0853	kmp_s_0763_br-_0853		0.549		☑
kmp_s_1219r-_0853	kmp_s_1219r_0853		0.549		☑
kms_s_0485r-_0853	kms_s_0485r_0853		0.549		☑
kms_s_0943r-_0853	kms_s_0943r_0853		0.549		☑

7.210 Reaction r_0856

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name phosphoadenylyl-sulfate reductase (thioredoxin)

Notes GENE_ASSOCIATION:((YGR209C and YPR167C) or (YLR043C and YPR167C))

Reaction equation

$$\text{s\_0206} + \text{s\_1521} \xrightleftharpoons{\text{s\_0206, s\_0397, s\_0763\_b, s\_1349, s\_1517, s\_1521}} \text{s\_0397} + 2\,\text{s\_0763\_b} + \text{s\_1349} + \text{s\_1517} \tag{1124}$$

Reactants

Table 841: Properties of each reactant.

Id	Name	SBO
s_0206	3'-phospho-5'-adenylyl sulfate [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Modifiers

Table 842: Properties of each modifier.

Id	Name	SBO
s_0206	3'-phospho-5'-adenylyl sulfate [intracellular]	
s_0397	adenosine 3',5'-bismonophosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1349	sulphite [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 843: Properties of each product.

Id	Name	SBO
s_0397	adenosine 3',5'-bismonophosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1349	sulphite [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{210} = & \text{vol}(\text{intracellular}) \\ & \cdot \text{function\_210}(\text{Keq\_r\_0856}, \text{Vmax\_r\_0856}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0397r\_0856}, \\ & \text{kmp\_s\_0763\_br\_0856}, \text{kmp\_s\_1349r\_0856}, \text{kmp\_s\_1517r\_0856}, \text{kms\_s\_0206r\_0856}, \\ & \text{kms\_s\_1521r\_0856}, [\text{s\_0206}], [\text{s\_0397}], [\text{s\_0763\_b}], [\text{s\_1349}], [\text{s\_1517}], [\text{s\_1521}]) \end{aligned} \tag{1125}$$

$$\begin{aligned} & \text{function\_210}(\text{Keq\_r\_0856}, \text{Vmax\_r\_0856}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0397r\_0856}, \\ & \text{kmp\_s\_0763\_br\_0856}, \text{kmp\_s\_1349r\_0856}, \text{kmp\_s\_1517r\_0856}, \text{kms\_s\_0206r\_0856}, \\ & \text{kms\_s\_1521r\_0856}, [\text{s\_0206}], [\text{s\_0397}], [\text{s\_0763\_b}], [\text{s\_1349}], [\text{s\_1517}], [\text{s\_1521}]) \\ & = \frac{\text{Vmax\_r\_0856} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0206r\_0856}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0856}}\right)^1 \cdot \left([\text{s\_0206}]^1 \cdot [\text{s\_1521}]^1 - \frac{[\text{s\_0397}]^1 \cdot [\text{s\_0763\_b}]^2 \cdot [\text{s\_1349}]^1 \cdot [\text{s\_1517}]^1}{\text{Keq\_r\_0856}}\right)}{\left(1 + \frac{[\text{s\_0206}]}{\text{kms\_s\_0206r\_0856}}\right) \cdot \left(1 + \frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0856}}\right) + \left(1 + \frac{[\text{s\_0397}]}{\text{kmp\_s\_0397r\_0856}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0856}}\right) \cdot \left(1 + \frac{[\text{s\_1349}]}{\text{kmp\_s\_1349r\_0856}}\right) \cdot \left(1 + \frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0856}}\right) -}}{\text{vol}(\text{intracellular})} \end{aligned} \tag{1126}$$

$$\begin{aligned}&\text{function\_210}\left(\text{Keq\_r\_0856}, \text{Vmax\_r\_0856}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0397r\_0856},\right.\\&\text{kmp\_s\_0763\_br\_0856}, \text{kmp\_s\_1349r\_0856}, \text{kmp\_s\_1517r\_0856}, \text{kms\_s\_0206r\_0856},\\&\left.\text{kms\_s\_1521r\_0856}, [\text{s\_0206}], [\text{s\_0397}], [\text{s\_0763\_b}], [\text{s\_1349}], [\text{s\_1517}], [\text{s\_1521}]\right)\\&= \frac{\text{Vmax\_r\_0856} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0206r\_0856}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1521r\_0856}}\right)^{1} \cdot \left([\text{s\_0206}]^{1} \cdot [\text{s\_1521}]^{1} - \frac{[\text{s\_0397}]^{1} \cdot [\text{s\_0763\_b}]^{2} \cdot [\text{s\_1349}]^{1} \cdot [\text{s\_1517}]^{1}}{\text{Keq\_r\_0856}}\right)}{\left(1+\frac{[\text{s\_0206}]}{\text{kms\_s\_0206r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kms\_s\_1521r\_0856}}\right) + \left(1+\frac{[\text{s\_0397}]}{\text{kmp\_s\_0397r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1349}]}{\text{kmp\_s\_1349r\_0856}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kmp\_s\_1517r\_0856}}\right) \cdot}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1127}$$

Table 844: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0856`	Keq_r_0856		0.182		☑
`Vmax_r_0856`	Vmax_r_0856		1.078		☑
`kmp_s_0397r_0856`	kmp_s_0397r_0856		0.549		☑
`kmp_s_0763_br_0856`	kmp_s_0763_br_0856		0.549		☑
`kmp_s_1349r_0856`	kmp_s_1349r_0856		0.549		☑
`kmp_s_1517r_0856`	kmp_s_1517r_0856		0.549		☑
`kms_s_0206r_0856`	kms_s_0206r_0856		0.549		☑
`kms_s_1521r_0856`	kms_s_1521r_0856		0.549		☑

7.211 Reaction `r_0859`

This is a reversible reaction of two reactants forming three products influenced by six modifiers.

Name phosphofructokinase

Notes GENE_ASSOCIATION:(YGR240C and YMR205C)

Reaction equation

$$\text{s\_0446} + \text{s\_0539} \xrightleftharpoons{\text{s\_0446, s\_0446, s\_0539, s\_0400, s\_0537, s\_0763\_b}} \text{s\_0400} + \text{s\_0537} + \text{s\_0763\_b} \tag{1128}$$

Reactants

Table 845: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	

Modifiers

Table 846: Properties of each modifier.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0446	ATP [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	
s_0400	ADP [intracellular]	
s_0537	D-fructose 1,6-bisphosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 847: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0537	D-fructose 1,6-bisphosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{211} = & \operatorname{vol}(\mathrm{intracellular}) \\
& \cdot \mathrm{function\_211}(\mathrm{Vmax\_r\_0859}, \mathrm{kms\_s\_0446r\_0859}, \mathrm{kms\_s\_0539r\_0859}, [\mathrm{s\_0446}], [\mathrm{s\_0539}], \\
& [\mathrm{s\_0400}], [\mathrm{s\_0537}], [\mathrm{s\_0763\_b}], \mathrm{Keq\_r\_0859}, \mathrm{kmp\_s\_0400r\_0859}, \mathrm{kmp\_s\_0537r\_0859}, \\
& \mathrm{kmp\_s\_0763\_br\_0859}, [\mathrm{s\_0446}], \mathrm{kmI\_s\_0446mr\_0859}, \operatorname{vol}(\mathrm{intracellular}))
\end{aligned}
\tag{1129}
$$

$$\begin{aligned}&\text{function\_211}\left(\text{Vmax\_r\_0859}, \text{kms\_s\_0446r\_0859}, \text{kms\_s\_0539r\_0859}, [\text{s\_0446}], [\text{s\_0539}],\right.\\&[\text{s\_0400}], [\text{s\_0537}], [\text{s\_0763\_b}], \text{Keq\_r\_0859}, \text{kmp\_s\_0400r\_0859}, \text{kmp\_s\_0537r\_0859},\\&\left.\text{kmp\_s\_0763\_br\_0859}, \text{s\_0446m}, \text{kmI\_s\_0446mr\_0859}, \text{vol}\left(\text{intracellular}\right)\right)\\&= \frac{\text{Vmax\_r\_0859} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0859}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0539r\_0859}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0539}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0537}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0859}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0539}]}{\text{kms\_s\_0539r\_0859}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0537}]}{\text{kmp\_s\_0537r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0859}}\right) + \left(1+\frac{\text{s\_0446m}}{\text{kmI\_s\_0446mr\_0859}}\right.}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1130}$$

$$\begin{aligned}&\text{function\_211}\left(\text{Vmax\_r\_0859}, \text{kms\_s\_0446r\_0859}, \text{kms\_s\_0539r\_0859}, [\text{s\_0446}], [\text{s\_0539}],\right.\\&[\text{s\_0400}], [\text{s\_0537}], [\text{s\_0763\_b}], \text{Keq\_r\_0859}, \text{kmp\_s\_0400r\_0859}, \text{kmp\_s\_0537r\_0859},\\&\left.\text{kmp\_s\_0763\_br\_0859}, \text{s\_0446m}, \text{kmI\_s\_0446mr\_0859}, \text{vol}\left(\text{intracellular}\right)\right)\\&= \frac{\text{Vmax\_r\_0859} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0859}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0539r\_0859}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0539}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_0537}]^{1} \cdot [\text{s\_0763\_b}]^{1}}{\text{Keq\_r\_0859}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0539}]}{\text{kms\_s\_0539r\_0859}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0537}]}{\text{kmp\_s\_0537r\_0859}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0859}}\right) + \left(1+\frac{\text{s\_0446m}}{\text{kmI\_s\_0446mr\_0859}}\right.}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1131}$$

Table 848: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0859	Vmax_r_0859		84.347		☑
kms_s_0446r-_0859	kms_s_0446r_0859		1.092		☑
kms_s_0539r-_0859	kms_s_0539r_0859		0.105		☑
Keq_r_0859	Keq_r_0859		12.209		☑
kmp_s_0400r-_0859	kmp_s_0400r_0859		1.719		☑
kmp_s_0537r-_0859	kmp_s_0537r_0859		1.343		☑
kmp_s_0763-_br_0859	kmp_s_0763_br-_0859		0.549		☑
kmI_s-_0446mr_0859	kmI_s_0446mr-_0859		4.000		☑
intracellular	intracellular		1.000		☑

7.212 Reaction r_0861

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name phosphoglucomutase

Notes GENE_ASSOCIATION:(YKL127W or YMR105C)

Reaction equation

$$s\_0410 \xrightleftharpoons{s\_0410,\ s\_0549} s\_0549 \tag{1132}$$

Reactant

Table 849: Properties of each reactant.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	

Modifiers

Table 850: Properties of each modifier.

Id	Name	SBO
s_0410	aldehydo-D-glucose 6-phosphate [intracellular]	
s_0549	D-glucose 1-phosphate [intracellular]	

Product

Table 851: Properties of each product.

Id	Name	SBO
s_0549	D-glucose 1-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{212} = \text{vol}(\text{intracellular}) \cdot \text{function\_212}(\text{Keq\_r\_0861}, \text{Vmax\_r\_0861}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0549r\_0861}, \text{kms\_s\_0410r\_0861}, [\text{s\_0410}], [\text{s\_0549}]) \tag{1133}$$

$$\text{function\_212}(\text{Keq\_r\_0861}, \text{Vmax\_r\_0861}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0549r\_0861}, \text{kms\_s\_0410r\_0861}, [\text{s\_0410}], [\text{s\_0549}]) = \frac{\text{Vmax\_r\_0861} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0410r\_0861}}\right)^{1} \cdot \left([\text{s\_0410}]^{1} - \frac{[\text{s\_0549}]^{1}}{\text{Keq\_r\_0861}}\right)}{1 + \frac{[\text{s\_0410}]}{\text{kms\_s\_0410r\_0861}} + 1 + \frac{[\text{s\_0549}]}{\text{kmp\_s\_0549r\_0861}} - 1}}{\text{vol}(\text{intracellular})} \tag{1134}$$

$$\text{function\_212}\left(\text{Keq\_r\_0861}, \text{Vmax\_r\_0861}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0549r\_0861}, \text{kms\_s\_0410r\_0861}, [\text{s\_0410}], [\text{s\_0549}]\right) = \frac{\text{Vmax\_r\_0861} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0410r\_0861}}\right)^{1} \cdot \left([\text{s\_0410}]^{1} - \frac{[\text{s\_0549}]^{1}}{\text{Keq\_r\_0861}}\right)}{1+\frac{[\text{s\_0410}]}{\text{kms\_s\_0410r\_0861}}+1+\frac{[\text{s\_0549}]}{\text{kmp\_s\_0549r\_0861}}-1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1135}$$

Table 852: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0861	Keq_r_0861		1.100		☑
Vmax_r_0861	Vmax_r_0861		3.072		☑
kmp_s_0549r-_0861	kmp_s_0549r_0861		0.549		☑
kms_s_0410r-_0861	kms_s_0410r_0861		0.549		☑

7.213 Reaction r_0865

This is a reversible reaction of two reactants forming two products influenced by five modifiers.

Name phosphoglycerate kinase

Notes GENE_ASSOCIATION:YCR012W

Reaction equation

$$\text{s\_0265} + \text{s\_0400} \xrightleftharpoons{\text{s\_0446, s\_0265, s\_0400, s\_0264, s\_0446}} \text{s\_0264} + \text{s\_0446} \tag{1136}$$

Reactants

Table 853: Properties of each reactant.

Id	Name	SBO
s_0265	3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]	
s_0400	ADP [intracellular]	

Modifiers

Table 854: Properties of each modifier.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0265	3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]	
s_0400	ADP [intracellular]	
s_0264	3-phospho-D-glyceric acid [intracellular]	
s_0446	ATP [intracellular]	

Products

Table 855: Properties of each product.

Id	Name	SBO
s_0264	3-phospho-D-glyceric acid [intracellular]	
s_0446	ATP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{213} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_213}\left(\mathrm{Vmax\_r\_0865}, \mathrm{kms\_s\_0265r\_0865}, \mathrm{kms\_s\_0400r\_0865}, \left[\mathrm{s\_0265}\right], \left[\mathrm{s\_0400}\right], \left[\mathrm{s\_0264}\right], \left[\mathrm{s\_0446}\right], \mathrm{Keq\_r\_0865}, \mathrm{kmp\_s\_0264r\_0865}, \mathrm{kmp\_s\_0446r\_0865}, \left[\mathrm{s\_0446}\right], \mathrm{kmI\_s\_0446mr\_0865}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) \tag{1137}$$

$$\mathrm{function\_213}\left(\mathrm{Vmax\_r\_0865}, \mathrm{kms\_s\_0265r\_0865}, \mathrm{kms\_s\_0400r\_0865}, \left[\mathrm{s\_0265}\right], \left[\mathrm{s\_0400}\right], \left[\mathrm{s\_0264}\right], \left[\mathrm{s\_0446}\right], \mathrm{Keq\_r\_0865}, \mathrm{kmp\_s\_0264r\_0865}, \mathrm{kmp\_s\_0446r\_0865}, \mathrm{s\_0446m}, \mathrm{kmI\_s\_0446mr\_0865}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) = \frac{\mathrm{Vmax\_r\_0865} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0265r\_0865}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0400r\_0865}}\right)^{1} \cdot \left(\left[\mathrm{s\_0265}\right]^{1} \cdot \left[\mathrm{s\_0400}\right]^{1} - \frac{\left[\mathrm{s\_0264}\right]^{1} \cdot \left[\mathrm{s\_0446}\right]^{1}}{\mathrm{Keq\_r\_0865}}\right)}{\left(1 + \frac{\left[\mathrm{s\_0265}\right]}{\mathrm{kms\_s\_0265r\_0865}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0400}\right]}{\mathrm{kms\_s\_0400r\_0865}}\right) + \left(1 + \frac{\left[\mathrm{s\_0264}\right]}{\mathrm{kmp\_s\_0264r\_0865}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0446}\right]}{\mathrm{kmp\_s\_0446r\_0865}}\right) + 1 + \frac{\mathrm{s\_0446m}}{\mathrm{kmI\_s\_0446mr\_0865}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1138}$$

$$\mathrm{function\_213}\left(\mathrm{Vmax\_r\_0865}, \mathrm{kms\_s\_0265r\_0865}, \mathrm{kms\_s\_0400r\_0865}, \left[\mathrm{s\_0265}\right], \left[\mathrm{s\_0400}\right], \left[\mathrm{s\_0264}\right], \left[\mathrm{s\_0446}\right], \mathrm{Keq\_r\_0865}, \mathrm{kmp\_s\_0264r\_0865}, \mathrm{kmp\_s\_0446r\_0865}, \mathrm{s\_0446m}, \mathrm{kmI\_s\_0446mr\_0865}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) = \frac{\mathrm{Vmax\_r\_0865} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0265r\_0865}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0400r\_0865}}\right)^{1} \cdot \left(\left[\mathrm{s\_0265}\right]^{1} \cdot \left[\mathrm{s\_0400}\right]^{1} - \frac{\left[\mathrm{s\_0264}\right]^{1} \cdot \left[\mathrm{s\_0446}\right]^{1}}{\mathrm{Keq\_r\_0865}}\right)}{\left(1 + \frac{\left[\mathrm{s\_0265}\right]}{\mathrm{kms\_s\_0265r\_0865}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0400}\right]}{\mathrm{kms\_s\_0400r\_0865}}\right) + \left(1 + \frac{\left[\mathrm{s\_0264}\right]}{\mathrm{kmp\_s\_0264r\_0865}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0446}\right]}{\mathrm{kmp\_s\_0446r\_0865}}\right) + 1 + \frac{\mathrm{s\_0446m}}{\mathrm{kmI\_s\_0446mr\_0865}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1139}$$

Table 856: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0865	Vmax_r_0865		136.563		☑
kms_s_0265r-_0865	kms_s_0265r_0865		$1.08759 \cdot 10^{-4}$		☑
kms_s_0400r-_0865	kms_s_0400r_0865		1.719		☑
Keq_r_0865	Keq_r_0865		2334.850		☑
kmp_s_0264r-_0865	kmp_s_0264r_0865		0.363		☑
kmp_s_0446r-_0865	kmp_s_0446r_0865		1.092		☑
kmI_s-_0446mr_0865	kmI_s_0446mr-_0865		0.525		☑
intracellular	intracellular		1.000		☑

7.214 Reaction r_0866

This is a reversible reaction of one reactant forming one product influenced by three modifiers.

Name phosphoglycerate mutase

Notes GENE_ASSOCIATION:YKL152C

Reaction equation

$$\mathrm{s\_0264} \xrightleftharpoons{\mathrm{s\_0193,\ s\_0264,\ s\_0193}} \mathrm{s\_0193} \tag{1140}$$

Reactant

Table 857: Properties of each reactant.

Id	Name	SBO
s_0264	3-phospho-D-glyceric acid [intracellular]	

Modifiers

Table 858: Properties of each modifier.

Id	Name	SBO
s_0193	2-phospho-D-glyceric acid [intracellular]	

Id	Name	SBO
s_0264	3-phospho-D-glyceric acid [intracellular]	
s_0193	2-phospho-D-glyceric acid [intracellular]	

Product

Table 859: Properties of each product.

Id	Name	SBO
s_0193	2-phospho-D-glyceric acid [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{214} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_214}(\mathrm{Vmax\_r\_0866}, \mathrm{kms\_s\_0264r\_0866}, [\mathrm{s\_0264}], [\mathrm{s\_0193}], \mathrm{Keq\_r\_0866}, \mathrm{kmp\_s\_0193r\_0866}, [\mathrm{s\_0193}], \mathrm{kmI\_s\_0193mr\_0866}, \mathrm{vol}(\mathrm{intracellular})) \tag{1141}$$

$$\mathrm{function\_214}(\mathrm{Vmax\_r\_0866}, \mathrm{kms\_s\_0264r\_0866}, [\mathrm{s\_0264}], [\mathrm{s\_0193}], \mathrm{Keq\_r\_0866}, \mathrm{kmp\_s\_0193r\_0866}, \mathrm{s\_0193m}, \mathrm{kmI\_s\_0193mr\_0866}, \mathrm{vol}(\mathrm{intracellular})) = \frac{\mathrm{Vmax\_r\_0866} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0264r\_0866}}\right)^{1} \cdot \left([\mathrm{s\_0264}]^{1} - \frac{[\mathrm{s\_0193}]^{1}}{\mathrm{Keq\_r\_0866}}\right)}{1 + \frac{[\mathrm{s\_0264}]}{\mathrm{kms\_s\_0264r\_0866}} + 1 + \frac{[\mathrm{s\_0193}]}{\mathrm{kmp\_s\_0193r\_0866}} + 1 + \frac{\mathrm{s\_0193m}}{\mathrm{kmI\_s\_0193mr\_0866}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1142}$$

$$\mathrm{function\_214}(\mathrm{Vmax\_r\_0866}, \mathrm{kms\_s\_0264r\_0866}, [\mathrm{s\_0264}], [\mathrm{s\_0193}], \mathrm{Keq\_r\_0866}, \mathrm{kmp\_s\_0193r\_0866}, \mathrm{s\_0193m}, \mathrm{kmI\_s\_0193mr\_0866}, \mathrm{vol}(\mathrm{intracellular})) = \frac{\mathrm{Vmax\_r\_0866} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0264r\_0866}}\right)^{1} \cdot \left([\mathrm{s\_0264}]^{1} - \frac{[\mathrm{s\_0193}]^{1}}{\mathrm{Keq\_r\_0866}}\right)}{1 + \frac{[\mathrm{s\_0264}]}{\mathrm{kms\_s\_0264r\_0866}} + 1 + \frac{[\mathrm{s\_0193}]}{\mathrm{kmp\_s\_0193r\_0866}} + 1 + \frac{\mathrm{s\_0193m}}{\mathrm{kmI\_s\_0193mr\_0866}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1143}$$

Table 860: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0866	Vmax_r_0866		5.115		☑
kms_s_0264r-_0866	kms_s_0264r_0866		0.363		☑
Keq_r_0866	Keq_r_0866		6.700		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0193r-_0866	kmp_s_0193r_0866		0.052		☑
kmI_s-_0193mr_0866	kmI_s_0193mr-_0866		0.800		☑

7.215 Reaction r_0873

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phospholipid methyltransferase

Notes GENE_ASSOCIATION:YJR073C

Reaction equation

$$\text{s\_1225} + \text{s\_1293} \xrightleftharpoons{\text{s\_1225, s\_1228, s\_1290, s\_1293}} \text{s\_1228} + \text{s\_1290} \tag{1144}$$

Reactants

Table 861: Properties of each reactant.

Id	Name	SBO
s_1225	phosphatidyl-N,N-dimethylethanolamine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Modifiers

Table 862: Properties of each modifier.

Id	Name	SBO
s_1225	phosphatidyl-N,N-dimethylethanolamine [intracellular]	
s_1228	phosphatidylcholine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Products

Table 863: Properties of each product.

Id	Name	SBO
s_1228	phosphatidylcholine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{215} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_215}\left(\mathrm{Keq\_r\_0873}, \mathrm{Vmax\_r\_0873}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1228r\_0873}, \mathrm{kmp\_s\_1290r\_0873}, \mathrm{kms\_s\_1225r\_0873}, \mathrm{kms\_s\_1293r\_0873}, [\mathrm{s\_1225}], [\mathrm{s\_1228}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]\right) \quad (1145)$$

$$\mathrm{function\_215}\left(\mathrm{Keq\_r\_0873}, \mathrm{Vmax\_r\_0873}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1228r\_0873}, \mathrm{kmp\_s\_1290r\_0873}, \mathrm{kms\_s\_1225r\_0873}, \mathrm{kms\_s\_1293r\_0873}, [\mathrm{s\_1225}], [\mathrm{s\_1228}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]\right) = \frac{\mathrm{Vmax\_r\_0873} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1225r\_0873}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1293r\_0873}}\right)^{1} \cdot \left([\mathrm{s\_1225}]^{1} \cdot [\mathrm{s\_1293}]^{1} - \frac{[\mathrm{s\_1228}]^{1} \cdot [\mathrm{s\_1290}]^{1}}{\mathrm{Keq\_r\_0873}}\right)}{\left(1+\frac{[\mathrm{s\_1225}]}{\mathrm{kms\_s\_1225r\_0873}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0873}}\right) + \left(1+\frac{[\mathrm{s\_1228}]}{\mathrm{kmp\_s\_1228r\_0873}}\right) \cdot \left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0873}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1146)$$

$$\mathrm{function\_215}\left(\mathrm{Keq\_r\_0873}, \mathrm{Vmax\_r\_0873}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1228r\_0873}, \mathrm{kmp\_s\_1290r\_0873}, \mathrm{kms\_s\_1225r\_0873}, \mathrm{kms\_s\_1293r\_0873}, [\mathrm{s\_1225}], [\mathrm{s\_1228}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]\right) = \frac{\mathrm{Vmax\_r\_0873} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1225r\_0873}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1293r\_0873}}\right)^{1} \cdot \left([\mathrm{s\_1225}]^{1} \cdot [\mathrm{s\_1293}]^{1} - \frac{[\mathrm{s\_1228}]^{1} \cdot [\mathrm{s\_1290}]^{1}}{\mathrm{Keq\_r\_0873}}\right)}{\left(1+\frac{[\mathrm{s\_1225}]}{\mathrm{kms\_s\_1225r\_0873}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0873}}\right) + \left(1+\frac{[\mathrm{s\_1228}]}{\mathrm{kmp\_s\_1228r\_0873}}\right) \cdot \left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0873}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1147)$$

Table 864: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0873	Keq_r_0873		1.100		☑
Vmax_r_0873	Vmax_r_0873		0.012		☑
kmp_s_1228r-_0873	kmp_s_1228r_0873		0.549		☑
kmp_s_1290r-_0873	kmp_s_1290r_0873		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_1225r-_0873	kms_s_1225r_0873		0.549		☑
kms_s_1293r-_0873	kms_s_1293r_0873		0.549		☑

7.216 Reaction r_0874

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phospholipid methyltransferase_2

Notes GENE_ASSOCIATION:YJR073C

Reaction equation

$$s\_1226 + s\_1293 \xrightleftharpoons{s\_0763\_b,\ s\_1225,\ s\_1226,\ s\_1290,\ s\_1293} s\_0763\_b + s\_1225 + s\_1290 \quad (1148)$$

Reactants

Table 865: Properties of each reactant.

Id	Name	SBO
s_1226	phosphatidyl-N-methylethanolamine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Modifiers

Table 866: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1225	phosphatidyl-N,N-dimethylethanolamine [intracellular]	
s_1226	phosphatidyl-N-methylethanolamine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	

Products

Table 867: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1225	phosphatidyl-N,N-dimethylethanolamine [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{216} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_216}(\mathrm{Keq\_r\_0874}, \mathrm{Vmax\_r\_0874}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0874}, \mathrm{kmp\_s\_1225r\_0874}, \mathrm{kmp\_s\_1290r\_0874}, \mathrm{kms\_s\_1226r\_0874}, \mathrm{kms\_s\_1293r\_0874}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1225}], [\mathrm{s\_1226}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]) \quad (1149)$$

$$\mathrm{function\_216}(\mathrm{Keq\_r\_0874}, \mathrm{Vmax\_r\_0874}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0874}, \mathrm{kmp\_s\_1225r\_0874}, \mathrm{kmp\_s\_1290r\_0874}, \mathrm{kms\_s\_1226r\_0874}, \mathrm{kms\_s\_1293r\_0874}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1225}], [\mathrm{s\_1226}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]) = \frac{\mathrm{Vmax\_r\_0874} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1226r\_0874}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1293r\_0874}}\right)^1 \cdot \left([\mathrm{s\_1226}]^1 \cdot [\mathrm{s\_1293}]^1 - \frac{[\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1225}]^1 \cdot [\mathrm{s\_1290}]^1}{\mathrm{Keq\_r\_0874}}\right)}{\left(1+\frac{[\mathrm{s\_1226}]}{\mathrm{kms\_s\_1226r\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0874}}\right) + \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1225}]}{\mathrm{kmp\_s\_1225r\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0874}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1150)$$

$$\mathrm{function\_216}(\mathrm{Keq\_r\_0874}, \mathrm{Vmax\_r\_0874}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0763\_br\_0874}, \mathrm{kmp\_s\_1225r\_0874}, \mathrm{kmp\_s\_1290r\_0874}, \mathrm{kms\_s\_1226r\_0874}, \mathrm{kms\_s\_1293r\_0874}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1225}], [\mathrm{s\_1226}], [\mathrm{s\_1290}], [\mathrm{s\_1293}]) = \frac{\mathrm{Vmax\_r\_0874} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1226r\_0874}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1293r\_0874}}\right)^1 \cdot \left([\mathrm{s\_1226}]^1 \cdot [\mathrm{s\_1293}]^1 - \frac{[\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1225}]^1 \cdot [\mathrm{s\_1290}]^1}{\mathrm{Keq\_r\_0874}}\right)}{\left(1+\frac{[\mathrm{s\_1226}]}{\mathrm{kms\_s\_1226r\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0874}}\right) + \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1225}]}{\mathrm{kmp\_s\_1225r\_0874}}\right) \cdot \left(1+\frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0874}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1151)$$

Table 868: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0874	Keq_r_0874		0.604		☑
Vmax_r_0874	Vmax_r_0874		0.019		☑
kmp_s_0763-_br_0874	kmp_s_0763_br-_0874		0.549		☑
kmp_s_1225r-_0874	kmp_s_1225r_0874		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1290r-_0874	kmp_s_1290r_0874		0.549		☑
kms_s_1226r-_0874	kms_s_1226r_0874		0.549		☑
kms_s_1293r-_0874	kms_s_1293r_0874		0.549		☑

7.217 Reaction r_0875

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name phosphomannomutase

Notes GENE_ASSOCIATION:YFL045C

Reaction equation

$$\text{s\_0554} \xrightleftharpoons{\text{s\_0553, s\_0554}} \text{s\_0553} \tag{1152}$$

Reactant

Table 869: Properties of each reactant.

Id	Name	SBO
s_0554	D-mannose 6-phosphate [intracellular]	

Modifiers

Table 870: Properties of each modifier.

Id	Name	SBO
s_0553	D-mannose 1-phosphate [intracellular]	
s_0554	D-mannose 6-phosphate [intracellular]	

Product

Table 871: Properties of each product.

Id	Name	SBO
s_0553	D-mannose 1-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{217} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_217}(\mathrm{Keq\_r\_0875}, \mathrm{Vmax\_r\_0875}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0553r\_0875}, \mathrm{kms\_s\_0554r\_0875}, [\mathrm{s\_0553}], [\mathrm{s\_0554}]) \quad (1153)$$

$$\mathrm{function\_217}(\mathrm{Keq\_r\_0875}, \mathrm{Vmax\_r\_0875}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0553r\_0875}, \mathrm{kms\_s\_0554r\_0875}, [\mathrm{s\_0553}], [\mathrm{s\_0554}]) = \frac{\mathrm{Vmax\_r\_0875} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0554r\_0875}}\right)^{1} \cdot \left([\mathrm{s\_0554}]^{1} - \frac{[\mathrm{s\_0553}]^{1}}{\mathrm{Keq\_r\_0875}}\right)}{1 + \frac{[\mathrm{s\_0554}]}{\mathrm{kms\_s\_0554r\_0875}} + 1 + \frac{[\mathrm{s\_0553}]}{\mathrm{kmp\_s\_0553r\_0875}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1154)$$

$$\mathrm{function\_217}(\mathrm{Keq\_r\_0875}, \mathrm{Vmax\_r\_0875}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0553r\_0875}, \mathrm{kms\_s\_0554r\_0875}, [\mathrm{s\_0553}], [\mathrm{s\_0554}]) = \frac{\mathrm{Vmax\_r\_0875} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0554r\_0875}}\right)^{1} \cdot \left([\mathrm{s\_0554}]^{1} - \frac{[\mathrm{s\_0553}]^{1}}{\mathrm{Keq\_r\_0875}}\right)}{1 + \frac{[\mathrm{s\_0554}]}{\mathrm{kms\_s\_0554r\_0875}} + 1 + \frac{[\mathrm{s\_0553}]}{\mathrm{kmp\_s\_0553r\_0875}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1155)$$

Table 872: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0875`	Keq_r_0875		1.100		☑
`Vmax_r_0875`	Vmax_r_0875		1.505		☑
`kmp_s_0553r-_0875`	kmp_s_0553r_0875		0.549		☑
`kms_s_0554r-_0875`	kms_s_0554r_0875		0.549		☑

7.218 Reaction `r_0877`

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phosphomevalonate kinase

Notes GENE_ASSOCIATION:YMR220W

Reaction equation

$$\mathrm{s\_0022} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0021,\ s\_0022,\ s\_0400,\ s\_0446}} \mathrm{s\_0021} + \mathrm{s\_0400} \quad (1156)$$

Reactants

Table 873: Properties of each reactant.

Id	Name	SBO
s_0022	(R)-5-phosphomevalonic acid [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 874: Properties of each modifier.

Id	Name	SBO
s_0021	(R)-5-diphosphomevalonic acid [intracellular]	
s_0022	(R)-5-phosphomevalonic acid [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	

Products

Table 875: Properties of each product.

Id	Name	SBO
s_0021	(R)-5-diphosphomevalonic acid [intracellular]	
s_0400	ADP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{218} = \mathrm{vol}\,(\mathrm{intracellular}) \cdot \mathrm{function\_218}\,(\mathrm{Keq\_r\_0877}, \mathrm{Vmax\_r\_0877}, \mathrm{vol}\,(\mathrm{intracellular}), \mathrm{kmp\_s\_0021r\_0877}, \mathrm{kmp\_s\_0400r\_0877}, \mathrm{kms\_s\_0022r\_0877}, \mathrm{kms\_s\_0446r\_0877}, [\mathrm{s\_0021}], [\mathrm{s\_0022}], [\mathrm{s\_0400}], [\mathrm{s\_0446}]) \quad (1157)$$

$$\begin{aligned}&\text{function\_218}\left(\text{Keq\_r\_0877}, \text{Vmax\_r\_0877}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad \text{kmp\_s\_0021r\_0877}, \text{kmp\_s\_0400r\_0877}, \text{kms\_s\_0022r\_0877},\\&\quad\quad \left.\text{kms\_s\_0446r\_0877}, [\text{s\_0021}], [\text{s\_0022}], [\text{s\_0400}], [\text{s\_0446}]\right)\\&= \frac{\text{Vmax\_r\_0877} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0022r\_0877}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0877}}\right)^{1} \cdot \left([\text{s\_0022}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0021}]^{1} \cdot [\text{s\_0400}]^{1}}{\text{Keq\_r\_0877}}\right)}{\left(1 + \frac{[\text{s\_0022}]}{\text{kms\_s\_0022r\_0877}}\right) \cdot \left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0877}}\right) + \left(1 + \frac{[\text{s\_0021}]}{\text{kmp\_s\_0021r\_0877}}\right) \cdot \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0877}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1158}$$

$$\begin{aligned}&\text{function\_218}\left(\text{Keq\_r\_0877}, \text{Vmax\_r\_0877}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad \text{kmp\_s\_0021r\_0877}, \text{kmp\_s\_0400r\_0877}, \text{kms\_s\_0022r\_0877},\\&\quad\quad \left.\text{kms\_s\_0446r\_0877}, [\text{s\_0021}], [\text{s\_0022}], [\text{s\_0400}], [\text{s\_0446}]\right)\\&= \frac{\text{Vmax\_r\_0877} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0022r\_0877}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0446r\_0877}}\right)^{1} \cdot \left([\text{s\_0022}]^{1} \cdot [\text{s\_0446}]^{1} - \frac{[\text{s\_0021}]^{1} \cdot [\text{s\_0400}]^{1}}{\text{Keq\_r\_0877}}\right)}{\left(1 + \frac{[\text{s\_0022}]}{\text{kms\_s\_0022r\_0877}}\right) \cdot \left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0877}}\right) + \left(1 + \frac{[\text{s\_0021}]}{\text{kmp\_s\_0021r\_0877}}\right) \cdot \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0877}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned}$$

$$\tag{1159}$$

Table 876: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0877	Keq_r_0877		1.732		☑
Vmax_r_0877	Vmax_r_0877		0.176		☑
kmp_s_0021r-_0877	kmp_s_0021r_0877		0.549		☑
kmp_s_0400r-_0877	kmp_s_0400r_0877		1.719		☑
kms_s_0022r-_0877	kms_s_0022r_0877		0.549		☑
kms_s_0446r-_0877	kms_s_0446r_0877		1.092		☑

7.219 Reaction r_0881

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name phosphoribosyl-AMP cyclohydrolase

Notes GENE_ASSOCIATION:YCL030C

Reaction equation

$$\text{s\_0080} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0079, s\_0080, s\_1434\_b}} \text{s\_0079} \tag{1160}$$

Reactants

Table 877: Properties of each reactant.

Id	Name	SBO
s_0080	1-(5-phosphoribosyl)-5'-AMP [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 878: Properties of each modifier.

Id	Name
s_0079	1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide
s_0080	1-(5-phosphoribosyl)-5'-AMP [intracellular]
s_1434_b	water [intracellular]

Product

Table 879: Properties of each product.

Id	Name
s_0079	1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide [i

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{219} = &\ \mathrm{vol}\left(\mathrm{intracellular}\right) \\
&\cdot \mathrm{function\_219}\left(\mathrm{Keq\_r\_0881}, \mathrm{Vmax\_r\_0881}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0079r\_0881},\right. \\
&\left. \mathrm{kms\_s\_0080r\_0881}, \mathrm{kms\_s\_1434\_br\_0881}, [\mathrm{s\_0079}], [\mathrm{s\_0080}], [\mathrm{s\_1434\_b}]\right)
\end{aligned}
\tag{1161}
$$

$$
\begin{aligned}
&\mathrm{function\_219}\left(\mathrm{Keq\_r\_0881}, \mathrm{Vmax\_r\_0881}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0079r\_0881},\right. \\
&\left. \mathrm{kms\_s\_0080r\_0881}, \mathrm{kms\_s\_1434\_br\_0881}, [\mathrm{s\_0079}], [\mathrm{s\_0080}], [\mathrm{s\_1434\_b}]\right) \\
&= \frac{\mathrm{Vmax\_r\_0881} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0080r\_0881}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0881}}\right)^{1} \cdot \left([\mathrm{s\_0080}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0079}]^{1}}{\mathrm{Keq\_r\_0881}}\right)}{\left(1 + \frac{[\mathrm{s\_0080}]}{\mathrm{kms\_s\_0080r\_0881}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0881}}\right) + 1 + \frac{[\mathrm{s\_0079}]}{\mathrm{kmp\_s\_0079r\_0881}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{1162}
$$

$$\begin{aligned}&\text{function\_219}\left(\text{Keq\_r\_0881}, \text{Vmax\_r\_0881}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0079r\_0881},\right.\\&\left.\text{kms\_s\_0080r\_0881}, \text{kms\_s\_1434\_br\_0881}, [\text{s\_0079}], [\text{s\_0080}], [\text{s\_1434\_b}]\right)\\&= \frac{\text{Vmax\_r\_0881} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0080r\_0881}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0881}}\right)^{1} \cdot \left([\text{s\_0080}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0079}]^{1}}{\text{Keq\_r\_0881}}\right)}{\left(1+\frac{[\text{s\_0080}]}{\text{kms\_s\_0080r\_0881}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0881}}\right) + 1 + \frac{[\text{s\_0079}]}{\text{kmp\_s\_0079r\_0881}} - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \quad (1163)$$

Table 880: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0881	Keq_r_0881		2.004		☑
Vmax_r_0881	Vmax_r_0881		0.229		☑
kmp_s_0079r_0881	kmp_s_0079r_0881		0.549		☑
kms_s_0080r_0881	kms_s_0080r_0881		0.549		☑
kms_s_1434_br_0881	kms_s_1434_br_0881		0.549		☑

7.220 Reaction r_0882

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphoribosyl-ATP pyrophosphatase

Notes GENE_ASSOCIATION:YCL030C

Reaction equation

$$\text{s\_0334} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0080, s\_0334, s\_0605, s\_0763\_b, s\_1434\_b}} \text{s\_0080} + \text{s\_0605} + \text{s\_0763\_b} \quad (1164)$$

Reactants

Table 881: Properties of each reactant.

Id	Name	SBO
s_0334	5-phosphoribosyl-ATP [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Id	Name	SBO
s_0080	1-(5-phosphoribosyl)-5'-AMP [intracellular]	
s_0334	5-phosphoribosyl-ATP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1434_b	water [intracellular]	

Table 882: Properties of each modifier.

Products

Table 883: Properties of each product.

Id	Name	SBO
s_0080	1-(5-phosphoribosyl)-5'-AMP [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{220} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_220}(\mathrm{Keq\_r\_0882}, \mathrm{Vmax\_r\_0882}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0080r\_0882}, \mathrm{kmp\_s\_0605r\_0882}, \mathrm{kmp\_s\_0763\_br\_0882}, \mathrm{kms\_s\_0334r\_0882}, \mathrm{kms\_s\_1434\_br\_0882}, [\mathrm{s\_0080}], [\mathrm{s\_0334}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) \tag{1165}$$

$$\mathrm{function\_220}(\mathrm{Keq\_r\_0882}, \mathrm{Vmax\_r\_0882}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0080r\_0882}, \mathrm{kmp\_s\_0605r\_0882}, \mathrm{kmp\_s\_0763\_br\_0882}, \mathrm{kms\_s\_0334r\_0882}, \mathrm{kms\_s\_1434\_br\_0882}, [\mathrm{s\_0080}], [\mathrm{s\_0334}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0882} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0334r\_0882}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0882}}\right)^{1} \cdot \left([\mathrm{s\_0334}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0080}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0882}}\right)}{\left(1 + \frac{[\mathrm{s\_0334}]}{\mathrm{kms\_s\_0334r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0882}}\right) + \left(1 + \frac{[\mathrm{s\_0080}]}{\mathrm{kmp\_s\_0080r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0882}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1166}$$

$$\mathrm{function\_220}(\mathrm{Keq\_r\_0882}, \mathrm{Vmax\_r\_0882}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0080r\_0882}, \mathrm{kmp\_s\_0605r\_0882}, \mathrm{kmp\_s\_0763\_br\_0882}, \mathrm{kms\_s\_0334r\_0882}, \mathrm{kms\_s\_1434\_br\_0882}, [\mathrm{s\_0080}], [\mathrm{s\_0334}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0882} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0334r\_0882}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0882}}\right)^{1} \cdot \left([\mathrm{s\_0334}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0080}]^{1} \cdot [\mathrm{s\_0605}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0882}}\right)}{\left(1 + \frac{[\mathrm{s\_0334}]}{\mathrm{kms\_s\_0334r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0882}}\right) + \left(1 + \frac{[\mathrm{s\_0080}]}{\mathrm{kmp\_s\_0080r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0882}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0882}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1167}$$

Table 884: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0882	Keq_r_0882		0.604		☑
Vmax_r_0882	Vmax_r_0882		0.505		☑
kmp_s_0080r_0882	kmp_s_0080r_0882		0.549		☑
kmp_s_0605r_0882	kmp_s_0605r_0882		0.549		☑
kmp_s_0763_br_0882	kmp_s_0763_br_0882		0.549		☑
kms_s_0334r_0882	kms_s_0334r_0882		0.549		☑
kms_s_1434_br_0882	kms_s_1434_br_0882		0.549		☑

7.221 Reaction r_0883

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phosphoribosylaminoimidazole carboxylase

Notes GENE_ASSOCIATION:YOR128C

Reaction equation

$$\mathrm{s\_0316} + \mathrm{s\_0470} \xrightleftharpoons{\mathrm{s\_0316,\ s\_0318,\ s\_0470,\ s\_0763\_b}} \mathrm{s\_0318} + \mathrm{s\_0763\_b} \tag{1168}$$

Reactants

Table 885: Properties of each reactant.

Id	Name	SBO
s_0316	5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]	
s_0470	carbon dioxide [intracellular]	

Modifiers

Table 886: Properties of each modifier.

Id	Name	SBO
s_0316	5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]	

Id	Name	SBO
s_0318	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 887: Properties of each product.

Id	Name	SBO
s_0318	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{221} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_221}(\mathrm{Keq\_r\_0883}, \mathrm{Vmax\_r\_0883}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0318r\_0883}, \mathrm{kmp\_s\_0763\_br\_0883}, \mathrm{kms\_s\_0316r\_0883}, \mathrm{kms\_s\_0470r\_0883}, [\mathrm{s\_0316}], [\mathrm{s\_0318}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) \tag{1169}$$

$$\mathrm{function\_221}(\mathrm{Keq\_r\_0883}, \mathrm{Vmax\_r\_0883}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0318r\_0883}, \mathrm{kmp\_s\_0763\_br\_0883}, \mathrm{kms\_s\_0316r\_0883}, \mathrm{kms\_s\_0470r\_0883}, [\mathrm{s\_0316}], [\mathrm{s\_0318}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0883} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0316r\_0883}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0470r\_0883}}\right)^{1} \cdot \left([\mathrm{s\_0316}]^{1} \cdot [\mathrm{s\_0470}]^{1} - \frac{[\mathrm{s\_0318}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0883}}\right)}{\left(1+\frac{[\mathrm{s\_0316}]}{\mathrm{kms\_s\_0316r\_0883}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kms\_s\_0470r\_0883}}\right) + \left(1+\frac{[\mathrm{s\_0318}]}{\mathrm{kmp\_s\_0318r\_0883}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0883}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1170}$$

$$\mathrm{function\_221}(\mathrm{Keq\_r\_0883}, \mathrm{Vmax\_r\_0883}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0318r\_0883}, \mathrm{kmp\_s\_0763\_br\_0883}, \mathrm{kms\_s\_0316r\_0883}, \mathrm{kms\_s\_0470r\_0883}, [\mathrm{s\_0316}], [\mathrm{s\_0318}], [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0883} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0316r\_0883}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0470r\_0883}}\right)^{1} \cdot \left([\mathrm{s\_0316}]^{1} \cdot [\mathrm{s\_0470}]^{1} - \frac{[\mathrm{s\_0318}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1}}{\mathrm{Keq\_r\_0883}}\right)}{\left(1+\frac{[\mathrm{s\_0316}]}{\mathrm{kms\_s\_0316r\_0883}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kms\_s\_0470r\_0883}}\right) + \left(1+\frac{[\mathrm{s\_0318}]}{\mathrm{kmp\_s\_0318r\_0883}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0883}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1171}$$

Table 888: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0883	Keq_r_0883		0.604		☑
Vmax_r_0883	Vmax_r_0883		0.467		☑
kmp_s_0318r-_0883	kmp_s_0318r_0883		0.549		☑
kmp_s_0763-_br_0883	kmp_s_0763_br-_0883		0.549		☑
kms_s_0316r-_0883	kms_s_0316r_0883		0.549		☑
kms_s_0470r-_0883	kms_s_0470r_0883		1.000		☑

7.222 Reaction r_0884

This is a reversible reaction of two reactants forming four products influenced by six modifiers.

Name phosphoribosylaminoimidazole synthase

Notes GENE_ASSOCIATION:YGL234W

Reaction equation

$$\mathrm{s\_0158} + \mathrm{s\_0446} \xrightleftharpoons{\mathrm{s\_0158,\ s\_0316,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1207}} \mathrm{s\_0316} + \mathrm{s\_0400} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1207} \quad (1172)$$

Reactants

Table 889: Properties of each reactant.

Id	Name	SBO
s_0158	2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 890: Properties of each modifier.

Id	Name	SBO
s_0158	2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]	
s_0316	5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]	

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 891: Properties of each product.

Id	Name	SBO
s_0316	5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]	
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{222} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_222}\left(\mathrm{Keq\_r\_0884}, \mathrm{Vmax\_r\_0884}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0316r\_0884}, \mathrm{kmp\_s\_0400r\_0884}, \mathrm{kmp\_s\_0763\_br\_0884}, \mathrm{kmp\_s\_1207r\_0884}, \mathrm{kms\_s\_0158r\_0884}, \mathrm{kms\_s\_0446r\_0884}, [\mathrm{s\_0158}], [\mathrm{s\_0316}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}]\right) \quad (1173)$$

$$\mathrm{function\_222}\left(\mathrm{Keq\_r\_0884}, \mathrm{Vmax\_r\_0884}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0316r\_0884}, \mathrm{kmp\_s\_0400r\_0884}, \mathrm{kmp\_s\_0763\_br\_0884}, \mathrm{kmp\_s\_1207r\_0884}, \mathrm{kms\_s\_0158r\_0884}, \mathrm{kms\_s\_0446r\_0884}, [\mathrm{s\_0158}], [\mathrm{s\_0316}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0884} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0158r\_0884}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0884}}\right)^{1} \cdot \left([\mathrm{s\_0158}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0316}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0884}}\right)}{\left(1 + \frac{[\mathrm{s\_0158}]}{\mathrm{kms\_s\_0158r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0884}}\right) + \left(1 + \frac{[\mathrm{s\_0316}]}{\mathrm{kmp\_s\_0316r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0884}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1174)$$

$$\mathrm{function\_222}\left(\mathrm{Keq\_r\_0884}, \mathrm{Vmax\_r\_0884}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0316r\_0884}, \mathrm{kmp\_s\_0400r\_0884}, \mathrm{kmp\_s\_0763\_br\_0884}, \mathrm{kmp\_s\_1207r\_0884}, \mathrm{kms\_s\_0158r\_0884}, \mathrm{kms\_s\_0446r\_0884}, [\mathrm{s\_0158}], [\mathrm{s\_0316}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}]\right) = \frac{\mathrm{Vmax\_r\_0884} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0158r\_0884}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0884}}\right)^{1} \cdot \left([\mathrm{s\_0158}]^{1} \cdot [\mathrm{s\_0446}]^{1} - \frac{[\mathrm{s\_0316}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_0884}}\right)}{\left(1 + \frac{[\mathrm{s\_0158}]}{\mathrm{kms\_s\_0158r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0884}}\right) + \left(1 + \frac{[\mathrm{s\_0316}]}{\mathrm{kmp\_s\_0316r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0884}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0884}}\right)}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1175)$$

Table 892: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0884	Keq_r_0884		0.287		☑
Vmax_r_0884	Vmax_r_0884		1.269		☑
kmp_s_0316r-_0884	kmp_s_0316r_0884		0.549		☑
kmp_s_0400r-_0884	kmp_s_0400r_0884		1.719		☑
kmp_s_0763-_br_0884	kmp_s_0763_br-_0884		0.549		☑
kmp_s_1207r-_0884	kmp_s_1207r_0884		0.549		☑
kms_s_0158r-_0884	kms_s_0158r_0884		0.549		☑
kms_s_0446r-_0884	kms_s_0446r_0884		1.092		☑

7.223 Reaction r_0885

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phosphoribosylaminoimidazolecarboxamide formyltransferase

Notes GENE_ASSOCIATION:(YLR028C or YMR120C)

Reaction equation

$$\mathrm{s\_0122} + \mathrm{s\_0317} \xrightleftharpoons{\mathrm{s\_0122,\ s\_0309,\ s\_0317,\ s\_0325}} \mathrm{s\_0309} + \mathrm{s\_0325} \tag{1176}$$

Reactants

Table 893: Properties of each reactant.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	

Modifiers

Table 894: Properties of each modifier.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0317	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	
s_0325	5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	

Products

Table 895: Properties of each product.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0325	5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{223} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_223}(\mathrm{Keq\_r\_0885}, \mathrm{Vmax\_r\_0885}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0885}, \mathrm{kmp\_s\_0325r\_0885}, \mathrm{kms\_s\_0122r\_0885}, \mathrm{kms\_s\_0317r\_0885}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0317}], [\mathrm{s\_0325}]) \tag{1177}$$

$$\mathrm{function\_223}(\mathrm{Keq\_r\_0885}, \mathrm{Vmax\_r\_0885}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0885}, \mathrm{kmp\_s\_0325r\_0885}, \mathrm{kms\_s\_0122r\_0885}, \mathrm{kms\_s\_0317r\_0885}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0317}], [\mathrm{s\_0325}]) = \frac{\mathrm{Vmax\_r\_0885} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0122r\_0885}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0317r\_0885}}\right)^{1} \cdot \left([\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0317}]^{1} - \frac{[\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0325}]^{1}}{\mathrm{Keq\_r\_0885}}\right)}{\left(1 + \frac{[\mathrm{s\_0122}]}{\mathrm{kms\_s\_0122r\_0885}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0317}]}{\mathrm{kms\_s\_0317r\_0885}}\right) + \left(1 + \frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0885}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0325}]}{\mathrm{kmp\_s\_0325r\_0885}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1178}$$

$$\mathrm{function\_223}(\mathrm{Keq\_r\_0885}, \mathrm{Vmax\_r\_0885}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0309r\_0885}, \mathrm{kmp\_s\_0325r\_0885}, \mathrm{kms\_s\_0122r\_0885}, \mathrm{kms\_s\_0317r\_0885}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0317}], [\mathrm{s\_0325}]) = \frac{\mathrm{Vmax\_r\_0885} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0122r\_0885}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0317r\_0885}}\right)^{1} \cdot \left([\mathrm{s\_0122}]^{1} \cdot [\mathrm{s\_0317}]^{1} - \frac{[\mathrm{s\_0309}]^{1} \cdot [\mathrm{s\_0325}]^{1}}{\mathrm{Keq\_r\_0885}}\right)}{\left(1 + \frac{[\mathrm{s\_0122}]}{\mathrm{kms\_s\_0122r\_0885}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0317}]}{\mathrm{kms\_s\_0317r\_0885}}\right) + \left(1 + \frac{[\mathrm{s\_0309}]}{\mathrm{kmp\_s\_0309r\_0885}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0325}]}{\mathrm{kmp\_s\_0325r\_0885}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1179}$$

Table 896: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0885	Keq_r_0885		1.100		☑
Vmax_r_0885	Vmax_r_0885		0.785		☑
kmp_s_0309r-_0885	kmp_s_0309r_0885		0.549		☑
kmp_s_0325r-_0885	kmp_s_0325r_0885		0.549		☑
kms_s_0122r-_0885	kms_s_0122r_0885		0.549		☑
kms_s_0317r-_0885	kms_s_0317r_0885		0.549		☑

7.224 Reaction r_0886

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name phosphoribosylaminoimidazolesuccinocarboxamide synthase

Notes GENE_ASSOCIATION:YAR015W

Reaction equation

$$\text{s\_0318} + \text{s\_0446} + \text{s\_0881} \xrightleftharpoons{\text{s\_0009, s\_0318, s\_0400, s\_0446, s\_0763\_b, s\_0881, s\_1207}} \text{s\_0009} + \text{s\_0400} + \text{s\_0763\_b} + \quad (1180)$$

Reactants

Table 897: Properties of each reactant.

Id	Name	SBO
s_0318	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]	
s_0446	ATP [intracellular]	
s_0881	L-aspartate [intracellular]	

Modifiers

Table 898: Properties of each modifier.

Id	Name
s_0009	(2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]
s_0318	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]
s_0400	ADP [intracellular]
s_0446	ATP [intracellular]
s_0763_b	H+ [intracellular]
s_0881	L-aspartate [intracellular]
s_1207	phosphate [intracellular]

Products

Table 899: Properties of each product.

Id	Name
s_0009	(2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]
s_0400	ADP [intracellular]
s_0763_b	H+ [intracellular]
s_1207	phosphate [intracellular]

Kinetic Law

Derived unit contains undeclared units

$$
\begin{aligned}
v_{224} = {} & \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_224}\left(\mathrm{Keq\_r\_0886}, \mathrm{Vmax\_r\_0886}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \\
& \mathrm{kmp\_s\_0009r\_0886}, \mathrm{kmp\_s\_0400r\_0886}, \mathrm{kmp\_s\_0763\_br\_0886}, \mathrm{kmp\_s\_1207r\_0886}, \\
& \mathrm{kms\_s\_0318r\_0886}, \mathrm{kms\_s\_0446r\_0886}, \mathrm{kms\_s\_0881r\_0886}, [\mathrm{s\_0009}], [\mathrm{s\_0318}], [\mathrm{s\_0400}], \\
& \left.[\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_1207}]\right)
\end{aligned}
\tag{1181}
$$

$$
\begin{aligned}
& \mathrm{function\_224}\left(\mathrm{Keq\_r\_0886}, \mathrm{Vmax\_r\_0886}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right. \\
& \mathrm{kmp\_s\_0009r\_0886}, \mathrm{kmp\_s\_0400r\_0886}, \mathrm{kmp\_s\_0763\_br\_0886}, \\
& \mathrm{kmp\_s\_1207r\_0886}, \mathrm{kms\_s\_0318r\_0886}, \mathrm{kms\_s\_0446r\_0886}, \mathrm{kms\_s\_0881r\_0886}, \\
& \left.[\mathrm{s\_0009}], [\mathrm{s\_0318}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0881}], [\mathrm{s\_1207}]\right) \\
& = \frac{\mathrm{Vmax\_r\_0886} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0318r\_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0881r\_0886}}\right)^{1} \cdot \left([\mathrm{s\_0318}]^{1} \cdot [\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0881}]^{1} - \frac{[\mathrm{s\_0009}]^{1} \cdot [\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0886}}\right.}{\left(1 + \frac{[\mathrm{s\_0318}]}{\mathrm{kms\_s\_0318r\_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0881}]}{\mathrm{kms\_s\_0881r\_0886}}\right) + \left(1 + \frac{[\mathrm{s\_0009}]}{\mathrm{kmp\_s\_0009r\_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0886}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned}
\tag{1182}
$$

$$\begin{aligned}
&\mathrm{function_224}\left(\mathrm{Keq_r_0886}, \mathrm{Vmax_r_0886}, \mathrm{vol}\left(\mathrm{intracellular}\right),\right.\\
&\mathrm{kmp_s_0009r_0886}, \mathrm{kmp_s_0400r_0886}, \mathrm{kmp_s_0763_br_0886},\\
&\mathrm{kmp_s_1207r_0886}, \mathrm{kms_s_0318r_0886}, \mathrm{kms_s_0446r_0886}, \mathrm{kms_s_0881r_0886},\\
&\left.[\mathrm{s_0009}], [\mathrm{s_0318}], [\mathrm{s_0400}], [\mathrm{s_0446}], [\mathrm{s_0763_b}], [\mathrm{s_0881}], [\mathrm{s_1207}]\right)\\
&= \frac{\mathrm{Vmax_r_0886} \cdot \frac{\left(\frac{1}{\mathrm{kms_s_0318r_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_0446r_0886}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms_s_0881r_0886}}\right)^{1} \cdot \left([\mathrm{s_0318}]^{1} \cdot [\mathrm{s_0446}]^{1} \cdot [\mathrm{s_0881}]^{1} - \frac{[\mathrm{s_0009}]^{1} \cdot [\mathrm{s_0400}]^{1} \cdot [\mathrm{s_0763_b}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq_r_0886}}\right.}{\left(1 + \frac{[\mathrm{s_0318}]}{\mathrm{kms_s_0318r_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s_0446}]}{\mathrm{kms_s_0446r_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s_0881}]}{\mathrm{kms_s_0881r_0886}}\right) + \left(1 + \frac{[\mathrm{s_0009}]}{\mathrm{kmp_s_0009r_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s_0400}]}{\mathrm{kmp_s_0400r_0886}}\right) \cdot \left(1 + \frac{[\mathrm{s_0763_b}]}{\mathrm{kmp_s_0763_br_0886}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}
\end{aligned} \tag{1183}$$

Table 900: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0886	Keq_r_0886		0.951		☑
Vmax_r_0886	Vmax_r_0886		1.536		☑
kmp_s_0009r-_0886	kmp_s_0009r_0886		0.549		☑
kmp_s_0400r-_0886	kmp_s_0400r_0886		1.719		☑
kmp_s_0763-_br_0886	kmp_s_0763_br-_0886		0.549		☑
kmp_s_1207r-_0886	kmp_s_1207r_0886		0.549		☑
kms_s_0318r-_0886	kms_s_0318r_0886		0.549		☑
kms_s_0446r-_0886	kms_s_0446r_0886		1.092		☑
kms_s_0881r-_0886	kms_s_0881r_0886		0.549		☑

7.225 Reaction r_0887

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name phosphoribosylanthranilate isomerase

Notes GENE_ASSOCIATION:YDR007W

Reaction equation

$$\mathrm{s\_1066} \xrightleftharpoons{\mathrm{s\_0078},\ \mathrm{s\_1066}} \mathrm{s\_0078} \tag{1184}$$

Reactant

Table 901: Properties of each reactant.

Id	Name	SBO
s_1066	N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]	

Modifiers

Table 902: Properties of each modifier.

Id	Name	SBO
s_0078	1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]	
s_1066	N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]	

Product

Table 903: Properties of each product.

Id	Name	SBO
s_0078	1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{225} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_225}\left(\mathrm{Keq\_r\_0887}, \mathrm{Vmax\_r\_0887}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0078r\_0887}, \mathrm{kms\_s\_1066r\_0887}, [\mathrm{s\_0078}], [\mathrm{s\_1066}]\right) \tag{1185}$$

$$\mathrm{function\_225}\left(\mathrm{Keq\_r\_0887}, \mathrm{Vmax\_r\_0887}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0078r\_0887}, \mathrm{kms\_s\_1066r\_0887}, [\mathrm{s\_0078}], [\mathrm{s\_1066}]\right) = \frac{\mathrm{Vmax\_r\_0887} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1066r\_0887}}\right)^{1} \cdot \left([\mathrm{s\_1066}]^{1} - \frac{[\mathrm{s\_0078}]^{1}}{\mathrm{Keq\_r\_0887}}\right)}{1 + \frac{[\mathrm{s\_1066}]}{\mathrm{kms\_s\_1066r\_0887}} + 1 + \frac{[\mathrm{s\_0078}]}{\mathrm{kmp\_s\_0078r\_0887}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1186}$$

$$\mathrm{function\_225}\left(\mathrm{Keq\_r\_0887}, \mathrm{Vmax\_r\_0887}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0078r\_0887}, \mathrm{kms\_s\_1066r\_0887}, [\mathrm{s\_0078}], [\mathrm{s\_1066}]\right) = \frac{\mathrm{Vmax\_r\_0887} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1066r\_0887}}\right)^{1} \cdot \left([\mathrm{s\_1066}]^{1} - \frac{[\mathrm{s\_0078}]^{1}}{\mathrm{Keq\_r\_0887}}\right)}{1 + \frac{[\mathrm{s\_1066}]}{\mathrm{kms\_s\_1066r\_0887}} + 1 + \frac{[\mathrm{s\_0078}]}{\mathrm{kmp\_s\_0078r\_0887}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1187}$$

Table 904: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0887	Keq_r_0887		1.100		☑
Vmax_r_0887	Vmax_r_0887		0.051		☑
kmp_s_0078r-_0887	kmp_s_0078r_0887		0.549		☑
kms_s_1066r-_0887	kms_s_1066r_0887		0.549		☑

7.226 Reaction r_0888

This is a reversible reaction of four reactants forming five products influenced by nine modifiers.

Name phosphoribosylformylglycinamidine synthase

Notes GENE_ASSOCIATION:YGR061C

Reaction equation

$$s\_0446 + s\_0907 + s\_1052 + s\_1434\_b \xrightleftharpoons{s\_0158,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_0899,\ s\_0907,\ s\_1052,\ s\_1207,\ s\_1434\_b} \tag{1188}$$

Reactants

Table 905: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1052	N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 906: Properties of each modifier.

Id	Name	SBO
s_0158	2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	

Id	Name	SBO
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_1052	N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 907: Properties of each product.

Id	Name	SBO
s_0158	2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]	
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{226} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_226}\left(\mathrm{Keq\_r\_0888}, \mathrm{Vmax\_r\_0888}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0158r\_0888}, \mathrm{kmp\_s\_0400r\_0888}, \mathrm{kmp\_s\_0763\_br\_0888}, \mathrm{kmp\_s\_0899r\_0888}, \mathrm{kmp\_s\_1207r\_0888}, \mathrm{kms\_s\_0446r\_0888}, \mathrm{kms\_s\_0907r\_0888}, \mathrm{kms\_s\_1052r\_0888}, \mathrm{kms\_s\_1434\_br\_0888}, [\mathrm{s\_0158}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1052}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) \tag{1189}$$

$$\mathrm{function\_226}\left(\mathrm{Keq\_r\_0888}, \mathrm{Vmax\_r\_0888}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0158r\_0888}, \mathrm{kmp\_s\_0400r\_0888}, \mathrm{kmp\_s\_0763\_br\_0888}, \mathrm{kmp\_s\_0899r\_0888}, \mathrm{kmp\_s\_1207r\_0888}, \mathrm{kms\_s\_0446r\_0888}, \mathrm{kms\_s\_0907r\_0888}, \mathrm{kms\_s\_1052r\_0888}, \mathrm{kms\_s\_1434\_br\_0888}, [\mathrm{s\_0158}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0899}], [\mathrm{s\_0907}], [\mathrm{s\_1052}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0888} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0888}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0907r\_0888}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1052r\_0888}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0888}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0907}]^1 \cdot [\mathrm{s\_1052}]^1 \cdot [\mathrm{s\_14}\right.}{\left(1 + \frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0888}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0907}]}{\mathrm{kms\_s\_0907r\_0888}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1052}]}{\mathrm{kms\_s\_1052r\_0888}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0888}}\right) + \left(1 + \frac{[\mathrm{s\_0158}]}{\mathrm{kmp\_s\_0158r\_0888}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0888}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1190}$$

$$\text{function\_226}\left(\text{Keq\_r\_0888}, \text{Vmax\_r\_0888}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0158r\_0888}, \text{kmp\_s\_0400r\_0888}, \text{kmp\_s\_0763\_br\_0888}, \text{kmp\_s\_0899r\_0888}, \text{kmp\_s\_1207r\_0888}, \text{kms\_s\_0446r\_0888}, \text{kms\_s\_0907r\_0888}, \text{kms\_s\_1052r\_0888}, \text{kms\_s\_1434\_br\_0888}, [\text{s\_0158}], [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0763\_b}], [\text{s\_0899}], [\text{s\_0907}], [\text{s\_1052}], [\text{s\_1207}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0888} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0907r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1052r\_0888}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0888}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0907}]^{1} \cdot [\text{s\_1052}]^{1} \cdot [\text{s\_14}\ldots\right.}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_0907}]}{\text{kms\_s\_0907r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_1052}]}{\text{kms\_s\_1052r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0888}}\right) + \left(1+\frac{[\text{s\_0158}]}{\text{kmp\_s\_0158r\_0888}}\right) \cdot \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_0888}}\right) \cdot \ldots}}{\text{vol}\left(\text{intracellular}\right)} \quad (1191)$$

Table 908: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0888	Keq_r_0888		0.951		☑
Vmax_r_0888	Vmax_r_0888		3.138		☑
kmp_s_0158r-_0888	kmp_s_0158r_0888		0.549		☑
kmp_s_0400r-_0888	kmp_s_0400r_0888		1.719		☑
kmp_s_0763-_br_0888	kmp_s_0763_br-_0888		0.549		☑
kmp_s_0899r-_0888	kmp_s_0899r_0888		0.549		☑
kmp_s_1207r-_0888	kmp_s_1207r_0888		0.549		☑
kms_s_0446r-_0888	kms_s_0446r_0888		1.092		☑
kms_s_0907r-_0888	kms_s_0907r_0888		0.549		☑
kms_s_1052r-_0888	kms_s_1052r_0888		0.549		☑
kms_s_1434-_br_0888	kms_s_1434_br-_0888		0.549		☑

7.227 Reaction r_0889

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphoribosylglycinamide formyltransferase

Notes GENE_ASSOCIATION:YDR408C

Reaction equation

$$s\_0122 + s\_1048 \xrightleftharpoons{s\_0122,\ s\_0309,\ s\_0763\_b,\ s\_1048,\ s\_1052} s\_0309 + s\_0763\_b + s\_1052 \quad (1192)$$

Reactants

Table 909: Properties of each reactant.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_1048	N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	

Modifiers

Table 910: Properties of each modifier.

Id	Name	SBO
s_0122	10-formyltetrahydrofolic acid [intracellular]	
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1048	N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	
s_1052	N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	

Products

Table 911: Properties of each product.

Id	Name	SBO
s_0309	5,6,7,8-tetrahydrofolic acid [intracellular]	
s_0763_b	H+ [intracellular]	
s_1052	N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{227} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_227}\left(\mathrm{Keq\_r\_0889}, \mathrm{Vmax\_r\_0889}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0309r\_0889}, \mathrm{kmp\_s\_0763\_br\_0889}, \mathrm{kmp\_s\_1052r\_0889}, \mathrm{kms\_s\_0122r\_0889}, \mathrm{kms\_s\_1048r\_0889}, [\mathrm{s\_0122}], [\mathrm{s\_0309}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1048}], [\mathrm{s\_1052}]\right) \quad (1193)$$

$$\begin{aligned}&\text{function\_227}\left(\text{Keq\_r\_0889}, \text{Vmax\_r\_0889}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0309r\_0889},\right.\\&\text{kmp\_s\_0763\_br\_0889}, \text{kmp\_s\_1052r\_0889}, \text{kms\_s\_0122r\_0889},\\&\left.\text{kms\_s\_1048r\_0889}, [\text{s\_0122}], [\text{s\_0309}], [\text{s\_0763\_b}], [\text{s\_1048}], [\text{s\_1052}]\right)\\&= \frac{\text{Vmax\_r\_0889} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0122r\_0889}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1048r\_0889}}\right)^{1} \cdot \left([\text{s\_0122}]^{1} \cdot [\text{s\_1048}]^{1} - \frac{[\text{s\_0309}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1052}]^{1}}{\text{Keq\_r\_0889}}\right)}{\left(1+\frac{[\text{s\_0122}]}{\text{kms\_s\_0122r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1048}]}{\text{kms\_s\_1048r\_0889}}\right) + \left(1+\frac{[\text{s\_0309}]}{\text{kmp\_s\_0309r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1052}]}{\text{kmp\_s\_1052r\_0889}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1194}$$

$$\begin{aligned}&\text{function\_227}\left(\text{Keq\_r\_0889}, \text{Vmax\_r\_0889}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0309r\_0889},\right.\\&\text{kmp\_s\_0763\_br\_0889}, \text{kmp\_s\_1052r\_0889}, \text{kms\_s\_0122r\_0889},\\&\left.\text{kms\_s\_1048r\_0889}, [\text{s\_0122}], [\text{s\_0309}], [\text{s\_0763\_b}], [\text{s\_1048}], [\text{s\_1052}]\right)\\&= \frac{\text{Vmax\_r\_0889} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0122r\_0889}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1048r\_0889}}\right)^{1} \cdot \left([\text{s\_0122}]^{1} \cdot [\text{s\_1048}]^{1} - \frac{[\text{s\_0309}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1052}]^{1}}{\text{Keq\_r\_0889}}\right)}{\left(1+\frac{[\text{s\_0122}]}{\text{kms\_s\_0122r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1048}]}{\text{kms\_s\_1048r\_0889}}\right) + \left(1+\frac{[\text{s\_0309}]}{\text{kmp\_s\_0309r\_0889}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0889}}\right) \cdot \left(1+\frac{[\text{s\_1052}]}{\text{kmp\_s\_1052r\_0889}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1195}$$

Table 912: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0889	Keq_r_0889		0.604		☑
Vmax_r_0889	Vmax_r_0889		0.734		☑
kmp_s_0309r_0889	kmp_s_0309r_0889		0.549		☑
kmp_s_0763_br_0889	kmp_s_0763_br_0889		0.549		☑
kmp_s_1052r_0889	kmp_s_1052r_0889		0.549		☑
kms_s_0122r_0889	kms_s_0122r_0889		0.549		☑
kms_s_1048r_0889	kms_s_1048r_0889		0.549		☑

7.228 Reaction r_0890

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name phosphoribosylglycinamide synthase

Notes GENE_ASSOCIATION:YGL234W

Reaction equation

$$s\_0333 + s\_0446 + s\_0740 \xrightleftharpoons[]{s\_0333,\ s\_0400,\ s\_0446,\ s\_0740,\ s\_0763\_b,\ s\_1048,\ s\_1207} s\_0400 + s\_0763\_b + s\_1048 + \quad (1196)$$

Reactants

Table 913: Properties of each reactant.

Id	Name	SBO
s_0333	5-phospho-beta-D-ribosylamine [intracellular]	
s_0446	ATP [intracellular]	
s_0740	glycine [intracellular]	

Modifiers

Table 914: Properties of each modifier.

Id	Name	SBO
s_0333	5-phospho-beta-D-ribosylamine [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0740	glycine [intracellular]	
s_0763_b	H+ [intracellular]	
s_1048	N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	
s_1207	phosphate [intracellular]	

Products

Table 915: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1048	N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{228} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_228}(\mathrm{Keq\_r\_0890}, \mathrm{Vmax\_r\_0890}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0890}, \mathrm{kmp\_s\_0763\_br\_0890}, \mathrm{kmp\_s\_1048r\_0890}, \mathrm{kmp\_s\_1207r\_0890}, \mathrm{kms\_s\_0333r\_0890}, \mathrm{kms\_s\_0446r\_0890}, \mathrm{kms\_s\_0740r\_0890}, [\mathrm{s\_0333}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0740}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1048}], [\mathrm{s\_1207}]) \tag{1197}$$

$$\mathrm{function\_228}(\mathrm{Keq\_r\_0890}, \mathrm{Vmax\_r\_0890}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0890}, \mathrm{kmp\_s\_0763\_br\_0890}, \mathrm{kmp\_s\_1048r\_0890}, \mathrm{kmp\_s\_1207r\_0890}, \mathrm{kms\_s\_0333r\_0890}, \mathrm{kms\_s\_0446r\_0890}, \mathrm{kms\_s\_0740r\_0890}, [\mathrm{s\_0333}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0740}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1048}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0890} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0333r\_0890}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0890}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0890}}\right)^1 \cdot \left([\mathrm{s\_0333}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0740}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1048}]^1 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0890}}\right.}{\left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kms\_s\_0333r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0890}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_1048}]}{\mathrm{kmp\_s\_1048r\_0890}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1198}$$

$$\mathrm{function\_228}(\mathrm{Keq\_r\_0890}, \mathrm{Vmax\_r\_0890}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0400r\_0890}, \mathrm{kmp\_s\_0763\_br\_0890}, \mathrm{kmp\_s\_1048r\_0890}, \mathrm{kmp\_s\_1207r\_0890}, \mathrm{kms\_s\_0333r\_0890}, \mathrm{kms\_s\_0446r\_0890}, \mathrm{kms\_s\_0740r\_0890}, [\mathrm{s\_0333}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0740}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1048}], [\mathrm{s\_1207}]) = \frac{\mathrm{Vmax\_r\_0890} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0333r\_0890}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0890}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0740r\_0890}}\right)^1 \cdot \left([\mathrm{s\_0333}]^1 \cdot [\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0740}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1048}]^1 \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0890}}\right.}{\left(1+\frac{[\mathrm{s\_0333}]}{\mathrm{kms\_s\_0333r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0740}]}{\mathrm{kms\_s\_0740r\_0890}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0890}}\right) \cdot \left(1+\frac{[\mathrm{s\_1048}]}{\mathrm{kmp\_s\_1048r\_0890}}\right) \cdot}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1199}$$

Table 916: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0890`	Keq_r_0890		0.951		☑
`Vmax_r_0890`	Vmax_r_0890		1.536		☑
`kmp_s_0400r-_0890`	kmp_s_0400r_0890		1.719		☑
`kmp_s_0763-_br_0890`	kmp_s_0763_br-_0890		0.549		☑
`kmp_s_1048r-_0890`	kmp_s_1048r_0890		0.549		☑
`kmp_s_1207r-_0890`	kmp_s_1207r_0890		0.549		☑
`kms_s_0333r-_0890`	kms_s_0333r_0890		0.549		☑
`kms_s_0446r-_0890`	kms_s_0446r_0890		1.092		☑
`kms_s_0740r-_0890`	kms_s_0740r_0890		0.549		☑

7.229 Reaction r_0891

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name phosphoribosylpyrophosphate synthetase

Notes GENE_ASSOCIATION:(YBL068W or YER099C or YHL011C or YKL181W or YOL061W)

Reaction equation

$$s\_0427 + s\_0446 \xrightleftharpoons[]{s\_0331,\ s\_0427,\ s\_0434,\ s\_0446,\ s\_0763\_b} s\_0331 + s\_0434 + s\_0763\_b \quad (1200)$$

Reactants

Table 917: Properties of each reactant.

Id	Name	SBO
s_0427	alpha-D-ribose 5-phosphate [intracellular]	
s_0446	ATP [intracellular]	

Modifiers

Table 918: Properties of each modifier.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0427	alpha-D-ribose 5-phosphate [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	

Products

Table 919: Properties of each product.

Id	Name	SBO
s_0331	5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]	
s_0434	AMP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{229} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_229}(\mathrm{Keq\_r\_0891}, \mathrm{Vmax\_r\_0891}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0331r\_0891}, \mathrm{kmp\_s\_0434r\_0891}, \mathrm{kmp\_s\_0763\_br\_0891}, \mathrm{kms\_s\_0427r\_0891}, \mathrm{kms\_s\_0446r\_0891}, [\mathrm{s\_0331}], [\mathrm{s\_0427}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) \quad (1201)$$

$$\mathrm{function\_229}(\mathrm{Keq\_r\_0891}, \mathrm{Vmax\_r\_0891}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0331r\_0891}, \mathrm{kmp\_s\_0434r\_0891}, \mathrm{kmp\_s\_0763\_br\_0891}, \mathrm{kms\_s\_0427r\_0891}, \mathrm{kms\_s\_0446r\_0891}, [\mathrm{s\_0331}], [\mathrm{s\_0427}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0891} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0427r\_0891}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0891}}\right)^1 \cdot \left([\mathrm{s\_0427}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0331}]^1 \cdot [\mathrm{s\_0434}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0891}}\right)}{\left(1+\frac{[\mathrm{s\_0427}]}{\mathrm{kms\_s\_0427r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0891}}\right) + \left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kmp\_s\_0331r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0891}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1202)$$

$$\mathrm{function\_229}(\mathrm{Keq\_r\_0891}, \mathrm{Vmax\_r\_0891}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0331r\_0891}, \mathrm{kmp\_s\_0434r\_0891}, \mathrm{kmp\_s\_0763\_br\_0891}, \mathrm{kms\_s\_0427r\_0891}, \mathrm{kms\_s\_0446r\_0891}, [\mathrm{s\_0331}], [\mathrm{s\_0427}], [\mathrm{s\_0434}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}]) = \frac{\mathrm{Vmax\_r\_0891} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0427r\_0891}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0446r\_0891}}\right)^1 \cdot \left([\mathrm{s\_0427}]^1 \cdot [\mathrm{s\_0446}]^1 - \frac{[\mathrm{s\_0331}]^1 \cdot [\mathrm{s\_0434}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0891}}\right)}{\left(1+\frac{[\mathrm{s\_0427}]}{\mathrm{kms\_s\_0427r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0891}}\right) + \left(1+\frac{[\mathrm{s\_0331}]}{\mathrm{kmp\_s\_0331r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0434}]}{\mathrm{kmp\_s\_0434r\_0891}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0891}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1203)$$

Table 920: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0891	Keq_r_0891		0.697		☑
Vmax_r_0891	Vmax_r_0891		2.251		☑
kmp_s_0331r-_0891	kmp_s_0331r_0891		0.549		☑
kmp_s_0434r-_0891	kmp_s_0434r_0891		1.260		☑
kmp_s_0763-_br_0891	kmp_s_0763_br-_0891		0.549		☑
kms_s_0427r-_0891	kms_s_0427r_0891		0.549		☑
kms_s_0446r-_0891	kms_s_0446r_0891		1.092		☑

7.230 Reaction r_0911

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name prephenate dehydratase

Notes GENE_ASSOCIATION:YNL316C

Reaction equation

$$s\_0763\_b + s\_1258 \xrightleftharpoons{s\_0470,\ s\_0763\_b,\ s\_0859,\ s\_1258,\ s\_1434\_b} s\_0470 + s\_0859 + s\_1434\_b \quad (1204)$$

Reactants

Table 921: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1258	prephenate(2-) [intracellular]	

Modifiers

Table 922: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0763_b	H+ [intracellular]	
s_0859	keto-phenylpyruvate [intracellular]	
s_1258	prephenate(2-) [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 923: Properties of each product.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0859	keto-phenylpyruvate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{230} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_230}(\mathrm{Keq\_r\_0911}, \mathrm{Vmax\_r\_0911}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0911}, \mathrm{kmp\_s\_0859r\_0911}, \mathrm{kmp\_s\_1434\_br\_0911}, \mathrm{kms\_s\_0763\_br\_0911}, \mathrm{kms\_s\_1258r\_0911}, [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0859}], [\mathrm{s\_1258}], [\mathrm{s\_1434\_b}]) \quad (1205)$$

$$\mathrm{function\_230}(\mathrm{Keq\_r\_0911}, \mathrm{Vmax\_r\_0911}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0911}, \mathrm{kmp\_s\_0859r\_0911}, \mathrm{kmp\_s\_1434\_br\_0911}, \mathrm{kms\_s\_0763\_br\_0911}, \mathrm{kms\_s\_1258r\_0911}, [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0859}], [\mathrm{s\_1258}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0911} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0911}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1258r\_0911}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1258}]^1 - \frac{[\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0859}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0911}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1258}]}{\mathrm{kms\_s\_1258r\_0911}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_0859}]}{\mathrm{kmp\_s\_0859r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0911}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1206)$$

$$\mathrm{function\_230}(\mathrm{Keq\_r\_0911}, \mathrm{Vmax\_r\_0911}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0470r\_0911}, \mathrm{kmp\_s\_0859r\_0911}, \mathrm{kmp\_s\_1434\_br\_0911}, \mathrm{kms\_s\_0763\_br\_0911}, \mathrm{kms\_s\_1258r\_0911}, [\mathrm{s\_0470}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0859}], [\mathrm{s\_1258}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0911} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0911}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1258r\_0911}}\right)^1 \cdot \left([\mathrm{s\_0763\_b}]^1 \cdot [\mathrm{s\_1258}]^1 - \frac{[\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0859}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0911}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1258}]}{\mathrm{kms\_s\_1258r\_0911}}\right) + \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_0859}]}{\mathrm{kmp\_s\_0859r\_0911}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0911}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1207)$$

Table 924: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0911	Keq_r_0911		1.100		☑
Vmax_r_0911	Vmax_r_0911		0.768		☑
kmp_s_0470r_0911	kmp_s_0470r_0911		1.000		☑
kmp_s_0859r_0911	kmp_s_0859r_0911		0.549		☑
kmp_s_1434_br_0911	kmp_s_1434_br_0911		0.549		☑
kms_s_0763_br_0911	kms_s_0763_br_0911		0.549		☑
kms_s_1258r_0911	kms_s_1258r_0911		0.549		☑

7.231 Reaction r_0913

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name prephenate dehydrogenase (NADP)

Notes GENE_ASSOCIATION:YBR166C

Reaction equation

$$s\_1091 + s\_1258 \xrightleftharpoons{s\_0209,\ s\_0470,\ s\_1091,\ s\_1096,\ s\_1258} s\_0209 + s\_0470 + s\_1096 \quad (1208)$$

Reactants

Table 925: Properties of each reactant.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1258	prephenate(2-) [intracellular]	

Modifiers

Table 926: Properties of each modifier.

Id	Name	SBO
s_0209	3-(4-hydroxyphenyl)pyruvate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1258	prephenate(2-) [intracellular]	

Products

Table 927: Properties of each product.

Id	Name	SBO
s_0209	3-(4-hydroxyphenyl)pyruvate [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_1096	NADPH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{231} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_231}(\mathrm{Keq\_r\_0913}, \mathrm{Vmax\_r\_0913}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0209r\_0913}, \mathrm{kmp\_s\_0470r\_0913}, \mathrm{kmp\_s\_1096r\_0913}, \mathrm{kms\_s\_1091r\_0913}, \mathrm{kms\_s\_1258r\_0913}, [\mathrm{s\_0209}], [\mathrm{s\_0470}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1258}]) \tag{1209}$$

$$\mathrm{function\_231}(\mathrm{Keq\_r\_0913}, \mathrm{Vmax\_r\_0913}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0209r\_0913}, \mathrm{kmp\_s\_0470r\_0913}, \mathrm{kmp\_s\_1096r\_0913}, \mathrm{kms\_s\_1091r\_0913}, \mathrm{kms\_s\_1258r\_0913}, [\mathrm{s\_0209}], [\mathrm{s\_0470}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1258}]) = \frac{\mathrm{Vmax\_r\_0913} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1091r\_0913}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1258r\_0913}}\right)^1 \cdot \left([\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1258}]^1 - \frac{[\mathrm{s\_0209}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0913}}\right)}{\left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_1258}]}{\mathrm{kms\_s\_1258r\_0913}}\right) + \left(1+\frac{[\mathrm{s\_0209}]}{\mathrm{kmp\_s\_0209r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0913}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1210}$$

$$\mathrm{function\_231}(\mathrm{Keq\_r\_0913}, \mathrm{Vmax\_r\_0913}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0209r\_0913}, \mathrm{kmp\_s\_0470r\_0913}, \mathrm{kmp\_s\_1096r\_0913}, \mathrm{kms\_s\_1091r\_0913}, \mathrm{kms\_s\_1258r\_0913}, [\mathrm{s\_0209}], [\mathrm{s\_0470}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1258}]) = \frac{\mathrm{Vmax\_r\_0913} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1091r\_0913}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1258r\_0913}}\right)^1 \cdot \left([\mathrm{s\_1091}]^1 \cdot [\mathrm{s\_1258}]^1 - \frac{[\mathrm{s\_0209}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_1096}]^1}{\mathrm{Keq\_r\_0913}}\right)}{\left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kms\_s\_1091r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_1258}]}{\mathrm{kms\_s\_1258r\_0913}}\right) + \left(1+\frac{[\mathrm{s\_0209}]}{\mathrm{kmp\_s\_0209r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0913}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kmp\_s\_1096r\_0913}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1211}$$

Table 928: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0913`	Keq_r_0913		1.100		☑
`Vmax_r_0913`	Vmax_r_0913		0.649		☑
`kmp_s_0209r-_0913`	kmp_s_0209r_0913		0.549		☑
`kmp_s_0470r-_0913`	kmp_s_0470r_0913		1.000		☑
`kmp_s_1096r-_0913`	kmp_s_1096r_0913		0.549		☑
`kms_s_1091r-_0913`	kms_s_1091r_0913		0.549		☑
`kms_s_1258r-_0913`	kms_s_1258r_0913		0.549		☑

7.232 Reaction r_0934

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name pyrimidine phosphatase

Notes GENE_ASSOCIATION:

Reaction equation

$$s\_0319 + s\_1434\_b \xrightleftharpoons{s\_0319,\ s\_0320,\ s\_1207,\ s\_1434\_b} s\_0320 + s\_1207 \quad (1212)$$

Reactants

Table 929: Properties of each reactant.

Id	Name	SBO
s_0319	5-amino-6-(5-phosphoribitylamino)uracil [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 930: Properties of each modifier.

Id	Name	SBO
s_0319	5-amino-6-(5-phosphoribitylamino)uracil [intracellular]	
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 931: Properties of each product.

Id	Name	SBO
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{232} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_232}(\mathrm{Keq\_r\_0934}, \mathrm{Vmax\_r\_0934}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0320r\_0934}, \mathrm{kmp\_s\_1207r\_0934}, \mathrm{kms\_s\_0319r\_0934}, \mathrm{kms\_s\_1434\_br\_0934}, [\mathrm{s\_0319}], [\mathrm{s\_0320}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \quad (1213)$$

$$\mathrm{function\_232}(\mathrm{Keq\_r\_0934}, \mathrm{Vmax\_r\_0934}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0320r\_0934}, \mathrm{kmp\_s\_1207r\_0934}, \mathrm{kms\_s\_0319r\_0934}, \mathrm{kms\_s\_1434\_br\_0934}, [\mathrm{s\_0319}], [\mathrm{s\_0320}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0934} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0319r\_0934}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0934}}\right)^1 \cdot \left([\mathrm{s\_0319}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0320}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0934}}\right)}{\left(1+\frac{[\mathrm{s\_0319}]}{\mathrm{kms\_s\_0319r\_0934}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0934}}\right) + \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kmp\_s\_0320r\_0934}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0934}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1214)$$

$$\mathrm{function\_232}(\mathrm{Keq\_r\_0934}, \mathrm{Vmax\_r\_0934}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0320r\_0934}, \mathrm{kmp\_s\_1207r\_0934}, \mathrm{kms\_s\_0319r\_0934}, \mathrm{kms\_s\_1434\_br\_0934}, [\mathrm{s\_0319}], [\mathrm{s\_0320}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0934} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0319r\_0934}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_0934}}\right)^1 \cdot \left([\mathrm{s\_0319}]^1 \cdot [\mathrm{s\_1434\_b}]^1 - \frac{[\mathrm{s\_0320}]^1 \cdot [\mathrm{s\_1207}]^1}{\mathrm{Keq\_r\_0934}}\right)}{\left(1+\frac{[\mathrm{s\_0319}]}{\mathrm{kms\_s\_0319r\_0934}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_0934}}\right) + \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kmp\_s\_0320r\_0934}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0934}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1215)$$

Table 932: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0934	Keq_r_0934		1.100		☑
Vmax_r_0934	Vmax_r_0934		0.004		☑
kmp_s_0320r-_0934	kmp_s_0320r_0934		0.549		☑
kmp_s_1207r-_0934	kmp_s_1207r_0934		0.549		☑
kms_s_0319r-_0934	kms_s_0319r_0934		0.549		☑
kms_s_1434-_br_0934	kms_s_1434_br-_0934		0.549		☑

7.233 Reaction r_0936

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name pyrroline-5-carboxylate reductase

Notes GENE_ASSOCIATION:YER023W

Reaction equation

$$\mathrm{s\_0120} + 2\,\mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0120,\ s\_0763\_b,\ s\_0939,\ s\_1091,\ s\_1096}} \mathrm{s\_0939} + \mathrm{s\_1091} \quad (1216)$$

Reactants

Table 933: Properties of each reactant.

Id	Name	SBO
s_0120	1-pyrroline-5-carboxylate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 934: Properties of each modifier.

Id	Name	SBO
s_0120	1-pyrroline-5-carboxylate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0939	L-proline [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	

Products

Table 935: Properties of each product.

Id	Name	SBO
s_0939	L-proline [intracellular]	
s_1091	NADP(+) [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{233} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_233}(\mathrm{Keq\_r\_0936}, \mathrm{Vmax\_r\_0936}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0939r\_0936}, \mathrm{kmp\_s\_1091r\_0936}, \mathrm{kms\_s\_0120r\_0936}, \mathrm{kms\_s\_0763\_br\_0936}, \mathrm{kms\_s\_1096r\_0936}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0939}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) \quad (1217)$$

$$\mathrm{function\_233}(\mathrm{Keq\_r\_0936}, \mathrm{Vmax\_r\_0936}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0939r\_0936}, \mathrm{kmp\_s\_1091r\_0936}, \mathrm{kms\_s\_0120r\_0936}, \mathrm{kms\_s\_0763\_br\_0936}, \mathrm{kms\_s\_1096r\_0936}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0939}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0936} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0120r\_0936}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0936}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0936}}\right)^{1} \cdot \left([\mathrm{s\_0120}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0939}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0936}}\right)}{\left(1+\frac{[\mathrm{s\_0120}]}{\mathrm{kms\_s\_0120r\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0936}}\right) + \left(1+\frac{[\mathrm{s\_0939}]}{\mathrm{kmp\_s\_0939r\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0936}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1218)$$

$$\mathrm{function\_233}(\mathrm{Keq\_r\_0936}, \mathrm{Vmax\_r\_0936}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0939r\_0936}, \mathrm{kmp\_s\_1091r\_0936}, \mathrm{kms\_s\_0120r\_0936}, \mathrm{kms\_s\_0763\_br\_0936}, \mathrm{kms\_s\_1096r\_0936}, [\mathrm{s\_0120}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0939}], [\mathrm{s\_1091}], [\mathrm{s\_1096}]) = \frac{\mathrm{Vmax\_r\_0936} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0120r\_0936}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0936}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0936}}\right)^{1} \cdot \left([\mathrm{s\_0120}]^{1} \cdot [\mathrm{s\_0763\_b}]^{2} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0939}]^{1} \cdot [\mathrm{s\_1091}]^{1}}{\mathrm{Keq\_r\_0936}}\right)}{\left(1+\frac{[\mathrm{s\_0120}]}{\mathrm{kms\_s\_0120r\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0936}}\right) + \left(1+\frac{[\mathrm{s\_0939}]}{\mathrm{kmp\_s\_0939r\_0936}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0936}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1219)$$

Table 936: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0936`	Keq_r_0936		3.650		☑
`Vmax_r_0936`	Vmax_r_0936		0.864		☑
`kmp_s_0939r_0936`	kmp_s_0939r_0936		0.549		☑
`kmp_s_1091r_0936`	kmp_s_1091r_0936		0.549		☑
`kms_s_0120r_0936`	kms_s_0120r_0936		0.549		☑
`kms_s_0763_br_0936`	kms_s_0763_br_0936		0.549		☑
`kms_s_1096r_0936`	kms_s_1096r_0936		0.549		☑

7.234 Reaction `r_0937`

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name pyruvate carboxylase

Notes GENE_ASSOCIATION:(YBR218C or YGL062W)

Reaction equation

$$s\_0446 + s\_0458 + s\_1277 \xrightleftharpoons{s\_0400,\ s\_0446,\ s\_0458,\ s\_0763\_b,\ s\_1156,\ s\_1207,\ s\_1277} s\_0400 + s\_0763\_b + s\_1156 + \tag{1220}$$

Reactants

Table 937: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 938: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0458	bicarbonate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	
s_1207	phosphate [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 939: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1156	oxaloacetate(2-) [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{234} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_234}\left(\mathrm{Keq\_r\_0937}, \mathrm{Vmax\_r\_0937}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0937}, \mathrm{kmp\_s\_0763\_br\_0937}, \mathrm{kmp\_s\_1156r\_0937}, \mathrm{kmp\_s\_1207r\_0937}, \mathrm{kms\_s\_0446r\_0937}, \mathrm{kms\_s\_0458r\_0937}, \mathrm{kms\_s\_1277r\_0937}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1207}], [\mathrm{s\_1277}]\right) \tag{1221}$$

$$\mathrm{function\_234}\left(\mathrm{Keq\_r\_0937}, \mathrm{Vmax\_r\_0937}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0937}, \mathrm{kmp\_s\_0763\_br\_0937}, \mathrm{kmp\_s\_1156r\_0937}, \mathrm{kmp\_s\_1207r\_0937}, \mathrm{kms\_s\_0446r\_0937}, \mathrm{kms\_s\_0458r\_0937}, \mathrm{kms\_s\_1277r\_0937}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1207}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0937} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0937}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1156}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0937}}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0937}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1156}]}{\mathrm{kmp\_s\_1156r\_0937}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1222}$$

$$\mathrm{function\_234}\left(\mathrm{Keq\_r\_0937}, \mathrm{Vmax\_r\_0937}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_0937}, \mathrm{kmp\_s\_0763\_br\_0937}, \mathrm{kmp\_s\_1156r\_0937}, \mathrm{kmp\_s\_1207r\_0937}, \mathrm{kms\_s\_0446r\_0937}, \mathrm{kms\_s\_0458r\_0937}, \mathrm{kms\_s\_1277r\_0937}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0458}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1156}], [\mathrm{s\_1207}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0937} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0458r\_0937}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0937}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_0458}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1156}]^{1} \cdot [\mathrm{s}}{\mathrm{Keq\_r\_0937}}\right.}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0458}]}{\mathrm{kms\_s\_0458r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0937}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0937}}\right) \cdot \left(1+\frac{[\mathrm{s\_1156}]}{\mathrm{kmp\_s\_1156r\_0937}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1223}$$

Table 940: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0937`	Keq_r_0937		8.613		☑
`Vmax_r_0937`	Vmax_r_0937		62.238		☑
`kmp_s_0400r_0937`	kmp_s_0400r_0937		1.719		☑
`kmp_s_0763_br_0937`	kmp_s_0763_br_0937		0.549		☑
`kmp_s_1156r_0937`	kmp_s_1156r_0937		0.549		☑
`kmp_s_1207r_0937`	kmp_s_1207r_0937		0.549		☑
`kms_s_0446r_0937`	kms_s_0446r_0937		1.092		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0458r-_0937	kms_s_0458r_0937		0.549		☑
kms_s_1277r-_0937	kms_s_1277r_0937		0.061		☑

7.235 Reaction r_0938

This is a reversible reaction of two reactants forming two products influenced by five modifiers.

Name pyruvate decarboxylase

Notes GENE_ASSOCIATION:(YGR087C or YLR044C or YLR134W)

Reaction equation

$$s\_0763\_b + s\_1277 \xrightleftharpoons{s\_1277,\ s\_0763\_b,\ s\_1277,\ s\_0366,\ s\_0470} s\_0366 + s\_0470 \qquad (1224)$$

Reactants

Table 941: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 942: Properties of each modifier.

Id	Name	SBO
s_1277	pyruvate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1277	pyruvate [intracellular]	
s_0366	acetaldehyde [intracellular]	
s_0470	carbon dioxide [intracellular]	

Products

Table 943: Properties of each product.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0470	carbon dioxide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{235} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_235}\left(\mathrm{Vmax\_r\_0938}, \mathrm{kms\_s\_0763\_br\_0938}, \mathrm{kms\_s\_1277r\_0938}, \left[\mathrm{s\_0763\_b}\right], \left[\mathrm{s\_1277}\right], \left[\mathrm{s\_0366}\right], \left[\mathrm{s\_0470}\right], \mathrm{Keq\_r\_0938}, \mathrm{kmp\_s\_0366r\_0938}, \mathrm{kmp\_s\_0470r\_0938}, \left[\mathrm{s\_1277}\right], \mathrm{kmI\_s\_1277mr\_0938}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) \quad (1225)$$

$$\mathrm{function\_235}\left(\mathrm{Vmax\_r\_0938}, \mathrm{kms\_s\_0763\_br\_0938}, \mathrm{kms\_s\_1277r\_0938}, \left[\mathrm{s\_0763\_b}\right], \left[\mathrm{s\_1277}\right], \left[\mathrm{s\_0366}\right], \left[\mathrm{s\_0470}\right], \mathrm{Keq\_r\_0938}, \mathrm{kmp\_s\_0366r\_0938}, \mathrm{kmp\_s\_0470r\_0938}, \mathrm{s\_1277m}, \mathrm{kmI\_s\_1277mr\_0938}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) = \frac{\mathrm{Vmax\_r\_0938} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0938}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0938}}\right)^{1} \cdot \left(\left[\mathrm{s\_0763\_b}\right]^{1} \cdot \left[\mathrm{s\_1277}\right]^{1} - \frac{\left[\mathrm{s\_0366}\right]^{1} \cdot \left[\mathrm{s\_0470}\right]^{1}}{\mathrm{Keq\_r\_0938}}\right)}{\left(1 + \frac{\left[\mathrm{s\_0763\_b}\right]}{\mathrm{kms\_s\_0763\_br\_0938}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_1277}\right]}{\mathrm{kms\_s\_1277r\_0938}}\right) + \left(1 + \frac{\left[\mathrm{s\_0366}\right]}{\mathrm{kmp\_s\_0366r\_0938}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0470}\right]}{\mathrm{kmp\_s\_0470r\_0938}}\right) + 1 + \frac{\mathrm{s\_1277m}}{\mathrm{kmI\_s\_1277mr\_0938}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1226)$$

$$\mathrm{function\_235}\left(\mathrm{Vmax\_r\_0938}, \mathrm{kms\_s\_0763\_br\_0938}, \mathrm{kms\_s\_1277r\_0938}, \left[\mathrm{s\_0763\_b}\right], \left[\mathrm{s\_1277}\right], \left[\mathrm{s\_0366}\right], \left[\mathrm{s\_0470}\right], \mathrm{Keq\_r\_0938}, \mathrm{kmp\_s\_0366r\_0938}, \mathrm{kmp\_s\_0470r\_0938}, \mathrm{s\_1277m}, \mathrm{kmI\_s\_1277mr\_0938}, \mathrm{vol}\left(\mathrm{intracellular}\right)\right) = \frac{\mathrm{Vmax\_r\_0938} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0938}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0938}}\right)^{1} \cdot \left(\left[\mathrm{s\_0763\_b}\right]^{1} \cdot \left[\mathrm{s\_1277}\right]^{1} - \frac{\left[\mathrm{s\_0366}\right]^{1} \cdot \left[\mathrm{s\_0470}\right]^{1}}{\mathrm{Keq\_r\_0938}}\right)}{\left(1 + \frac{\left[\mathrm{s\_0763\_b}\right]}{\mathrm{kms\_s\_0763\_br\_0938}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_1277}\right]}{\mathrm{kms\_s\_1277r\_0938}}\right) + \left(1 + \frac{\left[\mathrm{s\_0366}\right]}{\mathrm{kmp\_s\_0366r\_0938}}\right) \cdot \left(1 + \frac{\left[\mathrm{s\_0470}\right]}{\mathrm{kmp\_s\_0470r\_0938}}\right) + 1 + \frac{\mathrm{s\_1277m}}{\mathrm{kmI\_s\_1277mr\_0938}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1227)$$

Table 944: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0938	Vmax_r_0938		77.767		☑
kms_s_0763-_br_0938	kms_s_0763_br-_0938		0.549		☑
kms_s_1277r-_0938	kms_s_1277r_0938		0.061		☑
Keq_r_0938	Keq_r_0938		3.972		☑
kmp_s_0366r-_0938	kmp_s_0366r_0938		0.120		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0470r-_0938	kmp_s_0470r_0938		1.000		☑
kmI_s-_1277mr_0938	kmI_s_1277mr-_0938		2.750		☑

7.236 Reaction r_0940

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name pyruvate dehydrogenase

Notes GENE_ASSOCIATION:(YBR221C and YER178W and YFL018C and YGR193C and YNL071W)

Reaction equation

$$s\_0514 + s\_1082 + s\_1277 \xrightleftharpoons{s\_0380,\ s\_0470,\ s\_0514,\ s\_1082,\ s\_1087,\ s\_1277} s\_0380 + s\_0470 + s\_1087 \tag{1228}$$

Reactants

Table 945: Properties of each reactant.

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1277	pyruvate [intracellular]	

Modifiers

Table 946: Properties of each modifier.

Id	Name	SBO
s_0380	acetyl-CoA [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 947: Properties of each product.

Id	Name	SBO
`s_0380`	acetyl-CoA [intracellular]	
`s_0470`	carbon dioxide [intracellular]	
`s_1087`	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{236} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_236}\left(\mathrm{Keq\_r\_0940}, \mathrm{Vmax\_r\_0940}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0380r\_0940}, \mathrm{kmp\_s\_0470r\_0940}, \mathrm{kmp\_s\_1087r\_0940}, \mathrm{kms\_s\_0514r\_0940}, \mathrm{kms\_s\_1082r\_0940}, \mathrm{kms\_s\_1277r\_0940}, [\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1277}]\right) \tag{1229}$$

$$\mathrm{function\_236}\left(\mathrm{Keq\_r\_0940}, \mathrm{Vmax\_r\_0940}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0380r\_0940}, \mathrm{kmp\_s\_0470r\_0940}, \mathrm{kmp\_s\_1087r\_0940}, \mathrm{kms\_s\_0514r\_0940}, \mathrm{kms\_s\_1082r\_0940}, \mathrm{kms\_s\_1277r\_0940}, [\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0940} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0514r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0940}}\right)^{1} \cdot \left([\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0940}}\right)}{\left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0940}}\right) + \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kmp\_s\_0380r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0940}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1230}$$

$$\mathrm{function\_236}\left(\mathrm{Keq\_r\_0940}, \mathrm{Vmax\_r\_0940}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0380r\_0940}, \mathrm{kmp\_s\_0470r\_0940}, \mathrm{kmp\_s\_1087r\_0940}, \mathrm{kms\_s\_0514r\_0940}, \mathrm{kms\_s\_1082r\_0940}, \mathrm{kms\_s\_1277r\_0940}, [\mathrm{s\_0380}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0940} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0514r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1082r\_0940}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1277r\_0940}}\right)^{1} \cdot \left([\mathrm{s\_0514}]^{1} \cdot [\mathrm{s\_1082}]^{1} \cdot [\mathrm{s\_1277}]^{1} - \frac{[\mathrm{s\_0380}]^{1} \cdot [\mathrm{s\_0470}]^{1} \cdot [\mathrm{s\_1087}]^{1}}{\mathrm{Keq\_r\_0940}}\right)}{\left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1082}]}{\mathrm{kms\_s\_1082r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kms\_s\_1277r\_0940}}\right) + \left(1+\frac{[\mathrm{s\_0380}]}{\mathrm{kmp\_s\_0380r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0940}}\right) \cdot \left(1+\frac{[\mathrm{s\_1087}]}{\mathrm{kmp\_s\_1087r\_0940}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1231}$$

Table 948: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0940`	Keq_r_0940		1.047		☑
`Vmax_r_0940`	Vmax_r_0940		9.455		☑
`kmp_s_0380r-_0940`	kmp_s_0380r_0940		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0470r-_0940	kmp_s_0470r_0940		1.000		☑
kmp_s_1087r-_0940	kmp_s_1087r_0940		0.087		☑
kms_s_0514r-_0940	kms_s_0514r_0940		0.549		☑
kms_s_1082r-_0940	kms_s_1082r_0940		1.503		☑
kms_s_1277r-_0940	kms_s_1277r_0940		0.061		☑

7.237 Reaction r_0941

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name pyruvate kinase

Notes GENE_ASSOCIATION:(YAL038W or YOR347C)

Reaction equation

$$\text{s\_0400} + \text{s\_0763\_b} + \text{s\_1243} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0763\_b, s\_1243, s\_1277}} \text{s\_0446} + \text{s\_1277} \tag{1232}$$

Reactants

Table 949: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1243	phosphoenolpyruvate [intracellular]	

Modifiers

Table 950: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	

Id	Name	SBO
s_1243	phosphoenolpyruvate [intracellular]	
s_1277	pyruvate [intracellular]	

Products

Table 951: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1277	pyruvate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{237} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_237}\left(\mathrm{Keq\_r\_0941}, \mathrm{Vmax\_r\_0941}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0941}, \mathrm{kmp\_s\_1277r\_0941}, \mathrm{kms\_s\_0400r\_0941}, \mathrm{kms\_s\_0763\_br\_0941}, \mathrm{kms\_s\_1243r\_0941}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1243}], [\mathrm{s\_1277}]\right) \quad (1233)$$

$$\mathrm{function\_237}\left(\mathrm{Keq\_r\_0941}, \mathrm{Vmax\_r\_0941}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0941}, \mathrm{kmp\_s\_1277r\_0941}, \mathrm{kms\_s\_0400r\_0941}, \mathrm{kms\_s\_0763\_br\_0941}, \mathrm{kms\_s\_1243r\_0941}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1243}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0941} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0941}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1243}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0941}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0941}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0941}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1234)$$

$$\mathrm{function\_237}\left(\mathrm{Keq\_r\_0941}, \mathrm{Vmax\_r\_0941}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0446r\_0941}, \mathrm{kmp\_s\_1277r\_0941}, \mathrm{kms\_s\_0400r\_0941}, \mathrm{kms\_s\_0763\_br\_0941}, \mathrm{kms\_s\_1243r\_0941}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1243}], [\mathrm{s\_1277}]\right) = \frac{\mathrm{Vmax\_r\_0941} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0941}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1243r\_0941}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1243}]^{1} - \frac{[\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1277}]^{1}}{\mathrm{Keq\_r\_0941}}\right)}{\left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1243}]}{\mathrm{kms\_s\_1243r\_0941}}\right) + \left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kmp\_s\_0446r\_0941}}\right) \cdot \left(1+\frac{[\mathrm{s\_1277}]}{\mathrm{kmp\_s\_1277r\_0941}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1235)$$

Table 952: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0941	Keq_r_0941		2.845		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0941	Vmax_r_0941		146.411		☑
kmp_s_0446r-_0941	kmp_s_0446r_0941		1.092		☑
kmp_s_1277r-_0941	kmp_s_1277r_0941		0.061		☑
kms_s_0400r-_0941	kms_s_0400r_0941		1.719		☑
kms_s_0763-_br_0941	kms_s_0763_br-_0941		0.549		☑
kms_s_1243r-_0941	kms_s_1243r_0941		0.027		☑

7.238 Reaction r_0948

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name riboflavin synthase

Notes GENE_ASSOCIATION:YOL143C

Reaction equation

$$\mathrm{s\_0163} + \mathrm{s\_0320} \xrightleftharpoons{\mathrm{s\_0163,\ s\_0320,\ s\_0335,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0335} + \mathrm{s\_1207} + 2\,\mathrm{s\_1434\_b} \tag{1236}$$

Reactants

Table 953: Properties of each reactant.

Id	Name	SBO
s_0163	2-hydroxy-3-oxobutyl phosphate [intracellular]	
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	

Modifiers

Table 954: Properties of each modifier.

Id	Name	SBO
s_0163	2-hydroxy-3-oxobutyl phosphate [intracellular]	
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	
s_0335	6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]	

Id	Name	SBO
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 955: Properties of each product.

Id	Name	SBO
s_0335	6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{238} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_238}(\mathrm{Keq\_r\_0948}, \mathrm{Vmax\_r\_0948}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0335r\_0948}, \mathrm{kmp\_s\_1207r\_0948}, \mathrm{kmp\_s\_1434\_br\_0948}, \mathrm{kms\_s\_0163r\_0948}, \mathrm{kms\_s\_0320r\_0948}, [\mathrm{s\_0163}], [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \tag{1237}$$

$$\mathrm{function\_238}(\mathrm{Keq\_r\_0948}, \mathrm{Vmax\_r\_0948}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0335r\_0948}, \mathrm{kmp\_s\_1207r\_0948}, \mathrm{kmp\_s\_1434\_br\_0948}, \mathrm{kms\_s\_0163r\_0948}, \mathrm{kms\_s\_0320r\_0948}, [\mathrm{s\_0163}], [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0948} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0163r\_0948}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0320r\_0948}}\right)^{1} \cdot \left([\mathrm{s\_0163}]^{1} \cdot [\mathrm{s\_0320}]^{1} - \frac{[\mathrm{s\_0335}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0948}}\right)}{\left(1+\frac{[\mathrm{s\_0163}]}{\mathrm{kms\_s\_0163r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kms\_s\_0320r\_0948}}\right) + \left(1+\frac{[\mathrm{s\_0335}]}{\mathrm{kmp\_s\_0335r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0948}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1238}$$

$$\mathrm{function\_238}(\mathrm{Keq\_r\_0948}, \mathrm{Vmax\_r\_0948}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0335r\_0948}, \mathrm{kmp\_s\_1207r\_0948}, \mathrm{kmp\_s\_1434\_br\_0948}, \mathrm{kms\_s\_0163r\_0948}, \mathrm{kms\_s\_0320r\_0948}, [\mathrm{s\_0163}], [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0948} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0163r\_0948}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0320r\_0948}}\right)^{1} \cdot \left([\mathrm{s\_0163}]^{1} \cdot [\mathrm{s\_0320}]^{1} - \frac{[\mathrm{s\_0335}]^{1} \cdot [\mathrm{s\_1207}]^{1} \cdot [\mathrm{s\_1434\_b}]^{2}}{\mathrm{Keq\_r\_0948}}\right)}{\left(1+\frac{[\mathrm{s\_0163}]}{\mathrm{kms\_s\_0163r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_0320}]}{\mathrm{kms\_s\_0320r\_0948}}\right) + \left(1+\frac{[\mathrm{s\_0335}]}{\mathrm{kmp\_s\_0335r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_0948}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0948}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1239}$$

Table 956: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0948	Keq_r_0948		0.332		☑
Vmax_r_0948	Vmax_r_0948		0.012		☑
kmp_s_0335r-_0948	kmp_s_0335r_0948		0.549		☑
kmp_s_1207r-_0948	kmp_s_1207r_0948		0.549		☑
kmp_s_1434-_br_0948	kmp_s_1434_br-_0948		0.549		☑
kms_s_0163r-_0948	kms_s_0163r_0948		0.549		☑
kms_s_0320r-_0948	kms_s_0320r_0948		0.549		☑

7.239 Reaction r_0949

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name riboflavin synthase_2

Notes GENE_ASSOCIATION:YBR256C

Reaction equation

$$2\,\mathrm{s\_0335} \xrightleftharpoons{\mathrm{s\_0320,\ s\_0335,\ s\_1283}} \mathrm{s\_0320} + \mathrm{s\_1283} \tag{1240}$$

Reactant

Table 957: Properties of each reactant.

Id	Name	SBO
s_0335	6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]	

Modifiers

Table 958: Properties of each modifier.

Id	Name	SBO
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	
s_0335	6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]	

Id	Name	SBO
s_1283	riboflavin [intracellular]	

Products

Table 959: Properties of each product.

Id	Name	SBO
s_0320	5-amino-6-(D-ribitylamino)uracil [intracellular]	
s_1283	riboflavin [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{239} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_239}\left(\mathrm{Keq\_r\_0949}, \mathrm{Vmax\_r\_0949}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0320r\_0949}, \mathrm{kmp\_s\_1283r\_0949}, \mathrm{kms\_s\_0335r\_0949}, [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1283}]\right) \quad (1241)$$

$$\mathrm{function\_239}\left(\mathrm{Keq\_r\_0949}, \mathrm{Vmax\_r\_0949}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0320r\_0949}, \mathrm{kmp\_s\_1283r\_0949}, \mathrm{kms\_s\_0335r\_0949}, [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1283}]\right) = \frac{\mathrm{Vmax\_r\_0949} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0335r\_0949}}\right)^{2} \cdot \left([\mathrm{s\_0335}]^{2} - \frac{[\mathrm{s\_0320}]^{1} \cdot [\mathrm{s\_1283}]^{1}}{\mathrm{Keq\_r\_0949}}\right)}{1 + \frac{[\mathrm{s\_0335}]}{\mathrm{kms\_s\_0335r\_0949}} + \left(1 + \frac{[\mathrm{s\_0320}]}{\mathrm{kmp\_s\_0320r\_0949}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1283}]}{\mathrm{kmp\_s\_1283r\_0949}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1242)$$

$$\mathrm{function\_239}\left(\mathrm{Keq\_r\_0949}, \mathrm{Vmax\_r\_0949}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0320r\_0949}, \mathrm{kmp\_s\_1283r\_0949}, \mathrm{kms\_s\_0335r\_0949}, [\mathrm{s\_0320}], [\mathrm{s\_0335}], [\mathrm{s\_1283}]\right) = \frac{\mathrm{Vmax\_r\_0949} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0335r\_0949}}\right)^{2} \cdot \left([\mathrm{s\_0335}]^{2} - \frac{[\mathrm{s\_0320}]^{1} \cdot [\mathrm{s\_1283}]^{1}}{\mathrm{Keq\_r\_0949}}\right)}{1 + \frac{[\mathrm{s\_0335}]}{\mathrm{kms\_s\_0335r\_0949}} + \left(1 + \frac{[\mathrm{s\_0320}]}{\mathrm{kmp\_s\_0320r\_0949}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1283}]}{\mathrm{kmp\_s\_1283r\_0949}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1243)$$

Table 960: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0949	Keq_r_0949		1.100		☑
Vmax_r_0949	Vmax_r_0949		0.003		☑
kmp_s_0320r-_0949	kmp_s_0320r_0949		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1283r-_0949	kmp_s_1283r_0949		0.549		☑
kms_s_0335r-_0949	kms_s_0335r_0949		0.549		☑

7.240 Reaction r_0951

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ribonucleoside-diphosphate reductase

Notes GENE_ASSOCIATION:((YER070W and YGR180C and YGR209C) or (YER070W and YGR180C and YLR043C) or (YGR180C and YGR209C and YIL066C) or (YGR180C and YIL066C and YLR043C)) or ((YER070W and YGR209C and YJL026W) or (YER070W and YJL026W and YLR043C) or (YGR209C and YIL066C and YJL026W) or (YIL066C and YJL026W and YLR043C))

Reaction equation

$$s\_0400 + s\_1521 \xrightleftharpoons{s\_0400,\ s\_0562,\ s\_1434\_b,\ s\_1517,\ s\_1521} s\_0562 + s\_1434\_b + s\_1517 \tag{1244}$$

Reactants

Table 961: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Modifiers

Table 962: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0562	dADP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 963: Properties of each product.

Id	Name	SBO
s_0562	dADP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{240} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_240}(\mathrm{Keq\_r\_0951}, \mathrm{Vmax\_r\_0951}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0951}, \mathrm{kmp\_s\_1434\_br\_0951}, \mathrm{kmp\_s\_1517r\_0951}, \mathrm{kms\_s\_0400r\_0951}, \mathrm{kms\_s\_1521r\_0951}, [\mathrm{s\_0400}], [\mathrm{s\_0562}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \tag{1245}$$

$$\mathrm{function\_240}(\mathrm{Keq\_r\_0951}, \mathrm{Vmax\_r\_0951}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0951}, \mathrm{kmp\_s\_1434\_br\_0951}, \mathrm{kmp\_s\_1517r\_0951}, \mathrm{kms\_s\_0400r\_0951}, \mathrm{kms\_s\_1521r\_0951}, [\mathrm{s\_0400}], [\mathrm{s\_0562}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0951} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0951}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0951}}\right)^1 \cdot \left([\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_1521}]^1 - \frac{[\mathrm{s\_0562}]^1 \cdot [\mathrm{s\_1434\_b}]^1 \cdot [\mathrm{s\_1517}]^1}{\mathrm{Keq\_r\_0951}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0951}}\right) + \left(1 + \frac{[\mathrm{s\_0562}]}{\mathrm{kmp\_s\_0562r\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0951}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1246}$$

$$\mathrm{function\_240}(\mathrm{Keq\_r\_0951}, \mathrm{Vmax\_r\_0951}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0562r\_0951}, \mathrm{kmp\_s\_1434\_br\_0951}, \mathrm{kmp\_s\_1517r\_0951}, \mathrm{kms\_s\_0400r\_0951}, \mathrm{kms\_s\_1521r\_0951}, [\mathrm{s\_0400}], [\mathrm{s\_0562}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0951} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_0951}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0951}}\right)^1 \cdot \left([\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_1521}]^1 - \frac{[\mathrm{s\_0562}]^1 \cdot [\mathrm{s\_1434\_b}]^1 \cdot [\mathrm{s\_1517}]^1}{\mathrm{Keq\_r\_0951}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0951}}\right) + \left(1 + \frac{[\mathrm{s\_0562}]}{\mathrm{kmp\_s\_0562r\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0951}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0951}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1247}$$

Table 964: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0951	Keq_r_0951		0.193		☑
Vmax_r_0951	Vmax_r_0951		0.012		☑
kmp_s_0562r_0951	kmp_s_0562r_0951		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1434-_br_0951	kmp_s_1434_br-_0951		0.549		☑
kmp_s_1517r-_0951	kmp_s_1517r_0951		0.549		☑
kms_s_0400r-_0951	kms_s_0400r_0951		1.719		☑
kms_s_1521r-_0951	kms_s_1521r_0951		0.549		☑

7.241 Reaction r_0955

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ribonucleoside-diphosphate reductase (GDP)

Notes GENE_ASSOCIATION:((YER070W and YGR209C and YJL026W) or (YER070W and YJL026W and YLR043C)) or ((YER070W and YGR180C and YGR209C) or (YER070W and YGR180C and YLR043C))

Reaction equation

$$\mathrm{s\_0706} + \mathrm{s\_1521} \xrightleftharpoons[]{\mathrm{s\_0591,\ s\_0706,\ s\_1434\_b,\ s\_1517,\ s\_1521}} \mathrm{s\_0591} + \mathrm{s\_1434\_b} + \mathrm{s\_1517} \tag{1248}$$

Reactants

Table 965: Properties of each reactant.

Id	Name	SBO
s_0706	GDP [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Modifiers

Table 966: Properties of each modifier.

Id	Name	SBO
s_0591	dGDP [intracellular]	
s_0706	GDP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Id	Name	SBO
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 967: Properties of each product.

Id	Name	SBO
s_0591	dGDP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{241} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_241}(\mathrm{Keq\_r\_0955}, \mathrm{Vmax\_r\_0955}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0591r\_0955}, \mathrm{kmp\_s\_1434\_br\_0955}, \mathrm{kmp\_s\_1517r\_0955}, \mathrm{kms\_s\_0706r\_0955}, \mathrm{kms\_s\_1521r\_0955}, [\mathrm{s\_0591}], [\mathrm{s\_0706}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \quad (1249)$$

$$\mathrm{function\_241}(\mathrm{Keq\_r\_0955}, \mathrm{Vmax\_r\_0955}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0591r\_0955}, \mathrm{kmp\_s\_1434\_br\_0955}, \mathrm{kmp\_s\_1517r\_0955}, \mathrm{kms\_s\_0706r\_0955}, \mathrm{kms\_s\_1521r\_0955}, [\mathrm{s\_0591}], [\mathrm{s\_0706}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0955} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0706r\_0955}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0955}}\right)^1 \cdot \left([\mathrm{s\_0706}]^1 \cdot [\mathrm{s\_1521}]^1 - \frac{[\mathrm{s\_0591}]^1 \cdot [\mathrm{s\_1434\_b}]^1 \cdot [\mathrm{s\_1517}]^1}{\mathrm{Keq\_r\_0955}}\right)}{\left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kms\_s\_0706r\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0955}}\right) + \left(1+\frac{[\mathrm{s\_0591}]}{\mathrm{kmp\_s\_0591r\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0955}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1250)$$

$$\mathrm{function\_241}(\mathrm{Keq\_r\_0955}, \mathrm{Vmax\_r\_0955}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0591r\_0955}, \mathrm{kmp\_s\_1434\_br\_0955}, \mathrm{kmp\_s\_1517r\_0955}, \mathrm{kms\_s\_0706r\_0955}, \mathrm{kms\_s\_1521r\_0955}, [\mathrm{s\_0591}], [\mathrm{s\_0706}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0955} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0706r\_0955}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0955}}\right)^1 \cdot \left([\mathrm{s\_0706}]^1 \cdot [\mathrm{s\_1521}]^1 - \frac{[\mathrm{s\_0591}]^1 \cdot [\mathrm{s\_1434\_b}]^1 \cdot [\mathrm{s\_1517}]^1}{\mathrm{Keq\_r\_0955}}\right)}{\left(1+\frac{[\mathrm{s\_0706}]}{\mathrm{kms\_s\_0706r\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0955}}\right) + \left(1+\frac{[\mathrm{s\_0591}]}{\mathrm{kmp\_s\_0591r\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0955}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0955}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1251)$$

Table 968: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0955	Keq_r_0955		0.604		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_0955	Vmax_r_0955		0.016		☑
kmp_s_0591r-_0955	kmp_s_0591r_0955		0.549		☑
kmp_s_1434-_br_0955	kmp_s_1434_br-_0955		0.549		☑
kmp_s_1517r-_0955	kmp_s_1517r_0955		0.549		☑
kms_s_0706r-_0955	kms_s_0706r_0955		0.549		☑
kms_s_1521r-_0955	kms_s_1521r_0955		0.549		☑

7.242 Reaction r_0957

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ribonucleoside-diphosphate reductase (UDP)

Notes GENE_ASSOCIATION:((YER070W and YGR209C and YJL026W) or (YER070W and YJL026W and YLR043C)) or ((YER070W and YGR180C and YGR209C) or (YER070W and YGR180C and YLR043C))

Reaction equation

$$\mathrm{s\_1411} + \mathrm{s\_1521} \xrightleftharpoons{\mathrm{s\_0622,\ s\_1411,\ s\_1434\_b,\ s\_1517,\ s\_1521}} \mathrm{s\_0622} + \mathrm{s\_1434\_b} + \mathrm{s\_1517} \tag{1252}$$

Reactants

Table 969: Properties of each reactant.

Id	Name	SBO
s_1411	UDP [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Modifiers

Table 970: Properties of each modifier.

Id	Name	SBO
s_0622	dUDP [intracellular]	

Id	Name	SBO
s_1411	UDP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 971: Properties of each product.

Id	Name	SBO
s_0622	dUDP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{242} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_242}(\mathrm{Keq\_r\_0957}, \mathrm{Vmax\_r\_0957}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0622r\_0957}, \mathrm{kmp\_s\_1434\_br\_0957}, \mathrm{kmp\_s\_1517r\_0957}, \mathrm{kms\_s\_1411r\_0957}, \mathrm{kms\_s\_1521r\_0957}, [\mathrm{s\_0622}], [\mathrm{s\_1411}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \quad (1253)$$

$$\mathrm{function\_242}(\mathrm{Keq\_r\_0957}, \mathrm{Vmax\_r\_0957}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0622r\_0957}, \mathrm{kmp\_s\_1434\_br\_0957}, \mathrm{kmp\_s\_1517r\_0957}, \mathrm{kms\_s\_1411r\_0957}, \mathrm{kms\_s\_1521r\_0957}, [\mathrm{s\_0622}], [\mathrm{s\_1411}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0957} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1411r\_0957}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0957}}\right)^{1} \cdot \left([\mathrm{s\_1411}]^{1} \cdot [\mathrm{s\_1521}]^{1} - \frac{[\mathrm{s\_0622}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} \cdot [\mathrm{s\_1517}]^{1}}{\mathrm{Keq\_r\_0957}}\right)}{\left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kms\_s\_1411r\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0957}}\right) + \left(1 + \frac{[\mathrm{s\_0622}]}{\mathrm{kmp\_s\_0622r\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0957}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1254)$$

$$\mathrm{function\_242}(\mathrm{Keq\_r\_0957}, \mathrm{Vmax\_r\_0957}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0622r\_0957}, \mathrm{kmp\_s\_1434\_br\_0957}, \mathrm{kmp\_s\_1517r\_0957}, \mathrm{kms\_s\_1411r\_0957}, \mathrm{kms\_s\_1521r\_0957}, [\mathrm{s\_0622}], [\mathrm{s\_1411}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0957} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1411r\_0957}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0957}}\right)^{1} \cdot \left([\mathrm{s\_1411}]^{1} \cdot [\mathrm{s\_1521}]^{1} - \frac{[\mathrm{s\_0622}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} \cdot [\mathrm{s\_1517}]^{1}}{\mathrm{Keq\_r\_0957}}\right)}{\left(1 + \frac{[\mathrm{s\_1411}]}{\mathrm{kms\_s\_1411r\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0957}}\right) + \left(1 + \frac{[\mathrm{s\_0622}]}{\mathrm{kmp\_s\_0622r\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0957}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0957}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1255)$$

Table 972: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0957	Keq_r_0957		0.604		☑
Vmax_r_0957	Vmax_r_0957		0.040		☑
kmp_s_0622r-_0957	kmp_s_0622r_0957		0.549		☑
kmp_s_1434-_br_0957	kmp_s_1434_br-_0957		0.549		☑
kmp_s_1517r-_0957	kmp_s_1517r_0957		0.549		☑
kms_s_1411r-_0957	kms_s_1411r_0957		0.549		☑
kms_s_1521r-_0957	kms_s_1521r_0957		0.549		☑

7.243 Reaction r_0959

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name ribonucleoside-triphosphate reductase (ATP)

Notes GENE_ASSOCIATION:(YGR209C or YLR043C)

Reaction equation

$$\text{s\_0446} + \text{s\_1521} \xrightleftharpoons{\text{s\_0446, s\_0566, s\_1434\_b, s\_1517, s\_1521}} \text{s\_0566} + \text{s\_1434\_b} + \text{s\_1517} \quad (1256)$$

Reactants

Table 973: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Modifiers

Table 974: Properties of each modifier.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0566	dATP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 975: Properties of each product.

Id	Name	SBO
s_0566	dATP [intracellular]	
s_1434_b	water [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{243} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_243}(\mathrm{Keq\_r\_0959}, \mathrm{Vmax\_r\_0959}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0566r\_0959}, \mathrm{kmp\_s\_1434\_br\_0959}, \mathrm{kmp\_s\_1517r\_0959}, \mathrm{kms\_s\_0446r\_0959}, \mathrm{kms\_s\_1521r\_0959}, [\mathrm{s\_0446}], [\mathrm{s\_0566}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \tag{1257}$$

$$\mathrm{function\_243}(\mathrm{Keq\_r\_0959}, \mathrm{Vmax\_r\_0959}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0566r\_0959}, \mathrm{kmp\_s\_1434\_br\_0959}, \mathrm{kmp\_s\_1517r\_0959}, \mathrm{kms\_s\_0446r\_0959}, \mathrm{kms\_s\_1521r\_0959}, [\mathrm{s\_0446}], [\mathrm{s\_0566}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0959} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0959}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0959}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1521}]^{1} - \frac{[\mathrm{s\_0566}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} \cdot [\mathrm{s\_1517}]^{1}}{\mathrm{Keq\_r\_0959}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0959}}\right) + \left(1+\frac{[\mathrm{s\_0566}]}{\mathrm{kmp\_s\_0566r\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0959}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1258}$$

$$\mathrm{function\_243}(\mathrm{Keq\_r\_0959}, \mathrm{Vmax\_r\_0959}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0566r\_0959}, \mathrm{kmp\_s\_1434\_br\_0959}, \mathrm{kmp\_s\_1517r\_0959}, \mathrm{kms\_s\_0446r\_0959}, \mathrm{kms\_s\_1521r\_0959}, [\mathrm{s\_0446}], [\mathrm{s\_0566}], [\mathrm{s\_1434\_b}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) = \frac{\mathrm{Vmax\_r\_0959} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0959}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1521r\_0959}}\right)^{1} \cdot \left([\mathrm{s\_0446}]^{1} \cdot [\mathrm{s\_1521}]^{1} - \frac{[\mathrm{s\_0566}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} \cdot [\mathrm{s\_1517}]^{1}}{\mathrm{Keq\_r\_0959}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kms\_s\_1521r\_0959}}\right) + \left(1+\frac{[\mathrm{s\_0566}]}{\mathrm{kmp\_s\_0566r\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0959}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kmp\_s\_1517r\_0959}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1259}$$

Table 976: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0959	Keq_r_0959		0.304		☑
Vmax_r_0959	Vmax_r_0959		0.012		☑
kmp_s_0566r_0959	kmp_s_0566r_0959		0.549		☑
kmp_s_1434_br_0959	kmp_s_1434_br_0959		0.549		☑
kmp_s_1517r_0959	kmp_s_1517r_0959		0.549		☑
kms_s_0446r_0959	kms_s_0446r_0959		1.092		☑
kms_s_1521r_0959	kms_s_1521r_0959		0.549		☑

7.244 Reaction r_0963

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name ribose-5-phosphate isomerase

Notes GENE_ASSOCIATION:YOR095C

Reaction equation

$$s\_0557 \xrightleftharpoons{s\_0427,\ s\_0557} s\_0427 \qquad (1260)$$

Reactant

Table 977: Properties of each reactant.

Id	Name	SBO
s_0557	D-ribulose 5-phosphate [intracellular]	

Modifiers

Table 978: Properties of each modifier.

Id	Name	SBO
s_0427	alpha-D-ribose 5-phosphate [intracellular]	
s_0557	D-ribulose 5-phosphate [intracellular]	

Product

Table 979: Properties of each product.

Id	Name	SBO
s_0427	alpha-D-ribose 5-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{244} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_244}(\mathrm{Keq\_r\_0963}, \mathrm{Vmax\_r\_0963}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_0963}, \mathrm{kms\_s\_0557r\_0963}, [\mathrm{s\_0427}], [\mathrm{s\_0557}]) \quad (1261)$$

$$\mathrm{function\_244}(\mathrm{Keq\_r\_0963}, \mathrm{Vmax\_r\_0963}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_0963}, \mathrm{kms\_s\_0557r\_0963}, [\mathrm{s\_0427}], [\mathrm{s\_0557}]) = \frac{\mathrm{Vmax\_r\_0963} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0557r\_0963}}\right)^{1} \cdot \left([\mathrm{s\_0557}]^{1} - \frac{[\mathrm{s\_0427}]^{1}}{\mathrm{Keq\_r\_0963}}\right)}{1 + \frac{[\mathrm{s\_0557}]}{\mathrm{kms\_s\_0557r\_0963}} + 1 + \frac{[\mathrm{s\_0427}]}{\mathrm{kmp\_s\_0427r\_0963}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1262)$$

$$\mathrm{function\_244}(\mathrm{Keq\_r\_0963}, \mathrm{Vmax\_r\_0963}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_0963}, \mathrm{kms\_s\_0557r\_0963}, [\mathrm{s\_0427}], [\mathrm{s\_0557}]) = \frac{\mathrm{Vmax\_r\_0963} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0557r\_0963}}\right)^{1} \cdot \left([\mathrm{s\_0557}]^{1} - \frac{[\mathrm{s\_0427}]^{1}}{\mathrm{Keq\_r\_0963}}\right)}{1 + \frac{[\mathrm{s\_0557}]}{\mathrm{kms\_s\_0557r\_0963}} + 1 + \frac{[\mathrm{s\_0427}]}{\mathrm{kmp\_s\_0427r\_0963}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1263)$$

Table 980: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0963	Keq_r_0963		1.100		☑
Vmax_r_0963	Vmax_r_0963		0.554		☑
kmp_s_0427r-_0963	kmp_s_0427r_0963		0.549		☑
kms_s_0557r-_0963	kms_s_0557r_0963		0.549		☑

7.245 Reaction r_0965

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name ribulose 5-phosphate 3-epimerase

Notes GENE_ASSOCIATION:YJL121C

Reaction equation

$$\text{s\_0561} \xrightleftharpoons{\text{s\_0557, s\_0561}} \text{s\_0557} \tag{1264}$$

Reactant

Table 981: Properties of each reactant.

Id	Name	SBO
s_0561	D-xylulose 5-phosphate [intracellular]	

Modifiers

Table 982: Properties of each modifier.

Id	Name	SBO
s_0557	D-ribulose 5-phosphate [intracellular]	
s_0561	D-xylulose 5-phosphate [intracellular]	

Product

Table 983: Properties of each product.

Id	Name	SBO
s_0557	D-ribulose 5-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{245} = \text{vol}(\text{intracellular}) \cdot \text{function\_245}(\text{Keq\_r\_0965}, \text{Vmax\_r\_0965}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0557r\_0965}, \text{kms\_s\_0561r\_0965}, [\text{s\_0557}], [\text{s\_0561}]) \tag{1265}$$

$$\begin{aligned}&\text{function\_245}\left(\text{Keq\_r\_0965}, \text{Vmax\_r\_0965}, \text{vol}\left(\text{intracellular}\right),\right.\\&\left.\text{kmp\_s\_0557r\_0965}, \text{kms\_s\_0561r\_0965}, [\text{s\_0557}],\right.\\&\left.[\text{s\_0561}]\right) = \frac{\text{Vmax\_r\_0965} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0561r\_0965}}\right)^{1} \cdot \left([\text{s\_0561}]^{1} - \frac{[\text{s\_0557}]^{1}}{\text{Keq\_r\_0965}}\right)}{1+\frac{[\text{s\_0561}]}{\text{kms\_s\_0561r\_0965}}+1+\frac{[\text{s\_0557}]}{\text{kmp\_s\_0557r\_0965}}-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \quad (1266)$$

$$\begin{aligned}&\text{function\_245}\left(\text{Keq\_r\_0965}, \text{Vmax\_r\_0965}, \text{vol}\left(\text{intracellular}\right),\right.\\&\left.\text{kmp\_s\_0557r\_0965}, \text{kms\_s\_0561r\_0965}, [\text{s\_0557}],\right.\\&\left.[\text{s\_0561}]\right) = \frac{\text{Vmax\_r\_0965} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0561r\_0965}}\right)^{1} \cdot \left([\text{s\_0561}]^{1} - \frac{[\text{s\_0557}]^{1}}{\text{Keq\_r\_0965}}\right)}{1+\frac{[\text{s\_0561}]}{\text{kms\_s\_0561r\_0965}}+1+\frac{[\text{s\_0557}]}{\text{kmp\_s\_0557r\_0965}}-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \quad (1267)$$

Table 984: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0965	Keq_r_0965		1.100		☑
Vmax_r_0965	Vmax_r_0965		0.558		☑
kmp_s_0557r-_0965	kmp_s_0557r_0965		0.549		☑
kms_s_0561r-_0965	kms_s_0561r_0965		0.549		☑

7.246 Reaction r_0967

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name S-adenosyl-methionine delta-24-sterol-c-methyltransferase

Notes GENE_ASSOCIATION:YML008C

Reaction equation

$$\text{s\_1293} + \text{s\_1447} \xrightleftharpoons{\text{s\_0669, s\_0763\_b, s\_1290, s\_1293, s\_1447}} \text{s\_0669} + \text{s\_0763\_b} + \text{s\_1290} \quad (1268)$$

Reactants

Table 985: Properties of each reactant.

Id	Name	SBO
s_1293	S-adenosyl-L-methionine [intracellular]	
s_1447	zymosterol [intracellular]	

Modifiers

Table 986: Properties of each modifier.

Id	Name	SBO
s_0669	fecosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	
s_1293	S-adenosyl-L-methionine [intracellular]	
s_1447	zymosterol [intracellular]	

Products

Table 987: Properties of each product.

Id	Name	SBO
s_0669	fecosterol [intracellular]	
s_0763_b	H+ [intracellular]	
s_1290	S-adenosyl-L-homocysteine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{246} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_246}\left(\mathrm{Keq\_r\_0967}, \mathrm{Vmax\_r\_0967}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0669r\_0967}, \mathrm{kmp\_s\_0763\_br\_0967}, \mathrm{kmp\_s\_1290r\_0967}, \mathrm{kms\_s\_1293r\_0967}, \mathrm{kms\_s\_1447r\_0967}, [\mathrm{s\_0669}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1290}], [\mathrm{s\_1293}], [\mathrm{s\_1447}]\right) \tag{1269}$$

$$\mathrm{function\_246}\left(\mathrm{Keq\_r\_0967}, \mathrm{Vmax\_r\_0967}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0669r\_0967}, \mathrm{kmp\_s\_0763\_br\_0967}, \mathrm{kmp\_s\_1290r\_0967}, \mathrm{kms\_s\_1293r\_0967}, \mathrm{kms\_s\_1447r\_0967}, [\mathrm{s\_0669}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1290}], [\mathrm{s\_1293}], [\mathrm{s\_1447}]\right) = \frac{\mathrm{Vmax\_r\_0967} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1293r\_0967}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1447r\_0967}}\right)^{1} \cdot \left([\mathrm{s\_1293}]^{1} \cdot [\mathrm{s\_1447}]^{1} - \frac{[\mathrm{s\_0669}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1290}]^{1}}{\mathrm{Keq\_r\_0967}}\right)}{\left(1 + \frac{[\mathrm{s\_1293}]}{\mathrm{kms\_s\_1293r\_0967}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1447}]}{\mathrm{kms\_s\_1447r\_0967}}\right) + \left(1 + \frac{[\mathrm{s\_0669}]}{\mathrm{kmp\_s\_0669r\_0967}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0967}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1290}]}{\mathrm{kmp\_s\_1290r\_0967}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1270}$$

$$\text{function\_246}\left(\text{Keq\_r\_0967}, \text{Vmax\_r\_0967}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0669r\_0967}, \text{kmp\_s\_0763\_br\_0967}, \text{kmp\_s\_1290r\_0967}, \text{kms\_s\_1293r\_0967}, \text{kms\_s\_1447r\_0967}, [\text{s\_0669}], [\text{s\_0763\_b}], [\text{s\_1290}], [\text{s\_1293}], [\text{s\_1447}]\right) = \frac{\text{Vmax\_r\_0967} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1293r\_0967}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1447r\_0967}}\right)^{1} \cdot \left([\text{s\_1293}]^{1} \cdot [\text{s\_1447}]^{1} - \frac{[\text{s\_0669}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1290}]^{1}}{\text{Keq\_r\_0967}}\right)}{\left(1+\frac{[\text{s\_1293}]}{\text{kms\_s\_1293r\_0967}}\right) \cdot \left(1+\frac{[\text{s\_1447}]}{\text{kms\_s\_1447r\_0967}}\right) + \left(1+\frac{[\text{s\_0669}]}{\text{kmp\_s\_0669r\_0967}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0967}}\right) \cdot \left(1+\frac{[\text{s\_1290}]}{\text{kmp\_s\_1290r\_0967}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1271}$$

Table 988: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0967	Keq_r_0967		0.604		☑
Vmax_r_0967	Vmax_r_0967		0.001		☑
kmp_s_0669r-_0967	kmp_s_0669r_0967		0.549		☑
kmp_s_0763-_br_0967	kmp_s_0763_br-_0967		0.549		☑
kmp_s_1290r-_0967	kmp_s_1290r_0967		0.549		☑
kms_s_1293r-_0967	kms_s_1293r_0967		0.549		☑
kms_s_1447r-_0967	kms_s_1447r_0967		0.549		☑

7.247 Reaction r_0969

This is a reversible reaction of three reactants forming four products influenced by seven modifiers.

Name saccharopine dehydrogenase (NAD, L-lysine forming)

Notes GENE_ASSOCIATION:YIR034C

Reaction equation

$$\text{s\_0942} + \text{s\_1082} + \text{s\_1434\_b} \xrightleftharpoons{\text{s\_0185, s\_0763\_b, s\_0929, s\_0942, s\_1082, s\_1087, s\_1434\_b}} \text{s\_0185} + \text{s\_0763\_b} + \text{s\_09} \tag{1272}$$

Reactants

Table 989: Properties of each reactant.

Id	Name	SBO
s_0942	L-saccharopine [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 990: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0929	L-lysine [intracellular]	
s_0942	L-saccharopine [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 991: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0763_b	H+ [intracellular]	
s_0929	L-lysine [intracellular]	
s_1087	NADH [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{247} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_247}\left(\mathrm{Keq\_r\_0969}, \mathrm{Vmax\_r\_0969}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_0969}, \mathrm{kmp\_s\_0763\_br\_0969}, \mathrm{kmp\_s\_0929r\_0969}, \mathrm{kmp\_s\_1087r\_0969}, \mathrm{kms\_s\_0942r\_0969}, \mathrm{kms\_s\_1082r\_0969}, \mathrm{kms\_s\_1434\_br\_0969}, [\mathrm{s\_0185}], [\mathrm{s\_0763\_b}], [\mathrm{s\_0929}], [\mathrm{s\_0942}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1434\_b}]\right) \quad (1273)$$

$$\text{function\_247}\left(\text{Keq\_r\_0969}, \text{Vmax\_r\_0969}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0185r\_0969}, \text{kmp\_s\_0763\_br\_0969}, \text{kmp\_s\_0929r\_0969}, \text{kmp\_s\_1087r\_0969}, \text{kms\_s\_0942r\_0969}, \text{kms\_s\_1082r\_0969}, \text{kms\_s\_1434\_br\_0969}, [\text{s\_0185}], [\text{s\_0763\_b}], [\text{s\_0929}], [\text{s\_0942}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0969} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0942r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0969}}\right)^{1} \cdot \left([\text{s\_0942}]^{1} \cdot [\text{s\_1082}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0929}]}{\text{Keq\_r\_0969}}\right.}{\left(1 + \frac{[\text{s\_0942}]}{\text{kms\_s\_0942r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0969}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_0929}]}{\text{kmp\_s\_0929r\_0969}}\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{1274}$$

$$\text{function\_247}\left(\text{Keq\_r\_0969}, \text{Vmax\_r\_0969}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0185r\_0969}, \text{kmp\_s\_0763\_br\_0969}, \text{kmp\_s\_0929r\_0969}, \text{kmp\_s\_1087r\_0969}, \text{kms\_s\_0942r\_0969}, \text{kms\_s\_1082r\_0969}, \text{kms\_s\_1434\_br\_0969}, [\text{s\_0185}], [\text{s\_0763\_b}], [\text{s\_0929}], [\text{s\_0942}], [\text{s\_1082}], [\text{s\_1087}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0969} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0942r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1082r\_0969}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1434\_br\_0969}}\right)^{1} \cdot \left([\text{s\_0942}]^{1} \cdot [\text{s\_1082}]^{1} \cdot [\text{s\_1434\_b}]^{1} - \frac{[\text{s\_0185}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_0929}]}{\text{Keq\_r\_0969}}\right.}{\left(1 + \frac{[\text{s\_0942}]}{\text{kms\_s\_0942r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_1082}]}{\text{kms\_s\_1082r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kms\_s\_1434\_br\_0969}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_0969}}\right) \cdot \left(1 + \frac{[\text{s\_0929}]}{\text{kmp\_s\_0929r\_0969}}\right.}}{\text{vol}\left(\text{intracellular}\right)} \tag{1275}$$

Table 992: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0969`	Keq_r_0969		0.035		☑
`Vmax_r_0969`	Vmax_r_0969		3.365		☑
`kmp_s_0185r-_0969`	kmp_s_0185r_0969		0.549		☑
`kmp_s_0763-_br_0969`	kmp_s_0763_br-_0969		0.549		☑
`kmp_s_0929r-_0969`	kmp_s_0929r_0969		0.549		☑
`kmp_s_1087r-_0969`	kmp_s_1087r_0969		0.087		☑
`kms_s_0942r-_0969`	kms_s_0942r_0969		0.549		☑
`kms_s_1082r-_0969`	kms_s_1082r_0969		1.503		☑
`kms_s_1434-_br_0969`	kms_s_1434_br-_0969		0.549		☑

7.248 Reaction `r_0970`

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name saccharopine dehydrogenase (NADP, L-glutamate forming)

Notes GENE_ASSOCIATION:YNR050C

Reaction equation

$$s\_0763\_b + s\_0867 + s\_0899 + s\_1096 \xrightleftharpoons{s\_0763\_b,\ s\_0867,\ s\_0899,\ s\_0942,\ s\_1091,\ s\_1096,\ s\_1434\_b} s\_0942 + s\_1091 \quad (1276)$$

Reactants

Table 993: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0867	L-allysine [intracellular]	
s_0899	L-glutamate [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 994: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0867	L-allysine [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0942	L-saccharopine [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 995: Properties of each product.

Id	Name	SBO
s_0942	L-saccharopine [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{248} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_248}\left(\mathrm{Keq\_r\_0970}, \mathrm{Vmax\_r\_0970}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0942r\_0970}, \mathrm{kmp\_s\_1091r\_0970}, \mathrm{kmp\_s\_1434\_br\_0970}, \mathrm{kms\_s\_0763\_br\_0970}, \mathrm{kms\_s\_0867r\_0970}, \mathrm{kms\_s\_0899r\_0970}, \mathrm{kms\_s\_1096r\_0970}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0867}], [\mathrm{s\_0899}], [\mathrm{s\_0942}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) \quad (1277)$$

$$\mathrm{function\_248}\left(\mathrm{Keq\_r\_0970}, \mathrm{Vmax\_r\_0970}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0942r\_0970}, \mathrm{kmp\_s\_1091r\_0970}, \mathrm{kmp\_s\_1434\_br\_0970}, \mathrm{kms\_s\_0763\_br\_0970}, \mathrm{kms\_s\_0867r\_0970}, \mathrm{kms\_s\_0899r\_0970}, \mathrm{kms\_s\_1096r\_0970}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0867}], [\mathrm{s\_0899}], [\mathrm{s\_0942}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0970} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0867r\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0970}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0867}]^{1} \cdot [\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0942}]}{\ldots}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0867}]}{\mathrm{kms\_s\_0867r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0970}}\right) + \left(1 + \frac{[\mathrm{s\_0942}]}{\mathrm{kmp\_s\_0942r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0970}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1278)$$

$$\mathrm{function\_248}\left(\mathrm{Keq\_r\_0970}, \mathrm{Vmax\_r\_0970}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0942r\_0970}, \mathrm{kmp\_s\_1091r\_0970}, \mathrm{kmp\_s\_1434\_br\_0970}, \mathrm{kms\_s\_0763\_br\_0970}, \mathrm{kms\_s\_0867r\_0970}, \mathrm{kms\_s\_0899r\_0970}, \mathrm{kms\_s\_1096r\_0970}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0867}], [\mathrm{s\_0899}], [\mathrm{s\_0942}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0970} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0867r\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0899r\_0970}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0970}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_0867}]^{1} \cdot [\mathrm{s\_0899}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0942}]}{\ldots}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0867}]}{\mathrm{kms\_s\_0867r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0899}]}{\mathrm{kms\_s\_0899r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0970}}\right) + \left(1 + \frac{[\mathrm{s\_0942}]}{\mathrm{kmp\_s\_0942r\_0970}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0970}}\right) \cdot \ldots}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1279)$$

Table 996: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0970	Keq_r_0970		2.004		☑
Vmax_r_0970	Vmax_r_0970		3.365		☑
kmp_s_0942r_0970	kmp_s_0942r_0970		0.549		☑
kmp_s_1091r_0970	kmp_s_1091r_0970		0.549		☑
kmp_s_1434_br_0970	kmp_s_1434_br_0970		0.549		☑
kms_s_0763_br_0970	kms_s_0763_br_0970		0.549		☑
kms_s_0867r_0970	kms_s_0867r_0970		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0899r-_0970	kms_s_0899r_0970		0.549		☑
kms_s_1096r-_0970	kms_s_1096r_0970		0.549		☑

7.249 Reaction r_0972

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name serine C-palmitoyltransferase

Notes GENE_ASSOCIATION:(YDR062W or YMR296C)

Reaction equation

$$\text{s\_0943} + \text{s\_1187} \xrightleftharpoons{\text{s\_0218, s\_0470, s\_0514, s\_0943, s\_1187}} \text{s\_0218} + \text{s\_0470} + \text{s\_0514} \quad (1280)$$

Reactants

Table 997: Properties of each reactant.

Id	Name	SBO
s_0943	L-serine [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	

Modifiers

Table 998: Properties of each modifier.

Id	Name	SBO
s_0218	3-dehydrosphinganine [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	
s_0943	L-serine [intracellular]	
s_1187	palmitoyl-CoA [intracellular]	

Products

Table 999: Properties of each product.

Id	Name	SBO
s_0218	3-dehydrosphinganine [intracellular]	
s_0470	carbon dioxide [intracellular]	
s_0514	coenzyme A [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{249} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_249}(\mathrm{Keq\_r\_0972}, \mathrm{Vmax\_r\_0972}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0218r\_0972}, \mathrm{kmp\_s\_0470r\_0972}, \mathrm{kmp\_s\_0514r\_0972}, \mathrm{kms\_s\_0943r\_0972}, \mathrm{kms\_s\_1187r\_0972}, [\mathrm{s\_0218}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0943}], [\mathrm{s\_1187}]) \tag{1281}$$

$$\mathrm{function\_249}(\mathrm{Keq\_r\_0972}, \mathrm{Vmax\_r\_0972}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0218r\_0972}, \mathrm{kmp\_s\_0470r\_0972}, \mathrm{kmp\_s\_0514r\_0972}, \mathrm{kms\_s\_0943r\_0972}, \mathrm{kms\_s\_1187r\_0972}, [\mathrm{s\_0218}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0943}], [\mathrm{s\_1187}]) = \frac{\mathrm{Vmax\_r\_0972} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0943r\_0972}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1187r\_0972}}\right)^1 \cdot \left([\mathrm{s\_0943}]^1 \cdot [\mathrm{s\_1187}]^1 - \frac{[\mathrm{s\_0218}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0972}}\right)}{\left(1 + \frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1187}]}{\mathrm{kms\_s\_1187r\_0972}}\right) + \left(1 + \frac{[\mathrm{s\_0218}]}{\mathrm{kmp\_s\_0218r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0972}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1282}$$

$$\mathrm{function\_249}(\mathrm{Keq\_r\_0972}, \mathrm{Vmax\_r\_0972}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0218r\_0972}, \mathrm{kmp\_s\_0470r\_0972}, \mathrm{kmp\_s\_0514r\_0972}, \mathrm{kms\_s\_0943r\_0972}, \mathrm{kms\_s\_1187r\_0972}, [\mathrm{s\_0218}], [\mathrm{s\_0470}], [\mathrm{s\_0514}], [\mathrm{s\_0943}], [\mathrm{s\_1187}]) = \frac{\mathrm{Vmax\_r\_0972} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0943r\_0972}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1187r\_0972}}\right)^1 \cdot \left([\mathrm{s\_0943}]^1 \cdot [\mathrm{s\_1187}]^1 - \frac{[\mathrm{s\_0218}]^1 \cdot [\mathrm{s\_0470}]^1 \cdot [\mathrm{s\_0514}]^1}{\mathrm{Keq\_r\_0972}}\right)}{\left(1 + \frac{[\mathrm{s\_0943}]}{\mathrm{kms\_s\_0943r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1187}]}{\mathrm{kms\_s\_1187r\_0972}}\right) + \left(1 + \frac{[\mathrm{s\_0218}]}{\mathrm{kmp\_s\_0218r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0470}]}{\mathrm{kmp\_s\_0470r\_0972}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0514}]}{\mathrm{kmp\_s\_0514r\_0972}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1283}$$

Table 1000: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0972	Keq_r_0972		1.100		☑
Vmax_r_0972	Vmax_r_0972		0.003		☑
kmp_s_0218r-_0972	kmp_s_0218r_0972		0.549		☑
kmp_s_0470r-_0972	kmp_s_0470r_0972		1.000		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0514r-_0972	kmp_s_0514r_0972		0.549		☑
kms_s_0943r-_0972	kms_s_0943r_0972		0.549		☑
kms_s_1187r-_0972	kms_s_1187r_0972		0.549		☑

7.250 Reaction r_0976

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name shikimate dehydrogenase

Notes GENE_ASSOCIATION:YDR127W

Reaction equation

$$\text{s\_0217} + \text{s\_0763\_b} + \text{s\_1096} \xrightleftharpoons{\text{s\_0217, s\_0763\_b, s\_1091, s\_1096, s\_1306}} \text{s\_1091} + \text{s\_1306} \tag{1284}$$

Reactants

Table 1001: Properties of each reactant.

Id	Name	SBO
s_0217	3-dehydroshikimate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 1002: Properties of each modifier.

Id	Name	SBO
s_0217	3-dehydroshikimate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1306	shikimate [intracellular]	

Products

Table 1003: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1306	shikimate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{250} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_250}\left(\mathrm{Keq\_r\_0976}, \mathrm{Vmax\_r\_0976}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0976}, \mathrm{kmp\_s\_1306r\_0976}, \mathrm{kms\_s\_0217r\_0976}, \mathrm{kms\_s\_0763\_br\_0976}, \mathrm{kms\_s\_1096r\_0976}, [\mathrm{s\_0217}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1306}]\right) \quad (1285)$$

$$\mathrm{function\_250}\left(\mathrm{Keq\_r\_0976}, \mathrm{Vmax\_r\_0976}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0976}, \mathrm{kmp\_s\_1306r\_0976}, \mathrm{kms\_s\_0217r\_0976}, \mathrm{kms\_s\_0763\_br\_0976}, \mathrm{kms\_s\_1096r\_0976}, [\mathrm{s\_0217}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1306}]\right) = \frac{\mathrm{Vmax\_r\_0976} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0217r\_0976}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0976}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0976}}\right)^{1} \cdot \left([\mathrm{s\_0217}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1306}]^{1}}{\mathrm{Keq\_r\_0976}}\right)}{\left(1+\frac{[\mathrm{s\_0217}]}{\mathrm{kms\_s\_0217r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0976}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kmp\_s\_1306r\_0976}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1286)$$

$$\mathrm{function\_250}\left(\mathrm{Keq\_r\_0976}, \mathrm{Vmax\_r\_0976}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_1091r\_0976}, \mathrm{kmp\_s\_1306r\_0976}, \mathrm{kms\_s\_0217r\_0976}, \mathrm{kms\_s\_0763\_br\_0976}, \mathrm{kms\_s\_1096r\_0976}, [\mathrm{s\_0217}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1306}]\right) = \frac{\mathrm{Vmax\_r\_0976} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0217r\_0976}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0976}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0976}}\right)^{1} \cdot \left([\mathrm{s\_0217}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1306}]^{1}}{\mathrm{Keq\_r\_0976}}\right)}{\left(1+\frac{[\mathrm{s\_0217}]}{\mathrm{kms\_s\_0217r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0976}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0976}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kmp\_s\_1306r\_0976}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1287)$$

Table 1004: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0976	Keq_r_0976		2.004		☑
Vmax_r_0976	Vmax_r_0976		1.609		☑
kmp_s_1091r-_0976	kmp_s_1091r_0976		0.549		☑
kmp_s_1306r-_0976	kmp_s_1306r_0976		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0217r-_0976	kms_s_0217r_0976		0.549		☑
kms_s_0763-_br_0976	kms_s_0763_br-_0976		0.549		☑
kms_s_1096r-_0976	kms_s_1096r_0976		0.549		☑

7.251 Reaction r_0977

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name shikimate kinase

Notes GENE_ASSOCIATION:YDR127W

Reaction equation

$$s\_0446 + s\_1306 \xrightleftharpoons{s\_0267,\ s\_0400,\ s\_0446,\ s\_0763\_b,\ s\_1306} s\_0267 + s\_0400 + s\_0763\_b \quad (1288)$$

Reactants

Table 1005: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1306	shikimate [intracellular]	

Modifiers

Table 1006: Properties of each modifier.

Id	Name	SBO
s_0267	3-phosphoshikimic acid [intracellular]	
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1306	shikimate [intracellular]	

Products

Table 1007: Properties of each product.

Id	Name	SBO
s_0267	3-phosphoshikimic acid [intracellular]	
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{251} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_251}(\mathrm{Keq\_r\_0977}, \mathrm{Vmax\_r\_0977}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0267r\_0977}, \mathrm{kmp\_s\_0400r\_0977}, \mathrm{kmp\_s\_0763\_br\_0977}, \mathrm{kms\_s\_0446r\_0977}, \mathrm{kms\_s\_1306r\_0977}, [\mathrm{s\_0267}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1306}]) \quad (1289)$$

$$\mathrm{function\_251}(\mathrm{Keq\_r\_0977}, \mathrm{Vmax\_r\_0977}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0267r\_0977}, \mathrm{kmp\_s\_0400r\_0977}, \mathrm{kmp\_s\_0763\_br\_0977}, \mathrm{kms\_s\_0446r\_0977}, \mathrm{kms\_s\_1306r\_0977}, [\mathrm{s\_0267}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1306}]) = \frac{\mathrm{Vmax\_r\_0977} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0977}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1306r\_0977}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1306}]^1 - \frac{[\mathrm{s\_0267}]^1 \cdot [\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0977}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kms\_s\_1306r\_0977}}\right) + \left(1+\frac{[\mathrm{s\_0267}]}{\mathrm{kmp\_s\_0267r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0977}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1290)$$

$$\mathrm{function\_251}(\mathrm{Keq\_r\_0977}, \mathrm{Vmax\_r\_0977}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0267r\_0977}, \mathrm{kmp\_s\_0400r\_0977}, \mathrm{kmp\_s\_0763\_br\_0977}, \mathrm{kms\_s\_0446r\_0977}, \mathrm{kms\_s\_1306r\_0977}, [\mathrm{s\_0267}], [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1306}]) = \frac{\mathrm{Vmax\_r\_0977} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_0977}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1306r\_0977}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_1306}]^1 - \frac{[\mathrm{s\_0267}]^1 \cdot [\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_0763\_b}]^1}{\mathrm{Keq\_r\_0977}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_1306}]}{\mathrm{kms\_s\_1306r\_0977}}\right) + \left(1+\frac{[\mathrm{s\_0267}]}{\mathrm{kmp\_s\_0267r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_0977}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kmp\_s\_0763\_br\_0977}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1291)$$

Table 1008: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0977	Keq_r_0977		0.951		☑
Vmax_r_0977	Vmax_r_0977		1.609		☑
kmp_s_0267r-_0977	kmp_s_0267r_0977		0.549		☑
kmp_s_0400r-_0977	kmp_s_0400r_0977		1.719		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_0763_br_0977	kmp_s_0763_br_0977		0.549		☑
kms_s_0446r_0977	kms_s_0446r_0977		1.092		☑
kms_s_1306r_0977	kms_s_1306r_0977		0.549		☑

7.252 Reaction r_0991

This is a reversible reaction of four reactants forming three products influenced by seven modifiers.

Name squalene epoxidase (NAD)

Notes GENE_ASSOCIATION:((YGR175C and YIL043C and YNL111C) or (YGR175C and YKL150W and YNL111C))

Reaction equation

$$\mathrm{s\_0763\_b} + \mathrm{s\_1087} + \mathrm{s\_1160} + \mathrm{s\_1327} \xrightleftharpoons{\mathrm{s\_0040,\ s\_0763\_b,\ s\_1082,\ s\_1087,\ s\_1160,\ s\_1327,\ s\_1434\_b}} \mathrm{s\_0040} + \mathrm{s\_1082} \tag{1292}$$

Reactants

Table 1009: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1087	NADH [intracellular]	
s_1160	oxygen [intracellular]	
s_1327	squalene [intracellular]	

Modifiers

Table 1010: Properties of each modifier.

Id	Name	SBO
s_0040	(S)-2,3-epoxysqualene [intracellular]	
s_0763_b	H+ [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1087	NADH [intracellular]	

Id	Name	SBO
s_1160	oxygen [intracellular]	
s_1327	squalene [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1011: Properties of each product.

Id	Name	SBO
s_0040	(S)-2,3-epoxysqualene [intracellular]	
s_1082	NAD(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{252} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_252}\left(\mathrm{Keq\_r\_0991}, \mathrm{Vmax\_r\_0991}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0040r\_0991}, \mathrm{kmp\_s\_1082r\_0991}, \mathrm{kmp\_s\_1434\_br\_0991}, \mathrm{kms\_s\_0763\_br\_0991}, \mathrm{kms\_s\_1087r\_0991}, \mathrm{kms\_s\_1160r\_0991}, \mathrm{kms\_s\_1327r\_0991}, [\mathrm{s\_0040}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1327}], [\mathrm{s\_1434\_b}]\right) \tag{1293}$$

$$\mathrm{function\_252}\left(\mathrm{Keq\_r\_0991}, \mathrm{Vmax\_r\_0991}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0040r\_0991}, \mathrm{kmp\_s\_1082r\_0991}, \mathrm{kmp\_s\_1434\_br\_0991}, \mathrm{kms\_s\_0763\_br\_0991}, \mathrm{kms\_s\_1087r\_0991}, \mathrm{kms\_s\_1160r\_0991}, \mathrm{kms\_s\_1327r\_0991}, [\mathrm{s\_0040}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1327}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0991} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1327r\_0991}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} \cdot [\mathrm{s\_1160}]^{1} \cdot [\mathrm{s\_1327}]^{1} - \frac{[\mathrm{s\_0040}]}{}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1327}]}{\mathrm{kms\_s\_1327r\_0991}}\right) + \left(1 + \frac{[\mathrm{s\_0040}]}{\mathrm{kmp\_s\_0040r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0991}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1294}$$

$$\mathrm{function\_252}\left(\mathrm{Keq\_r\_0991}, \mathrm{Vmax\_r\_0991}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0040r\_0991}, \mathrm{kmp\_s\_1082r\_0991}, \mathrm{kmp\_s\_1434\_br\_0991}, \mathrm{kms\_s\_0763\_br\_0991}, \mathrm{kms\_s\_1087r\_0991}, \mathrm{kms\_s\_1160r\_0991}, \mathrm{kms\_s\_1327r\_0991}, [\mathrm{s\_0040}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1082}], [\mathrm{s\_1087}], [\mathrm{s\_1160}], [\mathrm{s\_1327}], [\mathrm{s\_1434\_b}]\right) = \frac{\mathrm{Vmax\_r\_0991} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1087r\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1160r\_0991}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1327r\_0991}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1087}]^{1} \cdot [\mathrm{s\_1160}]^{1} \cdot [\mathrm{s\_1327}]^{1} - \frac{[\mathrm{s\_0040}]}{}\right.}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1087}]}{\mathrm{kms\_s\_1087r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1160}]}{\mathrm{kms\_s\_1160r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1327}]}{\mathrm{kms\_s\_1327r\_0991}}\right) + \left(1 + \frac{[\mathrm{s\_0040}]}{\mathrm{kmp\_s\_0040r\_0991}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1082}]}{\mathrm{kmp\_s\_1082r\_0991}}\right) \cdot}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1295}$$

Table 1012: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0991	Keq_r_0991		34.726		☑
Vmax_r_0991	Vmax_r_0991		0.096		☑
kmp_s_0040r-_0991	kmp_s_0040r_0991		0.549		☑
kmp_s_1082r-_0991	kmp_s_1082r_0991		1.503		☑
kmp_s_1434-_br_0991	kmp_s_1434_br-_0991		0.549		☑
kms_s_0763-_br_0991	kms_s_0763_br-_0991		0.549		☑
kms_s_1087r-_0991	kms_s_1087r_0991		0.087		☑
kms_s_1160r-_0991	kms_s_1160r_0991		0.549		☑
kms_s_1327r-_0991	kms_s_1327r_0991		0.549		☑

7.253 Reaction r_0993

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name squalene synthase

Notes GENE_ASSOCIATION:YHR190W

Reaction equation

$$2\,\mathrm{s\_0195} + \mathrm{s\_0763\_b} + \mathrm{s\_1096} \xrightleftharpoons{\mathrm{s\_0195,\ s\_0605,\ s\_0763\_b,\ s\_1091,\ s\_1096,\ s\_1327}} 2\,\mathrm{s\_0605} + \mathrm{s\_1091} + \mathrm{s\_1327} \tag{1296}$$

Reactants

Table 1013: Properties of each reactant.

Id	Name	SBO
s_0195	2-trans,6-trans-farnesyl diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	

Modifiers

Table 1014: Properties of each modifier.

Id	Name	SBO
s_0195	2-trans,6-trans-farnesyl diphosphate [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1327	squalene [intracellular]	

Products

Table 1015: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1327	squalene [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{253} = & \operatorname{vol}(\mathrm{intracellular}) \\ & \cdot \mathrm{function\_253}(\mathrm{Keq\_r\_0993}, \mathrm{Vmax\_r\_0993}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0993}, \\ & \mathrm{kmp\_s\_1091r\_0993}, \mathrm{kmp\_s\_1327r\_0993}, \mathrm{kms\_s\_0195r\_0993}, \mathrm{kms\_s\_0763\_br\_0993}, \\ & \mathrm{kms\_s\_1096r\_0993}, [\mathrm{s\_0195}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1327}]) \end{aligned} \tag{1297}$$

$$\begin{aligned} & \mathrm{function\_253}(\mathrm{Keq\_r\_0993}, \mathrm{Vmax\_r\_0993}, \operatorname{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_0993}, \\ & \mathrm{kmp\_s\_1091r\_0993}, \mathrm{kmp\_s\_1327r\_0993}, \mathrm{kms\_s\_0195r\_0993}, \mathrm{kms\_s\_0763\_br\_0993}, \\ & \mathrm{kms\_s\_1096r\_0993}, [\mathrm{s\_0195}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1327}]) \\ = & \frac{\mathrm{Vmax\_r\_0993} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0195r\_0993}}\right)^{2} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_0993}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_0993}}\right)^{1} \cdot \left([\mathrm{s\_0195}]^{2} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} - \frac{[\mathrm{s\_0605}]^{2} \cdot [\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1327}]^{1}}{\mathrm{Keq\_r\_0993}}\right)}{\left(1+\frac{[\mathrm{s\_0195}]}{\mathrm{kms\_s\_0195r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_0993}}\right) + \left(1+\frac{[\mathrm{s\_0605}]}{\mathrm{kmp\_s\_0605r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_0993}}\right) \cdot \left(1+\frac{[\mathrm{s\_1327}]}{\mathrm{kmp\_s\_1327r\_0993}}\right) -}}{\operatorname{vol}(\mathrm{intracellular})} \end{aligned} \tag{1298}$$

$$\begin{aligned}&\text{function\_253}\left(\text{Keq\_r\_0993}, \text{Vmax\_r\_0993}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0605r\_0993},\right.\\&\text{kmp\_s\_1091r\_0993}, \text{kmp\_s\_1327r\_0993}, \text{kms\_s\_0195r\_0993}, \text{kms\_s\_0763\_br\_0993},\\&\left.\text{kms\_s\_1096r\_0993}, [\text{s\_0195}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1327}]\right)\\&= \frac{\text{Vmax\_r\_0993} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0195r\_0993}}\right)^{2} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_0993}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_0993}}\right)^{1} \cdot \left([\text{s\_0195}]^{2} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} - \frac{[\text{s\_0605}]^{2} \cdot [\text{s\_1091}]^{1} \cdot [\text{s\_1327}]^{1}}{\text{Keq\_r\_0993}}\right)}{\left(1+\frac{[\text{s\_0195}]}{\text{kms\_s\_0195r\_0993}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_0993}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_0993}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_0993}}\right) \cdot \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_0993}}\right) \cdot \left(1+\frac{[\text{s\_1327}]}{\text{kmp\_s\_1327r\_0993}}\right) -}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1299}$$

Table 1016: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_0993`	Keq_r_0993		1.100		☑
`Vmax_r_0993`	Vmax_r_0993		0.063		☑
`kmp_s_0605r_0993`	kmp_s_0605r_0993		0.549		☑
`kmp_s_1091r_0993`	kmp_s_1091r_0993		0.549		☑
`kmp_s_1327r_0993`	kmp_s_1327r_0993		0.549		☑
`kms_s_0195r_0993`	kms_s_0195r_0993		0.549		☑
`kms_s_0763_br_0993`	kms_s_0763_br_0993		0.549		☑
`kms_s_1096r_0993`	kms_s_1096r_0993		0.549		☑

7.254 Reaction `r_0995`

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name steryl ester hydrolase

Notes GENE_ASSOCIATION:(YKL140W or YLL012W) or YLR020C

Reaction equation

$$\text{s\_0635} + \text{s\_0663} \xrightleftharpoons{\text{s\_0635, s\_0641, s\_0663, s\_1434\_b}} \text{s\_0641} + \text{s\_1434\_b} \tag{1300}$$

Reactants

Table 1017: Properties of each reactant.

Id	Name	SBO
s_0635	ergosterol [intracellular]	
s_0663	fatty acid [intracellular]	

Modifiers

Table 1018: Properties of each modifier.

Id	Name	SBO
s_0635	ergosterol [intracellular]	
s_0641	ergosterol ester [intracellular]	
s_0663	fatty acid [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1019: Properties of each product.

Id	Name	SBO
s_0641	ergosterol ester [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{254} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_254}(\mathrm{Keq\_r\_0995}, \mathrm{Vmax\_r\_0995}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0641r\_0995}, \mathrm{kmp\_s\_1434\_br\_0995}, \mathrm{kms\_s\_0635r\_0995}, \mathrm{kms\_s\_0663r\_0995}, [\mathrm{s\_0635}], [\mathrm{s\_0641}], [\mathrm{s\_0663}], [\mathrm{s\_1434\_b}]) \tag{1301}$$

$$\mathrm{function\_254}(\mathrm{Keq\_r\_0995}, \mathrm{Vmax\_r\_0995}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0641r\_0995}, \mathrm{kmp\_s\_1434\_br\_0995}, \mathrm{kms\_s\_0635r\_0995}, \mathrm{kms\_s\_0663r\_0995}, [\mathrm{s\_0635}], [\mathrm{s\_0641}], [\mathrm{s\_0663}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_0995} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0635r\_0995}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0663r\_0995}}\right)^1 \cdot \left([\mathrm{s\_0635}]^1 \cdot [\mathrm{s\_0663}]^1 - \frac{[\mathrm{s\_0641}]^1 \cdot [\mathrm{s\_1434\_b}]^1}{\mathrm{Keq\_r\_0995}}\right)}{\left(1+\frac{[\mathrm{s\_0635}]}{\mathrm{kms\_s\_0635r\_0995}}\right) \cdot \left(1+\frac{[\mathrm{s\_0663}]}{\mathrm{kms\_s\_0663r\_0995}}\right) + \left(1+\frac{[\mathrm{s\_0641}]}{\mathrm{kmp\_s\_0641r\_0995}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_0995}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1302}$$

$$\text{function\_254}\left(\text{Keq\_r\_0995}, \text{Vmax\_r\_0995}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0641r\_0995}, \text{kmp\_s\_1434\_br\_0995}, \text{kms\_s\_0635r\_0995}, \text{kms\_s\_0663r\_0995}, [\text{s\_0635}], [\text{s\_0641}], [\text{s\_0663}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_0995} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0635r\_0995}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0663r\_0995}}\right)^{1} \cdot \left([\text{s\_0635}]^{1} \cdot [\text{s\_0663}]^{1} - \frac{[\text{s\_0641}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_0995}}\right)}{\left(1+\frac{[\text{s\_0635}]}{\text{kms\_s\_0635r\_0995}}\right) \cdot \left(1+\frac{[\text{s\_0663}]}{\text{kms\_s\_0663r\_0995}}\right) + \left(1+\frac{[\text{s\_0641}]}{\text{kmp\_s\_0641r\_0995}}\right) \cdot \left(1+\frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_0995}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \quad (1303)$$

Table 1020: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_0995	Keq_r_0995		1.100		☑
Vmax_r_0995	Vmax_r_0995		0.003		☑
kmp_s_0641r-_0995	kmp_s_0641r_0995		0.549		☑
kmp_s_1434-_br_0995	kmp_s_1434_br-_0995		0.549		☑
kms_s_0635r-_0995	kms_s_0635r_0995		0.549		☑
kms_s_0663r-_0995	kms_s_0663r_0995		0.549		☑

7.255 Reaction r_1003

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name succinate-CoA ligase (ADP-forming)

Notes GENE_ASSOCIATION:(YGR244C and YOR142W)

Reaction equation

$$\text{s\_0446} + \text{s\_0514} + \text{s\_1338} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0514, s\_1207, s\_1338, s\_1342}} \text{s\_0400} + \text{s\_1207} + \text{s\_1342} \quad (1304)$$

Reactants

Table 1021: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	

Id	Name	SBO
s_0514	coenzyme A [intracellular]	
s_1338	succinate(2-) [intracellular]	

Modifiers

Table 1022: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0514	coenzyme A [intracellular]	
s_1207	phosphate [intracellular]	
s_1338	succinate(2-) [intracellular]	
s_1342	succinyl-CoA [intracellular]	

Products

Table 1023: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_1207	phosphate [intracellular]	
s_1342	succinyl-CoA [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{255} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_255}\left(\mathrm{Keq\_r\_1003}, \mathrm{Vmax\_r\_1003}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_1003}, \mathrm{kmp\_s\_1207r\_1003}, \mathrm{kmp\_s\_1342r\_1003}, \mathrm{kms\_s\_0446r\_1003}, \mathrm{kms\_s\_0514r\_1003}, \mathrm{kms\_s\_1338r\_1003}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_1207}], [\mathrm{s\_1338}], [\mathrm{s\_1342}]\right) \tag{1305}$$

$$\mathrm{function\_255}\left(\mathrm{Keq\_r\_1003}, \mathrm{Vmax\_r\_1003}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_1003}, \mathrm{kmp\_s\_1207r\_1003}, \mathrm{kmp\_s\_1342r\_1003}, \mathrm{kms\_s\_0446r\_1003}, \mathrm{kms\_s\_0514r\_1003}, \mathrm{kms\_s\_1338r\_1003}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0514}], [\mathrm{s\_1207}], [\mathrm{s\_1338}], [\mathrm{s\_1342}]\right) \tag{1306}$$
$$= \frac{\mathrm{Vmax\_r\_1003} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0446r\_1003}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_0514r\_1003}}\right)^1 \cdot \left(\frac{1}{\mathrm{kms\_s\_1338r\_1003}}\right)^1 \cdot \left([\mathrm{s\_0446}]^1 \cdot [\mathrm{s\_0514}]^1 \cdot [\mathrm{s\_1338}]^1 - \frac{[\mathrm{s\_0400}]^1 \cdot [\mathrm{s\_1207}]^1 \cdot [\mathrm{s\_1342}]^1}{\mathrm{Keq\_r\_1003}}\right)}{\left(1+\frac{[\mathrm{s\_0446}]}{\mathrm{kms\_s\_0446r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_0514}]}{\mathrm{kms\_s\_0514r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1338}]}{\mathrm{kms\_s\_1338r\_1003}}\right) + \left(1+\frac{[\mathrm{s\_0400}]}{\mathrm{kmp\_s\_0400r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1003}}\right) \cdot \left(1+\frac{[\mathrm{s\_1342}]}{\mathrm{kmp\_s\_1342r\_1003}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)}$$

$$\begin{aligned}&\text{function\_255}\left(\text{Keq\_r\_1003}, \text{Vmax\_r\_1003}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0400r\_1003},\right.\\&\text{kmp\_s\_1207r\_1003}, \text{kmp\_s\_1342r\_1003}, \text{kms\_s\_0446r\_1003}, \text{kms\_s\_0514r\_1003},\\&\left.\text{kms\_s\_1338r\_1003}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0514}], [\text{s\_1207}], [\text{s\_1338}], [\text{s\_1342}]\right)\\&= \frac{\text{Vmax\_r\_1003} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_1003}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0514r\_1003}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1338r\_1003}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_0514}]^{1} \cdot [\text{s\_1338}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_1207}]^{1} \cdot [\text{s\_1342}]^{1}}{\text{Keq\_r\_1003}}\right)}{\left(1+\frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_1003}}\right) \cdot \left(1+\frac{[\text{s\_0514}]}{\text{kms\_s\_0514r\_1003}}\right) \cdot \left(1+\frac{[\text{s\_1338}]}{\text{kms\_s\_1338r\_1003}}\right) + \left(1+\frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_1003}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1003}}\right) \cdot \left(1+\frac{[\text{s\_1342}]}{\text{kmp\_s\_1342r\_1003}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1307}$$

Table 1024: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_1003`	Keq_r_1003		1.732		☑
`Vmax_r_1003`	Vmax_r_1003		0.131		☑
`kmp_s_0400r-_1003`	kmp_s_0400r_1003		1.719		☑
`kmp_s_1207r-_1003`	kmp_s_1207r_1003		0.549		☑
`kmp_s_1342r-_1003`	kmp_s_1342r_1003		0.549		☑
`kms_s_0446r-_1003`	kms_s_0446r_1003		1.092		☑
`kms_s_0514r-_1003`	kms_s_0514r_1003		0.549		☑
`kms_s_1338r-_1003`	kms_s_1338r_1003		0.549		☑

7.256 Reaction `r_1007`

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name sulfate adenylyltransferase (ADP)

Notes GENE_ASSOCIATION:YCL050C

Reaction equation

$$\text{s\_0400} + \text{s\_0763\_b} + \text{s\_1347} \xrightleftharpoons{\text{s\_0304, s\_0400, s\_0763\_b, s\_1207, s\_1347}} \text{s\_0304} + \text{s\_1207} \tag{1308}$$

Reactants

Table 1025: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1347	sulphate [intracellular]	

Modifiers

Table 1026: Properties of each modifier.

Id	Name	SBO
s_0304	5'-adenylyl sulfate [intracellular]	
s_0400	ADP [intracellular]	
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	
s_1347	sulphate [intracellular]	

Products

Table 1027: Properties of each product.

Id	Name	SBO
s_0304	5'-adenylyl sulfate [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{256} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_256}\left(\mathrm{Keq\_r\_1007}, \mathrm{Vmax\_r\_1007}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0304r\_1007}, \mathrm{kmp\_s\_1207r\_1007}, \mathrm{kms\_s\_0400r\_1007}, \mathrm{kms\_s\_0763\_br\_1007}, \mathrm{kms\_s\_1347r\_1007}, [\mathrm{s\_0304}], [\mathrm{s\_0400}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1347}]\right) \tag{1309}$$

$$\mathrm{function\_256}\left(\mathrm{Keq\_r\_1007}, \mathrm{Vmax\_r\_1007}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0304r\_1007}, \mathrm{kmp\_s\_1207r\_1007}, \mathrm{kms\_s\_0400r\_1007}, \mathrm{kms\_s\_0763\_br\_1007}, \mathrm{kms\_s\_1347r\_1007}, [\mathrm{s\_0304}], [\mathrm{s\_0400}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1207}], [\mathrm{s\_1347}]\right) = \frac{\mathrm{Vmax\_r\_1007} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0400r\_1007}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0763\_br\_1007}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1347r\_1007}}\right)^{1} \cdot \left([\mathrm{s\_0400}]^{1} \cdot [\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1347}]^{1} - \frac{[\mathrm{s\_0304}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1007}}\right)}{\left(1 + \frac{[\mathrm{s\_0400}]}{\mathrm{kms\_s\_0400r\_1007}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_1007}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1347}]}{\mathrm{kms\_s\_1347r\_1007}}\right) + \left(1 + \frac{[\mathrm{s\_0304}]}{\mathrm{kmp\_s\_0304r\_1007}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1007}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \tag{1310}$$

$$\text{function\_256}(\text{Keq\_r\_1007}, \text{Vmax\_r\_1007}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0304r\_1007}, \text{kmp\_s\_1207r\_1007}, \text{kms\_s\_0400r\_1007}, \text{kms\_s\_0763\_br\_1007}, \text{kms\_s\_1347r\_1007}, [\text{s\_0304}], [\text{s\_0400}], [\text{s\_0763\_b}], [\text{s\_1207}], [\text{s\_1347}]) = \frac{\text{Vmax\_r\_1007} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_1007}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_1007}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_1347r\_1007}}\right)^1 \cdot \left([\text{s\_0400}]^1 \cdot [\text{s\_0763\_b}]^1 \cdot [\text{s\_1347}]^1 - \frac{[\text{s\_0304}]^1 \cdot [\text{s\_1207}]^1}{\text{Keq\_r\_1007}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_1007}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1007}}\right) \cdot \left(1+\frac{[\text{s\_1347}]}{\text{kms\_s\_1347r\_1007}}\right) + \left(1+\frac{[\text{s\_0304}]}{\text{kmp\_s\_0304r\_1007}}\right) \cdot \left(1+\frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1007}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1311}$$

Table 1028: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1007	Keq_r_1007		0.640		☑
Vmax_r_1007	Vmax_r_1007		0.624		☑
kmp_s_0304r-_1007	kmp_s_0304r_1007		0.549		☑
kmp_s_1207r-_1007	kmp_s_1207r_1007		0.549		☑
kms_s_0400r-_1007	kms_s_0400r_1007		1.719		☑
kms_s_0763-_br_1007	kms_s_0763_br-_1007		0.549		☑
kms_s_1347r-_1007	kms_s_1347r_1007		0.549		☑

7.257 Reaction r_1008

This is a reversible reaction of three reactants forming three products influenced by six modifiers.

Name sulfite reductase (NADPH2)

Notes GENE_ASSOCIATION:(YFR030W or YJR137C)

Reaction equation

$$5\,\text{s\_0763\_b} + 3\,\text{s\_1096} + \text{s\_1349} \xrightleftharpoons{\text{s\_0763\_b, s\_0805, s\_1091, s\_1096, s\_1349, s\_1434\_b}} \text{s\_0805} + 3\,\text{s\_1091} + 3\,\text{s\_1434\_b} \tag{1312}$$

Reactants

Table 1029: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	

Id	Name	SBO
s_1096	NADPH [intracellular]	
s_1349	sulphite [intracellular]	

Modifiers

Table 1030: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0805	hydrogen sulfide [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1349	sulphite [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1031: Properties of each product.

Id	Name	SBO
s_0805	hydrogen sulfide [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{257} = & \mathrm{vol}(\mathrm{intracellular}) \\ & \cdot \mathrm{function\_257}(\mathrm{Keq\_r\_1008}, \mathrm{Vmax\_r\_1008}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0805r\_1008}, \\ & \mathrm{kmp\_s\_1091r\_1008}, \mathrm{kmp\_s\_1434\_br\_1008}, \mathrm{kms\_s\_0763\_br\_1008}, \mathrm{kms\_s\_1096r\_1008}, \\ & \mathrm{kms\_s\_1349r\_1008}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0805}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1349}], [\mathrm{s\_1434\_b}]) \end{aligned} \tag{1313}$$

$$\begin{aligned} & \mathrm{function\_257}(\mathrm{Keq\_r\_1008}, \mathrm{Vmax\_r\_1008}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0805r\_1008}, \\ & \mathrm{kmp\_s\_1091r\_1008}, \mathrm{kmp\_s\_1434\_br\_1008}, \mathrm{kms\_s\_0763\_br\_1008}, \mathrm{kms\_s\_1096r\_1008}, \\ & \mathrm{kms\_s\_1349r\_1008}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0805}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1349}], [\mathrm{s\_1434\_b}]) \\ & = \frac{\mathrm{Vmax\_r\_1008} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_1008}}\right)^{5} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_1008}}\right)^{3} \cdot \left(\frac{1}{\mathrm{kms\_s\_1349r\_1008}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{5} \cdot [\mathrm{s\_1096}]^{3} \cdot [\mathrm{s\_1349}]^{1} - \frac{[\mathrm{s\_0805}]^{1} \cdot [\mathrm{s\_1091}]^{3} \cdot [\mathrm{s\_1434\_b}]^{3}}{\mathrm{Keq\_r\_1008}}\right)}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_1008}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_1008}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1349}]}{\mathrm{kms\_s\_1349r\_1008}}\right) + \left(1 + \frac{[\mathrm{s\_0805}]}{\mathrm{kmp\_s\_0805r\_1008}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_1008}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kmp\_s\_1434\_br\_1008}}\right)}}{\mathrm{vol}(\mathrm{intracellular})} \end{aligned} \tag{1314}$$

$$\begin{aligned}
&\text{function_257}\left(\text{Keq_r_1008}, \text{Vmax_r_1008}, \text{vol}\left(\text{intracellular}\right), \text{kmp_s_0805r_1008},\right. \\
&\text{kmp_s_1091r_1008}, \text{kmp_s_1434_br_1008}, \text{kms_s_0763_br_1008}, \text{kms_s_1096r_1008}, \\
&\left.\text{kms_s_1349r_1008}, [\text{s_0763_b}], [\text{s_0805}], [\text{s_1091}], [\text{s_1096}], [\text{s_1349}], [\text{s_1434_b}]\right) \\
&= \frac{\text{Vmax_r_1008} \cdot \frac{\left(\frac{1}{\text{kms_s_0763_br_1008}}\right)^{5} \cdot \left(\frac{1}{\text{kms_s_1096r_1008}}\right)^{3} \cdot \left(\frac{1}{\text{kms_s_1349r_1008}}\right)^{1} \cdot \left([\text{s_0763_b}]^{5} \cdot [\text{s_1096}]^{3} \cdot [\text{s_1349}]^{1} - \frac{[\text{s_0805}]^{1} \cdot [\text{s_1091}]^{3} \cdot [\text{s_1434_b}]^{3}}{\text{Keq_r_1008}}\right)}{\left(1+\frac{[\text{s_0763_b}]}{\text{kms_s_0763_br_1008}}\right) \cdot \left(1+\frac{[\text{s_1096}]}{\text{kms_s_1096r_1008}}\right) \cdot \left(1+\frac{[\text{s_1349}]}{\text{kms_s_1349r_1008}}\right) + \left(1+\frac{[\text{s_0805}]}{\text{kmp_s_0805r_1008}}\right) \cdot \left(1+\frac{[\text{s_1091}]}{\text{kmp_s_1091r_1008}}\right) \cdot \left(1+\frac{[\text{s_1434_b}]}{\text{kmp_s_1434_br_1008}}\right)}}{\text{vol}\left(\text{intracellular}\right)}
\end{aligned} \tag{1315}$$

Table 1032: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_1008`	Keq_r_1008		3.650		☑
`Vmax_r_1008`	Vmax_r_1008		0.851		☑
`kmp_s_0805r_1008`	kmp_s_0805r_1008		0.549		☑
`kmp_s_1091r_1008`	kmp_s_1091r_1008		0.549		☑
`kmp_s_1434_br_1008`	kmp_s_1434_br_1008		0.549		☑
`kms_s_0763_br_1008`	kms_s_0763_br_1008		0.549		☑
`kms_s_1096r_1008`	kms_s_1096r_1008		0.549		☑
`kms_s_1349r_1008`	kms_s_1349r_1008		0.549		☑

7.258 Reaction `r_1024`

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name thioredoxin reductase (NADPH)

Notes GENE_ASSOCIATION:(YDR353W or (YDR353W and YGR209C) or (YDR353W and YLR043C)) or ((YCR083W and YHR106W) or (YCR083W and YPL091W))

Reaction equation

$$\text{s\_0763\_b} + \text{s\_1096} + \text{s\_1517} \xrightleftharpoons{\text{s\_0763\_b, s\_1091, s\_1096, s\_1517, s\_1521}} \text{s\_1091} + \text{s\_1521} \tag{1316}$$

Reactants

Table 1033: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1096	NADPH [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	

Modifiers

Table 1034: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1091	NADP(+) [intracellular]	
s_1096	NADPH [intracellular]	
s_1517	thioredoxin disulfide [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Products

Table 1035: Properties of each product.

Id	Name	SBO
s_1091	NADP(+) [intracellular]	
s_1521	thioredoxin dithiol [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{258} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_258}(\mathrm{Keq\_r\_1024}, \mathrm{Vmax\_r\_1024}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_1024}, \mathrm{kmp\_s\_1521r\_1024}, \mathrm{kms\_s\_0763\_br\_1024}, \mathrm{kms\_s\_1096r\_1024}, \mathrm{kms\_s\_1517r\_1024}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \quad (1317)$$

$$\mathrm{function\_258}(\mathrm{Keq\_r\_1024}, \mathrm{Vmax\_r\_1024}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_1091r\_1024}, \mathrm{kmp\_s\_1521r\_1024}, \mathrm{kms\_s\_0763\_br\_1024}, \mathrm{kms\_s\_1096r\_1024}, \mathrm{kms\_s\_1517r\_1024}, [\mathrm{s\_0763\_b}], [\mathrm{s\_1091}], [\mathrm{s\_1096}], [\mathrm{s\_1517}], [\mathrm{s\_1521}]) \quad (1318)$$

$$= \frac{\mathrm{Vmax\_r\_1024} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_1024}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1096r\_1024}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1517r\_1024}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1096}]^{1} \cdot [\mathrm{s\_1517}]^{1} - \frac{[\mathrm{s\_1091}]^{1} \cdot [\mathrm{s\_1521}]^{1}}{\mathrm{Keq\_r\_1024}}\right)}{\left(1+\frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_1024}}\right) \cdot \left(1+\frac{[\mathrm{s\_1096}]}{\mathrm{kms\_s\_1096r\_1024}}\right) \cdot \left(1+\frac{[\mathrm{s\_1517}]}{\mathrm{kms\_s\_1517r\_1024}}\right) + \left(1+\frac{[\mathrm{s\_1091}]}{\mathrm{kmp\_s\_1091r\_1024}}\right) \cdot \left(1+\frac{[\mathrm{s\_1521}]}{\mathrm{kmp\_s\_1521r\_1024}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})}$$

$$\text{function\_258}(\text{Keq\_r\_1024}, \text{Vmax\_r\_1024}, \text{vol}(\text{intracellular}), \text{kmp\_s\_1091r\_1024}, \text{kmp\_s\_1521r\_1024}, \text{kms\_s\_0763\_br\_1024}, \text{kms\_s\_1096r\_1024}, \text{kms\_s\_1517r\_1024}, [\text{s\_0763\_b}], [\text{s\_1091}], [\text{s\_1096}], [\text{s\_1517}], [\text{s\_1521}]) = \frac{\text{Vmax\_r\_1024} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0763\_br\_1024}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1096r\_1024}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1517r\_1024}}\right)^{1} \cdot \left([\text{s\_0763\_b}]^{1} \cdot [\text{s\_1096}]^{1} \cdot [\text{s\_1517}]^{1} - \frac{[\text{s\_1091}]^{1} \cdot [\text{s\_1521}]^{1}}{\text{Keq\_r\_1024}}\right)}{\left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1096}]}{\text{kms\_s\_1096r\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1517}]}{\text{kms\_s\_1517r\_1024}}\right) + \left(1+\frac{[\text{s\_1091}]}{\text{kmp\_s\_1091r\_1024}}\right) \cdot \left(1+\frac{[\text{s\_1521}]}{\text{kmp\_s\_1521r\_1024}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1319}$$

Table 1036: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1024	Keq_r_1024		2.004		☑
Vmax_r_1024	Vmax_r_1024		0.705		☑
kmp_s_1091r-_1024	kmp_s_1091r_1024		0.549		☑
kmp_s_1521r-_1024	kmp_s_1521r_1024		0.549		☑
kms_s_0763-_br_1024	kms_s_0763_br-_1024		0.549		☑
kms_s_1096r-_1024	kms_s_1096r_1024		0.549		☑
kms_s_1517r-_1024	kms_s_1517r_1024		0.549		☑

7.259 Reaction r_1026

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name threonine aldolase

Notes GENE_ASSOCIATION:YEL046C

Reaction equation

$$\text{s\_0949} \xrightleftharpoons{\text{s\_0366, s\_0740, s\_0949}} \text{s\_0366} + \text{s\_0740} \tag{1320}$$

Reactant

Table 1037: Properties of each reactant.

Id	Name	SBO
s_0949	L-threonine [intracellular]	

Modifiers

Table 1038: Properties of each modifier.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0740	glycine [intracellular]	
s_0949	L-threonine [intracellular]	

Products

Table 1039: Properties of each product.

Id	Name	SBO
s_0366	acetaldehyde [intracellular]	
s_0740	glycine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{259} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_259}(\mathrm{Keq\_r\_1026}, \mathrm{Vmax\_r\_1026}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0366r\_1026}, \mathrm{kmp\_s\_0740r\_1026}, \mathrm{kms\_s\_0949r\_1026}, [\mathrm{s\_0366}], [\mathrm{s\_0740}], [\mathrm{s\_0949}]) \quad (1321)$$

$$\mathrm{function\_259}(\mathrm{Keq\_r\_1026}, \mathrm{Vmax\_r\_1026}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0366r\_1026}, \mathrm{kmp\_s\_0740r\_1026}, \mathrm{kms\_s\_0949r\_1026}, [\mathrm{s\_0366}], [\mathrm{s\_0740}], [\mathrm{s\_0949}]) = \frac{\mathrm{Vmax\_r\_1026} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0949r\_1026}}\right)^{1} \cdot \left([\mathrm{s\_0949}]^{1} - \frac{[\mathrm{s\_0366}]^{1} \cdot [\mathrm{s\_0740}]^{1}}{\mathrm{Keq\_r\_1026}}\right)}{1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kms\_s\_0949r\_1026}} + \left(1 + \frac{[\mathrm{s\_0366}]}{\mathrm{kmp\_s\_0366r\_1026}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0740}]}{\mathrm{kmp\_s\_0740r\_1026}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1322)$$

$$\mathrm{function\_259}(\mathrm{Keq\_r\_1026}, \mathrm{Vmax\_r\_1026}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0366r\_1026}, \mathrm{kmp\_s\_0740r\_1026}, \mathrm{kms\_s\_0949r\_1026}, [\mathrm{s\_0366}], [\mathrm{s\_0740}], [\mathrm{s\_0949}]) = \frac{\mathrm{Vmax\_r\_1026} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0949r\_1026}}\right)^{1} \cdot \left([\mathrm{s\_0949}]^{1} - \frac{[\mathrm{s\_0366}]^{1} \cdot [\mathrm{s\_0740}]^{1}}{\mathrm{Keq\_r\_1026}}\right)}{1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kms\_s\_0949r\_1026}} + \left(1 + \frac{[\mathrm{s\_0366}]}{\mathrm{kmp\_s\_0366r\_1026}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0740}]}{\mathrm{kmp\_s\_0740r\_1026}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1323)$$

Table 1040: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1026	Keq_r_1026		0.073		☑
Vmax_r_1026	Vmax_r_1026		3.184		☑
kmp_s_0366r_1026	kmp_s_0366r_1026		0.120		☑
kmp_s_0740r_1026	kmp_s_0740r_1026		0.549		☑
kms_s_0949r_1026	kms_s_0949r_1026		1.000		☑

7.260 Reaction r_1027

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name threonine synthase

Notes GENE_ASSOCIATION:YCR053W

Reaction equation

$$\mathrm{s\_1122} + \mathrm{s\_1434\_b} \xrightleftharpoons{\mathrm{s\_0949,\ s\_1122,\ s\_1207,\ s\_1434\_b}} \mathrm{s\_0949} + \mathrm{s\_1207} \tag{1324}$$

Reactants

Table 1041: Properties of each reactant.

Id	Name	SBO
s_1122	O-phospho-L-homoserine [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 1042: Properties of each modifier.

Id	Name	SBO
s_0949	L-threonine [intracellular]	
s_1122	O-phospho-L-homoserine [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1043: Properties of each product.

Id	Name	SBO
s_0949	L-threonine [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{260} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_260}(\mathrm{Keq\_r\_1027}, \mathrm{Vmax\_r\_1027}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0949r\_1027}, \mathrm{kmp\_s\_1207r\_1027}, \mathrm{kms\_s\_1122r\_1027}, \mathrm{kms\_s\_1434\_br\_1027}, [\mathrm{s\_0949}], [\mathrm{s\_1122}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \tag{1325}$$

$$\mathrm{function\_260}(\mathrm{Keq\_r\_1027}, \mathrm{Vmax\_r\_1027}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0949r\_1027}, \mathrm{kmp\_s\_1207r\_1027}, \mathrm{kms\_s\_1122r\_1027}, \mathrm{kms\_s\_1434\_br\_1027}, [\mathrm{s\_0949}], [\mathrm{s\_1122}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1027} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1122r\_1027}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1027}}\right)^{1} \cdot \left([\mathrm{s\_1122}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0949}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1027}}\right)}{\left(1 + \frac{[\mathrm{s\_1122}]}{\mathrm{kms\_s\_1122r\_1027}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1027}}\right) + \left(1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kmp\_s\_0949r\_1027}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1027}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1326}$$

$$\mathrm{function\_260}(\mathrm{Keq\_r\_1027}, \mathrm{Vmax\_r\_1027}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0949r\_1027}, \mathrm{kmp\_s\_1207r\_1027}, \mathrm{kms\_s\_1122r\_1027}, \mathrm{kms\_s\_1434\_br\_1027}, [\mathrm{s\_0949}], [\mathrm{s\_1122}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1027} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1122r\_1027}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1027}}\right)^{1} \cdot \left([\mathrm{s\_1122}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0949}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1027}}\right)}{\left(1 + \frac{[\mathrm{s\_1122}]}{\mathrm{kms\_s\_1122r\_1027}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1027}}\right) + \left(1 + \frac{[\mathrm{s\_0949}]}{\mathrm{kmp\_s\_0949r\_1027}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1027}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1327}$$

Table 1044: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1027	Keq_r_1027		2.004		☑
Vmax_r_1027	Vmax_r_1027		5.575		☑
kmp_s_0949r-_1027	kmp_s_0949r_1027		1.000		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1207r-_1027	kmp_s_1207r_1027		0.549		☑
kms_s_1122r-_1027	kms_s_1122r_1027		0.549		☑
kms_s_1434-_br_1027	kms_s_1434_br-_1027		0.549		☑

7.261 Reaction r_1032

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name thymidylate synthase

Notes GENE_ASSOCIATION:YOR074C

Reaction equation

$$\text{s\_0307} + \text{s\_0624} \xrightleftharpoons{\text{s\_0307, s\_0601, s\_0619, s\_0624}} \text{s\_0601} + \text{s\_0619} \tag{1328}$$

Reactants

Table 1045: Properties of each reactant.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0624	dUMP [intracellular]	

Modifiers

Table 1046: Properties of each modifier.

Id	Name	SBO
s_0307	5,10-methylenetetrahydrofolate(2-) [intracellular]	
s_0601	dihydrofolic acid [intracellular]	
s_0619	dTMP [intracellular]	
s_0624	dUMP [intracellular]	

Products

Table 1047: Properties of each product.

Id	Name	SBO
s_0601	dihydrofolic acid [intracellular]	
s_0619	dTMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{261} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_261}\left(\mathrm{Keq\_r\_1032}, \mathrm{Vmax\_r\_1032}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0601r\_1032}, \mathrm{kmp\_s\_0619r\_1032}, \mathrm{kms\_s\_0307r\_1032}, \mathrm{kms\_s\_0624r\_1032}, [\mathrm{s\_0307}], [\mathrm{s\_0601}], [\mathrm{s\_0619}], [\mathrm{s\_0624}]\right) \quad (1329)$$

$$\mathrm{function\_261}\left(\mathrm{Keq\_r\_1032}, \mathrm{Vmax\_r\_1032}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0601r\_1032}, \mathrm{kmp\_s\_0619r\_1032}, \mathrm{kms\_s\_0307r\_1032}, \mathrm{kms\_s\_0624r\_1032}, [\mathrm{s\_0307}], [\mathrm{s\_0601}], [\mathrm{s\_0619}], [\mathrm{s\_0624}]\right) = \frac{\mathrm{Vmax\_r\_1032} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_1032}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0624r\_1032}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0624}]^{1} - \frac{[\mathrm{s\_0601}]^{1} \cdot [\mathrm{s\_0619}]^{1}}{\mathrm{Keq\_r\_1032}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_1032}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0624}]}{\mathrm{kms\_s\_0624r\_1032}}\right) + \left(1 + \frac{[\mathrm{s\_0601}]}{\mathrm{kmp\_s\_0601r\_1032}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0619}]}{\mathrm{kmp\_s\_0619r\_1032}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1330)$$

$$\mathrm{function\_261}\left(\mathrm{Keq\_r\_1032}, \mathrm{Vmax\_r\_1032}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0601r\_1032}, \mathrm{kmp\_s\_0619r\_1032}, \mathrm{kms\_s\_0307r\_1032}, \mathrm{kms\_s\_0624r\_1032}, [\mathrm{s\_0307}], [\mathrm{s\_0601}], [\mathrm{s\_0619}], [\mathrm{s\_0624}]\right) = \frac{\mathrm{Vmax\_r\_1032} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0307r\_1032}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0624r\_1032}}\right)^{1} \cdot \left([\mathrm{s\_0307}]^{1} \cdot [\mathrm{s\_0624}]^{1} - \frac{[\mathrm{s\_0601}]^{1} \cdot [\mathrm{s\_0619}]^{1}}{\mathrm{Keq\_r\_1032}}\right)}{\left(1 + \frac{[\mathrm{s\_0307}]}{\mathrm{kms\_s\_0307r\_1032}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0624}]}{\mathrm{kms\_s\_0624r\_1032}}\right) + \left(1 + \frac{[\mathrm{s\_0601}]}{\mathrm{kmp\_s\_0601r\_1032}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0619}]}{\mathrm{kmp\_s\_0619r\_1032}}\right) - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1331)$$

Table 1048: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1032	Keq_r_1032		1.100		☑
Vmax_r_1032	Vmax_r_1032		0.015		☑
kmp_s_0601r_1032	kmp_s_0601r_1032		0.549		☑
kmp_s_0619r_1032	kmp_s_0619r_1032		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0307r_1032	kms_s_0307r_1032		0.549		☑
kms_s_0624r_1032	kms_s_0624r_1032		0.549		☑

7.262 Reaction r_1035

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name transaldolase

Notes GENE_ASSOCIATION:YLR354C

Reaction equation

$$s\_0533 + s\_0539 \xrightleftharpoons{s\_0533,\ s\_0539,\ s\_0731,\ s\_1304} s\_0731 + s\_1304 \quad (1332)$$

Reactants

Table 1049: Properties of each reactant.

Id	Name	SBO
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	

Modifiers

Table 1050: Properties of each modifier.

Id	Name	SBO
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1304	sedoheptulose 7-phosphate [intracellular]	

Products

Table 1051: Properties of each product.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1304	sedoheptulose 7-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{262} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_262}(\mathrm{Keq\_r\_1035}, \mathrm{Vmax\_r\_1035}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1035}, \mathrm{kmp\_s\_1304r\_1035}, \mathrm{kms\_s\_0533r\_1035}, \mathrm{kms\_s\_0539r\_1035}, [\mathrm{s\_0533}], [\mathrm{s\_0539}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) \quad (1333)$$

$$\mathrm{function\_262}(\mathrm{Keq\_r\_1035}, \mathrm{Vmax\_r\_1035}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1035}, \mathrm{kmp\_s\_1304r\_1035}, \mathrm{kms\_s\_0533r\_1035}, \mathrm{kms\_s\_0539r\_1035}, [\mathrm{s\_0533}], [\mathrm{s\_0539}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) = \frac{\mathrm{Vmax\_r\_1035} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0533r\_1035}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0539r\_1035}}\right)^{1} \cdot \left([\mathrm{s\_0533}]^{1} \cdot [\mathrm{s\_0539}]^{1} - \frac{[\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_1304}]^{1}}{\mathrm{Keq\_r\_1035}}\right)}{\left(1 + \frac{[\mathrm{s\_0533}]}{\mathrm{kms\_s\_0533r\_1035}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_1035}}\right) + \left(1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1035}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1304}]}{\mathrm{kmp\_s\_1304r\_1035}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1334)$$

$$\mathrm{function\_262}(\mathrm{Keq\_r\_1035}, \mathrm{Vmax\_r\_1035}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1035}, \mathrm{kmp\_s\_1304r\_1035}, \mathrm{kms\_s\_0533r\_1035}, \mathrm{kms\_s\_0539r\_1035}, [\mathrm{s\_0533}], [\mathrm{s\_0539}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) = \frac{\mathrm{Vmax\_r\_1035} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0533r\_1035}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_0539r\_1035}}\right)^{1} \cdot \left([\mathrm{s\_0533}]^{1} \cdot [\mathrm{s\_0539}]^{1} - \frac{[\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_1304}]^{1}}{\mathrm{Keq\_r\_1035}}\right)}{\left(1 + \frac{[\mathrm{s\_0533}]}{\mathrm{kms\_s\_0533r\_1035}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0539}]}{\mathrm{kms\_s\_0539r\_1035}}\right) + \left(1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1035}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1304}]}{\mathrm{kmp\_s\_1304r\_1035}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1335)$$

Table 1052: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1035	Keq_r_1035		0.459		☑
Vmax_r_1035	Vmax_r_1035		0.140		☑
kmp_s_0731r-_1035	kmp_s_0731r_1035		0.044		☑
kmp_s_1304r-_1035	kmp_s_1304r_1035		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0533r-_1035	kms_s_0533r_1035		0.549		☑
kms_s_0539r-_1035	kms_s_0539r_1035		0.105		☑

7.263 Reaction r_1036

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name transketolase

Notes GENE_ASSOCIATION:(YBR117C or YPR074C)

Reaction equation

$$\text{s\_0731} + \text{s\_1304} \xrightleftharpoons{\text{s\_0427, s\_0561, s\_0731, s\_1304}} \text{s\_0427} + \text{s\_0561} \quad (1336)$$

Reactants

Table 1053: Properties of each reactant.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1304	sedoheptulose 7-phosphate [intracellular]	

Modifiers

Table 1054: Properties of each modifier.

Id	Name	SBO
s_0427	alpha-D-ribose 5-phosphate [intracellular]	
s_0561	D-xylulose 5-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_1304	sedoheptulose 7-phosphate [intracellular]	

Products

Table 1055: Properties of each product.

Id	Name	SBO
s_0427	alpha-D-ribose 5-phosphate [intracellular]	
s_0561	D-xylulose 5-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{263} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_263}(\mathrm{Keq\_r\_1036}, \mathrm{Vmax\_r\_1036}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_1036}, \mathrm{kmp\_s\_0561r\_1036}, \mathrm{kms\_s\_0731r\_1036}, \mathrm{kms\_s\_1304r\_1036}, [\mathrm{s\_0427}], [\mathrm{s\_0561}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) \tag{1337}$$

$$\mathrm{function\_263}(\mathrm{Keq\_r\_1036}, \mathrm{Vmax\_r\_1036}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_1036}, \mathrm{kmp\_s\_0561r\_1036}, \mathrm{kms\_s\_0731r\_1036}, \mathrm{kms\_s\_1304r\_1036}, [\mathrm{s\_0427}], [\mathrm{s\_0561}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) = \frac{\mathrm{Vmax\_r\_1036} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0731r\_1036}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1304r\_1036}}\right)^{1} \cdot \left([\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_1304}]^{1} - \frac{[\mathrm{s\_0427}]^{1} \cdot [\mathrm{s\_0561}]^{1}}{\mathrm{Keq\_r\_1036}}\right)}{\left(1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kms\_s\_0731r\_1036}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1304}]}{\mathrm{kms\_s\_1304r\_1036}}\right) + \left(1 + \frac{[\mathrm{s\_0427}]}{\mathrm{kmp\_s\_0427r\_1036}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0561}]}{\mathrm{kmp\_s\_0561r\_1036}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1338}$$

$$\mathrm{function\_263}(\mathrm{Keq\_r\_1036}, \mathrm{Vmax\_r\_1036}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0427r\_1036}, \mathrm{kmp\_s\_0561r\_1036}, \mathrm{kms\_s\_0731r\_1036}, \mathrm{kms\_s\_1304r\_1036}, [\mathrm{s\_0427}], [\mathrm{s\_0561}], [\mathrm{s\_0731}], [\mathrm{s\_1304}]) = \frac{\mathrm{Vmax\_r\_1036} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0731r\_1036}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1304r\_1036}}\right)^{1} \cdot \left([\mathrm{s\_0731}]^{1} \cdot [\mathrm{s\_1304}]^{1} - \frac{[\mathrm{s\_0427}]^{1} \cdot [\mathrm{s\_0561}]^{1}}{\mathrm{Keq\_r\_1036}}\right)}{\left(1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kms\_s\_0731r\_1036}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1304}]}{\mathrm{kms\_s\_1304r\_1036}}\right) + \left(1 + \frac{[\mathrm{s\_0427}]}{\mathrm{kmp\_s\_0427r\_1036}}\right) \cdot \left(1 + \frac{[\mathrm{s\_0561}]}{\mathrm{kmp\_s\_0561r\_1036}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \tag{1339}$$

Table 1056: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1036	Keq_r_1036		13.839		☑
Vmax_r_1036	Vmax_r_1036		0.140		☑
kmp_s_0427r-_1036	kmp_s_0427r_1036		0.549		☑
kmp_s_0561r-_1036	kmp_s_0561r_1036		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0731r-_1036	kms_s_0731r_1036		0.044		☑
kms_s_1304r-_1036	kms_s_1304r_1036		0.549		☑

7.264 Reaction r_1037

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name transketolase_2

Notes GENE_ASSOCIATION:(YBR117C or YPR074C)

Reaction equation

$$\mathrm{s\_0539} + \mathrm{s\_0731} \xrightleftharpoons{\mathrm{s\_0533,\ s\_0539,\ s\_0561,\ s\_0731}} \mathrm{s\_0533} + \mathrm{s\_0561} \tag{1340}$$

Reactants

Table 1057: Properties of each reactant.

Id	Name	SBO
s_0539	D-fructose 6-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	

Modifiers

Table 1058: Properties of each modifier.

Id	Name	SBO
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_0539	D-fructose 6-phosphate [intracellular]	
s_0561	D-xylulose 5-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	

Products

Table 1059: Properties of each product.

Id	Name	SBO
s_0533	D-erythrose 4-phosphate(2-) [intracellular]	
s_0561	D-xylulose 5-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{264} = \text{vol}(\text{intracellular}) \cdot \text{function\_264}(\text{Keq\_r\_1037}, \text{Vmax\_r\_1037}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0533r\_1037}, \text{kmp\_s\_0561r\_1037}, \text{kms\_s\_0539r\_1037}, \text{kms\_s\_0731r\_1037}, [\text{s\_0533}], [\text{s\_0539}], [\text{s\_0561}], [\text{s\_0731}]) \tag{1341}$$

$$\text{function\_264}(\text{Keq\_r\_1037}, \text{Vmax\_r\_1037}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0533r\_1037}, \text{kmp\_s\_0561r\_1037}, \text{kms\_s\_0539r\_1037}, \text{kms\_s\_0731r\_1037}, [\text{s\_0533}], [\text{s\_0539}], [\text{s\_0561}], [\text{s\_0731}]) = \frac{\text{Vmax\_r\_1037} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0539r\_1037}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0731r\_1037}}\right)^{1} \cdot \left([\text{s\_0539}]^{1} \cdot [\text{s\_0731}]^{1} - \frac{[\text{s\_0533}]^{1} \cdot [\text{s\_0561}]^{1}}{\text{Keq\_r\_1037}}\right)}{\left(1 + \frac{[\text{s\_0539}]}{\text{kms\_s\_0539r\_1037}}\right) \cdot \left(1 + \frac{[\text{s\_0731}]}{\text{kms\_s\_0731r\_1037}}\right) + \left(1 + \frac{[\text{s\_0533}]}{\text{kmp\_s\_0533r\_1037}}\right) \cdot \left(1 + \frac{[\text{s\_0561}]}{\text{kmp\_s\_0561r\_1037}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1342}$$

$$\text{function\_264}(\text{Keq\_r\_1037}, \text{Vmax\_r\_1037}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0533r\_1037}, \text{kmp\_s\_0561r\_1037}, \text{kms\_s\_0539r\_1037}, \text{kms\_s\_0731r\_1037}, [\text{s\_0533}], [\text{s\_0539}], [\text{s\_0561}], [\text{s\_0731}]) = \frac{\text{Vmax\_r\_1037} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0539r\_1037}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0731r\_1037}}\right)^{1} \cdot \left([\text{s\_0539}]^{1} \cdot [\text{s\_0731}]^{1} - \frac{[\text{s\_0533}]^{1} \cdot [\text{s\_0561}]^{1}}{\text{Keq\_r\_1037}}\right)}{\left(1 + \frac{[\text{s\_0539}]}{\text{kms\_s\_0539r\_1037}}\right) \cdot \left(1 + \frac{[\text{s\_0731}]}{\text{kms\_s\_0731r\_1037}}\right) + \left(1 + \frac{[\text{s\_0533}]}{\text{kmp\_s\_0533r\_1037}}\right) \cdot \left(1 + \frac{[\text{s\_0561}]}{\text{kmp\_s\_0561r\_1037}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1343}$$

Table 1060: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1037	Keq_r_1037		72.668		☑
Vmax_r_1037	Vmax_r_1037		1.163		☑
kmp_s_0533r-_1037	kmp_s_0533r_1037		0.549		☑
kmp_s_0561r-_1037	kmp_s_0561r_1037		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0539r-_1037	kms_s_0539r_1037		0.105		☑
kms_s_0731r-_1037	kms_s_0731r_1037		0.044		☑

7.265 Reaction r_1038

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name trehalose-phosphatase

Notes GENE_ASSOCIATION:YDR074W

Reaction equation

$$s\_0419 + s\_1434\_b \xrightleftharpoons{s\_0416,\ s\_0419,\ s\_1207,\ s\_1434\_b} s\_0416 + s\_1207 \tag{1344}$$

Reactants

Table 1061: Properties of each reactant.

Id	Name	SBO
s_0419	alpha,alpha-trehalose 6-phosphate [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 1062: Properties of each modifier.

Id	Name	SBO
s_0416	alpha,alpha-trehalose [intracellular]	
s_0419	alpha,alpha-trehalose 6-phosphate [intracellular]	
s_1207	phosphate [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1063: Properties of each product.

Id	Name	SBO
s_0416	alpha,alpha-trehalose [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{265} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_265}(\mathrm{Keq\_r\_1038}, \mathrm{Vmax\_r\_1038}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0416r\_1038}, \mathrm{kmp\_s\_1207r\_1038}, \mathrm{kms\_s\_0419r\_1038}, \mathrm{kms\_s\_1434\_br\_1038}, [\mathrm{s\_0416}], [\mathrm{s\_0419}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) \quad (1345)$$

$$\mathrm{function\_265}(\mathrm{Keq\_r\_1038}, \mathrm{Vmax\_r\_1038}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0416r\_1038}, \mathrm{kmp\_s\_1207r\_1038}, \mathrm{kms\_s\_0419r\_1038}, \mathrm{kms\_s\_1434\_br\_1038}, [\mathrm{s\_0416}], [\mathrm{s\_0419}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1038} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0419r\_1038}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1038}}\right)^{1} \cdot \left([\mathrm{s\_0419}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0416}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1038}}\right)}{\left(1 + \frac{[\mathrm{s\_0419}]}{\mathrm{kms\_s\_0419r\_1038}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1038}}\right) + \left(1 + \frac{[\mathrm{s\_0416}]}{\mathrm{kmp\_s\_0416r\_1038}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1038}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1346)$$

$$\mathrm{function\_265}(\mathrm{Keq\_r\_1038}, \mathrm{Vmax\_r\_1038}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0416r\_1038}, \mathrm{kmp\_s\_1207r\_1038}, \mathrm{kms\_s\_0419r\_1038}, \mathrm{kms\_s\_1434\_br\_1038}, [\mathrm{s\_0416}], [\mathrm{s\_0419}], [\mathrm{s\_1207}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1038} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0419r\_1038}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1038}}\right)^{1} \cdot \left([\mathrm{s\_0419}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0416}]^{1} \cdot [\mathrm{s\_1207}]^{1}}{\mathrm{Keq\_r\_1038}}\right)}{\left(1 + \frac{[\mathrm{s\_0419}]}{\mathrm{kms\_s\_0419r\_1038}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1038}}\right) + \left(1 + \frac{[\mathrm{s\_0416}]}{\mathrm{kmp\_s\_0416r\_1038}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1207}]}{\mathrm{kmp\_s\_1207r\_1038}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1347)$$

Table 1064: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1038	Keq_r_1038		1.100		☑
Vmax_r_1038	Vmax_r_1038		0.100		☑
kmp_s_0416r-_1038	kmp_s_0416r_1038		0.549		☑
kmp_s_1207r-_1038	kmp_s_1207r_1038		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_0419r-_1038	kms_s_0419r_1038		0.549		☑
kms_s_1434-_br_1038	kms_s_1434_br-_1038		0.549		☑

7.266 Reaction r_1040

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name triacylglycerol lipase

Notes GENE_ASSOCIATION:(YKR089C or YMR313C or YOR081C)

Reaction equation

$$s\_1399 + s\_1434\_b \xrightleftharpoons{s\_0596,\ s\_0663,\ s\_1399,\ s\_1434\_b} s\_0596 + s\_0663 \quad (1348)$$

Reactants

Table 1065: Properties of each reactant.

Id	Name	SBO
s_1399	triglyceride [intracellular]	
s_1434_b	water [intracellular]	

Modifiers

Table 1066: Properties of each modifier.

Id	Name	SBO
s_0596	diglyceride [intracellular]	
s_0663	fatty acid [intracellular]	
s_1399	triglyceride [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1067: Properties of each product.

Id	Name	SBO
s_0596	diglyceride [intracellular]	
s_0663	fatty acid [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{266} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_266}(\mathrm{Keq\_r\_1040}, \mathrm{Vmax\_r\_1040}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_1040}, \mathrm{kmp\_s\_0663r\_1040}, \mathrm{kms\_s\_1399r\_1040}, \mathrm{kms\_s\_1434\_br\_1040}, [\mathrm{s\_0596}], [\mathrm{s\_0663}], [\mathrm{s\_1399}], [\mathrm{s\_1434\_b}]) \quad (1349)$$

$$\mathrm{function\_266}(\mathrm{Keq\_r\_1040}, \mathrm{Vmax\_r\_1040}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_1040}, \mathrm{kmp\_s\_0663r\_1040}, \mathrm{kms\_s\_1399r\_1040}, \mathrm{kms\_s\_1434\_br\_1040}, [\mathrm{s\_0596}], [\mathrm{s\_0663}], [\mathrm{s\_1399}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1040} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1399r\_1040}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1040}}\right)^{1} \cdot \left([\mathrm{s\_1399}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0596}]^{1} \cdot [\mathrm{s\_0663}]^{1}}{\mathrm{Keq\_r\_1040}}\right)}{\left(1+\frac{[\mathrm{s\_1399}]}{\mathrm{kms\_s\_1399r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1040}}\right) + \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kmp\_s\_0596r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_0663}]}{\mathrm{kmp\_s\_0663r\_1040}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1350)$$

$$\mathrm{function\_266}(\mathrm{Keq\_r\_1040}, \mathrm{Vmax\_r\_1040}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0596r\_1040}, \mathrm{kmp\_s\_0663r\_1040}, \mathrm{kms\_s\_1399r\_1040}, \mathrm{kms\_s\_1434\_br\_1040}, [\mathrm{s\_0596}], [\mathrm{s\_0663}], [\mathrm{s\_1399}], [\mathrm{s\_1434\_b}]) = \frac{\mathrm{Vmax\_r\_1040} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1399r\_1040}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1434\_br\_1040}}\right)^{1} \cdot \left([\mathrm{s\_1399}]^{1} \cdot [\mathrm{s\_1434\_b}]^{1} - \frac{[\mathrm{s\_0596}]^{1} \cdot [\mathrm{s\_0663}]^{1}}{\mathrm{Keq\_r\_1040}}\right)}{\left(1+\frac{[\mathrm{s\_1399}]}{\mathrm{kms\_s\_1399r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_1434\_b}]}{\mathrm{kms\_s\_1434\_br\_1040}}\right) + \left(1+\frac{[\mathrm{s\_0596}]}{\mathrm{kmp\_s\_0596r\_1040}}\right) \cdot \left(1+\frac{[\mathrm{s\_0663}]}{\mathrm{kmp\_s\_0663r\_1040}}\right) - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1351)$$

Table 1068: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1040	Keq_r_1040		1.100		☑
Vmax_r_1040	Vmax_r_1040		0.004		☑
kmp_s_0596r-_1040	kmp_s_0596r_1040		0.549		☑
kmp_s_0663r-_1040	kmp_s_0663r_1040		0.549		☑

Id	Name	SBO	Value	Unit	Constant
kms_s_1399r-_1040	kms_s_1399r_1040		0.549		☑
kms_s_1434-_br_1040	kms_s_1434_br-_1040		0.549		☑

7.267 Reaction r_1041

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name triose-phosphate isomerase

Notes GENE_ASSOCIATION:YDR050C

Reaction equation

$$s\_0735 \xrightleftharpoons{s\_0731,\ s\_0735} s\_0731 \qquad (1352)$$

Reactant

Table 1069: Properties of each reactant.

Id	Name	SBO
s_0735	glycerone phosphate [intracellular]	

Modifiers

Table 1070: Properties of each modifier.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0735	glycerone phosphate [intracellular]	

Product

Table 1071: Properties of each product.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{267} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_267}(\mathrm{Keq\_r\_1041}, \mathrm{Vmax\_r\_1041}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1041}, \mathrm{kms\_s\_0735r\_1041}, [\mathrm{s\_0731}], [\mathrm{s\_0735}]) \quad (1353)$$

$$\mathrm{function\_267}(\mathrm{Keq\_r\_1041}, \mathrm{Vmax\_r\_1041}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1041}, \mathrm{kms\_s\_0735r\_1041}, [\mathrm{s\_0731}], [\mathrm{s\_0735}]) = \frac{\mathrm{Vmax\_r\_1041} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0735r\_1041}}\right)^{1} \cdot \left([\mathrm{s\_0735}]^{1} - \frac{[\mathrm{s\_0731}]^{1}}{\mathrm{Keq\_r\_1041}}\right)}{1 + \frac{[\mathrm{s\_0735}]}{\mathrm{kms\_s\_0735r\_1041}} + 1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1041}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1354)$$

$$\mathrm{function\_267}(\mathrm{Keq\_r\_1041}, \mathrm{Vmax\_r\_1041}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0731r\_1041}, \mathrm{kms\_s\_0735r\_1041}, [\mathrm{s\_0731}], [\mathrm{s\_0735}]) = \frac{\mathrm{Vmax\_r\_1041} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0735r\_1041}}\right)^{1} \cdot \left([\mathrm{s\_0735}]^{1} - \frac{[\mathrm{s\_0731}]^{1}}{\mathrm{Keq\_r\_1041}}\right)}{1 + \frac{[\mathrm{s\_0735}]}{\mathrm{kms\_s\_0735r\_1041}} + 1 + \frac{[\mathrm{s\_0731}]}{\mathrm{kmp\_s\_0731r\_1041}} - 1}}{\mathrm{vol}(\mathrm{intracellular})} \quad (1355)$$

Table 1072: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_1041`	Keq_r_1041		0.080		☑
`Vmax_r_1041`	Vmax_r_1041		20.559		☑
`kmp_s_0731r_1041`	kmp_s_0731r_1041		0.044		☑
`kms_s_0735r_1041`	kms_s_0735r_1041		0.602		☑

7.268 Reaction `r_1042`

This is a reversible reaction of two reactants forming three products influenced by five modifiers.

Name tryptophan synthase (indoleglycerol phosphate)

Notes GENE_ASSOCIATION:YGL026C

Reaction equation

$$\mathrm{s\_0088} + \mathrm{s\_0943} \xrightleftharpoons{\mathrm{s\_0088,\ s\_0731,\ s\_0943,\ s\_0952,\ s\_1434\_b}} \mathrm{s\_0731} + \mathrm{s\_0952} + \mathrm{s\_1434\_b} \quad (1356)$$

Reactants

Table 1073: Properties of each reactant.

Id	Name	SBO
s_0088	1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]	
s_0943	L-serine [intracellular]	

Modifiers

Table 1074: Properties of each modifier.

Id	Name	SBO
s_0088	1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]	
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0943	L-serine [intracellular]	
s_0952	L-tryptophan [intracellular]	
s_1434_b	water [intracellular]	

Products

Table 1075: Properties of each product.

Id	Name	SBO
s_0731	glyceraldehyde 3-phosphate [intracellular]	
s_0952	L-tryptophan [intracellular]	
s_1434_b	water [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{268} = {} & \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_268}(\mathrm{Keq\_r\_1042}, \mathrm{Vmax\_r\_1042}, \mathrm{vol}(\mathrm{intracellular}), \\ & \mathrm{kmp\_s\_0731r\_1042}, \mathrm{kmp\_s\_0952r\_1042}, \mathrm{kmp\_s\_1434\_br\_1042}, \mathrm{kms\_s\_0088r\_1042}, \\ & \mathrm{kms\_s\_0943r\_1042}, [\mathrm{s\_0088}], [\mathrm{s\_0731}], [\mathrm{s\_0943}], [\mathrm{s\_0952}], [\mathrm{s\_1434\_b}]) \end{aligned} \quad (1357)$$

$$\text{function\_268}\left(\text{Keq\_r\_1042}, \text{Vmax\_r\_1042}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0731r\_1042}, \text{kmp\_s\_0952r\_1042}, \text{kmp\_s\_1434\_br\_1042}, \text{kms\_s\_0088r\_1042}, \text{kms\_s\_0943r\_1042}, [\text{s\_0088}], [\text{s\_0731}], [\text{s\_0943}], [\text{s\_0952}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_1042} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0088r\_1042}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0943r\_1042}}\right)^{1} \cdot \left([\text{s\_0088}]^{1} \cdot [\text{s\_0943}]^{1} - \frac{[\text{s\_0731}]^{1} \cdot [\text{s\_0952}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_1042}}\right)}{\left(1 + \frac{[\text{s\_0088}]}{\text{kms\_s\_0088r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_0943}]}{\text{kms\_s\_0943r\_1042}}\right) + \left(1 + \frac{[\text{s\_0731}]}{\text{kmp\_s\_0731r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_0952}]}{\text{kmp\_s\_0952r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_1042}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1358}$$

$$\text{function\_268}\left(\text{Keq\_r\_1042}, \text{Vmax\_r\_1042}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0731r\_1042}, \text{kmp\_s\_0952r\_1042}, \text{kmp\_s\_1434\_br\_1042}, \text{kms\_s\_0088r\_1042}, \text{kms\_s\_0943r\_1042}, [\text{s\_0088}], [\text{s\_0731}], [\text{s\_0943}], [\text{s\_0952}], [\text{s\_1434\_b}]\right) = \frac{\text{Vmax\_r\_1042} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0088r\_1042}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0943r\_1042}}\right)^{1} \cdot \left([\text{s\_0088}]^{1} \cdot [\text{s\_0943}]^{1} - \frac{[\text{s\_0731}]^{1} \cdot [\text{s\_0952}]^{1} \cdot [\text{s\_1434\_b}]^{1}}{\text{Keq\_r\_1042}}\right)}{\left(1 + \frac{[\text{s\_0088}]}{\text{kms\_s\_0088r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_0943}]}{\text{kms\_s\_0943r\_1042}}\right) + \left(1 + \frac{[\text{s\_0731}]}{\text{kmp\_s\_0731r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_0952}]}{\text{kmp\_s\_0952r\_1042}}\right) \cdot \left(1 + \frac{[\text{s\_1434\_b}]}{\text{kmp\_s\_1434\_br\_1042}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1359}$$

Table 1076: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1042	Keq_r_1042		0.087		☑
Vmax_r_1042	Vmax_r_1042		0.188		☑
kmp_s_0731r_1042	kmp_s_0731r_1042		0.044		☑
kmp_s_0952r_1042	kmp_s_0952r_1042		1.000		☑
kmp_s_1434_br_1042	kmp_s_1434_br_1042		0.549		☑
kms_s_0088r_1042	kms_s_0088r_1042		0.549		☑
kms_s_0943r_1042	kms_s_0943r_1042		0.549		☑

7.269 Reaction r_1050

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name tyrosine transaminase

Notes GENE_ASSOCIATION:(YGL202W or YHR137W) or YKL106W or YLR027C

Reaction equation

$$\text{s\_0209} + \text{s\_0899} \xrightleftharpoons{\text{s\_0185, s\_0209, s\_0899, s\_0955}} \text{s\_0185} + \text{s\_0955} \tag{1360}$$

Reactants

Table 1077: Properties of each reactant.

Id	Name	SBO
s_0209	3-(4-hydroxyphenyl)pyruvate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 1078: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0209	3-(4-hydroxyphenyl)pyruvate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0955	L-tyrosine [intracellular]	

Products

Table 1079: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0955	L-tyrosine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{269} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_269}\left(\mathrm{Keq\_r\_1050}, \mathrm{Vmax\_r\_1050}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_1050}, \mathrm{kmp\_s\_0955r\_1050}, \mathrm{kms\_s\_0209r\_1050}, \mathrm{kms\_s\_0899r\_1050}, [\mathrm{s\_0185}], [\mathrm{s\_0209}], [\mathrm{s\_0899}], [\mathrm{s\_0955}]\right) \tag{1361}$$

$$\begin{aligned}&\text{function\_269}\left(\text{Keq\_r\_1050}, \text{Vmax\_r\_1050}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0185r\_1050}, \text{kmp\_s\_0955r\_1050}, \text{kms\_s\_0209r\_1050},\\&\quad\quad\left.\text{kms\_s\_0899r\_1050}, [\text{s\_0185}], [\text{s\_0209}], [\text{s\_0899}], [\text{s\_0955}]\right)\\&=\frac{\text{Vmax\_r\_1050}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0209r\_1050}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0899r\_1050}}\right)^{1}\cdot\left([\text{s\_0209}]^{1}\cdot[\text{s\_0899}]^{1}-\frac{[\text{s\_0185}]^{1}\cdot[\text{s\_0955}]^{1}}{\text{Keq\_r\_1050}}\right)}{\left(1+\frac{[\text{s\_0209}]}{\text{kms\_s\_0209r\_1050}}\right)\cdot\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_1050}}\right)+\left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_1050}}\right)\cdot\left(1+\frac{[\text{s\_0955}]}{\text{kmp\_s\_0955r\_1050}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1362}$$

$$\begin{aligned}&\text{function\_269}\left(\text{Keq\_r\_1050}, \text{Vmax\_r\_1050}, \text{vol}\left(\text{intracellular}\right),\right.\\&\quad\text{kmp\_s\_0185r\_1050}, \text{kmp\_s\_0955r\_1050}, \text{kms\_s\_0209r\_1050},\\&\quad\quad\left.\text{kms\_s\_0899r\_1050}, [\text{s\_0185}], [\text{s\_0209}], [\text{s\_0899}], [\text{s\_0955}]\right)\\&=\frac{\text{Vmax\_r\_1050}\cdot\frac{\left(\frac{1}{\text{kms\_s\_0209r\_1050}}\right)^{1}\cdot\left(\frac{1}{\text{kms\_s\_0899r\_1050}}\right)^{1}\cdot\left([\text{s\_0209}]^{1}\cdot[\text{s\_0899}]^{1}-\frac{[\text{s\_0185}]^{1}\cdot[\text{s\_0955}]^{1}}{\text{Keq\_r\_1050}}\right)}{\left(1+\frac{[\text{s\_0209}]}{\text{kms\_s\_0209r\_1050}}\right)\cdot\left(1+\frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_1050}}\right)+\left(1+\frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_1050}}\right)\cdot\left(1+\frac{[\text{s\_0955}]}{\text{kmp\_s\_0955r\_1050}}\right)-1}}{\text{vol}\left(\text{intracellular}\right)}\end{aligned} \tag{1363}$$

Table 1080: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1050	Keq_r_1050		1.100		☑
Vmax_r_1050	Vmax_r_1050		0.413		☑
kmp_s_0185r-_1050	kmp_s_0185r_1050		0.549		☑
kmp_s_0955r-_1050	kmp_s_0955r_1050		0.549		☑
kms_s_0209r-_1050	kms_s_0209r_1050		0.549		☑
kms_s_0899r-_1050	kms_s_0899r_1050		0.549		☑

7.270 Reaction r_1059

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name UMP kinase

Notes GENE_ASSOCIATION:YKL024C

Reaction equation

$$\text{s\_0446}+\text{s\_1417} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_1411, s\_1417}} \text{s\_0400}+\text{s\_1411} \tag{1364}$$

Reactants

Table 1081: Properties of each reactant.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_1417	UMP [intracellular]	

Modifiers

Table 1082: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_1411	UDP [intracellular]	
s_1417	UMP [intracellular]	

Products

Table 1083: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_1411	UDP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{270} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_270}\left(\mathrm{Keq\_r\_1059}, \mathrm{Vmax\_r\_1059}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0400r\_1059}, \mathrm{kmp\_s\_1411r\_1059}, \mathrm{kms\_s\_0446r\_1059}, \mathrm{kms\_s\_1417r\_1059}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_1411}], [\mathrm{s\_1417}]\right) \tag{1365}$$

$$\begin{aligned}&\text{function\_270}(\text{Keq\_r\_1059}, \text{Vmax\_r\_1059}, \text{vol}(\text{intracellular}),\\&\quad \text{kmp\_s\_0400r\_1059}, \text{kmp\_s\_1411r\_1059}, \text{kms\_s\_0446r\_1059},\\&\quad\quad \text{kms\_s\_1417r\_1059}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_1411}], [\text{s\_1417}])\\&= \frac{\text{Vmax\_r\_1059} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_1059}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1417r\_1059}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_1417}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_1411}]^{1}}{\text{Keq\_r\_1059}}\right)}{\left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_1059}}\right) \cdot \left(1 + \frac{[\text{s\_1417}]}{\text{kms\_s\_1417r\_1059}}\right) + \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_1059}}\right) \cdot \left(1 + \frac{[\text{s\_1411}]}{\text{kmp\_s\_1411r\_1059}}\right) - 1}}{\text{vol}(\text{intracellular})}\end{aligned} \tag{1366}$$

$$\begin{aligned}&\text{function\_270}(\text{Keq\_r\_1059}, \text{Vmax\_r\_1059}, \text{vol}(\text{intracellular}),\\&\quad \text{kmp\_s\_0400r\_1059}, \text{kmp\_s\_1411r\_1059}, \text{kms\_s\_0446r\_1059},\\&\quad\quad \text{kms\_s\_1417r\_1059}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_1411}], [\text{s\_1417}])\\&= \frac{\text{Vmax\_r\_1059} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0446r\_1059}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1417r\_1059}}\right)^{1} \cdot \left([\text{s\_0446}]^{1} \cdot [\text{s\_1417}]^{1} - \frac{[\text{s\_0400}]^{1} \cdot [\text{s\_1411}]^{1}}{\text{Keq\_r\_1059}}\right)}{\left(1 + \frac{[\text{s\_0446}]}{\text{kms\_s\_0446r\_1059}}\right) \cdot \left(1 + \frac{[\text{s\_1417}]}{\text{kms\_s\_1417r\_1059}}\right) + \left(1 + \frac{[\text{s\_0400}]}{\text{kmp\_s\_0400r\_1059}}\right) \cdot \left(1 + \frac{[\text{s\_1411}]}{\text{kmp\_s\_1411r\_1059}}\right) - 1}}{\text{vol}(\text{intracellular})}\end{aligned} \tag{1367}$$

Table 1084: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1059	Keq_r_1059		1.732		☑
Vmax_r_1059	Vmax_r_1059		0.239		☑
kmp_s_0400r_1059	kmp_s_0400r_1059		1.719		☑
kmp_s_1411r_1059	kmp_s_1411r_1059		0.549		☑
kms_s_0446r_1059	kms_s_0446r_1059		1.092		☑
kms_s_1417r_1059	kms_s_1417r_1059		0.549		☑

7.271 Reaction r_1066

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name uridylate kinase (dUMP)

Notes GENE_ASSOCIATION:YKL024C

Reaction equation

$$\text{s\_0400} + \text{s\_0622} \xrightleftharpoons{\text{s\_0400, s\_0446, s\_0622, s\_0624}} \text{s\_0446} + \text{s\_0624} \tag{1368}$$

Reactants

Table 1085: Properties of each reactant.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0622	dUDP [intracellular]	

Modifiers

Table 1086: Properties of each modifier.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0446	ATP [intracellular]	
s_0622	dUDP [intracellular]	
s_0624	dUMP [intracellular]	

Products

Table 1087: Properties of each product.

Id	Name	SBO
s_0446	ATP [intracellular]	
s_0624	dUMP [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{271} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_271}(\mathrm{Keq\_r\_1066}, \mathrm{Vmax\_r\_1066}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0446r\_1066}, \mathrm{kmp\_s\_0624r\_1066}, \mathrm{kms\_s\_0400r\_1066}, \mathrm{kms\_s\_0622r\_1066}, [\mathrm{s\_0400}], [\mathrm{s\_0446}], [\mathrm{s\_0622}], [\mathrm{s\_0624}]) \quad (1369)$$

$$\text{function\_271}(\text{Keq\_r\_1066}, \text{Vmax\_r\_1066}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0446r\_1066}, \text{kmp\_s\_0624r\_1066}, \text{kms\_s\_0400r\_1066}, \text{kms\_s\_0622r\_1066}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0622}], [\text{s\_0624}]) = \frac{\text{Vmax\_r\_1066} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_1066}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0622r\_1066}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0622}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0624}]^{1}}{\text{Keq\_r\_1066}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0622}]}{\text{kms\_s\_0622r\_1066}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0624}]}{\text{kmp\_s\_0624r\_1066}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1370}$$

$$\text{function\_271}(\text{Keq\_r\_1066}, \text{Vmax\_r\_1066}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0446r\_1066}, \text{kmp\_s\_0624r\_1066}, \text{kms\_s\_0400r\_1066}, \text{kms\_s\_0622r\_1066}, [\text{s\_0400}], [\text{s\_0446}], [\text{s\_0622}], [\text{s\_0624}]) = \frac{\text{Vmax\_r\_1066} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0400r\_1066}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0622r\_1066}}\right)^{1} \cdot \left([\text{s\_0400}]^{1} \cdot [\text{s\_0622}]^{1} - \frac{[\text{s\_0446}]^{1} \cdot [\text{s\_0624}]^{1}}{\text{Keq\_r\_1066}}\right)}{\left(1+\frac{[\text{s\_0400}]}{\text{kms\_s\_0400r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0622}]}{\text{kms\_s\_0622r\_1066}}\right) + \left(1+\frac{[\text{s\_0446}]}{\text{kmp\_s\_0446r\_1066}}\right) \cdot \left(1+\frac{[\text{s\_0624}]}{\text{kmp\_s\_0624r\_1066}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1371}$$

Table 1088: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1066	Keq_r_1066		0.699		☑
Vmax_r_1066	Vmax_r_1066		0.026		☑
kmp_s_0446r_1066	kmp_s_0446r_1066		1.092		☑
kmp_s_0624r_1066	kmp_s_0624r_1066		0.549		☑
kms_s_0400r_1066	kms_s_0400r_1066		1.719		☑
kms_s_0622r_1066	kms_s_0622r_1066		0.549		☑

7.272 Reaction r_1072

This is a reversible reaction of three reactants forming two products influenced by five modifiers.

Name UTP-glucose-1-phosphate uridylyltransferase

Notes GENE_ASSOCIATION:YKL035W

Reaction equation

$$\mathrm{s\_0549} + \mathrm{s\_0763\_b} + \mathrm{s\_1430} \xrightleftharpoons{\mathrm{s\_0549,\ s\_0605,\ s\_0763\_b,\ s\_1415,\ s\_1430}} \mathrm{s\_0605} + \mathrm{s\_1415} \tag{1372}$$

Reactants

Table 1089: Properties of each reactant.

Id	Name	SBO
s_0549	D-glucose 1-phosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1430	UTP [intracellular]	

Modifiers

Table 1090: Properties of each modifier.

Id	Name	SBO
s_0549	D-glucose 1-phosphate [intracellular]	
s_0605	diphosphate [intracellular]	
s_0763_b	H+ [intracellular]	
s_1415	UDP-D-glucose [intracellular]	
s_1430	UTP [intracellular]	

Products

Table 1091: Properties of each product.

Id	Name	SBO
s_0605	diphosphate [intracellular]	
s_1415	UDP-D-glucose [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{272} = \mathrm{vol}(\mathrm{intracellular}) \cdot \mathrm{function\_272}(\mathrm{Keq\_r\_1072}, \mathrm{Vmax\_r\_1072}, \mathrm{vol}(\mathrm{intracellular}), \mathrm{kmp\_s\_0605r\_1072}, \mathrm{kmp\_s\_1415r\_1072}, \mathrm{kms\_s\_0549r\_1072}, \mathrm{kms\_s\_0763\_br\_1072}, \mathrm{kms\_s\_1430r\_1072}, [\mathrm{s\_0549}], [\mathrm{s\_0605}], [\mathrm{s\_0763\_b}], [\mathrm{s\_1415}], [\mathrm{s\_1430}]) \tag{1373}$$

$$\text{function\_272}\left(\text{Keq\_r\_1072}, \text{Vmax\_r\_1072}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0605r\_1072}, \text{kmp\_s\_1415r\_1072}, \text{kms\_s\_0549r\_1072}, \text{kms\_s\_0763\_br\_1072}, \text{kms\_s\_1430r\_1072}, [\text{s\_0549}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_1415}], [\text{s\_1430}]\right) = \frac{\text{Vmax\_r\_1072} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0549r\_1072}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_1072}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1430r\_1072}}\right)^{1} \cdot \left([\text{s\_0549}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1430}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_1415}]^{1}}{\text{Keq\_r\_1072}}\right)}{\left(1+\frac{[\text{s\_0549}]}{\text{kms\_s\_0549r\_1072}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1072}}\right) \cdot \left(1+\frac{[\text{s\_1430}]}{\text{kms\_s\_1430r\_1072}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_1072}}\right) \cdot \left(1+\frac{[\text{s\_1415}]}{\text{kmp\_s\_1415r\_1072}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1374}$$

$$\text{function\_272}\left(\text{Keq\_r\_1072}, \text{Vmax\_r\_1072}, \text{vol}\left(\text{intracellular}\right), \text{kmp\_s\_0605r\_1072}, \text{kmp\_s\_1415r\_1072}, \text{kms\_s\_0549r\_1072}, \text{kms\_s\_0763\_br\_1072}, \text{kms\_s\_1430r\_1072}, [\text{s\_0549}], [\text{s\_0605}], [\text{s\_0763\_b}], [\text{s\_1415}], [\text{s\_1430}]\right) = \frac{\text{Vmax\_r\_1072} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0549r\_1072}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_0763\_br\_1072}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1430r\_1072}}\right)^{1} \cdot \left([\text{s\_0549}]^{1} \cdot [\text{s\_0763\_b}]^{1} \cdot [\text{s\_1430}]^{1} - \frac{[\text{s\_0605}]^{1} \cdot [\text{s\_1415}]^{1}}{\text{Keq\_r\_1072}}\right)}{\left(1+\frac{[\text{s\_0549}]}{\text{kms\_s\_0549r\_1072}}\right) \cdot \left(1+\frac{[\text{s\_0763\_b}]}{\text{kms\_s\_0763\_br\_1072}}\right) \cdot \left(1+\frac{[\text{s\_1430}]}{\text{kms\_s\_1430r\_1072}}\right) + \left(1+\frac{[\text{s\_0605}]}{\text{kmp\_s\_0605r\_1072}}\right) \cdot \left(1+\frac{[\text{s\_1415}]}{\text{kmp\_s\_1415r\_1072}}\right) - 1}}{\text{vol}\left(\text{intracellular}\right)} \tag{1375}$$

Table 1092: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_1072`	Keq_r_1072		2.004		☑
`Vmax_r_1072`	Vmax_r_1072		11.265		☑
`kmp_s_0605r_1072`	kmp_s_0605r_1072		0.549		☑
`kmp_s_1415r_1072`	kmp_s_1415r_1072		0.549		☑
`kms_s_0549r_1072`	kms_s_0549r_1072		0.549		☑
`kms_s_0763_br_1072`	kms_s_0763_br_1072		0.549		☑
`kms_s_1430r_1072`	kms_s_1430r_1072		0.549		☑

7.273 Reaction `r_1073`

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name valine transaminase

Notes GENE_ASSOCIATION:YJR148W or YHR208W

Reaction equation

$$\text{s\_0238} + \text{s\_0899} \xrightleftharpoons{\text{s\_0185, s\_0238, s\_0899, s\_0960}} \text{s\_0185} + \text{s\_0960} \tag{1376}$$

Reactants

Table 1093: Properties of each reactant.

Id	Name	SBO
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_0899	L-glutamate [intracellular]	

Modifiers

Table 1094: Properties of each modifier.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0238	3-methyl-2-oxobutanoate [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0960	L-valine [intracellular]	

Products

Table 1095: Properties of each product.

Id	Name	SBO
s_0185	2-oxoglutarate [intracellular]	
s_0960	L-valine [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{273} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_273}\left(\mathrm{Keq\_r\_1073}, \mathrm{Vmax\_r\_1073}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0185r\_1073}, \mathrm{kmp\_s\_0960r\_1073}, \mathrm{kms\_s\_0238r\_1073}, \mathrm{kms\_s\_0899r\_1073}, [\mathrm{s\_0185}], [\mathrm{s\_0238}], [\mathrm{s\_0899}], [\mathrm{s\_0960}]\right) \quad (1377)$$

$$\text{function\_273}(\text{Keq\_r\_1073}, \text{Vmax\_r\_1073}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0185r\_1073}, \text{kmp\_s\_0960r\_1073}, \text{kms\_s\_0238r\_1073}, \text{kms\_s\_0899r\_1073}, [\text{s\_0185}], [\text{s\_0238}], [\text{s\_0899}], [\text{s\_0960}]) = \frac{\text{Vmax\_r\_1073} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0238r\_1073}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0899r\_1073}}\right)^1 \cdot \left([\text{s\_0238}]^1 \cdot [\text{s\_0899}]^1 - \frac{[\text{s\_0185}]^1 \cdot [\text{s\_0960}]^1}{\text{Keq\_r\_1073}}\right)}{\left(1 + \frac{[\text{s\_0238}]}{\text{kms\_s\_0238r\_1073}}\right) \cdot \left(1 + \frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_1073}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_1073}}\right) \cdot \left(1 + \frac{[\text{s\_0960}]}{\text{kmp\_s\_0960r\_1073}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1378}$$

$$\text{function\_273}(\text{Keq\_r\_1073}, \text{Vmax\_r\_1073}, \text{vol}(\text{intracellular}), \text{kmp\_s\_0185r\_1073}, \text{kmp\_s\_0960r\_1073}, \text{kms\_s\_0238r\_1073}, \text{kms\_s\_0899r\_1073}, [\text{s\_0185}], [\text{s\_0238}], [\text{s\_0899}], [\text{s\_0960}]) = \frac{\text{Vmax\_r\_1073} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0238r\_1073}}\right)^1 \cdot \left(\frac{1}{\text{kms\_s\_0899r\_1073}}\right)^1 \cdot \left([\text{s\_0238}]^1 \cdot [\text{s\_0899}]^1 - \frac{[\text{s\_0185}]^1 \cdot [\text{s\_0960}]^1}{\text{Keq\_r\_1073}}\right)}{\left(1 + \frac{[\text{s\_0238}]}{\text{kms\_s\_0238r\_1073}}\right) \cdot \left(1 + \frac{[\text{s\_0899}]}{\text{kms\_s\_0899r\_1073}}\right) + \left(1 + \frac{[\text{s\_0185}]}{\text{kmp\_s\_0185r\_1073}}\right) \cdot \left(1 + \frac{[\text{s\_0960}]}{\text{kmp\_s\_0960r\_1073}}\right) - 1}}{\text{vol}(\text{intracellular})} \tag{1379}$$

Table 1096: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`Keq_r_1073`	Keq_r_1073		2.004		☑
`Vmax_r_1073`	Vmax_r_1073		1.101		☑
`kmp_s_0185r_1073`	kmp_s_0185r_1073		0.549		☑
`kmp_s_0960r_1073`	kmp_s_0960r_1073		1.000		☑
`kms_s_0238r_1073`	kms_s_0238r_1073		0.549		☑
`kms_s_0899r_1073`	kms_s_0899r_1073		0.549		☑

7.274 Reaction `r_1157`

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name ammonia transport

Notes GENE_ASSOCIATION:(YDR384C or YGR121C or YNL142W or YPR138C)

Reaction equation

$$\text{s\_0431\_b} \xrightleftharpoons{\text{s\_0430, s\_0431\_b}} \text{s\_0430} \tag{1380}$$

 Produced by SBML2LaTeX

Reactant

Table 1097: Properties of each reactant.

Id	Name	SBO
s_0431_b	ammonium [extracellular]	

Modifiers

Table 1098: Properties of each modifier.

Id	Name	SBO
s_0430	ammonium [intracellular]	
s_0431_b	ammonium [extracellular]	

Product

Table 1099: Properties of each product.

Id	Name	SBO
s_0430	ammonium [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{274} = \text{function\_274}\left(\text{Keq\_r\_1157}, \text{Vmax\_r\_1157}, \text{kmp\_s\_0430r\_1157}, \text{kms\_s\_0431\_br\_1157}, [\text{s\_0430}], [\text{s\_0431\_b}]\right) \tag{1381}$$

$$\begin{aligned}&\text{function\_274}\left(\text{Keq\_r\_1157}, \text{Vmax\_r\_1157}, \text{kmp\_s\_0430r\_1157}, \text{kms\_s\_0431\_br\_1157}, [\text{s\_0430}], [\text{s\_0431\_b}]\right) = \text{Vmax\_r\_1157} \\ &\cdot \frac{\left(\frac{1}{\text{kms\_s\_0431\_br\_1157}}\right)^1 \cdot \left([\text{s\_0431\_b}]^1 - \frac{[\text{s\_0430}]^1}{\text{Keq\_r\_1157}}\right)}{1 + \frac{[\text{s\_0431\_b}]}{\text{kms\_s\_0431\_br\_1157}} + 1 + \frac{[\text{s\_0430}]}{\text{kmp\_s\_0430r\_1157}} - 1}\end{aligned} \tag{1382}$$

Table 1100: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1157	Keq_r_1157		1.000		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_1157	Vmax_r_1157		0.965		☑
kmp_s_0430r-_1157	kmp_s_0430r_1157		0.549		☑
kms_s_0431-_br_1157	kms_s_0431_br-_1157		38.000		☑

7.275 Reaction r_1194

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name CO2 transport

Notes GENE_ASSOCIATION:

Reaction equation

$$s\_0470 \xrightleftharpoons{s\_0470,\ s\_0472\_b} s\_0472\_b \tag{1383}$$

Reactant

Table 1101: Properties of each reactant.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	

Modifiers

Table 1102: Properties of each modifier.

Id	Name	SBO
s_0470	carbon dioxide [intracellular]	
s_0472_b	carbon dioxide [extracellular]	

Product

Table 1103: Properties of each product.

Id	Name	SBO
s_0472_b	carbon dioxide [extracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{275} = \text{function\_275}\left(\text{Keq\_r\_1194}, \text{Vmax\_r\_1194}, \text{kmp\_s\_0472\_br\_1194}, \text{kms\_s\_0470r\_1194}, [\text{s\_0470}], [\text{s\_0472\_b}]\right) \tag{1384}$$

$$\text{function\_275}\left(\text{Keq\_r\_1194}, \text{Vmax\_r\_1194}, \text{kmp\_s\_0472\_br\_1194}, \text{kms\_s\_0470r\_1194}, [\text{s\_0470}], [\text{s\_0472\_b}]\right) = \text{Vmax\_r\_1194} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0470r\_1194}}\right)^{1} \cdot \left([\text{s\_0470}]^{1} - \frac{[\text{s\_0472\_b}]^{1}}{\text{Keq\_r\_1194}}\right)}{1 + \frac{[\text{s\_0470}]}{\text{kms\_s\_0470r\_1194}} + 1 + \frac{[\text{s\_0472\_b}]}{\text{kmp\_s\_0472\_br\_1194}} - 1} \tag{1385}$$

Table 1104: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1194	Keq_r_1194		1.000		☑
Vmax_r_1194	Vmax_r_1194		2.379		☑
kmp_s_0472-_br_1194	kmp_s_0472_br-_1194		10^{-5}		☑
kms_s_0470r-_1194	kms_s_0470r_1194		1.000		☑

7.276 Reaction r_1247

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name ethanol transport

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0650} \xrightleftharpoons{\text{s\_0650, s\_0651\_b}} \text{s\_0651\_b} \tag{1386}$$

Reactant

Table 1105: Properties of each reactant.

Id	Name	SBO
s_0650	ethanol [intracellular]	

Modifiers

Table 1106: Properties of each modifier.

Id	Name	SBO
s_0650	ethanol [intracellular]	
s_0651_b	ethanol [extracellular]	

Product

Table 1107: Properties of each product.

Id	Name	SBO
s_0651_b	ethanol [extracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{276} = \text{function\_276}\left(\text{Keq\_r\_1247}, \text{Vmax\_r\_1247}, \text{kmp\_s\_0651\_br\_1247}, \text{kms\_s\_0650r\_1247}, [\text{s\_0650}], [\text{s\_0651\_b}]\right) \tag{1387}$$

$$\begin{aligned}&\text{function\_276}\left(\text{Keq\_r\_1247}, \text{Vmax\_r\_1247}, \text{kmp\_s\_0651\_br\_1247}, \text{kms\_s\_0650r\_1247}, [\text{s\_0650}], [\text{s\_0651\_b}]\right) = \text{Vmax\_r\_1247} \\ &\cdot \frac{\left(\frac{1}{\text{kms\_s\_0650r\_1247}}\right)^{1} \cdot \left([\text{s\_0650}]^{1} - \frac{[\text{s\_0651\_b}]^{1}}{\text{Keq\_r\_1247}}\right)}{1 + \frac{[\text{s\_0650}]}{\text{kms\_s\_0650r\_1247}} + 1 + \frac{[\text{s\_0651\_b}]}{\text{kmp\_s\_0651\_br\_1247}} - 1}\end{aligned} \tag{1388}$$

Table 1108: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1247	Keq_r_1247		1.000		☑
Vmax_r_1247	Vmax_r_1247		4.818		☑
kmp_s_0651_br_1247	kmp_s_0651_br_1247		24.500		☑
kms_s_0650r_1247	kms_s_0650r_1247		50.000		☑

7.277 Reaction r_1293

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name glucose transport

Notes GENE_ASSOCIATION:(YDL245C or YDR342C or YDR343C or YDR345C or YDR536W or YEL069C or YFL011W or YHR092C or YHR094C or YHR096C or YJL214W or YJL219W or YJR158W or YLR081W or YMR011W or YNR072W or YOL156W)

Reaction equation

$$\text{s\_0547\_b} \xrightleftharpoons{\text{s\_0545, s\_0547\_b}} \text{s\_0545} \tag{1389}$$

Reactant

Table 1109: Properties of each reactant.

Id	Name	SBO
s_0547_b	D-glucose [extracellular]	

Modifiers

Table 1110: Properties of each modifier.

Id	Name	SBO
s_0545	D-glucose [intracellular]	
s_0547_b	D-glucose [extracellular]	

Product

Table 1111: Properties of each product.

Id	Name	SBO
s_0545	D-glucose [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{277} = \text{function\_277}\left(\text{Keq\_r\_1293}, \text{Vmax\_r\_1293}, \text{kmp\_s\_0545r\_1293}, \text{kms\_s\_0547\_br\_1293}, [\text{s\_0545}], [\text{s\_0547\_b}]\right) \tag{1390}$$

$$\text{function\_277}\left(\text{Keq\_r\_1293}, \text{Vmax\_r\_1293}, \text{kmp\_s\_0545r\_1293}, \text{kms\_s\_0547\_br\_1293}, [\text{s\_0545}], [\text{s\_0547\_b}]\right) = \text{Vmax\_r\_1293} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0547\_br\_1293}}\right)^{1} \cdot \left([\text{s\_0547\_b}]^{1} - \frac{[\text{s\_0545}]^{1}}{\text{Keq\_r\_1293}}\right)}{1 + \frac{[\text{s\_0547\_b}]}{\text{kms\_s\_0547\_br\_1293}} + 1 + \frac{[\text{s\_0545}]}{\text{kmp\_s\_0545r\_1293}} - 1} \tag{1391}$$

Table 1112: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1293	Keq_r_1293		1.000		☑
Vmax_r_1293	Vmax_r_1293		2.361		☑
kmp_s_0545r-_1293	kmp_s_0545r_1293		0.099		☑
kms_s_0547-_br_1293	kms_s_0547_br-_1293		11.100		☑

7.278 Reaction r_1435

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name O2 transport

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_1162\_b} \xrightleftharpoons{\text{s\_1160, s\_1162\_b}} \text{s\_1160} \tag{1392}$$

Reactant

Table 1113: Properties of each reactant.

Id	Name	SBO
s_1162_b	oxygen [extracellular]	

Modifiers

Table 1114: Properties of each modifier.

Id	Name	SBO
s_1160	oxygen [intracellular]	
s_1162_b	oxygen [extracellular]	

Product

Table 1115: Properties of each product.

Id	Name	SBO
s_1160	oxygen [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{278} = \text{function\_278}\left(\text{Keq\_r\_1435}, \text{Vmax\_r\_1435}, \text{kmp\_s\_1160r\_1435}, \text{kms\_s\_1162\_br\_1435}, [\text{s\_1160}], [\text{s\_1162\_b}]\right) \quad (1393)$$

$$\text{function\_278}\left(\text{Keq\_r\_1435}, \text{Vmax\_r\_1435}, \text{kmp\_s\_1160r\_1435}, \text{kms\_s\_1162\_br\_1435}, [\text{s\_1160}], [\text{s\_1162\_b}]\right) = \text{Vmax\_r\_1435} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1162\_br\_1435}}\right)^{1} \cdot \left([\text{s\_1162\_b}]^{1} - \frac{[\text{s\_1160}]^{1}}{\text{Keq\_r\_1435}}\right)}{1 + \frac{[\text{s\_1162\_b}]}{\text{kms\_s\_1162\_br\_1435}} + 1 + \frac{[\text{s\_1160}]}{\text{kmp\_s\_1160r\_1435}} - 1} \quad (1394)$$

Table 1116: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1435	Keq_r_1435		1.000		☑
Vmax_r_1435	Vmax_r_1435		0.023		☑
kmp_s_1160r_1435	kmp_s_1160r_1435		0.549		☑
kms_s_1162_br_1435	kms_s_1162_br_1435		24.500		☑

7.279 Reaction r_1461

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name phosphate transport

Notes GENE_ASSOCIATION:(YBR296C or YCR037C or YJL198W or YML123C or YNR013C)

Reaction equation

$$s\_0766\_b + s\_1209\_b \xrightleftharpoons{s\_0763\_b,\ s\_0766\_b,\ s\_1207,\ s\_1209\_b} s\_0763\_b + s\_1207 \quad (1395)$$

Reactants

Table 1117: Properties of each reactant.

Id	Name	SBO
s_0766_b	H+ [extracellular]	
s_1209_b	phosphate [extracellular]	

Modifiers

Table 1118: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0766_b	H+ [extracellular]	
s_1207	phosphate [intracellular]	
s_1209_b	phosphate [extracellular]	

Products

Table 1119: Properties of each product.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{279} = \text{function\_279}(\text{Keq\_r\_1461}, \text{Vmax\_r\_1461}, \text{kmp\_s\_0763\_br\_1461}, \text{kmp\_s\_1207r\_1461}, \text{kms\_s\_0766\_br\_1461}, \text{kms\_s\_1209\_br\_1461}, [\text{s\_0763\_b}], [\text{s\_0766\_b}], [\text{s\_1207}], [\text{s\_1209\_b}]) \quad (1396)$$

$$\text{function\_279}\,(\text{Keq\_r\_1461}, \text{Vmax\_r\_1461}, \text{kmp\_s\_0763\_br\_1461}, \text{kmp\_s\_1207r\_1461}, \text{kms\_s\_0766\_br\_1461}, \text{kms\_s\_1209\_br\_1461}, [\text{s\_0763\_b}], [\text{s\_0766\_b}], [\text{s\_1207}], [\text{s\_1209\_b}]) = \text{Vmax\_r\_1461} \cdot \frac{\left(\frac{1}{\text{kms\_s\_0766\_br\_1461}}\right)^{1} \cdot \left(\frac{1}{\text{kms\_s\_1209\_br\_1461}}\right)^{1} \cdot \left([\text{s\_0766\_b}]^{1} \cdot [\text{s\_1209\_b}]^{1} - \frac{[\text{s\_0763\_b}]^{1} \cdot [\text{s\_1207}]^{1}}{\text{Keq\_r\_1461}}\right)}{\left(1 + \frac{[\text{s\_0766\_b}]}{\text{kms\_s\_0766\_br\_1461}}\right) \cdot \left(1 + \frac{[\text{s\_1209\_b}]}{\text{kms\_s\_1209\_br\_1461}}\right) + \left(1 + \frac{[\text{s\_0763\_b}]}{\text{kmp\_s\_0763\_br\_1461}}\right) \cdot \left(1 + \frac{[\text{s\_1207}]}{\text{kmp\_s\_1207r\_1461}}\right) - 1} \quad (1397)$$

Table 1120: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1461	Keq_r_1461		1.000		☑
Vmax_r_1461	Vmax_r_1461		0.093		☑
kmp_s_0763-_br_1461	kmp_s_0763_br-_1461		0.549		☑
kmp_s_1207r-_1461	kmp_s_1207r_1461		0.549		☑
kms_s_0766-_br_1461	kms_s_0766_br-_1461		0.100		☑
kms_s_1209-_br_1461	kms_s_1209_br-_1461		24.500		☑

7.280 Reaction r_1503

This is a reversible reaction of two reactants forming two products influenced by four modifiers.

Name succinate transport

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0763\_b} + \text{s\_1338} \xrightleftharpoons{\text{s\_0763\_b, s\_0766\_b, s\_1338, s\_1339\_b}} \text{s\_0766\_b} + \text{s\_1339\_b} \quad (1398)$$

Reactants

Table 1121: Properties of each reactant.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_1338	succinate(2-) [intracellular]	

Modifiers

Table 1122: Properties of each modifier.

Id	Name	SBO
s_0763_b	H+ [intracellular]	
s_0766_b	H+ [extracellular]	
s_1338	succinate(2-) [intracellular]	
s_1339_b	succinate(2-) [extracellular]	

Products

Table 1123: Properties of each product.

Id	Name	SBO
s_0766_b	H+ [extracellular]	
s_1339_b	succinate(2-) [extracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{280} = \mathrm{function\_280}\left(\mathrm{Keq\_r\_1503}, \mathrm{Vmax\_r\_1503}, \mathrm{kmp\_s\_0766\_br\_1503}, \mathrm{kmp\_s\_1339\_br\_1503}, \mathrm{kms\_s\_0763\_br\_1503}, \mathrm{kms\_s\_1338r\_1503}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0766\_b}], [\mathrm{s\_1338}], [\mathrm{s\_1339\_b}]\right) \tag{1399}$$

$$\mathrm{function\_280}\left(\mathrm{Keq\_r\_1503}, \mathrm{Vmax\_r\_1503}, \mathrm{kmp\_s\_0766\_br\_1503}, \mathrm{kmp\_s\_1339\_br\_1503}, \mathrm{kms\_s\_0763\_br\_1503}, \mathrm{kms\_s\_1338r\_1503}, [\mathrm{s\_0763\_b}], [\mathrm{s\_0766\_b}], [\mathrm{s\_1338}], [\mathrm{s\_1339\_b}]\right) = \mathrm{Vmax\_r\_1503} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_0763\_br\_1503}}\right)^{1} \cdot \left(\frac{1}{\mathrm{kms\_s\_1338r\_1503}}\right)^{1} \cdot \left([\mathrm{s\_0763\_b}]^{1} \cdot [\mathrm{s\_1338}]^{1} - \frac{[\mathrm{s\_0766\_b}]^{1} \cdot [\mathrm{s\_1339\_b}]^{1}}{\mathrm{Keq\_r\_1503}}\right)}{\left(1 + \frac{[\mathrm{s\_0763\_b}]}{\mathrm{kms\_s\_0763\_br\_1503}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1338}]}{\mathrm{kms\_s\_1338r\_1503}}\right) + \left(1 + \frac{[\mathrm{s\_0766\_b}]}{\mathrm{kmp\_s\_0766\_br\_1503}}\right) \cdot \left(1 + \frac{[\mathrm{s\_1339\_b}]}{\mathrm{kmp\_s\_1339\_br\_1503}}\right) - 1} \tag{1400}$$

Table 1124: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1503	Keq_r_1503		1.000		☑
Vmax_r_1503	Vmax_r_1503		0.840		☑
kmp_s_0766-_br_1503	kmp_s_0766_br-_1503		0.100		☑

Id	Name	SBO	Value	Unit	Constant
kmp_s_1339-_br_1503	kmp_s_1339_br-_1503		1.000		☑
kms_s_0763-_br_1503	kms_s_0763_br-_1503		0.549		☑
kms_s_1338r-_1503	kms_s_1338r_1503		0.549		☑

7.281 Reaction r_1507

This is a reversible reaction of one reactant forming one product influenced by two modifiers.

Name sulfate uniport

Notes GENE_ASSOCIATION:(YBR294W or YLR092W)

Reaction equation

$$\text{s\_1348\_b} \xrightleftharpoons{\text{s\_1347, s\_1348\_b}} \text{s\_1347} \tag{1401}$$

Reactant

Table 1125: Properties of each reactant.

Id	Name	SBO
s_1348_b	sulphate [extracellular]	

Modifiers

Table 1126: Properties of each modifier.

Id	Name	SBO
s_1347	sulphate [intracellular]	
s_1348_b	sulphate [extracellular]	

Product

Table 1127: Properties of each product.

Id	Name	SBO
s_1347	sulphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{281} = \text{function\_281}\left(\text{Keq\_r\_1507}, \text{Vmax\_r\_1507}, \text{kmp\_s\_1347r\_1507}, \text{kms\_s\_1348\_br\_1507}, [\text{s\_1347}], [\text{s\_1348\_b}]\right) \tag{1402}$$

$$\text{function\_281}\left(\text{Keq\_r\_1507}, \text{Vmax\_r\_1507}, \text{kmp\_s\_1347r\_1507}, \text{kms\_s\_1348\_br\_1507}, [\text{s\_1347}], [\text{s\_1348\_b}]\right) = \text{Vmax\_r\_1507} \cdot \frac{\left(\frac{1}{\text{kms\_s\_1348\_br\_1507}}\right)^{1} \cdot \left([\text{s\_1348\_b}]^{1} - \frac{[\text{s\_1347}]^{1}}{\text{Keq\_r\_1507}}\right)}{1 + \frac{[\text{s\_1348\_b}]}{\text{kms\_s\_1348\_br\_1507}} + 1 + \frac{[\text{s\_1347}]}{\text{kmp\_s\_1347r\_1507}} - 1} \tag{1403}$$

Table 1128: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1507	Keq_r_1507		1.000		☑
Vmax_r_1507	Vmax_r_1507		0.019		☑
kmp_s_1347r-_1507	kmp_s_1347r_1507		0.549		☑
kms_s_1348-_br_1507	kms_s_1348_br-_1507		42.200		☑

7.282 Reaction r_1672

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name isa acyl-CoA

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_1342} \xrightarrow{\text{s\_0386, s\_1342}} \text{s\_0386} \tag{1404}$$

Reactant

Table 1129: Properties of each reactant.

Id	Name	SBO
s_1342	succinyl-CoA [intracellular]	

Modifiers

Table 1130: Properties of each modifier.

Id	Name	SBO
s_0386	acyl-CoA [intracellular]	
s_1342	succinyl-CoA [intracellular]	

Product

Table 1131: Properties of each product.

Id	Name	SBO
s_0386	acyl-CoA [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{282} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_282}\left(\mathrm{Keq\_r\_1672}, \mathrm{Vmax\_r\_1672}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0386r\_1672}, \mathrm{kms\_s\_1342r\_1672}, [\mathrm{s\_0386}], [\mathrm{s\_1342}]\right) \quad (1405)$$

$$\mathrm{function\_282}\left(\mathrm{Keq\_r\_1672}, \mathrm{Vmax\_r\_1672}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0386r\_1672}, \mathrm{kms\_s\_1342r\_1672}, [\mathrm{s\_0386}], [\mathrm{s\_1342}]\right) = \frac{\mathrm{Vmax\_r\_1672} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1342r\_1672}}\right)^{1} \cdot \left([\mathrm{s\_1342}]^{1} - \frac{[\mathrm{s\_0386}]^{1}}{\mathrm{Keq\_r\_1672}}\right)}{1 + \frac{[\mathrm{s\_1342}]}{\mathrm{kms\_s\_1342r\_1672}} + 1 + \frac{[\mathrm{s\_0386}]}{\mathrm{kmp\_s\_0386r\_1672}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1406)$$

$$\mathrm{function\_282}\left(\mathrm{Keq\_r\_1672}, \mathrm{Vmax\_r\_1672}, \mathrm{vol}\left(\mathrm{intracellular}\right), \mathrm{kmp\_s\_0386r\_1672}, \mathrm{kms\_s\_1342r\_1672}, [\mathrm{s\_0386}], [\mathrm{s\_1342}]\right) = \frac{\mathrm{Vmax\_r\_1672} \cdot \frac{\left(\frac{1}{\mathrm{kms\_s\_1342r\_1672}}\right)^{1} \cdot \left([\mathrm{s\_1342}]^{1} - \frac{[\mathrm{s\_0386}]^{1}}{\mathrm{Keq\_r\_1672}}\right)}{1 + \frac{[\mathrm{s\_1342}]}{\mathrm{kms\_s\_1342r\_1672}} + 1 + \frac{[\mathrm{s\_0386}]}{\mathrm{kmp\_s\_0386r\_1672}} - 1}}{\mathrm{vol}\left(\mathrm{intracellular}\right)} \quad (1407)$$

Table 1132: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Keq_r_1672	Keq_r_1672		1.100		☑

Id	Name	SBO	Value	Unit	Constant
Vmax_r_1672	Vmax_r_1672		0.026		☑
kmp_s_0386r-_1672	kmp_s_0386r_1672		0.549		☑
kms_s_1342r-_1672	kms_s_1342r_1672		0.549		☑

7.283 Reaction r_1812

This is an irreversible reaction of 36 reactants forming three products influenced by 37 modifiers.

Name biomass production

Notes GENE_ASSOCIATION:

Reaction equation

$$1.1358\,\mathrm{s\_0001} + 0.023371\,\mathrm{s\_0416} + 0.051\,\mathrm{s\_0434} + 59.276\,\mathrm{s\_0446} + 0.05\,\mathrm{s\_0511} + 0.003587\,\mathrm{s\_0564} + 0.002432\,\mathrm{s\_0} \tag{1408}$$

Reactants

Table 1133: Properties of each reactant.

Id	Name	SBO
s_0001	(1->3)-beta-D-glucan [intracellular]	
s_0416	alpha,alpha-trehalose [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0511	CMP [intracellular]	
s_0564	dAMP [intracellular]	
s_0569	dCMP [intracellular]	
s_0593	dGMP [intracellular]	
s_0619	dTMP [intracellular]	
s_0740	glycine [intracellular]	
s_0743	glycogen [intracellular]	
s_0752	GMP [intracellular]	
s_0863	L-alanine [intracellular]	
s_0873	L-arginine [intracellular]	
s_0877	L-asparagine [intracellular]	
s_0881	L-aspartate [intracellular]	
s_0889	L-cysteine [intracellular]	
s_0899	L-glutamate [intracellular]	

Id	Name	SBO
s_0907	L-glutamine [intracellular]	
s_0911	L-histidine [intracellular]	
s_0920	L-isoleucine [intracellular]	
s_0925	L-leucine [intracellular]	
s_0929	L-lysine [intracellular]	
s_0933	L-methionine [intracellular]	
s_0936	L-phenylalanine [intracellular]	
s_0939	L-proline [intracellular]	
s_0943	L-serine [intracellular]	
s_0949	L-threonine [intracellular]	
s_0952	L-tryptophan [intracellular]	
s_0955	L-tyrosine [intracellular]	
s_0960	L-valine [intracellular]	
s_1000	lipid [intracellular]	
s_1011	mannan [intracellular]	
s_1347	sulphate [intracellular]	
s_1417	UMP [intracellular]	
s_1283	riboflavin [intracellular]	

Modifiers

Table 1134: Properties of each modifier.

Id	Name	SBO
s_0547_b	D-glucose [extracellular]	
s_0001	(1->3)-beta-D-glucan [intracellular]	
s_0416	alpha,alpha-trehalose [intracellular]	
s_0434	AMP [intracellular]	
s_0446	ATP [intracellular]	
s_0511	CMP [intracellular]	
s_0564	dAMP [intracellular]	
s_0569	dCMP [intracellular]	
s_0593	dGMP [intracellular]	
s_0619	dTMP [intracellular]	
s_0740	glycine [intracellular]	
s_0743	glycogen [intracellular]	
s_0752	GMP [intracellular]	
s_0863	L-alanine [intracellular]	
s_0873	L-arginine [intracellular]	
s_0877	L-asparagine [intracellular]	
s_0881	L-aspartate [intracellular]	

Id	Name	SBO
s_0889	L-cysteine [intracellular]	
s_0899	L-glutamate [intracellular]	
s_0907	L-glutamine [intracellular]	
s_0911	L-histidine [intracellular]	
s_0920	L-isoleucine [intracellular]	
s_0925	L-leucine [intracellular]	
s_0929	L-lysine [intracellular]	
s_0933	L-methionine [intracellular]	
s_0936	L-phenylalanine [intracellular]	
s_0939	L-proline [intracellular]	
s_0943	L-serine [intracellular]	
s_0949	L-threonine [intracellular]	
s_0952	L-tryptophan [intracellular]	
s_0955	L-tyrosine [intracellular]	
s_0960	L-valine [intracellular]	
s_1000	lipid [intracellular]	
s_1011	mannan [intracellular]	
s_1283	riboflavin [intracellular]	
s_1347	sulphate [intracellular]	
s_1417	UMP [intracellular]	

Products

Table 1135: Properties of each product.

Id	Name	SBO
s_0400	ADP [intracellular]	
s_0463	biomass [intracellular]	
s_1207	phosphate [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{283} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_283}\left(\mathrm{V\_o}, \mathrm{a\_s\_0001r\_1812}, \mathrm{a\_s\_0416r\_1812}, \mathrm{a\_s\_0434r\_1812}, \mathrm{a\_s\_0446r\_1812}, \mathrm{a\_s\_0511r\_1812}, \mathrm{a\_s\_0564r\_1812}, \mathrm{a\_s\_0569r\_1812}, \mathrm{a\_s\_0593r\_1812}, \mathrm{a\_s\_0619r\_1812}, \mathrm{a\_s\_0740r\_1812}, \mathrm{a\_s\_0743r\_1812}, \mathrm{a\_s\_0752r\_1812}, \mathrm{a\_s\_0863r\_1812}, \mathrm{a\_s\_0873r\_1812}, \mathrm{a\_s\_0877r\_1812}, \mathrm{a\_s\_0881r\_1812}, \mathrm{a\_s\_0889r\_1812}, \mathrm{a\_s\_0899r\_1812}, \mathrm{a\_s\_0907r\_1812}, \mathrm{a\_s\_0911r\_1812}, \mathrm{a\_s\_0920r\_1812}, \mathrm{a\_s\_0925r\_1812}, \mathrm{a\_s\_0929r\_1812}, \mathrm{a\_s\_0933r\_1812}, \mathrm{a\_s\_0936r\_1812}, \mathrm{a\_s\_0939r\_1812}, \mathrm{a\_s\_0943r\_1812}, \mathrm{a\_s\_0949r\_1812}, \mathrm{a\_s\_0952r\_1812}, \mathrm{a\_s\_0955r\_1812}, \mathrm{a\_s\_0960r\_1812}, \mathrm{a\_s\_1000r\_1812}, \mathrm{a\_s\_1011r\_1812}, \mathrm{a\_s\_1283r\_1812}, \mathrm{a\_s\_1347r\_1812}, \mathrm{a\_s\_1417r\_1812}, \mathrm{vol}\left(\mathrm{intracellular}\right), [\mathrm{s\_0001}], \mathrm{s\_0001\_or\_1812}, [\mathrm{s\_0416}], \mathrm{s\_0416\_or\_1812}, [\mathrm{s\_0434}], \mathrm{s\_0434\_or\_1812}, [\mathrm{s\_0446}], \mathrm{s\_0446\_or\_1812}, [\mathrm{s\_0511}], \mathrm{s\_0511\_or\_1812}, [\mathrm{s\_0564}], \mathrm{s\_0564\_or\_1812}, [\mathrm{s\_0569}], \mathrm{s\_0569\_or\_1812}, [\mathrm{s\_0593}], \mathrm{s\_0593\_or\_1812}, [\mathrm{s\_0619}], \mathrm{s\_0619\_or\_1812}, [\mathrm{s\_0740}], \mathrm{s\_0740\_or\_1812}, [\mathrm{s\_0743}], \mathrm{s\_0743\_or\_1812}, [\mathrm{s\_0752}], \mathrm{s\_0752\_or\_1812}, [\mathrm{s\_0863}], \mathrm{s\_0863\_or\_1812}, [\mathrm{s\_0873}], \mathrm{s\_0873\_or\_1812}, [\mathrm{s\_0877}], \mathrm{s\_0877\_or\_1812}, [\mathrm{s\_0881}], \mathrm{s\_0881\_or\_1812}, [\mathrm{s\_0889}], \mathrm{s\_0889\_or\_1812}, [\mathrm{s\_0899}], \mathrm{s\_0899\_or\_1812}, [\mathrm{s\_0907}], \mathrm{s\_0907\_or\_1812}, [\mathrm{s\_0911}], \mathrm{s\_0911\_or\_1812}, [\mathrm{s\_0920}], \mathrm{s\_0920\_or\_1812}, [\mathrm{s\_0925}], \mathrm{s\_0925\_or\_1812}, [\mathrm{s\_0929}], \mathrm{s\_0929\_or\_1812}, [\mathrm{s\_0933}], \mathrm{s\_0933\_or\_1812}, [\mathrm{s\_0936}], \mathrm{s\_0936\_or\_1812}, [\mathrm{s\_0939}], \mathrm{s\_0939\_or\_1812}, [\mathrm{s\_0943}], \mathrm{s\_0943\_or\_1812}, [\mathrm{s\_0949}], \mathrm{s\_0949\_or\_1812}, [\mathrm{s\_0952}], \mathrm{s\_0952\_or\_1812}, [\mathrm{s\_0955}], \mathrm{s\_0955\_or\_1812}, [\mathrm{s\_0960}], \mathrm{s\_0960\_or\_1812}, [\mathrm{s\_1000}], \mathrm{s\_1000\_or\_1812}, [\mathrm{s\_1011}], \mathrm{s\_1011\_or\_1812}, [\mathrm{s\_1283}], \mathrm{s\_1283\_or\_1812}, [\mathrm{s\_1347}], \mathrm{s\_1347\_or\_1812}, [\mathrm{s\_1417}], \mathrm{s\_1417\_or\_1812}, \mathrm{zero\_flux}\right) \tag{1409}$$

$$\text{function\_283}\,(\text{V\_o}, \text{a\_s\_0001r\_1812}, \text{a\_s\_0416r\_1812}, \text{a\_s\_0434r\_1812}, \tag{1410}$$

$$\text{a\_s\_0446r\_1812}, \text{a\_s\_0511r\_1812}, \text{a\_s\_0564r\_1812}, \text{a\_s\_0569r\_1812}, \text{a\_s\_0593r\_1812},$$

$$\text{a\_s\_0619r\_1812}, \text{a\_s\_0740r\_1812}, \text{a\_s\_0743r\_1812}, \text{a\_s\_0752r\_1812}, \text{a\_s\_0863r\_1812},$$

$$\text{a\_s\_0873r\_1812}, \text{a\_s\_0877r\_1812}, \text{a\_s\_0881r\_1812}, \text{a\_s\_0889r\_1812}, \text{a\_s\_0899r\_1812},$$

$$\text{a\_s\_0907r\_1812}, \text{a\_s\_0911r\_1812}, \text{a\_s\_0920r\_1812}, \text{a\_s\_0925r\_1812}, \text{a\_s\_0929r\_1812},$$

$$\text{a\_s\_0933r\_1812}, \text{a\_s\_0936r\_1812}, \text{a\_s\_0939r\_1812}, \text{a\_s\_0943r\_1812}, \text{a\_s\_0949r\_1812},$$

$$\text{a\_s\_0952r\_1812}, \text{a\_s\_0955r\_1812}, \text{a\_s\_0960r\_1812}, \text{a\_s\_1000r\_1812}, \text{a\_s\_1011r\_1812},$$

$$\text{a\_s\_1283r\_1812}, \text{a\_s\_1347r\_1812}, \text{a\_s\_1417r\_1812}, \text{vol}\,(\text{intracellular})\,, [\text{s\_0001}],$$

$$\text{s\_0001\_or\_1812}, [\text{s\_0416}], \text{s\_0416\_or\_1812}, [\text{s\_0434}], \text{s\_0434\_or\_1812}, [\text{s\_0446}],$$

$$\text{s\_0446\_or\_1812}, [\text{s\_0511}], \text{s\_0511\_or\_1812}, [\text{s\_0564}], \text{s\_0564\_or\_1812}, [\text{s\_0569}],$$

$$\text{s\_0569\_or\_1812}, [\text{s\_0593}], \text{s\_0593\_or\_1812}, [\text{s\_0619}], \text{s\_0619\_or\_1812}, [\text{s\_0740}],$$

$$\text{s\_0740\_or\_1812}, [\text{s\_0743}], \text{s\_0743\_or\_1812}, [\text{s\_0752}], \text{s\_0752\_or\_1812}, [\text{s\_0863}],$$

$$\text{s\_0863\_or\_1812}, [\text{s\_0873}], \text{s\_0873\_or\_1812}, [\text{s\_0877}], \text{s\_0877\_or\_1812}, [\text{s\_0881}],$$

$$\text{s\_0881\_or\_1812}, [\text{s\_0889}], \text{s\_0889\_or\_1812}, [\text{s\_0899}], \text{s\_0899\_or\_1812}, [\text{s\_0907}],$$

$$\text{s\_0907\_or\_1812}, [\text{s\_0911}], \text{s\_0911\_or\_1812}, [\text{s\_0920}], \text{s\_0920\_or\_1812}, [\text{s\_0925}],$$

$$\text{s\_0925\_or\_1812}, [\text{s\_0929}], \text{s\_0929\_or\_1812}, [\text{s\_0933}], \text{s\_0933\_or\_1812}, [\text{s\_0936}],$$

$$\text{s\_0936\_or\_1812}, [\text{s\_0939}], \text{s\_0939\_or\_1812}, [\text{s\_0943}], \text{s\_0943\_or\_1812}, [\text{s\_0949}],$$

$$\text{s\_0949\_or\_1812}, [\text{s\_0952}], \text{s\_0952\_or\_1812}, [\text{s\_0955}], \text{s\_0955\_or\_1812}, [\text{s\_0960}],$$

$$\text{s\_0960\_or\_1812}, [\text{s\_1000}], \text{s\_1000\_or\_1812}, [\text{s\_1011}], \text{s\_1011\_or\_1812}, [\text{s\_1283}],$$

$$\text{s\_1283\_or\_1812}, [\text{s\_1347}], \text{s\_1347\_or\_1812}, [\text{s\_1417}], \text{s\_1417\_or\_1812}, \text{zero\_flux})$$

$$= \text{MAX}\left(\frac{}{+\text{a\_s\_0416r\_1812} \cdot \left(\frac{[\text{s\_0416}]}{\text{s\_0416\_or\_1812}}\right) + \text{a\_s\_0434r\_1812} \cdot \left(\frac{[\text{s\_0434}]}{\text{s\_0434\_or\_1812}}\right) + \text{a\_s\_0446r\_1812} \cdot \left(\frac{[\text{s\_0446}]}{\text{s\_0446\_or\_1812}}\right)\right.$$

$$\text{zero\_fluxvol}\,(\text{intracellular})$$

$$\text{function\_283}\,(\text{V\_o}, \text{a\_s\_0001r\_1812}, \text{a\_s\_0416r\_1812}, \text{a\_s\_0434r\_1812}, \text{a\_s\_0446r\_1812}, \text{a\_s\_0511r\_1812}, \text{a\_s\_0564r\_1812}, \text{a\_s\_0569r\_1812}, \text{a\_s\_0593r\_1812}, \text{a\_s\_0619r\_1812}, \text{a\_s\_0740r\_1812}, \text{a\_s\_0743r\_1812}, \text{a\_s\_0752r\_1812}, \text{a\_s\_0863r\_1812}, \text{a\_s\_0873r\_1812}, \text{a\_s\_0877r\_1812}, \text{a\_s\_0881r\_1812}, \text{a\_s\_0889r\_1812}, \text{a\_s\_0899r\_1812}, \text{a\_s\_0907r\_1812}, \text{a\_s\_0911r\_1812}, \text{a\_s\_0920r\_1812}, \text{a\_s\_0925r\_1812}, \text{a\_s\_0929r\_1812}, \text{a\_s\_0933r\_1812}, \text{a\_s\_0936r\_1812}, \text{a\_s\_0939r\_1812}, \text{a\_s\_0943r\_1812}, \text{a\_s\_0949r\_1812}, \text{a\_s\_0952r\_1812}, \text{a\_s\_0955r\_1812}, \text{a\_s\_0960r\_1812}, \text{a\_s\_1000r\_1812}, \text{a\_s\_1011r\_1812}, \text{a\_s\_1283r\_1812}, \text{a\_s\_1347r\_1812}, \text{a\_s\_1417r\_1812}, \text{vol}\,(\text{intracellular}), [\text{s\_0001}], \text{s\_0001\_or\_1812}, [\text{s\_0416}], \text{s\_0416\_or\_1812}, [\text{s\_0434}], \text{s\_0434\_or\_1812}, [\text{s\_0446}], \text{s\_0446\_or\_1812}, [\text{s\_0511}], \text{s\_0511\_or\_1812}, [\text{s\_0564}], \text{s\_0564\_or\_1812}, [\text{s\_0569}], \text{s\_0569\_or\_1812}, [\text{s\_0593}], \text{s\_0593\_or\_1812}, [\text{s\_0619}], \text{s\_0619\_or\_1812}, [\text{s\_0740}], \text{s\_0740\_or\_1812}, [\text{s\_0743}], \text{s\_0743\_or\_1812}, [\text{s\_0752}], \text{s\_0752\_or\_1812}, [\text{s\_0863}], \text{s\_0863\_or\_1812}, [\text{s\_0873}], \text{s\_0873\_or\_1812}, [\text{s\_0877}], \text{s\_0877\_or\_1812}, [\text{s\_0881}], \text{s\_0881\_or\_1812}, [\text{s\_0889}], \text{s\_0889\_or\_1812}, [\text{s\_0899}], \text{s\_0899\_or\_1812}, [\text{s\_0907}], \text{s\_0907\_or\_1812}, [\text{s\_0911}], \text{s\_0911\_or\_1812}, [\text{s\_0920}], \text{s\_0920\_or\_1812}, [\text{s\_0925}], \text{s\_0925\_or\_1812}, [\text{s\_0929}], \text{s\_0929\_or\_1812}, [\text{s\_0933}], \text{s\_0933\_or\_1812}, [\text{s\_0936}], \text{s\_0936\_or\_1812}, [\text{s\_0939}], \text{s\_0939\_or\_1812}, [\text{s\_0943}], \text{s\_0943\_or\_1812}, [\text{s\_0949}], \text{s\_0949\_or\_1812}, [\text{s\_0952}], \text{s\_0952\_or\_1812}, [\text{s\_0955}], \text{s\_0955\_or\_1812}, [\text{s\_0960}], \text{s\_0960\_or\_1812}, [\text{s\_1000}], \text{s\_1000\_or\_1812}, [\text{s\_1011}], \text{s\_1011\_or\_1812}, [\text{s\_1283}], \text{s\_1283\_or\_1812}, [\text{s\_1347}], \text{s\_1347\_or\_1812}, [\text{s\_1417}], \text{s\_1417\_or\_1812}, \text{zero\_flux}) = \text{MAX}\left(\frac{}{+\text{a\_s\_0416r\_1812} \cdot \left(\frac{[\text{s\_0416}]}{\text{s\_0416\_or\_1812}}\right) + \text{a\_s\_0434r\_1812} \cdot \left(\frac{[\text{s\_0434}]}{\text{s\_0434\_or\_1812}}\right) + \text{a\_s\_0446r\_1812} \cdot \left(\frac{[\text{s\_0446}]}{\text{s\_0446\_or\_1812}}\right) \right. \text{zero\_fluxvol}\,(\text{intracellular}) \tag{1411}$$

Table 1136: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`V_o`	V_o		0.056		☑
`a_s_0001r_1812`	a_s_0001r_1812		1.136		☑
`a_s_0416r_1812`	a_s_0416r_1812		0.023		☑
`a_s_0434r_1812`	a_s_0434r_1812		0.051		☑
`a_s_0446r_1812`	a_s_0446r_1812		59.276		☑
`a_s_0511r_1812`	a_s_0511r_1812		0.050		☑
`a_s_0564r_1812`	a_s_0564r_1812		0.004		☑

Id	Name	SBO	Value	Unit	Constant
a_s_0569r_1812	a_s_0569r_1812		0.002		☑
a_s_0593r_1812	a_s_0593r_1812		0.002		☑
a_s_0619r_1812	a_s_0619r_1812		0.004		☑
a_s_0740r_1812	a_s_0740r_1812		0.325		☑
a_s_0743r_1812	a_s_0743r_1812		0.519		☑
a_s_0752r_1812	a_s_0752r_1812		0.051		☑
a_s_0863r_1812	a_s_0863r_1812		0.357		☑
a_s_0873r_1812	a_s_0873r_1812		0.136		☑
a_s_0877r_1812	a_s_0877r_1812		0.172		☑
a_s_0881r_1812	a_s_0881r_1812		0.172		☑
a_s_0889r_1812	a_s_0889r_1812		0.043		☑
a_s_0899r_1812	a_s_0899r_1812		0.268		☑
a_s_0907r_1812	a_s_0907r_1812		0.268		☑
a_s_0911r_1812	a_s_0911r_1812		0.075		☑
a_s_0920r_1812	a_s_0920r_1812		0.172		☑
a_s_0925r_1812	a_s_0925r_1812		0.250		☑
a_s_0929r_1812	a_s_0929r_1812		0.239		☑
a_s_0933r_1812	a_s_0933r_1812		0.050		☑
a_s_0936r_1812	a_s_0936r_1812		0.114		☑
a_s_0939r_1812	a_s_0939r_1812		0.129		☑
a_s_0943r_1812	a_s_0943r_1812		0.254		☑

Id	Name	SBO	Value	Unit	Constant
a_s_0949r-_1812	a_s_0949r_1812		0.197		☑
a_s_0952r-_1812	a_s_0952r_1812		0.028		☑
a_s_0955r-_1812	a_s_0955r_1812		0.096		☑
a_s_0960r-_1812	a_s_0960r_1812		0.257		☑
a_s_1000r-_1812	a_s_1000r_1812		1.000		☑
a_s_1011r-_1812	a_s_1011r_1812		0.821		☑
a_s_1283r-_1812	a_s_1283r_1812		$9 \cdot 10^{-4}$		☑
a_s_1347r-_1812	a_s_1347r_1812		0.020		☑
a_s_1417r-_1812	a_s_1417r_1812		0.067		☑
s_0001_or-_1812	s_0001_or_1812		0.549		☑
s_0416_or-_1812	s_0416_or_1812		0.549		☑
s_0434_or-_1812	s_0434_or_1812		1.260		☑
s_0446_or-_1812	s_0446_or_1812		1.092		☑
s_0511_or-_1812	s_0511_or_1812		0.549		☑
s_0564_or-_1812	s_0564_or_1812		0.549		☑
s_0569_or-_1812	s_0569_or_1812		0.549		☑
s_0593_or-_1812	s_0593_or_1812		0.549		☑
s_0619_or-_1812	s_0619_or_1812		0.549		☑
s_0740_or-_1812	s_0740_or_1812		0.549		☑
s_0743_or-_1812	s_0743_or_1812		0.549		☑
s_0752_or-_1812	s_0752_or_1812		0.549		☑

Id	Name	SBO	Value	Unit	Constant
s_0863_or-_1812	s_0863_or_1812		0.549		☑
s_0873_or-_1812	s_0873_or_1812		0.549		☑
s_0877_or-_1812	s_0877_or_1812		0.549		☑
s_0881_or-_1812	s_0881_or_1812		0.549		☑
s_0889_or-_1812	s_0889_or_1812		0.549		☑
s_0899_or-_1812	s_0899_or_1812		0.549		☑
s_0907_or-_1812	s_0907_or_1812		0.549		☑
s_0911_or-_1812	s_0911_or_1812		0.549		☑
s_0920_or-_1812	s_0920_or_1812		0.549		☑
s_0925_or-_1812	s_0925_or_1812		0.549		☑
s_0929_or-_1812	s_0929_or_1812		0.549		☑
s_0933_or-_1812	s_0933_or_1812		0.549		☑
s_0936_or-_1812	s_0936_or_1812		0.549		☑
s_0939_or-_1812	s_0939_or_1812		0.549		☑
s_0943_or-_1812	s_0943_or_1812		0.549		☑
s_0949_or-_1812	s_0949_or_1812		1.000		☑
s_0952_or-_1812	s_0952_or_1812		1.000		☑
s_0955_or-_1812	s_0955_or_1812		0.549		☑
s_0960_or-_1812	s_0960_or_1812		1.000		☑
s_1000_or-_1812	s_1000_or_1812		0.549		☑
s_1011_or-_1812	s_1011_or_1812		0.549		☑

Id	Name	SBO	Value	Unit	Constant
s_1283_or-_1812	s_1283_or_1812		0.549		☑
s_1347_or-_1812	s_1347_or_1812		0.549		☑
s_1417_or-_1812	s_1417_or_1812		0.549		☑
zero_flux	zero_flux		0.000		☑

7.284 Reaction r_1814

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name growth

Notes GENE_ASSOCIATION:

Reaction equation

$$\text{s\_0463} \xrightarrow{\text{s\_0547\_b, s\_0463}} \text{s\_0464\_b} \tag{1412}$$

Reactant

Table 1137: Properties of each reactant.

Id	Name	SBO
s_0463	biomass [intracellular]	

Modifiers

Table 1138: Properties of each modifier.

Id	Name	SBO
s_0547_b	D-glucose [extracellular]	
s_0463	biomass [intracellular]	

Product

Table 1139: Properties of each product.

Id	Name	SBO
s_0464_b	biomass [extracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{284} = \text{function\_284}\left(\text{V\_o}, \text{a\_s\_0463r\_1814}, [\text{s\_0463}], \text{s\_0463\_or\_1814}, \text{zero\_flux}\right) \quad (1413)$$

$$\begin{aligned} &\text{function\_284}\left(\text{V\_o}, \text{a\_s\_0463r\_1814}, [\text{s\_0463}], \text{s\_0463\_or\_1814}, \text{zero\_flux}\right) \\ &= \text{MAX}\left(\text{V\_o} \cdot \left(1 + \text{a\_s\_0463r\_1814} \cdot \left(\frac{[\text{s\_0463}]}{\text{s\_0463\_or\_1814}}\right)\right), \text{zero\_flux}\right) \end{aligned} \quad (1414)$$

Table 1140: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
V_o	V_o		0.056		☑
a_s_0463r-_1814	a_s_0463r_1814		1.000		☑
s_0463_or-_1814	s_0463_or_1814		0.549		☑
zero_flux	zero_flux		0.000		☑

7.285 Reaction r_1816

This is an irreversible reaction of 15 reactants forming one product influenced by 16 modifiers.

Name lipid production

Notes GENE_ASSOCIATION:

Reaction equation

$$0.001531\,\text{s\_0090} + 5.6 \cdot 10^{-5}\text{s\_0124} + 9.6 \cdot 10^{-5}\text{s\_0627} + 1.25 \cdot 10^{-4}\text{s\_0632} + 0.005603\,\text{s\_0635} + 8.12 \cdot 10^{-4}\text{s\_0641} \quad (1415)$$

Reactants

Table 1141: Properties of each reactant.

Id	Name	SBO
s_0090	1-phosphatidyl-1D-myo-inositol [intracellular]	
s_0124	14-demethyllanosterol [intracellular]	
s_0627	episterol [intracellular]	
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0635	ergosterol [intracellular]	
s_0641	ergosterol ester [intracellular]	
s_0663	fatty acid [intracellular]	
s_0669	fecosterol [intracellular]	
s_0824	inositol phosphomannosylinositol phosphoceramide [intracellular]	
s_0963	lanosterol [intracellular]	
s_1219	phosphatidyl-L-serine [intracellular]	
s_1228	phosphatidylcholine [intracellular]	
s_1233	phosphatidylethanolamine [intracellular]	
s_1399	triglyceride [intracellular]	
s_1447	zymosterol [intracellular]	

Modifiers

Table 1142: Properties of each modifier.

Id	Name	SBO
s_0547_b	D-glucose [extracellular]	
s_0090	1-phosphatidyl-1D-myo-inositol [intracellular]	
s_0124	14-demethyllanosterol [intracellular]	
s_0627	episterol [intracellular]	
s_0632	ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]	
s_0635	ergosterol [intracellular]	
s_0641	ergosterol ester [intracellular]	
s_0663	fatty acid [intracellular]	
s_0669	fecosterol [intracellular]	
s_0824	inositol phosphomannosylinositol phosphoceramide [intracellular]	
s_0963	lanosterol [intracellular]	
s_1219	phosphatidyl-L-serine [intracellular]	
s_1228	phosphatidylcholine [intracellular]	
s_1233	phosphatidylethanolamine [intracellular]	
s_1399	triglyceride [intracellular]	
s_1447	zymosterol [intracellular]	

Product

Table 1143: Properties of each product.

Id	Name	SBO
s_1000	lipid [intracellular]	

Kinetic Law

Derived unit contains undeclared units

$$v_{285} = \mathrm{vol}\left(\mathrm{intracellular}\right) \cdot \mathrm{function\_285}\left(\mathrm{V\_o}, \mathrm{a\_s\_0090r\_1816}, \mathrm{a\_s\_0124r\_1816}, \mathrm{a\_s\_0627r\_1816}, \mathrm{a\_s\_0632r\_1816}, \mathrm{a\_s\_0635r\_1816}, \mathrm{a\_s\_0641r\_1816}, \mathrm{a\_s\_0663r\_1816}, \mathrm{a\_s\_0669r\_1816}, \mathrm{a\_s\_0824r\_1816}, \mathrm{a\_s\_0963r\_1816}, \mathrm{a\_s\_1219r\_1816}, \mathrm{a\_s\_1228r\_1816}, \mathrm{a\_s\_1233r\_1816}, \mathrm{a\_s\_1399r\_1816}, \mathrm{a\_s\_1447r\_1816}, \mathrm{vol}\left(\mathrm{intracellular}\right), [\mathrm{s\_0090}], \mathrm{s\_0090\_or\_1816}, [\mathrm{s\_0124}], \mathrm{s\_0124\_or\_1816}, [\mathrm{s\_0627}], \mathrm{s\_0627\_or\_1816}, [\mathrm{s\_0632}], \mathrm{s\_0632\_or\_1816}, [\mathrm{s\_0635}], \mathrm{s\_0635\_or\_1816}, [\mathrm{s\_0641}], \mathrm{s\_0641\_or\_1816}, [\mathrm{s\_0663}], \mathrm{s\_0663\_or\_1816}, [\mathrm{s\_0669}], \mathrm{s\_0669\_or\_1816}, [\mathrm{s\_0824}], \mathrm{s\_0824\_or\_1816}, [\mathrm{s\_0963}], \mathrm{s\_0963\_or\_1816}, [\mathrm{s\_1219}], \mathrm{s\_1219\_or\_1816}, [\mathrm{s\_1228}], \mathrm{s\_1228\_or\_1816}, [\mathrm{s\_1233}], \mathrm{s\_1233\_or\_1816}, [\mathrm{s\_1399}], \mathrm{s\_1399\_or\_1816}, [\mathrm{s\_1447}], \mathrm{s\_1447\_or\_1816}, \mathrm{zero\_flux}\right) \tag{1416}$$

$$\mathrm{function\_285}\left(\mathrm{V\_o}, \mathrm{a\_s\_0090r\_1816}, \mathrm{a\_s\_0124r\_1816}, \mathrm{a\_s\_0627r\_1816}, \mathrm{a\_s\_0632r\_1816}, \mathrm{a\_s\_0635r\_1816}, \mathrm{a\_s\_0641r\_1816}, \mathrm{a\_s\_0663r\_1816}, \mathrm{a\_s\_0669r\_1816}, \mathrm{a\_s\_0824r\_1816}, \mathrm{a\_s\_0963r\_1816}, \mathrm{a\_s\_1219r\_1816}, \mathrm{a\_s\_1228r\_1816}, \mathrm{a\_s\_1233r\_1816}, \mathrm{a\_s\_1399r\_1816}, \mathrm{a\_s\_1447r\_1816}, \mathrm{vol}\left(\mathrm{intracellular}\right), [\mathrm{s\_0090}], \mathrm{s\_0090\_or\_1816}, [\mathrm{s\_0124}], \mathrm{s\_0124\_or\_1816}, [\mathrm{s\_0627}], \mathrm{s\_0627\_or\_1816}, [\mathrm{s\_0632}], \mathrm{s\_0632\_or\_1816}, [\mathrm{s\_0635}], \mathrm{s\_0635\_or\_1816}, [\mathrm{s\_0641}], \mathrm{s\_0641\_or\_1816}, [\mathrm{s\_0663}], \mathrm{s\_0663\_or\_1816}, [\mathrm{s\_0669}], \mathrm{s\_0669\_or\_1816}, [\mathrm{s\_0824}], \mathrm{s\_0824\_or\_1816}, [\mathrm{s\_0963}], \mathrm{s\_0963\_or\_1816}, [\mathrm{s\_1219}], \mathrm{s\_1219\_or\_1816}, [\mathrm{s\_1228}], \mathrm{s\_1228\_or\_1816}, [\mathrm{s\_1233}], \mathrm{s\_1233\_or\_1816}, [\mathrm{s\_1399}], \mathrm{s\_1399\_or\_1816}, [\mathrm{s\_1447}], \mathrm{s\_1447\_or\_1816}, \mathrm{zero\_flux}\right) \tag{1417}$$

$$= \mathrm{MAX}\left(\frac{}{+\mathrm{a\_s\_0124r\_1816} \cdot \left(\frac{[\mathrm{s\_0124}]}{\mathrm{s\_0124\_or\_1816}}\right) + \mathrm{a\_s\_0627r\_1816} \cdot \left(\frac{[\mathrm{s\_0627}]}{\mathrm{s\_0627\_or\_1816}}\right) + \mathrm{a\_s\_0632r\_1816} \cdot \left(\frac{[\mathrm{s\_0632}]}{\mathrm{s\_0632\_or\_1816}}\right)}\right.$$

$$\mathrm{zero\_fluxvol}\left(\mathrm{intracellular}\right)$$

$$\text{function\_285}(\text{V\_o}, \text{a\_s\_0090r\_1816}, \text{a\_s\_0124r\_1816}, \text{a\_s\_0627r\_1816}, \text{a\_s\_0632r\_1816}, \text{a\_s\_0635r\_1816}, \text{a\_s\_0641r\_1816}, \text{a\_s\_0663r\_1816}, \text{a\_s\_0669r\_1816}, \text{a\_s\_0824r\_1816}, \text{a\_s\_0963r\_1816}, \text{a\_s\_1219r\_1816}, \text{a\_s\_1228r\_1816}, \text{a\_s\_1233r\_1816}, \text{a\_s\_1399r\_1816}, \text{a\_s\_1447r\_1816}, \text{vol}(\text{intracellular}), [\text{s\_0090}], \text{s\_0090\_or\_1816}, [\text{s\_0124}], \text{s\_0124\_or\_1816}, [\text{s\_0627}], \text{s\_0627\_or\_1816}, [\text{s\_0632}], \text{s\_0632\_or\_1816}, [\text{s\_0635}], \text{s\_0635\_or\_1816}, [\text{s\_0641}], \text{s\_0641\_or\_1816}, [\text{s\_0663}], \text{s\_0663\_or\_1816}, [\text{s\_0669}], \text{s\_0669\_or\_1816}, [\text{s\_0824}], \text{s\_0824\_or\_1816}, [\text{s\_0963}], \text{s\_0963\_or\_1816}, [\text{s\_1219}], \text{s\_1219\_or\_1816}, [\text{s\_1228}], \text{s\_1228\_or\_1816}, [\text{s\_1233}], \text{s\_1233\_or\_1816}, [\text{s\_1399}], \text{s\_1399\_or\_1816}, [\text{s\_1447}], \text{s\_1447\_or\_1816}, \text{zero\_flux}) \tag{1418}$$

$$= \text{MAX}\left(\frac{}{+\text{a\_s\_0124r\_1816} \cdot \left(\frac{[\text{s\_0124}]}{\text{s\_0124\_or\_1816}}\right) + \text{a\_s\_0627r\_1816} \cdot \left(\frac{[\text{s\_0627}]}{\text{s\_0627\_or\_1816}}\right) + \text{a\_s\_0632r\_1816} \cdot \left(\frac{[\text{s\_0632}]}{\text{s\_0632\_or\_1816}}\right)\right.$$

$$\text{zero\_flux}\text{vol}(\text{intracellular})$$

Table 1144: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
V_o	V_o		0.056		☑
a_s_0090r-_1816	a_s_0090r_1816		0.002		☑
a_s_0124r-_1816	a_s_0124r_1816		$5.6 \cdot 10^{-5}$		☑
a_s_0627r-_1816	a_s_0627r_1816		$9.6 \cdot 10^{-5}$		☑
a_s_0632r-_1816	a_s_0632r_1816		$1.25 \cdot 10^{-4}$		☑
a_s_0635r-_1816	a_s_0635r_1816		0.006		☑
a_s_0641r-_1816	a_s_0641r_1816		$8.12 \cdot 10^{-4}$		☑
a_s_0663r-_1816	a_s_0663r_1816		$2.06 \cdot 10^{-4}$		☑
a_s_0669r-_1816	a_s_0669r_1816		$1.14 \cdot 10^{-4}$		☑
a_s_0824r-_1816	a_s_0824r_1816		$4.17 \cdot 10^{-4}$		☑
a_s_0963r-_1816	a_s_0963r_1816		$3.2 \cdot 10^{-5}$		☑
a_s_1219r-_1816	a_s_1219r_1816		$3.73 \cdot 10^{-4}$		☑
a_s_1228r-_1816	a_s_1228r_1816		0.003		☑

Id	Name	SBO	Value	Unit	Constant
a_s_1233r-_1816	a_s_1233r_1816		$6.97 \cdot 10^{-4}$		☑
a_s_1399r-_1816	a_s_1399r_1816		$7.81 \cdot 10^{-4}$		☑
a_s_1447r-_1816	a_s_1447r_1816		$1.5 \cdot 10^{-5}$		☑
s_0090_or-_1816	s_0090_or_1816		0.549		☑
s_0124_or-_1816	s_0124_or_1816		0.549		☑
s_0627_or-_1816	s_0627_or_1816		0.549		☑
s_0632_or-_1816	s_0632_or_1816		0.549		☑
s_0635_or-_1816	s_0635_or_1816		0.549		☑
s_0641_or-_1816	s_0641_or_1816		0.549		☑
s_0663_or-_1816	s_0663_or_1816		0.549		☑
s_0669_or-_1816	s_0669_or_1816		0.549		☑
s_0824_or-_1816	s_0824_or_1816		0.549		☑
s_0963_or-_1816	s_0963_or_1816		0.549		☑
s_1219_or-_1816	s_1219_or_1816		0.549		☑
s_1228_or-_1816	s_1228_or_1816		0.549		☑
s_1233_or-_1816	s_1233_or_1816		0.549		☑
s_1399_or-_1816	s_1399_or_1816		0.549		☑
s_1447_or-_1816	s_1447_or_1816		0.549		☑
zero_flux	zero_flux		0.000		☑

8 Derived Rate Equations

When interpreted as an ordinary differential equation framework, this model implies the following set of equations for the rates of change of each species.

Identifiers for kinetic laws highlighted in gray cannot be verified to evaluate to units of SBML `substance` per `time`. As a result, some SBML interpreters may not be able to verify the consistency of the units on quantities in the model. Please check if

- parameters without an unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`> 0 for certain species.

8.1 Species s_0001

Name (1->3)-beta-D-glucan [intracellular]

Initial concentration $0.549000001186 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0005 and as a modifier in r_0005, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0001} = v_{1} - 1.1358\, v_{283} \tag{1419}$$

8.2 Species s_0007

Name (2R,3R)-2,3-dihydroxy-3-methylpentanoate [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0385 and as a product in r_0640 and as a modifier in r_0385, r_0640).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0007} = v_{171} - v_{99} \tag{1420}$$

8.3 Species s_0008

Name (2R,3S)-3-isopropylmalate(2-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0064 and as a product in r_0063 and as a modifier in r_0063, r_0064).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0008} = v_{23} - v_{24} \tag{1421}$$

8.4 Species s_0009

Name (2S)-2-[5-amino-1-(5-phospho-beta-D-ribosyl)imidazole-4-carboxamido]succinic acid [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0169 and as a product in r_0886 and as a modifier in r_0169, r_0886).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0009} = v_{224} - v_{39} \tag{1422}$$

8.5 Species s_0010

Name (2S)-2-isopropyl-3-oxosuccinate(2-) [intracellular]

Initial concentration $0.548999996568 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0031 and as a product in r_0064 and as a modifier in r_0031, r_0064).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0010} = v_{24} - v_{13} \tag{1423}$$

8.6 Species s_0015

Name (6R)-5,10-methenyltetrahydrofolic acid [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0699 and as a product in r_0707 and as a modifier in r_0699, r_0707).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0015} = v_{186} - v_{183} \tag{1424}$$

8.7 Species s_0017

Name (N(omega)-L-arginino)succinic acid [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0225 and as a product in r_0226 and as a modifier in r_0225, r_0226).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0017} = v_{50} - v_{49} \tag{1425}$$

8.8 Species s_0018

Name (R)-2,3-dihydroxy-3-methylbutanoate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0384 and as a product in r_0111 and as a modifier in r_0111, r_0384).

$$\frac{d}{dt} s\_0018 = v_{27} - v_{98} \quad (1426)$$

8.9 Species s_0021

Name (R)-5-diphosphomevalonic acid [intracellular]

Initial concentration $0.548999996063 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0715 and as a product in r_0877 and as a modifier in r_0715, r_0877).

$$\frac{d}{dt} s\_0021 = v_{218} - v_{188} \quad (1427)$$

8.10 Species s_0022

Name (R)-5-phosphomevalonic acid [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0877 and as a product in r_0712 and as a modifier in r_0712, r_0877).

$$\frac{d}{dt} s\_0022 = v_{187} - v_{218} \quad (1428)$$

8.11 Species s_0031

Name (R)-mevalonate [intracellular]

Initial concentration $0.548999996568 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0712 and as a product in r_0598 and as a modifier in r_0598, r_0712).

$$\frac{d}{dt} s\_0031 = v_{157} - v_{187} \quad (1429)$$

8.12 Species s_0040

Name (S)-2,3-epoxysqualene [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0673 and as a product in r_0991 and as a modifier in r_0673, r_0991).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0040} = v_{252} - v_{178} \tag{1430}$$

8.13 Species s_0042

Name (S)-2-acetyl-2-hydroxybutanoate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0640 and as a product in r_0016 and as a modifier in r_0016, r_0640).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0042} = v_{7} - v_{171} \tag{1431}$$

8.14 Species s_0046

Name (S)-3-hydroxyhexacosanoyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0719 and as a product in r_0057 and as a modifier in r_0057, r_0719).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0046} = v_{19} - v_{189} \tag{1432}$$

8.15 Species s_0052

Name (S)-3-hydroxypalmitoyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0720 and as a product in r_0058 and as a modifier in r_0058, r_0720).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0052} = v_{20} - v_{190} \tag{1433}$$

8.16 Species s_0055

Name (S)-3-hydroxytetradecanoyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0722 and as a product in r_0060 and as a modifier in r_0060, r_0722).

$$\frac{d}{dt} s\_0055 = v_{22} - v_{192} \tag{1434}$$

8.17 Species s_0058

Name (S)-3-methyl-2-oxopentanoate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0634 and as a product in r_0385 and as a modifier in r_0385, r_0634).

$$\frac{d}{dt} s\_0058 = v_{99} - v_{169} \tag{1435}$$

8.18 Species s_0064

Name (S)-dihydroorotate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0374 and as a product in r_0381 and as a modifier in r_0374, r_0381).

$$\frac{d}{dt} s\_0064 = v_{97} - v_{95} \tag{1436}$$

8.19 Species s_0069

Name (S)-malate(2-) [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0485 and as a product in r_0688 and as a modifier in r_0485, r_0688).

$$\frac{d}{dt} s\_0069 = v_{180} - v_{122} \tag{1437}$$

8.20 Species s_0078

Name 1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate [intracellular]

Initial concentration $0.548999996529\ \mathrm{mol \cdot l^{-1}}$

This species takes part in four reactions (as a reactant in r_0608 and as a product in r_0887 and as a modifier in r_0608, r_0887).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0078} = v_{225} - v_{163} \tag{1438}$$

8.21 Species s_0079

Name 1-(5-phospho-D-ribosyl)-5-[(5-phospho-D-ribosylamino)methylideneamino]imidazole-4-carboxamide [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol \cdot l^{-1}}$

This species takes part in four reactions (as a reactant in r_0008 and as a product in r_0881 and as a modifier in r_0008, r_0881).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0079} = v_{219} - v_{3} \tag{1439}$$

8.22 Species s_0080

Name 1-(5-phosphoribosyl)-5'-AMP [intracellular]

Initial concentration $0.5489999965\ \mathrm{mol \cdot l^{-1}}$

This species takes part in four reactions (as a reactant in r_0881 and as a product in r_0882 and as a modifier in r_0881, r_0882).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0080} = v_{220} - v_{219} \tag{1440}$$

8.23 Species s_0083

Name 1-acyl-sn-glycerol 3-phosphate [intracellular]

Initial concentration $0.548999995995\ \mathrm{mol \cdot l^{-1}}$

This species takes part in four reactions (as a reactant in r_0009 and as a product in r_0534 and as a modifier in r_0009, r_0534).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0083} = v_{139} - v_{4} \tag{1441}$$

8.24 Species s_0088

Name 1-C-(indol-3-yl)glycerol 3-phosphate [intracellular]

Initial concentration $0.548999996529 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_1042 and as a product in r_0608 and as a modifier in r_0608, r_1042).

$$\frac{d}{dt} s\_0088 = v_{163} - v_{268} \tag{1442}$$

8.25 Species s_0090

Name 1-phosphatidyl-1D-myo-inositol [intracellular]

Initial concentration $0.548999996262 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_1816 and as a product in r_0847 and as a modifier in r_0847, r_1816).

$$\frac{d}{dt} s\_0090 = v_{207} - 0.001531\, v_{285} \tag{1443}$$

8.26 Species s_0118

Name 1-pyrroline-3-hydroxy-5-carboxylic acid [intracellular]

Initial concentration $0.548999996262 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0661 and as a product in r_0660 and as a modifier in r_0660, r_0661).

$$\frac{d}{dt} s\_0118 = v_{175} - v_{176} \tag{1444}$$

8.27 Species s_0120

Name 1-pyrroline-5-carboxylate [intracellular]

Initial concentration $0.549000001186 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0936 and as a product in r_0657 and as a modifier in r_0657, r_0936).

$$\frac{d}{dt} s\_0120 = v_{174} - v_{233} \tag{1445}$$

8.28 Species s_0122

Name 10-formyltetrahydrofolic acid [intracellular]

Initial concentration $0.548999996383 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0885, r_0889 and as a product in r_0479, r_0699 and as a modifier in r_0479, r_0699, r_0885, r_0889).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0122} = v_{120} + v_{183} - v_{223} - v_{227} \quad (1446)$$

8.29 Species s_0124

Name 14-demethyllanosterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0268, r_1816 and as a product in r_0258 and as a modifier in r_0258, r_0268, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0124} = v_{60} - v_{68} - 5.6 \cdot 10^{-5}\, v_{285} \quad (1447)$$

8.30 Species s_0128

Name 1D-myo-inositol 1-phosphate [intracellular]

Initial concentration $0.5489999965 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0618, r_0621, r_0725 and as a product in r_0726 and as a modifier in r_0618, r_0621, r_0725, r_0726).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0128} = v_{195} - v_{165} - v_{166} - v_{194} \quad (1448)$$

8.31 Species s_0145

Name 2,5-diamino-4-hydroxy-6-(5-phosphoribosylamino)pyrimidine [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0015 and as a product in r_0562 and as a modifier in r_0015, r_0562).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0145} = v_{144} - v_{6} \quad (1449)$$

8.32 Species s_0146

Name 2,5-diamino-6-(5-phosphono)ribitylamino-4(3H)-pyrimidinone [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0014 and as a product in r_0015 and as a modifier in r_0014, r_0015).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0146} = v_6 - v_5 \tag{1450}$$

8.33 Species s_0149

Name 2-acetamido-5-oxopentanoate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0133 and as a product in r_0728 and as a modifier in r_0133, r_0728).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0149} = v_{196} - v_{34} \tag{1451}$$

8.34 Species s_0150

Name 2-acetyllactic acid [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0111 and as a product in r_0112 and as a modifier in r_0111, r_0112).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0150} = v_{28} - v_{27} \tag{1452}$$

8.35 Species s_0158

Name 2-formamido-N(1)-(5-phospho-D-ribosyl)acetamidine [intracellular]

Initial concentration $0.54899999593 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0884 and as a product in r_0888 and as a modifier in r_0884, r_0888).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0158} = v_{226} - v_{222} \tag{1453}$$

8.36 Species s_0163

Name 2-hydroxy-3-oxobutyl phosphate [intracellular]

Initial concentration $0.549000001186\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0948 and as a product in r_0040 and as a modifier in r_0040, r_0948).

$$\frac{\mathrm{d}}{\mathrm{d}t} s\_0163 = v_{15} - v_{238} \tag{1454}$$

8.37 Species s_0167

Name 2-isopropylmalate(2-) [intracellular]

Initial concentration $0.549000001219\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0025 and as a product in r_0026 and as a modifier in r_0025, r_0026).

$$\frac{\mathrm{d}}{\mathrm{d}t} s\_0167 = v_{11} - v_{10} \tag{1455}$$

8.38 Species s_0170

Name 2-isopropylmaleic acid [intracellular]

Initial concentration $0.548999999216\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0063 and as a product in r_0025 and as a modifier in r_0025, r_0063).

$$\frac{\mathrm{d}}{\mathrm{d}t} s\_0170 = v_{10} - v_{23} \tag{1456}$$

8.39 Species s_0180

Name 2-oxaloglutaric acid [intracellular]

Initial concentration $0.548999995536\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0765 and as a product in r_0585 and as a modifier in r_0585, r_0765).

$$\frac{\mathrm{d}}{\mathrm{d}t} s\_0180 = v_{153} - v_{197} \tag{1457}$$

8.40 Species s_0181

Name 2-oxoadipic acid [intracellular]

Initial concentration 0.548999996435 mol·l^{-1}

This species takes part in four reactions (as a reactant in r_0018 and as a product in r_0765 and as a modifier in r_0018, r_0765).

$$\frac{d}{dt} s\_0181 = v_{197} - v_{8} \tag{1458}$$

8.41 Species s_0183

Name 2-oxobutanoate [intracellular]

Initial concentration 0.549000000846 mol·l^{-1}

This species takes part in six reactions (as a reactant in r_0016 and as a product in r_0339, r_0667 and as a modifier in r_0016, r_0339, r_0667).

$$\frac{d}{dt} s\_0183 = v_{84} + v_{177} - v_{7} \tag{1459}$$

8.42 Species s_0185

Name 2-oxoglutarate [intracellular]

Initial concentration 0.548999999216 mol·l^{-1}

This species takes part in 30 reactions (as a reactant in r_0509, r_0510, r_0582 and as a product in r_0018, r_0133, r_0235, r_0577, r_0630, r_0634, r_0647, r_0674, r_0825, r_0969, r_1050, r_1073 and as a modifier in r_0018, r_0133, r_0235, r_0509, r_0510, r_0577, r_0582, r_0630, r_0634, r_0647, r_0674, r_0825, r_0969, r_1050, r_1073).

$$\begin{aligned} \frac{d}{dt} s\_0185 = {} & v_{8} + v_{34} + v_{54} + v_{150} + v_{167} + v_{169} + v_{172} + v_{179} \\ & + v_{205} + v_{247} + v_{269} + v_{273} - v_{129} - v_{130} - v_{152} \end{aligned} \tag{1460}$$

8.43 Species s_0193

Name 2-phospho-D-glyceric acid [intracellular]

Initial concentration 0.05150660046 mol·l^{-1}

This species takes part in five reactions (as a reactant in r_0398 and as a product in r_0866 and as a modifier in r_0398, r_0866, r_0866).

$$\frac{d}{dt} s\_0193 = v_{214} - v_{104} \tag{1461}$$

8.44 Species s_0195

Name 2-trans,6-trans-farnesyl diphosphate [intracellular]

Initial concentration 0.548999999216 $mol \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0993 and as a product in r_0496 and as a modifier in r_0496, r_0993).

$$\frac{d}{dt} s\_0195 = v_{124} - 2\, v_{253} \tag{1462}$$

8.45 Species s_0206

Name 3'-phospho-5'-adenylyl sulfate [intracellular]

Initial concentration 0.548999996343 $mol \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0856 and as a product in r_0172 and as a modifier in r_0172, r_0856).

$$\frac{d}{dt} s\_0206 = v_{42} - v_{210} \tag{1463}$$

8.46 Species s_0209

Name 3-(4-hydroxyphenyl)pyruvate [intracellular]

Initial concentration 0.548999996529 $mol \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_1050 and as a product in r_0913 and as a modifier in r_0913, r_1050).

$$\frac{d}{dt} s\_0209 = v_{231} - v_{269} \tag{1464}$$

8.47 Species s_0212

Name 3-(imidazol-4-yl)-2-oxopropyl dihydrogen phosphate [intracellular]

Initial concentration 0.548999996435 $mol \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0577 and as a product in r_0605 and as a modifier in r_0577, r_0605).

$$\frac{d}{dt} s\_0212 = v_{160} - v_{150} \tag{1465}$$

8.48 Species s_0215

Name 3-dehydro-4-methylzymosterol [intracellular]

Initial concentration $0.54899999551\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0263 and as a product in r_0262 and as a modifier in r_0262, r_0263).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0215} = v_{62} - v_{63} \tag{1466}$$

8.49 Species s_0216

Name 3-dehydroquinate [intracellular]

Initial concentration $0.549000001219\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0042 and as a product in r_0043 and as a modifier in r_0042, r_0043).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0216} = v_{17} - v_{16} \tag{1467}$$

8.50 Species s_0217

Name 3-dehydroshikimate [intracellular]

Initial concentration $0.548999999216\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0976 and as a product in r_0042 and as a modifier in r_0042, r_0976).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0217} = v_{16} - v_{250} \tag{1468}$$

8.51 Species s_0218

Name 3-dehydrosphinganine [intracellular]

Initial concentration $0.549000001826\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0044 and as a product in r_0972 and as a modifier in r_0044, r_0972).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0218} = v_{249} - v_{18} \tag{1469}$$

8.52 Species s_0225

Name 3-hydroxy-3-methylglutaryl-CoA [intracellular]

Initial concentration $0.549000001866 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0598 and as a product in r_0599 and as a modifier in r_0598, r_0599).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0225} = v_{158} - v_{157} \tag{1470}$$

8.53 Species s_0234

Name 3-hydroxyoctadecanoyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0721 and as a product in r_0059 and as a modifier in r_0059, r_0721).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0234} = v_{21} - v_{191} \tag{1471}$$

8.54 Species s_0238

Name 3-methyl-2-oxobutanoate [intracellular]

Initial concentration $0.549000001999 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0026, r_1073 and as a product in r_0384 and as a modifier in r_0026, r_0384, r_1073).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0238} = v_{98} - v_{11} - v_{273} \tag{1472}$$

8.55 Species s_0247

Name 3-oxohexacosanoyl-CoA [intracellular]

Initial concentration $0.549000000915 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0057 and as a product in r_0719 and as a modifier in r_0057, r_0719).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0247} = v_{189} - v_{19} \tag{1473}$$

8.56 Species s_0254

Name 3-oxooctadecanoyl-CoA [intracellular]

Initial concentration $0.549000000915 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0059 and as a product in r_0721 and as a modifier in r_0059, r_0721).

$$\frac{d}{dt} s\_0254 = v_{191} - v_{21} \tag{1474}$$

8.57 Species s_0257

Name 3-oxopalmitoyl-CoA [intracellular]

Initial concentration $0.549000000915 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0058 and as a product in r_0720 and as a modifier in r_0058, r_0720).

$$\frac{d}{dt} s\_0257 = v_{190} - v_{20} \tag{1475}$$

8.58 Species s_0261

Name 3-oxotetradecanoyl-CoA [intracellular]

Initial concentration $0.549000000915 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0060 and as a product in r_0722 and as a modifier in r_0060, r_0722).

$$\frac{d}{dt} s\_0261 = v_{192} - v_{22} \tag{1476}$$

8.59 Species s_0264

Name 3-phospho-D-glyceric acid [intracellular]

Initial concentration $0.363387999607 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0866 and as a product in r_0865 and as a modifier in r_0865, r_0866).

$$\frac{d}{dt} s\_0264 = v_{213} - v_{214} \tag{1477}$$

8.60 Species s_0265

Name 3-phospho-D-glyceroyl dihydrogen phosphate [intracellular]

Initial concentration $1.08759000085 \cdot 10^{-4}$ mol $\cdot$ l^{-1}

This species takes part in four reactions (as a reactant in r_0865 and as a product in r_0525 and as a modifier in r_0525, r_0865).

$$\frac{d}{dt} s\_0265 = v_{134} - v_{213} \tag{1478}$$

8.61 Species s_0267

Name 3-phosphoshikimic acid [intracellular]

Initial concentration 0.548999997773 mol $\cdot$ l^{-1}

This species takes part in four reactions (as a reactant in r_0068 and as a product in r_0977 and as a modifier in r_0068, r_0977).

$$\frac{d}{dt} s\_0267 = v_{251} - v_{25} \tag{1479}$$

8.62 Species s_0268

Name 4,4-dimethyl-5alpha-cholesta-8,14,24-trien-3beta-ol [intracellular]

Initial concentration 0.54900000196 mol $\cdot$ l^{-1}

This species takes part in four reactions (as a reactant in r_0258 and as a product in r_0347 and as a modifier in r_0258, r_0347).

$$\frac{d}{dt} s\_0268 = v_{87} - v_{60} \tag{1480}$$

8.63 Species s_0297

Name 4-methyl-2-oxopentanoate [intracellular]

Initial concentration 0.548999999216 mol $\cdot$ l^{-1}

This species takes part in four reactions (as a reactant in r_0674 and as a product in r_0031 and as a modifier in r_0031, r_0674).

$$\frac{d}{dt} s\_0297 = v_{13} - v_{179} \tag{1481}$$

8.64 Species s_0301

Name 4-phospho-L-aspartate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0238 and as a product in r_0233 and as a modifier in r_0233, r_0238).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0301} = v_{53} - v_{55} \tag{1482}$$

8.65 Species s_0302

Name 4alpha-methylzymosterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0265 and as a product in r_0263 and as a modifier in r_0263, r_0265).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0302} = v_{63} - v_{65} \tag{1483}$$

8.66 Species s_0303

Name 4beta-methylzymosterol-4alpha-carboxylic acid [intracellular]

Initial concentration $0.54899999551 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0262 and as a product in r_0268 and as a modifier in r_0262, r_0268).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0303} = v_{68} - v_{62} \tag{1484}$$

8.67 Species s_0304

Name 5'-adenylyl sulfate [intracellular]

Initial concentration $0.548999996343 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0172 and as a product in r_1007 and as a modifier in r_0172, r_1007).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0304} = v_{256} - v_{42} \tag{1485}$$

8.68 Species s_0306

Name 5'-xanthylic acid [intracellular]

Initial concentration $0.549000002154 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0551 and as a product in r_0607 and as a modifier in r_0551, r_0607).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0306} = v_{162} - v_{143} \tag{1486}$$

8.69 Species s_0307

Name 5,10-methylenetetrahydrofolate(2-) [intracellular]

Initial concentration $0.549000001826 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0093, r_0539, r_0707, r_1032 and as a product in r_0538 and as a modifier in r_0093, r_0538, r_0539, r_0707, r_1032).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0307} = v_{140} - v_{26} - v_{141} - v_{186} - v_{261} \tag{1487}$$

8.70 Species s_0309

Name 5,6,7,8-tetrahydrofolic acid [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 14 reactions (as a reactant in r_0479, r_0538 and as a product in r_0375, r_0539, r_0702, r_0885, r_0889 and as a modifier in r_0375, r_0479, r_0538, r_0539, r_0702, r_0885, r_0889).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0309} = v_{96} + v_{141} + v_{185} + v_{223} + v_{227} - v_{120} - v_{140} \tag{1488}$$

8.71 Species s_0315

Name 5-[(5-phospho-1-deoxy-D-ribulos-1-ylamino)methylideneamino]-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0604 and as a product in r_0008 and as a modifier in r_0008, r_0604).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0315} = v_{3} - v_{159} \tag{1489}$$

8.72 Species s_0316

Name 5-amino-1-(5-phospho-D-ribosyl)imidazole [intracellular]

Initial concentration $0.548999996168 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0883 and as a product in r_0884 and as a modifier in r_0883, r_0884).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0316} = v_{222} - v_{221} \tag{1490}$$

8.73 Species s_0317

Name 5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0885 and as a product in r_0169, r_0604 and as a modifier in r_0169, r_0604, r_0885).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0317} = v_{39} + v_{159} - v_{223} \tag{1491}$$

8.74 Species s_0318

Name 5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylic acid [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0886 and as a product in r_0883 and as a modifier in r_0883, r_0886).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0318} = v_{221} - v_{224} \tag{1492}$$

8.75 Species s_0319

Name 5-amino-6-(5-phosphoribitylamino)uracil [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0934 and as a product in r_0014 and as a modifier in r_0014, r_0934).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0319} = v_{5} - v_{232} \tag{1493}$$

8.76 Species s_0320

Name 5-amino-6-(D-ribitylamino)uracil [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0948 and as a product in r_0934, r_0949 and as a modifier in r_0934, r_0948, r_0949).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0320} = v_{232} + v_{239} - v_{238} \tag{1494}$$

8.77 Species s_0325

Name 5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0606 and as a product in r_0885 and as a modifier in r_0606, r_0885).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0325} = v_{223} - v_{161} \tag{1495}$$

8.78 Species s_0328

Name 5-methyltetrahydrofolate(2-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0702 and as a product in r_0093 and as a modifier in r_0093, r_0702).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0328} = v_{26} - v_{185} \tag{1496}$$

8.79 Species s_0330

Name 5-O-(1-carboxyvinyl)-3-phosphoshikimic acid [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0306 and as a product in r_0068 and as a modifier in r_0068, r_0306).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0330} = v_{25} - v_{78} \tag{1497}$$

8.80 Species s_0331

Name 5-O-phosphono-alpha-D-ribofuranosyl diphosphate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0220, r_0245, r_0514, r_0793 and as a product in r_0891 and as a modifier in r_0220, r_0245, r_0514, r_0793, r_0891).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0331} = v_{229} - v_{47} - v_{56} - v_{132} - v_{203} \tag{1498}$$

8.81 Species s_0333

Name 5-phospho-beta-D-ribosylamine [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0890 and as a product in r_0514 and as a modifier in r_0514, r_0890).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0333} = v_{132} - v_{228} \tag{1499}$$

8.82 Species s_0334

Name 5-phosphoribosyl-ATP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0882 and as a product in r_0245 and as a modifier in r_0245, r_0882).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0334} = v_{56} - v_{220} \tag{1500}$$

8.83 Species s_0335

Name 6,7-dimethyl-8-(1-D-ribityl)lumazine [intracellular]

Initial concentration $0.548999996262 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0949 and as a product in r_0948 and as a modifier in r_0948, r_0949).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0335} = v_{238} - 2\, v_{239} \tag{1501}$$

8.84 Species s_0356

Name 7-phospho-2-dehydro-3-deoxy-D-arabino-heptonic acid [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0043 and as a product in r_0021 and as a modifier in r_0021, r_0043).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0356} = v_9 - v_{17} \tag{1502}$$

8.85 Species s_0366

Name acetaldehyde [intracellular]

Initial concentration $0.120104000134 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0183, r_0191 and as a product in r_0938, r_1026 and as a modifier in r_0183, r_0191, r_0938, r_1026).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0366} = v_{235} + v_{259} - v_{44} - v_{45} \tag{1503}$$

8.86 Species s_0369

Name acetate [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0125 and as a product in r_0127, r_0191, r_0340, r_0783 and as a modifier in r_0125, r_0127, r_0191, r_0340, r_0783).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0369} = v_{32} + v_{45} + v_{85} + v_{200} - v_{31} \tag{1504}$$

8.87 Species s_0374

Name acetoacetyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0599 and as a product in r_0118 and as a modifier in r_0118, r_0599).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0374} = v_{29} - v_{158} \tag{1505}$$

8.88 Species s_0380

Name acetyl-CoA [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 22 reactions (as a reactant in r_0026, r_0118, r_0123, r_0127, r_0328, r_0430, r_0582, r_0589, r_0599 and as a product in r_0125, r_0940 and as a modifier in r_0026, r_0118, r_0123, r_0125, r_0127, r_0328, r_0430, r_0582, r_0589, r_0599, r_0940).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0380} = v_{31} + v_{236} - v_{11} - 2\,v_{29} - v_{30} - v_{32} - v_{80} - v_{112} - v_{152} - v_{156} - v_{158} \tag{1506}$$

8.89 Species s_0386

Name acyl-CoA [intracellular]

Initial concentration $0.548999995995 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0009, r_0370, r_0534 and as a product in r_1672 and as a modifier in r_0009, r_0370, r_0534, r_1672).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0386} = v_{282} - v_{4} - v_{93} - v_{139} \tag{1507}$$

8.90 Species s_0393

Name adenosine [intracellular]

Initial concentration $0.548999996273999 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0157 and as a product in r_0159 and as a modifier in r_0157, r_0159).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0393} = v_{36} - v_{35} \tag{1508}$$

8.91 Species s_0397

Name adenosine 3',5'-bismonophosphate [intracellular]

Initial concentration $0.548999996619 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0034 and as a product in r_0856 and as a modifier in r_0034, r_0856).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0397} = v_{210} - v_{14} \tag{1509}$$

8.92 Species s_0400

Name ADP [intracellular]

Initial concentration $1.71906998614 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 81 reactions (as a reactant in r_0163, r_0165, r_0246, r_0345, r_0360, r_0362, r_0771, r_0865, r_0941, r_0951, r_1007, r_1066 and as a product in r_0123, r_0130, r_0157, r_0172, r_0233, r_0249, r_0277, r_0336, r_0386, r_0479, r_0499, r_0506, r_0515, r_0567, r_0573, r_0588, r_0715, r_0779, r_0859, r_0877, r_0884, r_0886, r_0888, r_0890, r_0937, r_0977, r_1003, r_1059, r_1812 and as a modifier in r_0123, r_0130, r_0157, r_0163, r_0165, r_0172, r_0233, r_0246, r_0249, r_0277, r_0336, r_0345, r_0360, r_0362, r_0386, r_0479, r_0499, r_0506, r_0515, r_0567, r_0573, r_0588, r_0715, r_0771, r_0779, r_0859, r_0865, r_0877, r_0884, r_0886, r_0888, r_0890, r_0937, r_0941, r_0951, r_0977, r_1003, r_1007, r_1059, r_1066).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0400} = {} & v_{30} + v_{33} + v_{35} + v_{42} + v_{53} + v_{58} + 2\, v_{71} + v_{82} + v_{100} + v_{120} + v_{125} \\ & + v_{128} + v_{133} + v_{145} + v_{147} + v_{155} + v_{188} + v_{199} + v_{211} + v_{218} + v_{222} \\ & + v_{224} + v_{226} + v_{228} + v_{234} + v_{251} + v_{255} + v_{270} + 59.276\, v_{283} - 2\, v_{37} \\ & - v_{38} - v_{57} - v_{86} - v_{91} - v_{92} - v_{198} - v_{213} - v_{237} - v_{240} - v_{256} - v_{271}\end{aligned} \quad (1510)$$

8.93 Species s_0410

Name aldehydo-D-glucose 6-phosphate [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0213, r_0505, r_0726, r_0861 and as a product in r_0573 and as a modifier in r_0213, r_0505, r_0573, r_0726, r_0861).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0410} = v_{147} - v_{46} - v_{127} - v_{195} - v_{212} \quad (1511)$$

8.94 Species s_0416

Name alpha,alpha-trehalose [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_1038 and as a modifier in r_1038, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0416} = v_{265} - 0.023371\, v_{283} \quad (1512)$$

8.95 Species s_0419

Name alpha,alpha-trehalose 6-phosphate [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1038 and as a product in r_0213 and as a modifier in r_0213, r_1038).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0419} = v_{46} - v_{265} \tag{1513}$$

8.96 Species s_0427

Name alpha-D-ribose 5-phosphate [intracellular]

Initial concentration $0.548999996273999 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0891 and as a product in r_0963, r_1036 and as a modifier in r_0891, r_0963, r_1036).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0427} = v_{244} + v_{263} - v_{229} \tag{1514}$$

8.97 Species s_0430

Name ammonium [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 18 reactions (as a reactant in r_0336, r_0357, r_0509, r_0515 and as a product in r_0014, r_0339, r_0538, r_0667, r_1157 and as a modifier in r_0014, r_0336, r_0339, r_0357, r_0509, r_0515, r_0538, r_0667, r_1157).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0430} = v_{5} + v_{84} + v_{140} + v_{177} + v_{274} - v_{82} - v_{90} - v_{129} - v_{133} \tag{1515}$$

8.98 Species s_0434

Name AMP [intracellular]

Initial concentration $1.25955999733 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 30 reactions (as a reactant in r_0127, r_0439, r_0442, r_1812 and as a product in r_0034, r_0157, r_0163, r_0165, r_0171, r_0226, r_0229, r_0437, r_0551, r_0650, r_0891 and as a modifier in r_0034, r_0127, r_0157, r_0163, r_0165, r_0171, r_0226, r_0229, r_0437, r_0439, r_0442, r_0551, r_0650, r_0891, r_1812).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0434} = &\, v_{14} + v_{35} + v_{37} + v_{38} + v_{41} + v_{50} + v_{51} + v_{113} \\ &+ v_{143} + v_{173} + v_{229} - v_{32} - v_{114} - v_{115} - 0.051\, v_{283}\end{aligned} \tag{1516}$$

8.99 Species s_0438

Name amylose [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0006 and as a product in r_0547 and as a modifier in r_0006, r_0547).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0438} = v_{142} - v_{2} \tag{1517}$$

8.100 Species s_0439

Name anthranilate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0220 and as a product in r_0221 and as a modifier in r_0220, r_0221).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0439} = v_{48} - v_{47} \tag{1518}$$

8.101 Species s_0446

Name ATP [intracellular]

Initial concentration $1.09207999161 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 102 reactions (as a reactant in r_0123, r_0130, r_0157, r_0172, r_0226, r_0229, r_0233, r_0245, r_0249, r_0277, r_0336, r_0386, r_0437, r_0479, r_0499, r_0506, r_0515, r_0551, r_0567, r_0573, r_0588, r_0650, r_0701, r_0715, r_0779, r_0859, r_0877, r_0884, r_0886, r_0888, r_0890, r_0891, r_0937, r_0959, r_0977, r_1003, r_1059, r_1812 and as a product in r_0127, r_0163, r_0246, r_0345, r_0360, r_0362, r_0439, r_0442, r_0771, r_0865, r_0941, r_1066 and as a modifier in r_0123, r_0127, r_0130, r_0157, r_0163, r_0172, r_0226, r_0229, r_0233, r_0245, r_0246, r_0249, r_0277, r_0336, r_0345, r_0360, r_0362, r_0386, r_0437, r_0439, r_0442, r_0479, r_0499, r_0506, r_0515, r_0551, r_0567, r_0573, r_0588, r_0650, r_0701, r_0715, r_0771, r_0779, r_0859, r_0859, r_0865, r_0865, r_0877, r_0884, r_0886, r_0888, r_0890, r_0891, r_0937, r_0941, r_0959, r_0977, r_1003, r_1059, r_1066, r_1812).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0446} = {} & v_{32} + v_{37} + v_{57} + v_{86} + v_{91} + v_{92} + v_{114} + v_{115} + v_{198} + v_{213} \\ & + v_{237} + v_{271} - v_{30} - v_{33} - v_{35} - v_{42} - v_{50} - v_{51} - v_{53} - v_{56} - v_{58} \\ & - 2\, v_{71} - v_{82} - v_{100} - v_{113} - v_{120} - v_{125} - v_{128} - v_{133} - v_{143} - v_{145} \\ & - v_{147} - v_{155} - v_{173} - v_{184} - v_{188} - v_{199} - v_{211} - v_{218} - v_{222} - v_{224} \\ & - v_{226} - v_{228} - v_{229} - v_{234} - v_{243} - v_{251} - v_{255} - v_{270} - 59.276\, v_{283}\end{aligned} \tag{1519}$$

8.102 Species s_0455

Name beta-D-glucose 6-phosphate [intracellular]

Initial concentration $0.496413999333 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in five reactions (as a reactant in r_0504 and as a product in r_0499 and as a modifier in r_0499, r_0504, r_0504).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0455} = v_{125} - v_{126} \tag{1520}$$

8.103 Species s_0458

Name bicarbonate [intracellular]

Initial concentration $0.548999996101 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0123, r_0277, r_0937 and as a product in r_0251 and as a modifier in r_0123, r_0251, r_0277, r_0937).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0458} = v_{59} - v_{30} - v_{71} - v_{234} \tag{1521}$$

8.104 Species s_0463

Name biomass [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in r_1814 and as a product in r_1812 and as a modifier in r_1814).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0463} = v_{283} - v_{284} \tag{1522}$$

8.105 Species s_0468

Name but-1-ene-1,2,4-tricarboxylic acid [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0581 and as a product in r_0029 and as a modifier in r_0029, r_0581).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0468} = v_{12} - v_{151} \tag{1523}$$

8.106 Species s_0469

Name carbamoyl phosphate [intracellular]

Initial concentration $0.548999996395\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0232, r_0789 and as a product in r_0277 and as a modifier in r_0232, r_0277, r_0789).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0469} = v_{71} - v_{52} - v_{201} \tag{1524}$$

8.107 Species s_0470

Name carbon dioxide [intracellular]

Initial concentration $0.99999999807\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in 64 reactions (as a reactant in r_0251, r_0883, r_1194 and as a product in r_0016, r_0031, r_0112, r_0261, r_0262, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0538, r_0608, r_0630, r_0715, r_0765, r_0794, r_0850, r_0911, r_0913, r_0938, r_0940, r_0972 and as a modifier in r_0016, r_0031, r_0112, r_0251, r_0261, r_0262, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0538, r_0608, r_0630, r_0715, r_0765, r_0794, r_0850, r_0883, r_0911, r_0913, r_0938, r_0940, r_0972, r_1194).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0470} = & v_{7} + v_{13} + v_{28} + v_{61} + v_{62} + v_{105} + v_{106} + v_{107} + v_{108} + v_{109} + 3\,v_{110} \\ & + v_{111} + 3\,v_{112} + v_{116} + v_{117} + v_{118} + v_{119} + v_{140} + v_{163} + v_{167} + v_{188} \\ & + v_{197} + v_{204} + v_{208} + v_{230} + v_{231} + v_{235} + v_{236} + v_{249} - v_{59} - v_{221} - v_{275}\end{aligned} \tag{1525}$$

8.108 Species s_0481

Name CDP [intracellular]

Initial concentration $0.54899999608\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0345 and as a product in r_0712, r_0771 and as a modifier in r_0345, r_0712, r_0771).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0481} = v_{187} + v_{198} - v_{86} \tag{1526}$$

8.109 Species s_0485

Name CDP-diacylglycerol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0847, r_0853 and as a product in r_0284 and as a modifier in r_0284, r_0847, r_0853).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0485} = v_{73} - v_{207} - v_{209} \tag{1527}$$

8.110 Species s_0500

Name chorismate(2-) [intracellular]

Initial concentration $0.548999995879 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0221, r_0304 and as a product in r_0306 and as a modifier in r_0221, r_0304, r_0306).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0500} = v_{78} - v_{48} - v_{77} \tag{1528}$$

8.111 Species s_0501

Name cis-aconitate(3-) [intracellular]

Initial concentration $0.5489999965 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0307 and as a product in r_0330 and as a modifier in r_0307, r_0330).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0501} = v_{81} - v_{79} \tag{1529}$$

8.112 Species s_0507

Name citrate(3-) [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0330 and as a product in r_0328 and as a modifier in r_0328, r_0330).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0507} = v_{80} - v_{81} \tag{1530}$$

8.113 Species s_0511

Name CMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_1812 and as a product in r_0345, r_0847, r_0853 and as a modifier in r_0345, r_0847, r_0853, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0511} = v_{86} + v_{207} + v_{209} - 0.05\, v_{283} \tag{1531}$$

8.114 Species s_0514

Name coenzyme A [intracellular]

Initial concentration $0.548999995995 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 62 reactions (as a reactant in r_0125, r_0437, r_0940, r_1003 and as a product in r_0009, r_0026, r_0118, r_0127, r_0290, r_0328, r_0370, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0439, r_0442, r_0464, r_0465, r_0466, r_0467, r_0534, r_0582, r_0589, r_0598, r_0599, r_0972 and as a modifier in r_0009, r_0026, r_0118, r_0125, r_0127, r_0290, r_0328, r_0370, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0437, r_0439, r_0442, r_0464, r_0465, r_0466, r_0467, r_0534, r_0582, r_0589, r_0598, r_0599, r_0940, r_0972, r_1003).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0514} = {} & v_{4} + v_{11} + v_{29} + v_{32} + v_{75} + v_{80} + v_{93} + v_{105} + v_{106} + v_{107} + v_{108} \\ & + v_{109} + 3\, v_{110} + v_{111} + 3\, v_{112} + v_{114} + v_{115} + v_{116} + v_{117} + v_{118} + v_{119} \\ & + v_{139} + v_{152} + v_{156} + v_{157} + v_{158} + v_{249} - v_{31} - v_{113} - v_{236} - v_{255}\end{aligned} \tag{1532}$$

8.115 Species s_0521

Name CTP [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0284, r_0712, r_0771 and as a product in r_0336 and as a modifier in r_0284, r_0336, r_0712, r_0771).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0521} = v_{82} - v_{73} - v_{187} - v_{198} \tag{1533}$$

8.116 Species s_0529

Name D-arabinono-1,4-lactone [intracellular]

Initial concentration $0.549000000915 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0351 and as a product in r_0352 and as a modifier in r_0351, r_0352).

$$\frac{d}{dt} s\_0529 = v_{89} - v_{88} \tag{1534}$$

8.117 Species s_0530

Name D-arabinose [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0352 and as a product in r_0351 and as a modifier in r_0351, r_0352).

$$\frac{d}{dt} s\_0530 = v_{88} - v_{89} \tag{1535}$$

8.118 Species s_0532

Name D-erythro-1-(imidazol-4-yl)glycerol 3-phosphate [intracellular]

Initial concentration $0.548999996369 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0605 and as a product in r_0604 and as a modifier in r_0604, r_0605).

$$\frac{d}{dt} s\_0532 = v_{159} - v_{160} \tag{1536}$$

8.119 Species s_0533

Name D-erythrose 4-phosphate(2-) [intracellular]

Initial concentration $0.549000000621 \text{ mol} \cdot l^{-1}$

This species takes part in six reactions (as a reactant in r_0021, r_1035 and as a product in r_1037 and as a modifier in r_0021, r_1035, r_1037).

$$\frac{d}{dt} s\_0533 = v_{264} - v_9 - v_{262} \tag{1537}$$

8.120 Species s_0537

Name D-fructose 1,6-bisphosphate [intracellular]

Initial concentration $1.34278000007 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0484 and as a product in r_0859 and as a modifier in r_0484, r_0859).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0537} = v_{211} - v_{121} \tag{1538}$$

8.121 Species s_0539

Name D-fructose 6-phosphate [intracellular]

Initial concentration $0.104554999996 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0698, r_0859, r_1035, r_1037 and as a product in r_0504, r_0505 and as a modifier in r_0504, r_0505, r_0698, r_0859, r_1035, r_1037).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0539} = v_{126} + v_{127} - v_{182} - v_{211} - v_{262} - v_{264} \tag{1539}$$

8.122 Species s_0545

Name D-glucose [intracellular]

Initial concentration $0.09875869957 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0499, r_0573 and as a product in r_1293 and as a modifier in r_0499, r_0504, r_0504, r_0573, r_1293).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0545} = v_{277} - v_{125} - v_{147} \tag{1540}$$

8.123 Species s_0549

Name D-glucose 1-phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1072 and as a product in r_0861 and as a modifier in r_0861, r_1072).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0549} = v_{212} - v_{272} \tag{1541}$$

8.124 Species s_0553

Name D-mannose 1-phosphate [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0697 and as a product in r_0875 and as a modifier in r_0697, r_0875).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0553} = v_{217} - v_{181} \tag{1542}$$

8.125 Species s_0554

Name D-mannose 6-phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0875 and as a product in r_0698 and as a modifier in r_0698, r_0875).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0554} = v_{182} - v_{217} \tag{1543}$$

8.126 Species s_0557

Name D-ribulose 5-phosphate [intracellular]

Initial concentration $0.549000001186 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0040, r_0963 and as a product in r_0965 and as a modifier in r_0040, r_0963, r_0965).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0557} = v_{245} - v_{15} - v_{244} \tag{1544}$$

8.127 Species s_0561

Name D-xylulose 5-phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0965 and as a product in r_1036, r_1037 and as a modifier in r_0965, r_1036, r_1037).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0561} = v_{263} + v_{264} - v_{245} \tag{1545}$$

8.128 Species s_0562

Name dADP [intracellular]

Initial concentration $0.54899999608 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0360 and as a product in r_0568, r_0951 and as a modifier in r_0360, r_0568, r_0951).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0562} = v_{146} + v_{240} - v_{91} \tag{1546}$$

8.129 Species s_0564

Name dAMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0360 and as a modifier in r_0360, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0564} = v_{91} - 0.003587\, v_{283} \tag{1547}$$

8.130 Species s_0566

Name dATP [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0568 and as a product in r_0959 and as a modifier in r_0568, r_0959).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0566} = v_{243} - v_{146} \tag{1548}$$

8.131 Species s_0569

Name dCMP [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0357 and as a modifier in r_0357, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0569} = v_{90} - 0.002432\, v_{283} \tag{1549}$$

8.132 Species s_0574

Name decanoate [intracellular]

Initial concentration $0.54899999668 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0418 and as a product in r_0417 and as a modifier in r_0417, r_0418).

$$\frac{d}{dt} s\_0574 = v_{105} - v_{106} \tag{1550}$$

8.133 Species s_0582

Name decanoyl-CoA [intracellular]

Initial concentration $0.54899999668 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0464 and as a product in r_0429 and as a modifier in r_0429, r_0464).

$$\frac{d}{dt} s\_0582 = v_{111} - v_{116} \tag{1551}$$

8.134 Species s_0591

Name dGDP [intracellular]

Initial concentration $0.54899999608 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0362 and as a product in r_0955 and as a modifier in r_0362, r_0955).

$$\frac{d}{dt} s\_0591 = v_{241} - v_{92} \tag{1552}$$

8.135 Species s_0593

Name dGMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0362 and as a modifier in r_0362, r_1812).

$$\frac{d}{dt} s\_0593 = v_{92} - 0.002432\, v_{283} \tag{1553}$$

8.136 Species s_0596

Name diglyceride [intracellular]

Initial concentration $0.548999995995 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0370 and as a product in r_0371, r_1040 and as a modifier in r_0370, r_0371, r_1040).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0596} = v_{94} + v_{266} - v_{93} \tag{1554}$$

8.137 Species s_0601

Name dihydrofolic acid [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0375 and as a product in r_1032 and as a modifier in r_0375, r_1032).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0601} = v_{261} - v_{96} \tag{1555}$$

8.138 Species s_0605

Name diphosphate [intracellular]

Initial concentration $0.548999996218 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 44 reactions (as a reactant in r_0127, r_0439, r_0442, r_0610 and as a product in r_0220, r_0226, r_0229, r_0245, r_0284, r_0387, r_0437, r_0496, r_0514, r_0551, r_0562, r_0650, r_0697, r_0701, r_0793, r_0882, r_0993, r_1072 and as a modifier in r_0127, r_0220, r_0226, r_0229, r_0245, r_0284, r_0387, r_0437, r_0439, r_0442, r_0496, r_0514, r_0551, r_0562, r_0610, r_0650, r_0697, r_0701, r_0793, r_0882, r_0993, r_1072).

$$\begin{aligned} \frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0605} = {} & v_{47} + v_{50} + v_{51} + v_{56} + v_{73} + v_{101} + v_{113} + v_{124} \\ & + v_{132} + v_{143} + v_{144} + v_{173} + v_{181} + v_{184} + v_{203} \\ & + v_{220} + 2\, v_{253} + v_{272} - v_{32} - v_{114} - v_{115} - v_{164} \end{aligned} \tag{1556}$$

8.139 Species s_0615

Name dolichyl D-mannosyl phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0394 and as a product in r_0393 and as a modifier in r_0393, r_0394).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0615} = v_{102} - v_{103} \tag{1557}$$

8.140 Species s_0616

Name dolichyl phosphate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0393 and as a product in r_0394 and as a modifier in r_0393, r_0394).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0616} = v_{103} - v_{102} \tag{1558}$$

8.141 Species s_0619

Name dTMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_1032 and as a modifier in r_1032, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0619} = v_{261} - 0.003587\, v_{283} \tag{1559}$$

8.142 Species s_0622

Name dUDP [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1066 and as a product in r_0957 and as a modifier in r_0957, r_1066).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0622} = v_{242} - v_{271} \tag{1560}$$

8.143 Species s_0624

Name dUMP [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0357, r_1032 and as a product in r_1066 and as a modifier in r_0357, r_1032, r_1066).

$$\frac{d}{dt} s\_0624 = v_{271} - v_{90} - v_{261} \tag{1561}$$

8.144 Species s_0627

Name episterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1816 and as a product in r_0270 and as a modifier in r_0270, r_1816).

$$\frac{d}{dt} s\_0627 = v_{69} - 9.6 \cdot 10^{-5} v_{285} \tag{1562}$$

8.145 Species s_0632

Name ergosta-5,7,22,24(28)-tetraen-3beta-ol [intracellular]

Initial concentration $0.54900000196 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0271, r_1816 and as a product in r_0298 and as a modifier in r_0271, r_0298, r_1816).

$$\frac{d}{dt} s\_0632 = v_{76} - v_{70} - 1.25 \cdot 10^{-4} v_{285} \tag{1563}$$

8.146 Species s_0635

Name ergosterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0995, r_1816 and as a product in r_0271 and as a modifier in r_0271, r_0995, r_1816).

$$\frac{d}{dt} s\_0635 = v_{70} - v_{254} - 0.005603 v_{285} \tag{1564}$$

8.147 Species s_0641

Name ergosterol ester [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1816 and as a product in r_0995 and as a modifier in r_0995, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0641} = v_{254} - 8.12 \cdot 10^{-4}\, v_{285} \tag{1565}$$

8.148 Species s_0650

Name ethanol [intracellular]

Initial concentration $49.9999997395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1247 and as a product in r_0183 and as a modifier in r_0183, r_1247).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0650} = v_{44} - v_{276} \tag{1566}$$

8.149 Species s_0657

Name FAD [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0529 and as a product in r_0488 and as a modifier in r_0488, r_0529).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0657} = v_{123} - v_{137} \tag{1567}$$

8.150 Species s_0659

Name FADH2 [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0488 and as a product in r_0529 and as a modifier in r_0488, r_0529).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0659} = v_{137} - v_{123} \tag{1568}$$

8.151 Species s_0663

Name fatty acid [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0995, r_1816 and as a product in r_1040 and as a modifier in r_0995, r_1040, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0663} = v_{266} - v_{254} - 2.06 \cdot 10^{-4} v_{285} \tag{1569}$$

8.152 Species s_0669

Name fecosterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0270, r_1816 and as a product in r_0967 and as a modifier in r_0270, r_0967, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0669} = v_{246} - v_{69} - 1.14 \cdot 10^{-4} v_{285} \tag{1570}$$

8.153 Species s_0689

Name formate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0479 and as a product in r_0040, r_0347, r_0562 and as a modifier in r_0040, r_0347, r_0479, r_0562).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0689} = v_{15} + v_{87} + v_{144} - v_{120} \tag{1571}$$

8.154 Species s_0692

Name fumarate(2-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0488 and as a product in r_0169, r_0171, r_0225, r_0485 and as a modifier in r_0169, r_0171, r_0225, r_0485, r_0488).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0692} = v_{39} + v_{41} + v_{49} + v_{122} - v_{123} \tag{1572}$$

8.155 Species s_0706

Name GDP [intracellular]

Initial concentration $0.548999996111\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0165, r_0955 and as a product in r_0170, r_0393, r_0567, r_0568 and as a modifier in r_0165, r_0170, r_0393, r_0567, r_0568, r_0955).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0706} = v_{40} + v_{102} + v_{145} + v_{146} - v_{38} - v_{241} \tag{1573}$$

8.156 Species s_0710

Name GDP-alpha-D-mannose [intracellular]

Initial concentration $0.548999996435\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0393, r_0723 and as a product in r_0697 and as a modifier in r_0393, r_0697, r_0723).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0710} = v_{181} - v_{102} - v_{193} \tag{1574}$$

8.157 Species s_0712

Name geranyl diphosphate [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0496 and as a product in r_0387 and as a modifier in r_0387, r_0496).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0712} = v_{101} - v_{124} \tag{1575}$$

8.158 Species s_0731

Name glyceraldehyde 3-phosphate [intracellular]

Initial concentration $0.0436363000303\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in 15 reactions (as a reactant in r_0525, r_1036, r_1037 and as a product in r_0484, r_1035, r_1041, r_1042 and as a modifier in r_0484, r_0525, r_0525, r_1035, r_1036, r_1037, r_1041, r_1042).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0731} = v_{121} + v_{262} + v_{267} + v_{268} - v_{134} - v_{263} - v_{264} \tag{1576}$$

8.159 Species s_0732

Name glycerol [intracellular]

Initial concentration $0.149999999336 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0526 and as a product in r_0528 and as a modifier in r_0526, r_0528).

$$\frac{d}{dt} s\_0732 = v_{136} - v_{135} \quad (1577)$$

8.160 Species s_0734

Name glycerone [intracellular]

Initial concentration $0.54899999611 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0386 and as a product in r_0526 and as a modifier in r_0386, r_0526).

$$\frac{d}{dt} s\_0734 = v_{135} - v_{100} \quad (1578)$$

8.161 Species s_0735

Name glycerone phosphate [intracellular]

Initial concentration $0.601872999094 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in ten reactions (as a reactant in r_0530, r_1041 and as a product in r_0386, r_0484, r_0529 and as a modifier in r_0386, r_0484, r_0529, r_0530, r_1041).

$$\frac{d}{dt} s\_0735 = v_{100} + v_{121} + v_{137} - v_{138} - v_{267} \quad (1579)$$

8.162 Species s_0740

Name glycine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0538, r_0539, r_0890, r_1812 and as a product in r_0174, r_1026 and as a modifier in r_0174, r_0538, r_0539, r_0890, r_1026, r_1812).

$$\frac{d}{dt} s\_0740 = v_{43} + v_{259} - v_{140} - v_{141} - v_{228} - 0.32518\, v_{283} \quad (1580)$$

8.163 Species s_0743

Name glycogen [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0006 and as a modifier in r_0006, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0743} = v_{2} - 0.51852\, v_{283} \tag{1581}$$

8.164 Species s_0749

Name glyoxylate [intracellular]

Initial concentration $0.548999995944\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0174 and as a product in r_0633 and as a modifier in r_0174, r_0633).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0749} = v_{168} - v_{43} \tag{1582}$$

8.165 Species s_0752

Name GMP [intracellular]

Initial concentration $0.548999996279\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0567, r_0568, r_1812 and as a product in r_0551 and as a modifier in r_0551, r_0567, r_0568, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0752} = v_{143} - v_{145} - v_{146} - 0.051\, v_{283} \tag{1583}$$

8.166 Species s_0755

Name GTP [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0170, r_0562, r_0697 and as a product in r_0165 and as a modifier in r_0165, r_0170, r_0562, r_0697).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0755} = v_{38} - v_{40} - v_{144} - v_{181} \tag{1584}$$

8.167 Species s_0798

Name homocitrate(3-) [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0029 and as a product in r_0582 and as a modifier in r_0029, r_0582).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0798} = v_{152} - v_{12} \tag{1585}$$

8.168 Species s_0800

Name homoisocitrate(3-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0585 and as a product in r_0581 and as a modifier in r_0581, r_0585).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0800} = v_{151} - v_{153} \tag{1586}$$

8.169 Species s_0801

Name hydrogen peroxide [intracellular]

Initial concentration $0.549000001219 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0282 and as a product in r_0374 and as a modifier in r_0282, r_0374).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0801} = v_{95} - 2\, v_{72} \tag{1587}$$

8.170 Species s_0805

Name hydrogen sulfide [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0783 and as a product in r_1008 and as a modifier in r_0783, r_1008).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0805} = v_{257} - v_{200} \tag{1588}$$

8.171 Species s_0816

Name IMP [intracellular]

Initial concentration $0.548999996273\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0170, r_0607 and as a product in r_0606 and as a modifier in r_0170, r_0606, r_0607).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0816} = v_{161} - v_{40} - v_{162} \tag{1589}$$

8.172 Species s_0824

Name inositol phosphomannosylinositol phosphoceramide [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1816 and as a product in r_0618 and as a modifier in r_0618, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0824} = v_{165} - 4.17 \cdot 10^{-4}\, v_{285} \tag{1590}$$

8.173 Species s_0828

Name inositol-P-ceramide B [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0723 and as a product in r_0621 and as a modifier in r_0621, r_0723).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0828} = v_{166} - v_{193} \tag{1591}$$

8.174 Species s_0847

Name isocitrate(3-) [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0630, r_0633 and as a product in r_0307 and as a modifier in r_0307, r_0630, r_0633).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0847} = v_{79} - v_{167} - v_{168} \tag{1592}$$

8.175 Species s_0850

Name isopentenyl diphosphate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0387, r_0496, r_0638 and as a product in r_0715 and as a modifier in r_0387, r_0496, r_0638, r_0715).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0850} = v_{188} - v_{101} - v_{124} - v_{170} \tag{1593}$$

8.176 Species s_0859

Name keto-phenylpyruvate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0825 and as a product in r_0911 and as a modifier in r_0825, r_0911).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0859} = v_{230} - v_{205} \tag{1594}$$

8.177 Species s_0861

Name L-2-aminoadipate(2-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0650 and as a product in r_0018 and as a modifier in r_0018, r_0650).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0861} = v_{8} - v_{173} \tag{1595}$$

8.178 Species s_0863

Name L-alanine [intracellular]

Initial concentration $0.548999995944 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0174, r_1812 and as a product in r_0647 and as a modifier in r_0174, r_0647, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0863} = v_{172} - v_{43} - 0.35734\, v_{283} \tag{1596}$$

8.179 Species s_0867

Name L-allysine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0970 and as a product in r_0650 and as a modifier in r_0650, r_0970).

$$\frac{d}{dt} s\_0867 = v_{173} - v_{248} \tag{1597}$$

8.180 Species s_0873

Name L-arginine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0225 and as a modifier in r_0225, r_1812).

$$\frac{d}{dt} s\_0873 = v_{49} - 0.13579\, v_{283} \tag{1598}$$

8.181 Species s_0877

Name L-asparagine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0229 and as a modifier in r_0229, r_1812).

$$\frac{d}{dt} s\_0877 = v_{51} - 0.17152\, v_{283} \tag{1599}$$

8.182 Species s_0881

Name L-aspartate [intracellular]

Initial concentration $0.548999996273 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 16 reactions (as a reactant in r_0170, r_0226, r_0229, r_0232, r_0233, r_0886, r_1812 and as a product in r_0235 and as a modifier in r_0170, r_0226, r_0229, r_0232, r_0233, r_0235, r_0886, r_1812).

$$\frac{d}{dt} s\_0881 = v_{54} - v_{40} - v_{50} - v_{51} - v_{52} - v_{53} - v_{224} - 0.17152\, v_{283} \tag{1600}$$

8.183 Species s_0886

Name L-aspartate 4-semialdehyde [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0586 and as a product in r_0238 and as a modifier in r_0238, r_0586).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0886} = v_{55} - v_{154} \tag{1601}$$

8.184 Species s_0887

Name L-citrulline [intracellular]

Initial concentration $0.548999996406 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0226 and as a product in r_0789 and as a modifier in r_0226, r_0789).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0887} = v_{201} - v_{50} \tag{1602}$$

8.185 Species s_0888

Name L-cystathionine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0339 and as a product in r_0338, r_0340 and as a modifier in r_0338, r_0339, r_0340).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0888} = v_{83} + v_{85} - v_{84} \tag{1603}$$

8.186 Species s_0889

Name L-cysteine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0340, r_1812 and as a product in r_0339 and as a modifier in r_0339, r_0340, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_0889} = v_{84} - v_{85} - 0.04288\, v_{283} \tag{1604}$$

8.187 Species s_0894

Name L-gamma-glutamyl phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0512 and as a product in r_0506 and as a modifier in r_0506, r_0512).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0894} = v_{128} - v_{131} \tag{1605}$$

8.188 Species s_0899

Name L-glutamate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 48 reactions (as a reactant in r_0018, r_0133, r_0235, r_0506, r_0515, r_0577, r_0634, r_0647, r_0674, r_0791, r_0825, r_0970, r_1050, r_1073, r_1812 and as a product in r_0221, r_0229, r_0277, r_0509, r_0510, r_0514, r_0551, r_0604, r_0888 and as a modifier in r_0018, r_0133, r_0221, r_0229, r_0235, r_0277, r_0506, r_0509, r_0510, r_0514, r_0515, r_0551, r_0577, r_0604, r_0634, r_0647, r_0674, r_0791, r_0825, r_0888, r_0970, r_1050, r_1073, r_1812).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0899} = {} & v_{48} + v_{51} + v_{71} + v_{129} + 2\, v_{130} + v_{132} + v_{143} + v_{159} + v_{226} \\ & - v_{8} - v_{34} - v_{54} - v_{128} - v_{133} - v_{150} - v_{169} - v_{172} \\ & - v_{179} - v_{202} - v_{205} - v_{248} - v_{269} - v_{273} - 0.268\, v_{283}\end{aligned} \tag{1606}$$

8.189 Species s_0905

Name L-glutamic 5-semialdehyde [intracellular]

Initial concentration $0.54899999748 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0657 and as a product in r_0512 and as a modifier in r_0512, r_0657).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0905} = v_{131} - v_{174} \tag{1607}$$

8.190 Species s_0907

Name L-glutamine [intracellular]

Initial concentration $0.548999995879\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in 20 reactions (as a reactant in r_0221, r_0229, r_0277, r_0510, r_0514, r_0551, r_0604, r_0888, r_1812 and as a product in r_0515 and as a modifier in r_0221, r_0229, r_0277, r_0510, r_0514, r_0515, r_0551, r_0604, r_0888, r_1812).

$$\frac{d}{dt}s\_0907 = v_{133} - v_{48} - v_{51} - v_{71} - v_{130} - v_{132} - v_{143} - v_{159} - v_{226} - 0.268\ v_{283} \tag{1608}$$

8.191 Species s_0911

Name L-histidine [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0575 and as a modifier in r_0575, r_1812).

$$\frac{d}{dt}s\_0911 = v_{148} - 0.075041\ v_{283} \tag{1609}$$

8.192 Species s_0915

Name L-histidinol [intracellular]

Initial concentration $0.549000003759\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0575 and as a product in r_0576 and as a modifier in r_0575, r_0576).

$$\frac{d}{dt}s\_0915 = v_{149} - v_{148} \tag{1610}$$

8.193 Species s_0916

Name L-histidinol phosphate [intracellular]

Initial concentration $0.548999996435\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0576 and as a product in r_0577 and as a modifier in r_0576, r_0577).

$$\frac{d}{dt}s\_0916 = v_{150} - v_{149} \tag{1611}$$

8.194 Species s_0917

Name L-homocysteine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0338, r_0702 and as a product in r_0159, r_0783 and as a modifier in r_0159, r_0338, r_0702, r_0783).

$$\frac{d}{dt} s\_0917 = v_{36} + v_{200} - v_{83} - v_{185} \tag{1612}$$

8.195 Species s_0919

Name L-homoserine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0588, r_0589 and as a product in r_0586 and as a modifier in r_0586, r_0588, r_0589).

$$\frac{d}{dt} s\_0919 = v_{154} - v_{155} - v_{156} \tag{1613}$$

8.196 Species s_0920

Name L-isoleucine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0634 and as a modifier in r_0634, r_1812).

$$\frac{d}{dt} s\_0920 = v_{169} - 0.17152 \, v_{283} \tag{1614}$$

8.197 Species s_0925

Name L-leucine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0674 and as a modifier in r_0674, r_1812).

$$\frac{d}{dt} s\_0925 = v_{179} - 0.25014 \, v_{283} \tag{1615}$$

8.198 Species s_0929

Name L-lysine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0969 and as a modifier in r_0969, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0929} = v_{247} - 0.23942\, v_{283} \tag{1616}$$

8.199 Species s_0933

Name L-methionine [intracellular]

Initial concentration $0.548999996434 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0701, r_1812 and as a product in r_0702 and as a modifier in r_0701, r_0702, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0933} = v_{185} - v_{184} - 0.050027\, v_{283} \tag{1617}$$

8.200 Species s_0936

Name L-phenylalanine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0825 and as a modifier in r_0825, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0936} = v_{205} - 0.11435\, v_{283} \tag{1618}$$

8.201 Species s_0939

Name L-proline [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0936 and as a modifier in r_0936, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0939} = v_{233} - 0.12864\, v_{283} \tag{1619}$$

8.202 Species s_0942

Name L-saccharopine [intracellular]

Initial concentration $0.549000002886 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0969 and as a product in r_0970 and as a modifier in r_0969, r_0970).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0942} = v_{248} - v_{247} \tag{1620}$$

8.203 Species s_0943

Name L-serine [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0338, r_0853, r_0972, r_1042, r_1812 and as a product in r_0539 and as a modifier in r_0338, r_0539, r_0853, r_0972, r_1042, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0943} = v_{141} - v_{83} - v_{209} - v_{249} - v_{268} - 0.25371\, v_{283} \tag{1621}$$

8.204 Species s_0949

Name L-threonine [intracellular]

Initial concentration $1.00000000123 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0667, r_1026, r_1812 and as a product in r_1027 and as a modifier in r_0667, r_1026, r_1027, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0949} = v_{260} - v_{177} - v_{259} - 0.19653\, v_{283} \tag{1622}$$

8.205 Species s_0952

Name L-tryptophan [intracellular]

Initial concentration $0.99999999807 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_1042 and as a modifier in r_1042, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_0952} = v_{268} - 0.028\, v_{283} \tag{1623}$$

8.206 Species s_0955

Name L-tyrosine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_1050 and as a modifier in r_1050, r_1812).

$$\frac{d}{dt} s\_0955 = v_{269} - 0.096481\, v_{283} \tag{1624}$$

8.207 Species s_0960

Name L-valine [intracellular]

Initial concentration $0.99999999807 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_1073 and as a modifier in r_1073, r_1812).

$$\frac{d}{dt} s\_0960 = v_{273} - 0.25728\, v_{283} \tag{1625}$$

8.208 Species s_0963

Name lanosterol [intracellular]

Initial concentration $0.548999999685 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0347, r_1816 and as a product in r_0673 and as a modifier in r_0347, r_0673, r_1816).

$$\frac{d}{dt} s\_0963 = v_{178} - v_{87} - 3.2 \cdot 10^{-5}\, v_{285} \tag{1626}$$

8.209 Species s_0968

Name laurate [intracellular]

Initial concentration $0.54899999668 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0419 and as a product in r_0418 and as a modifier in r_0418, r_0419).

$$\frac{d}{dt} s\_0968 = v_{106} - v_{107} \tag{1627}$$

8.210 Species s_0977

Name lauroyl-CoA [intracellular]

Initial concentration $0.54899999668\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0465 and as a product in r_0464 and as a modifier in r_0464, r_0465).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0977} = v_{116} - v_{117} \tag{1628}$$

8.211 Species s_0987

Name lignocerate [intracellular]

Initial concentration $0.548999997213\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0437 and as a product in r_0425 and as a modifier in r_0425, r_0437).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_0987} = v_{110} - v_{113} \tag{1629}$$

8.212 Species s_1000

Name lipid [intracellular]

Initial concentration $0.54900000371\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in r_1812 and as a product in r_1816 and as a modifier in r_1812), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1000} = 0 \tag{1630}$$

8.213 Species s_1005

Name malonyl-CoA [intracellular]

Initial concentration $0.548999999216\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in 26 reactions (as a reactant in r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467 and as a product in r_0123 and as a modifier in r_0123, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1005} = v_{30} - v_{105} - v_{106} - v_{107} - v_{108} - v_{109} - 3\,v_{110} - v_{111} - 3\,v_{112} - v_{116} - v_{117} - v_{118} - v_{119} \tag{1631}$$

8.214 Species s_1011

Name mannan [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0394 and as a modifier in r_0394, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1011} = v_{103} - 0.82099\, v_{283} \quad (1632)$$

8.215 Species s_1013

Name mannosylinositol phosphorylceramide [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0618 and as a product in r_0723 and as a modifier in r_0618, r_0723).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1013} = v_{193} - v_{165} \quad (1633)$$

8.216 Species s_1020

Name myo-inositol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0847 and as a product in r_0725 and as a modifier in r_0725, r_0847).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1020} = v_{194} - v_{207} \quad (1634)$$

8.217 Species s_1028

Name myristate [intracellular]

Initial concentration $0.54899999668 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0421 and as a product in r_0419 and as a modifier in r_0419, r_0421).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1028} = v_{107} - v_{108} \quad (1635)$$

8.218 Species s_1044

Name myristoyl-CoA [intracellular]

Initial concentration $0.54899999668 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0466 and as a product in r_0465 and as a modifier in r_0465, r_0466).

$$\frac{d}{dt} s\_1044 = v_{117} - v_{118} \tag{1636}$$

8.219 Species s_1048

Name N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0889 and as a product in r_0890 and as a modifier in r_0889, r_0890).

$$\frac{d}{dt} s\_1048 = v_{228} - v_{227} \tag{1637}$$

8.220 Species s_1051

Name N(2)-acetyl-L-ornithine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0791 and as a product in r_0133 and as a modifier in r_0133, r_0791).

$$\frac{d}{dt} s\_1051 = v_{34} - v_{202} \tag{1638}$$

8.221 Species s_1052

Name N(2)-formyl-N(1)-(5-phospho-D-ribosyl)glycinamide [intracellular]

Initial concentration $0.548999996413 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0888 and as a product in r_0889 and as a modifier in r_0888, r_0889).

$$\frac{d}{dt} s\_1052 = v_{227} - v_{226} \tag{1639}$$

8.222 Species s_1053

Name N(6)-(1,2-dicarboxyethyl)-AMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0171 and as a product in r_0170 and as a modifier in r_0170, r_0171).

$$\frac{d}{dt} s\_1053 = v_{40} - v_{41} \tag{1640}$$

8.223 Species s_1060

Name N-(24-hydroxytetracosanyl)sphinganine [intracellular]

Initial concentration $0.548999996463 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0621 and as a product in r_0287 and as a modifier in r_0287, r_0621).

$$\frac{d}{dt} s\_1060 = v_{74} - v_{166} \tag{1641}$$

8.224 Species s_1066

Name N-(5-phospho-beta-D-ribosyl)anthranilate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0887 and as a product in r_0220 and as a modifier in r_0220, r_0887).

$$\frac{d}{dt} s\_1066 = v_{47} - v_{225} \tag{1642}$$

8.225 Species s_1070

Name N-acetyl-L-gamma-glutamyl phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0728 and as a product in r_0130 and as a modifier in r_0130, r_0728).

$$\frac{d}{dt} s\_1070 = v_{33} - v_{196} \tag{1643}$$

8.226 Species s_1071

Name N-acetyl-L-glutamate(2-) [intracellular]

Initial concentration $0.548999996383 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0130 and as a product in r_0791 and as a modifier in r_0130, r_0791).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1071} = v_{202} - v_{33} \tag{1644}$$

8.227 Species s_1073

Name N-carbamoyl-L-aspartate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0381 and as a product in r_0232 and as a modifier in r_0232, r_0381).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1073} = v_{52} - v_{97} \tag{1645}$$

8.228 Species s_1080

Name N-tetracosanylsphinganine [intracellular]

Initial concentration $0.549000001971 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0287 and as a product in r_0290 and as a modifier in r_0287, r_0290).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s\_1080} = v_{75} - v_{74} \tag{1646}$$

8.229 Species s_1082

Name NAD(+) [intracellular]

Initial concentration $1.50325999658 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 48 reactions (as a reactant in r_0064, r_0262, r_0525, r_0538, r_0575, r_0585, r_0607, r_0940, r_0969 and as a product in r_0057, r_0058, r_0059, r_0060, r_0183, r_0347, r_0351, r_0510, r_0512, r_0530, r_0586, r_0650, r_0661, r_0688, r_0991 and as a modifier in r_0057, r_0058, r_0059, r_0060, r_0064, r_0183, r_0262, r_0347, r_0351, r_0510, r_0512, r_0525, r_0530, r_0538, r_0575, r_0585, r_0586, r_0607, r_0650, r_0661, r_0688, r_0940, r_0969, r_0991).

$$\frac{d}{dt}s\_1082 = v_{19} + v_{20} + v_{21} + v_{22} + v_{44} + 3\,v_{87} + v_{88} + v_{130} + v_{131} + v_{138} + v_{154} + v_{173} + v_{176} + v_{180} + v_{252} - v_{24} - v_{62} - v_{134} - v_{140} - 2\,v_{148} - v_{153} - v_{162} - v_{236} - v_{247} \quad (1647)$$

8.230 Species s_1087

Name NADH [intracellular]

Initial concentration $0.0867352997424\ \mathrm{mol \cdot l^{-1}}$

This species takes part in 48 reactions (as a reactant in r_0057, r_0058, r_0059, r_0060, r_0183, r_0347, r_0351, r_0510, r_0512, r_0530, r_0586, r_0650, r_0661, r_0688, r_0991 and as a product in r_0064, r_0262, r_0525, r_0538, r_0575, r_0585, r_0607, r_0940, r_0969 and as a modifier in r_0057, r_0058, r_0059, r_0060, r_0064, r_0183, r_0262, r_0347, r_0351, r_0510, r_0512, r_0525, r_0530, r_0538, r_0575, r_0585, r_0586, r_0607, r_0650, r_0661, r_0688, r_0940, r_0969, r_0991).

$$\frac{d}{dt}s\_1087 = v_{24} + v_{62} + v_{134} + v_{140} + 2\,v_{148} + v_{153} + v_{162} + v_{236} + v_{247} - v_{19} - v_{20} - v_{21} - v_{22} - v_{44} - 3\,v_{87} - v_{88} - v_{130} - v_{131} - v_{138} - v_{154} - v_{173} - v_{176} - v_{180} - v_{252} \quad (1648)$$

8.231 Species s_1091

Name NADP(+) [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol \cdot l^{-1}}$

This species takes part in 98 reactions (as a reactant in r_0191, r_0261, r_0352, r_0526, r_0630, r_0660, r_0707, r_0719, r_0720, r_0721, r_0722, r_0913 and as a product in r_0015, r_0044, r_0093, r_0111, r_0238, r_0258, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0287, r_0375, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0509, r_0598, r_0640, r_0728, r_0936, r_0970, r_0976, r_0993, r_1008, r_1024 and as a modifier in r_0015, r_0044, r_0093, r_0111, r_0191, r_0238, r_0258, r_0261, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0287, r_0352, r_0375, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0509, r_0526, r_0598, r_0630, r_0640, r_0660, r_0707, r_0719, r_0720, r_0721, r_0722, r_0728, r_0913, r_0936, r_0970, r_0976, r_0993, r_1008, r_1024).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1091} = v_{6} + v_{18} + v_{26} + v_{27} + v_{55} + v_{60} + v_{63} + v_{64} + v_{65} + v_{66} + v_{67} + 3\, v_{68} + v_{70} + v_{74} + v_{96} + 2\, v_{105} + 2\, v_{106} + 2\, v_{107} + 2\, v_{108} + 2\, v_{109} + 6\, v_{110} + 2\, v_{111} + 6\, v_{112} + 2\, v_{116} + 2\, v_{117} + 2\, v_{118} + 2\, v_{119} + v_{129} + 2\, v_{157} + v_{171} + v_{196} + v_{233} + v_{248} + v_{250} + v_{253} + 3\, v_{257} + v_{258} - v_{45} - v_{61} - v_{89} - v_{135} - v_{167} - v_{175} - v_{186} - v_{189} - v_{190} - v_{191} - v_{192} - v_{231} \tag{1649}$$

8.232 Species s_1096

Name NADPH [intracellular]

Initial concentration $0.548999996474\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in 98 reactions (as a reactant in r_0015, r_0044, r_0093, r_0111, r_0238, r_0258, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0287, r_0375, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0509, r_0598, r_0640, r_0728, r_0936, r_0970, r_0976, r_0993, r_1008, r_1024 and as a product in r_0191, r_0261, r_0352, r_0526, r_0630, r_0660, r_0707, r_0719, r_0720, r_0721, r_0722, r_0913 and as a modifier in r_0015, r_0044, r_0093, r_0111, r_0191, r_0238, r_0258, r_0261, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0287, r_0352, r_0375, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0509, r_0526, r_0598, r_0630, r_0640, r_0660, r_0707, r_0719, r_0720, r_0721, r_0722, r_0728, r_0913, r_0936, r_0970, r_0976, r_0993, r_1008, r_1024).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1096} = v_{45} + v_{61} + v_{89} + v_{135} + v_{167} + v_{175} + v_{186} + v_{189} + v_{190} + v_{191} + v_{192} + v_{231} - v_{6} - v_{18} - v_{26} - v_{27} - v_{55} - v_{60} - v_{63} - v_{64} - v_{65} - v_{66} - v_{67} - 3\, v_{68} - v_{70} - v_{74} - v_{96} - 2\, v_{105} - 2\, v_{106} - 2\, v_{107} - 2\, v_{108} - 2\, v_{109} - 6\, v_{110} - 2\, v_{111} - 6\, v_{112} - 2\, v_{116} - 2\, v_{117} - 2\, v_{118} - 2\, v_{119} - v_{129} - 2\, v_{157} - v_{171} - v_{196} - v_{233} - v_{248} - v_{250} - v_{253} - 3\, v_{257} - v_{258} \tag{1650}$$

8.233 Species s_1117

Name O-acetyl-L-homoserine [intracellular]

Initial concentration $0.548999996395\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0340, r_0783 and as a product in r_0589 and as a modifier in r_0340, r_0589, r_0783).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1117} = v_{156} - v_{85} - v_{200} \tag{1651}$$

8.234 Species s_1122

Name O-phospho-L-homoserine [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1027 and as a product in r_0588 and as a modifier in r_0588, r_1027).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1122} = v_{155} - v_{260} \tag{1652}$$

8.235 Species s_1132

Name octanoate [intracellular]

Initial concentration $0.54899999668\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0417 and as a product in r_0442 and as a modifier in r_0417, r_0442).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1132} = v_{115} - v_{105} \tag{1653}$$

8.236 Species s_1140

Name octanoyl-CoA [intracellular]

Initial concentration $0.54899999668\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0429, r_0442 and as a product in r_0430 and as a modifier in r_0429, r_0430, r_0442).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1140} = v_{112} - v_{111} - v_{115} \tag{1654}$$

8.237 Species s_1151

Name ornithine [intracellular]

Initial concentration $0.548999996395\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0789 and as a product in r_0791 and as a modifier in r_0789, r_0791).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1151} = v_{202} - v_{201} \tag{1655}$$

8.238 Species s_1154

Name orotate [intracellular]

Initial concentration $0.548999999216\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0793 and as a product in r_0374 and as a modifier in r_0374, r_0793).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1154} = v_{95} - v_{203} \tag{1656}$$

8.239 Species s_1155

Name orotidine 5'-(dihydrogen phosphate) [intracellular]

Initial concentration $0.548999999216\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0794 and as a product in r_0793 and as a modifier in r_0793, r_0794).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1155} = v_{203} - v_{204} \tag{1657}$$

8.240 Species s_1156

Name oxaloacetate(2-) [intracellular]

Initial concentration $0.548999996435\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0235, r_0328, r_0688 and as a product in r_0937 and as a modifier in r_0235, r_0328, r_0688, r_0937).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1156} = v_{234} - v_{54} - v_{80} - v_{180} \tag{1658}$$

8.241 Species s_1160

Name oxygen [intracellular]

Initial concentration $0.548999996463\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in 22 reactions (as a reactant in r_0265, r_0266, r_0267, r_0268, r_0287, r_0298, r_0347, r_0374, r_0991 and as a product in r_0282, r_1435 and as a modifier in r_0265, r_0266, r_0267, r_0268, r_0282, r_0287, r_0298, r_0347, r_0374, r_0991, r_1435).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1160} = v_{72} + v_{278} - v_{65} - v_{66} - v_{67} - 3\,v_{68} - v_{74} - v_{76} - 3\,v_{87} - v_{95} - v_{252} \tag{1659}$$

8.242 Species s_1170

Name palmitate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0423 and as a product in r_0421 and as a modifier in r_0421, r_0423).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1170} = v_{108} - v_{109} \tag{1660}$$

8.243 Species s_1187

Name palmitoyl-CoA [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0467, r_0972 and as a product in r_0466 and as a modifier in r_0466, r_0467, r_0972).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1187} = v_{118} - v_{119} - v_{249} \tag{1661}$$

8.244 Species s_1207

Name phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 77 reactions (as a reactant in r_0246, r_0525 and as a product in r_0021, r_0034, r_0043, r_0068, r_0123, r_0170, r_0232, r_0238, r_0249, r_0277, r_0306, r_0336, r_0371, r_0479, r_0512, r_0515, r_0528, r_0576, r_0610, r_0701, r_0715, r_0725, r_0728, r_0789, r_0884, r_0886, r_0888, r_0890, r_0934, r_0937, r_0948, r_1003, r_1007, r_1027, r_1038, r_1461, r_1812 and as a modifier in r_0021, r_0034, r_0043, r_0068, r_0123, r_0170, r_0232, r_0238, r_0246, r_0249, r_0277, r_0306, r_0336, r_0371, r_0479, r_0512, r_0515, r_0525, r_0528, r_0576, r_0610, r_0701, r_0715, r_0725, r_0728, r_0789, r_0884, r_0886, r_0888, r_0890, r_0934, r_0937, r_0948, r_1003, r_1007, r_1027, r_1038, r_1461), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1207} = 0 \tag{1662}$$

8.245 Species s_1215

Name phosphatidate [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0284, r_0371 and as a product in r_0009 and as a modifier in r_0009, r_0284, r_0371).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1215} = v_{4} - v_{73} - v_{94} \tag{1663}$$

8.246 Species s_1219

Name phosphatidyl-L-serine [intracellular]

Initial concentration $0.549000001352\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0850, r_1816 and as a product in r_0853 and as a modifier in r_0850, r_0853, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1219} = v_{209} - v_{208} - 3.73 \cdot 10^{-4}\, v_{285} \tag{1664}$$

8.247 Species s_1225

Name phosphatidyl-N,N-dimethylethanolamine [intracellular]

Initial concentration $0.548999996435\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0873 and as a product in r_0874 and as a modifier in r_0873, r_0874).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1225} = v_{216} - v_{215} \tag{1665}$$

8.248 Species s_1226

Name phosphatidyl-N-methylethanolamine [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0874 and as a product in r_0831 and as a modifier in r_0831, r_0874).

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1226} = v_{206} - v_{216} \tag{1666}$$

8.249 Species s_1228

Name phosphatidylcholine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1816 and as a product in r_0873 and as a modifier in r_0873, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1228} = v_{215} - 0.002884\, v_{285} \tag{1667}$$

8.250 Species s_1233

Name phosphatidylethanolamine [intracellular]

Initial concentration $0.548999996395 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0831, r_1816 and as a product in r_0850 and as a modifier in r_0831, r_0850, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1233} = v_{208} - v_{206} - 6.97 \cdot 10^{-4}\, v_{285} \tag{1668}$$

8.251 Species s_1243

Name phosphoenolpyruvate [intracellular]

Initial concentration $0.0271092999605 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0021, r_0068, r_0941 and as a product in r_0398 and as a modifier in r_0021, r_0068, r_0398, r_0941).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1243} = v_{104} - v_{9} - v_{25} - v_{237} \tag{1669}$$

8.252 Species s_1257

Name prenyl diphosphate [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0387 and as a product in r_0638 and as a modifier in r_0387, r_0638).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1257} = v_{170} - v_{101} \tag{1670}$$

8.253 Species s_1258

Name prephenate(2-) [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0911, r_0913 and as a product in r_0304 and as a modifier in r_0304, r_0911, r_0913).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1258} = v_{77} - v_{230} - v_{231} \tag{1671}$$

8.254 Species s_1277

Name pyruvate [intracellular]

Initial concentration $0.0605904998459 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 19 reactions (as a reactant in r_0016, r_0112, r_0647, r_0937, r_0938, r_0940 and as a product in r_0174, r_0221, r_0941 and as a modifier in r_0016, r_0112, r_0174, r_0221, r_0647, r_0937, r_0938, r_0938, r_0940, r_0941).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1277} = v_{43} + v_{48} + v_{237} - v_{7} - 2\, v_{28} - v_{172} - v_{234} - v_{235} - v_{236} \tag{1672}$$

8.255 Species s_1283

Name riboflavin [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1812 and as a product in r_0949 and as a modifier in r_0949, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1283} = v_{239} - 9 \cdot 10^{-4}\, v_{283} \tag{1673}$$

8.256 Species s_1290

Name S-adenosyl-L-homocysteine [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0159 and as a product in r_0298, r_0831, r_0873, r_0874, r_0967 and as a modifier in r_0159, r_0298, r_0831, r_0873, r_0874, r_0967).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1290} = v_{76} + v_{206} + v_{215} + v_{216} + v_{246} - v_{36} \tag{1674}$$

8.257 Species s_1293

Name S-adenosyl-L-methionine [intracellular]

Initial concentration $0.548999996273 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0298, r_0831, r_0873, r_0874, r_0967 and as a product in r_0701 and as a modifier in r_0298, r_0701, r_0831, r_0873, r_0874, r_0967).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1293} = v_{184} - v_{76} - v_{206} - v_{215} - v_{216} - v_{246} \tag{1675}$$

8.258 Species s_1304

Name sedoheptulose 7-phosphate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1036 and as a product in r_1035 and as a modifier in r_1035, r_1036).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1304} = v_{262} - v_{263} \tag{1676}$$

8.259 Species s_1306

Name shikimate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0977 and as a product in r_0976 and as a modifier in r_0976, r_0977).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1306} = v_{250} - v_{251} \tag{1677}$$

8.260 Species s_1315

Name sn-glycerol 3-phosphate [intracellular]

Initial concentration $12.8510998429 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0528, r_0529, r_0534 and as a product in r_0530 and as a modifier in r_0528, r_0529, r_0530, r_0534).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1315} = v_{138} - v_{136} - v_{137} - v_{139} \tag{1678}$$

8.261 Species s_1325

Name sphinganine [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0290 and as a product in r_0044 and as a modifier in r_0044, r_0290).

$$\frac{d}{dt} s\_1325 = v_{18} - v_{75} \quad (1679)$$

8.262 Species s_1327

Name squalene [intracellular]

Initial concentration $0.548999996687 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0991 and as a product in r_0993 and as a modifier in r_0991, r_0993).

$$\frac{d}{dt} s\_1327 = v_{253} - v_{252} \quad (1680)$$

8.263 Species s_1329

Name stearate [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0425 and as a product in r_0423, r_0439 and as a modifier in r_0423, r_0425, r_0439).

$$\frac{d}{dt} s\_1329 = v_{109} + v_{114} - v_{110} \quad (1681)$$

8.264 Species s_1334

Name stearoyl-CoA [intracellular]

Initial concentration $0.548999996435 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0439 and as a product in r_0467 and as a modifier in r_0439, r_0467).

$$\frac{d}{dt} s\_1334 = v_{119} - v_{114} \quad (1682)$$

8.265 Species s_1338

Name succinate(2-) [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_1003, r_1503 and as a product in r_0488, r_0633 and as a modifier in r_0488, r_0633, r_1003, r_1503).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1338} = v_{123} + v_{168} - v_{255} - v_{280} \tag{1683}$$

8.266 Species s_1342

Name succinyl-CoA [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1672 and as a product in r_1003 and as a modifier in r_1003, r_1672).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1342} = v_{255} - v_{282} \tag{1684}$$

8.267 Species s_1347

Name sulphate [intracellular]

Initial concentration $0.548999996474\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in r_1007, r_1812 and as a product in r_1507 and as a modifier in r_1007, r_1507, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1347} = v_{281} - v_{256} - 0.02\, v_{283} \tag{1685}$$

8.268 Species s_1349

Name sulphite [intracellular]

Initial concentration $0.548999999216\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in r_1008 and as a product in r_0856 and as a modifier in r_0856, r_1008).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1349} = v_{210} - v_{257} \tag{1686}$$

8.269 Species s_1355

Name tetracosanoyl-CoA [intracellular]

Initial concentration $0.548999996395\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0290 and as a product in r_0437 and as a modifier in r_0290, r_0437).

$$\frac{d}{dt}\text{s\_1355} = v_{113} - v_{75} \tag{1687}$$

8.270 Species s_1379

Name trans-4-hydroxy-L-proline [intracellular]

Initial concentration $0.548999996262\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in four reactions (as a reactant in r_0660 and as a product in r_0661 and as a modifier in r_0660, r_0661).

$$\frac{d}{dt}\text{s\_1379} = v_{176} - v_{175} \tag{1688}$$

8.271 Species s_1399

Name triglyceride [intracellular]

Initial concentration $0.548999999216\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_1040, r_1816 and as a product in r_0370 and as a modifier in r_0370, r_1040, r_1816), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}\text{s\_1399} = 0 \tag{1689}$$

8.272 Species s_1411

Name UDP [intracellular]

Initial concentration $0.548999999216\ \text{mol}\cdot\text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0779, r_0957 and as a product in r_0005, r_0213, r_0547, r_1059 and as a modifier in r_0005, r_0213, r_0547, r_0779, r_0957, r_1059).

$$\frac{d}{dt}\text{s\_1411} = v_{1} + v_{46} + v_{142} + v_{270} - v_{199} - v_{242} \tag{1690}$$

8.273 Species s_1415

Name UDP-D-glucose [intracellular]

Initial concentration $0.549000001186 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in nine reactions (as a reactant in r_0005, r_0213, r_0547 and as a product in r_1072 and as a modifier in r_0005, r_0213, r_0213, r_0547, r_1072).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1415} = v_{272} - v_{1} - v_{46} - v_{142} \tag{1691}$$

8.274 Species s_1417

Name UMP [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_1059, r_1812 and as a product in r_0794 and as a modifier in r_0794, r_1059, r_1812).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1417} = v_{204} - v_{270} - 0.067\, v_{283} \tag{1692}$$

8.275 Species s_1430

Name UTP [intracellular]

Initial concentration $0.548999995967 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_0336, r_1072 and as a product in r_0779 and as a modifier in r_0336, r_0779, r_1072).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1430} = v_{199} - v_{82} - v_{272} \tag{1693}$$

8.276 Species s_1447

Name zymosterol [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in r_0298, r_0967, r_1816 and as a product in r_0264 and as a modifier in r_0264, r_0298, r_0967, r_1816).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1447} = v_{64} - v_{76} - v_{246} - 1.5 \cdot 10^{-5}\, v_{285} \tag{1694}$$

8.277 Species s_1455

Name zymosterol intermediate 1a [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0266 and as a product in r_0265 and as a modifier in r_0265, r_0266).

$$\frac{d}{dt} s\_1455 = v_{65} - v_{66} \tag{1695}$$

8.278 Species s_1456

Name zymosterol intermediate 1b [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0267 and as a product in r_0266 and as a modifier in r_0266, r_0267).

$$\frac{d}{dt} s\_1456 = v_{66} - v_{67} \tag{1696}$$

8.279 Species s_1457

Name zymosterol intermediate 1c [intracellular]

Initial concentration $0.548999996369 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0261 and as a product in r_0267 and as a modifier in r_0261, r_0267).

$$\frac{d}{dt} s\_1457 = v_{67} - v_{61} \tag{1697}$$

8.280 Species s_1458

Name zymosterol intermediate 2 [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in four reactions (as a reactant in r_0264 and as a product in r_0261 and as a modifier in r_0261, r_0264).

$$\frac{d}{dt} s\_1458 = v_{61} - v_{64} \tag{1698}$$

8.281 Species s_1517

Name thioredoxin disulfide [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_1024 and as a product in r_0856, r_0951, r_0955, r_0957, r_0959 and as a modifier in r_0856, r_0951, r_0955, r_0957, r_0959, r_1024).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1517} = v_{210} + v_{240} + v_{241} + v_{242} + v_{243} - v_{258} \quad (1699)$$

8.282 Species s_1521

Name thioredoxin dithiol [intracellular]

Initial concentration $0.548999996236 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in r_0856, r_0951, r_0955, r_0957, r_0959 and as a product in r_1024 and as a modifier in r_0856, r_0951, r_0955, r_0957, r_0959, r_1024).

$$\frac{\mathrm{d}}{\mathrm{d}t} \text{s\_1521} = v_{258} - v_{210} - v_{240} - v_{241} - v_{242} - v_{243} \quad (1700)$$

8.283 Species s_0763_b

Name H+ [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in 295 reactions (as a reactant in r_0014, r_0015, r_0016, r_0031, r_0044, r_0057, r_0058, r_0059, r_0060, r_0093, r_0111, r_0112, r_0125, r_0183, r_0238, r_0246, r_0258, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0284, r_0287, r_0347, r_0351, r_0375, r_0381, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0509, r_0510, r_0512, r_0530, r_0586, r_0598, r_0608, r_0640, r_0650, r_0661, r_0688, r_0697, r_0728, r_0765, r_0794, r_0911, r_0936, r_0938, r_0941, r_0970, r_0976, r_0991, r_0993, r_1007, r_1008, r_1024, r_1072, r_1503 and as a product in r_0005, r_0009, r_0026, r_0040, r_0064, r_0123, r_0157, r_0170, r_0172, r_0191, r_0213, r_0221, r_0226, r_0229, r_0232, r_0246, r_0251, r_0261, r_0262, r_0277, r_0290, r_0298, r_0328, r_0336, r_0340, r_0352, r_0357, r_0370, r_0371, r_0386, r_0394, r_0499, r_0515, r_0525, r_0526, r_0534, r_0547, r_0551, r_0562, r_0573, r_0575, r_0582, r_0585, r_0588, r_0599, r_0604, r_0607, r_0610, r_0657, r_0660, r_0699, r_0702, r_0712, r_0719, r_0720, r_0721, r_0722, r_0783, r_0789, r_0831, r_0847, r_0853, r_0856, r_0859, r_0874, r_0882, r_0883, r_0884, r_0886, r_0888, r_0889, r_0890, r_0891, r_0937, r_0967, r_0969, r_0977, r_1461 and as a modifier in r_0005, r_0009, r_0014, r_0015, r_0016, r_0026, r_0031, r_0040, r_0044, r_0057, r_0058, r_0059, r_0060, r_0064, r_0093, r_0111, r_0112, r_0123, r_0125, r_0157, r_0170, r_0172, r_0183, r_0191, r_0213, r_0221, r_0226, r_0229, r_0232, r_0238, r_0246, r_0251, r_0258, r_0261, r_0262, r_0263, r_0264, r_0265, r_0266, r_0267, r_0268, r_0271, r_0277, r_0284, r_0287, r_0290, r_0298, r_0328, r_0336, r_0340, r_0347, r_0351, r_0352, r_0357, r_0370, r_0371, r_0375, r_0381, r_0386, r_0394, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0499, r_0509, r_0510, r_0512, r_0515, r_0525, r_0526, r_0530, r_0534, r_0547, r_0551, r_0562, r_0573, r_0575, r_0582, r_0585, r_0586, r_0588, r_0598, r_0599, r_0604, r_0607, r_0608, r_0610, r_0640, r_0650, r_0657, r_0660, r_0661, r_0688, r_0697, r_0699, r_0702, r_0712, r_0719, r_0720, r_0721, r_0722, r_0728, r_0765, r_0783, r_0789, r_0794, r_0831, r_0847, r_0853, r_0856, r_0859, r_0874, r_0882, r_0883, r_0884, r_0886, r_0888, r_0889, r_0890, r_0891, r_0911, r_0936, r_0937, r_0938, r_0941, r_0967, r_0969, r_0970, r_0976, r_0977, r_0991, r_0993, r_1007, r_1008, r_1024, r_1072, r_1461, r_1503), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}s\_0763\_b = 0 \tag{1701}$$

8.284 Species s_1434_b

Name water [intracellular]

Initial concentration $0.548999999216 \text{ mol} \cdot l^{-1}$

This species takes part in 178 reactions (as a reactant in r_0014, r_0021, r_0026, r_0034, r_0063, r_0159, r_0191, r_0229, r_0249, r_0251, r_0277, r_0307, r_0328, r_0339, r_0371, r_0514, r_0528, r_0539, r_0547, r_0551, r_0562, r_0575, r_0576, r_0581, r_0582, r_0599, r_0607, r_0610, r_0699, r_0701, r_0725, r_0881, r_0882, r_0888, r_0934, r_0969, r_1027, r_1038, r_1040 and as a product in r_0006, r_0025, r_0029, r_0042, r_0125, r_0246, r_0265, r_0266, r_0267, r_0268, r_0282, r_0287, r_0298, r_0330, r_0338, r_0347, r_0357, r_0381, r_0384, r_0385, r_0398, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0485, r_0509, r_0605, r_0606, r_0608, r_0657, r_0911, r_0948, r_0951, r_0955, r_0957, r_0959, r_0970, r_0991, r_0995, r_1008, r_1042 and as a modifier in r_0006, r_0014, r_0021, r_0025, r_0026, r_0029, r_0034, r_0042, r_0063, r_0125, r_0159, r_0191, r_0229, r_0246, r_0249, r_0251, r_0265, r_0266, r_0267, r_0268, r_0277, r_0282, r_0287, r_0298, r_0307, r_0328, r_0330, r_0338, r_0339, r_0347, r_0357, r_0371, r_0381, r_0384, r_0385, r_0398, r_0417, r_0418, r_0419, r_0421, r_0423, r_0425, r_0429, r_0430, r_0464, r_0465, r_0466, r_0467, r_0485, r_0509, r_0514, r_0528, r_0539, r_0547, r_0551, r_0562, r_0575, r_0576, r_0581, r_0582, r_0599, r_0605, r_0606, r_0607, r_0608, r_0610, r_0657, r_0699, r_0701, r_0725, r_0881, r_0882, r_0888, r_0911, r_0934, r_0948, r_0951, r_0955, r_0957, r_0959, r_0969, r_0970, r_0991, r_0995, r_1008, r_1027, r_1038, r_1040, r_1042), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}s\_1434\_b = 0 \tag{1702}$$

8.285 Species species_1

Name glucose [extracellular]

Initial concentration $1 \text{ mol} \cdot l^{-1}$

This species does not take part in any reactions. Its quantity does hence not change over time:

$$\frac{d}{dt}\text{species\_1} = 0 \tag{1703}$$

8.286 Species s_0431_b

Name ammonium [extracellular]

Initial concentration $37.9999998108 \text{ mol} \cdot l^{-1}$

This species takes part in two reactions (as a reactant in r_1157 and as a modifier in r_1157), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}\text{s\_0431\_b} = 0 \tag{1704}$$

8.287 Species s_0464_b

Name biomass [extracellular]

Initial concentration $24.499999887 \text{ mol} \cdot l^{-1}$

This species takes part in one reaction (as a product in r_1814), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}\text{s\_0464\_b} = 0 \tag{1705}$$

8.288 Species s_0472_b

Name carbon dioxide [extracellular]

Initial concentration $1.00000027208 \cdot 10^{-5} \text{ mol} \cdot l^{-1}$

This species takes part in two reactions (as a product in r_1194 and as a modifier in r_1194), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}\text{s\_0472\_b} = 0 \tag{1706}$$

8.289 Species s_0547_b

Name D-glucose [extracellular]

Initial concentration $11.1 \text{ mol} \cdot \text{l}^{-1}$

Involved in event event_1

This species takes part in five reactions (as a reactant in r_1293 and as a modifier in r_1293, r_1812, r_1814, r_1816). Not these but one event influences the species' quantity because this species is on the boundary of the reaction system.

8.290 Species s_0651_b

Name ethanol [extracellular]

Initial concentration $24.49999989 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a product in r_1247 and as a modifier in r_1247), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0651\_b} = 0 \tag{1707}$$

8.291 Species s_0766_b

Name H+ [extracellular]

Initial concentration $0.1 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in r_1461 and as a product in r_0249, r_1503 and as a modifier in r_0249, r_1461, r_1503), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_0766\_b} = 0 \tag{1708}$$

8.292 Species s_1162_b

Name oxygen [extracellular]

Initial concentration $24.49999989 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in r_1435 and as a modifier in r_1435), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s\_1162\_b} = 0 \tag{1709}$$

8.293 Species s_1209_b

Name phosphate [extracellular]

Initial concentration $24.49999974\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in r_1461 and as a modifier in r_1461), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1209\_b} = 0 \tag{1710}$$

8.294 Species s_1339_b

Name succinate(2-) [extracellular]

Initial concentration $0.9999999981\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a product in r_1503 and as a modifier in r_1503), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1339\_b} = 0 \tag{1711}$$

8.295 Species s_1348_b

Name sulphate [extracellular]

Initial concentration $42.19999979\ \text{mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in r_1507 and as a modifier in r_1507), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t} \mathrm{s\_1348\_b} = 0 \tag{1712}$$

SBML2LaTeX was developed by Andreas Dräger[a], Hannes Planatscher[a], Dieudonné M Wouamba[a], Adrian Schröder[a], Michael Hucka[b], Lukas Endler[c], Martin Golebiewski[d] and Andreas Zell[a]. Please see http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX for more information.

[a]Center for Bioinformatics Tübingen (ZBIT), Germany
[b]California Institute of Technology, Beckman Institute BNMC, Pasadena, United States
[c]European Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, United Kingdom
[d]EML Research gGmbH, Heidelberg, Germany