

# SAFETY DATA SHEET

Version 8.7  
Revision Date 04.11.2022  
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## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1 Product identifiers

Product name : 1,4-Dioxane EMPLURA®

Product Number : 1.03115  
Catalogue No. : 103115  
Brand : Millipore  
CAS-No. : 123-91-1

### 1.2 Other means of identification

No data available

### 1.3 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Chemical production, Reagent for development and research

### 1.4 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Pte Ltd  
(Co. Registration No. 199403788W)  
2 Science Park Drive  
#05-01/12 Ascent Building  
SINGAPORE 118222  
SINGAPORE

Telephone : +65 6890 6633  
Fax : +65 6890 6639  
E-mail address : TechnicalService@merckgroup.com

### 1.5 Emergency telephone

Emergency Phone # : 1-800-262-8200

## SECTION 2: Hazards identification

### 2.1 GHS Classification

Flammable liquids (Category 2), H225  
Serious eye damage/eye irritation (Category 2), H319  
Carcinogenicity (Category 1B), H350  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word : Danger

Hazard statement(s)  
H225 : Highly flammable liquid and vapor.  
H319 : Causes serious eye irritation.

H335 May cause respiratory irritation.  
H350 May cause cancer.

Precautionary statement(s)

Prevention

P201 Obtain special instructions before use.  
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.  
P233 Keep container tightly closed.  
P261 Avoid breathing mist or vapors.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.  
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.  
P308 + P313 IF exposed or concerned: Get medical advice/ attention.  
P337 + P313 If eye irritation persists: Get medical advice/ attention.  
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

**Reduced Labeling (<= 125 ml)**

Pictogram



Signal Word none

Hazard statement(s) none

Precautionary statement(s) none

Refer to the Safety Data Sheet before use.

**2.3 Other hazards**

May form explosive peroxides.  
Repeated exposure may cause skin dryness or cracking.

**SECTION 3: Composition/information on ingredients**

Substance / Mixture : Substance

**3.1 Substances**

Formula : C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>  
Molecular weight : 88.11 g/mol  
CAS-No. : 123-91-1  
EC-No. : 204-661-8  
Index-No. : 603-024-00-5

**Hazardous ingredients**

Component	Classification	Concentration
<b>1,4-Dioxane</b>	Flam. Liq. 2; Eye Dam./Irrit. 2A; Carc. 1B; STOT SE 3; H225, H319, H350, H335	<= 100 %

	Concentration limits: >= 20 %: STOT SE 3, H335;	
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For the full text of the H-Statements mentioned in this Section, see Section 16.

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## SECTION 4: First aid measures

### 4.1 Description of first-aid measures

#### General advice

Show this material safety data sheet to the doctor in attendance.

#### If inhaled

After inhalation: fresh air. Call in physician.

#### In case of skin contact

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

#### In case of eye contact

After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

#### If swallowed

After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

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## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

#### Suitable extinguishing media

Water Foam Carbon dioxide (CO<sub>2</sub>) Dry powder

#### Unsuitable extinguishing media

For this substance/mixture no limitations of extinguishing agents are given.

### 5.2 Special hazards arising from the substance or mixture

Carbon oxides

Combustible.

Pay attention to flashback.

Vapors are heavier than air and may spread along floors.

Development of hazardous combustion gases or vapours possible in the event of fire.

Forms explosive mixtures with air at ambient temperatures.

### 5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

### 5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

### 6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

### 6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

### 6.4 Reference to other sections

For disposal see section 13.

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## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling

#### Advice on safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

#### Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

#### Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

#### Storage conditions

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Recommended storage temperature see product label.

#### Storage class

Storage class (TRGS 510): 3: Flammable liquids

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.3 no other specific uses are stipulated.

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## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

#### Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
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1,4-Dioxane	123-91-1	PEL (long term)	25 ppm 90 mg/m <sup>3</sup>	Singapore. Workplace Safety and Health Act - First Schedule Permissible Exposure Limits of Toxic Substances
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## 8.2 Exposure controls

### Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

### Personal protective equipment

#### Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

#### Skin protection

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: [www.kcl.de](http://www.kcl.de)).

Full contact

Material: butyl-rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: [www.kcl.de](http://www.kcl.de)).

Splash contact

Material: Viton®

Minimum layer thickness: 0.7 mm

Break through time: 120 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Body Protection

Flame retardant antistatic protective clothing.

#### Respiratory protection

required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

#### Control of environmental exposure

Do not let product enter drains. Risk of explosion.

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## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

- |                   |           |
|-------------------|-----------|
| a) Physical state | liquid    |
| b) Color          | colorless |

c) Odor	No data available
d) Melting point/freezing point	Melting point: 11.8 °C
e) Initial boiling point and boiling range	100 - 102 °C at 1,013 hPa
f) Flammability (solid, gas)	No data available
g) Upper/lower flammability or explosive limits	Upper explosion limit: 22 %(V) Lower explosion limit: 2 %(V)
h) Flash point	11 °C - closed cup
i) Autoignition temperature	190.55 °C
j) Decomposition temperature	No data available
k) pH	6.0 - 8 at 500 g/l at 20 °C
l) Viscosity	Viscosity, kinematic: 1.27 mm <sup>2</sup> /s at 20 °C - OECD Test Guideline 1140.93 mm <sup>2</sup> /s at 40 °C - OECD Test Guideline 114  Viscosity, dynamic: 1.2 mPa.s at 25 °C 1.32 mPa.s at 20 °C
m) Water solubility	1,000 g/l at 20 °C - completely miscible
n) Partition coefficient: n-octanol/water	log Pow: -0.42 - Bioaccumulation is not expected.
o) Vapor pressure	36 hPa at 20 °C 53 hPa at 25.20 °C
p) Density	1.034 g/cm <sup>3</sup> at 20 °C
Relative density	1.03 at 20 °C
q) Relative vapor density	3.04 - (Air = 1.0)
r) Particle characteristics	No data available
s) Explosive properties	No data available
t) Oxidizing properties	none

## 9.2 Other safety information

Surface tension	36.9 mN/m at 25 °C
Relative vapor density	3.04 - (Air = 1.0)

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## SECTION 10: Stability and reactivity

### 10.1 Reactivity

Formation of peroxides possible.

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Vapors may form explosive mixture with air.

### 10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .  
Contains the following stabilizer(s):  
butyl hydroxytoluene (BHT) (0.0025 %)

### 10.3 Possibility of hazardous reactions

Risk of explosion with:  
triethylaluminium  
lithium aluminium hydride  
Triethylamine  
Boranes  
silver perchlorate  
Oxygen  
Nitric acid  
with  
perchloric acid  
Raney-nickel  
with  
Hydrogen  
Risk of ignition or formation of inflammable gases or vapours with:  
fire-promoting substances  
Exothermic reaction with:  
Oxidizing agents  
Sulfur trioxide  
acids

### 10.4 Conditions to avoid

Warming.  
Moisture.

### 10.5 Incompatible materials

various plastics, copper compounds

### 10.6 Hazardous decomposition products

Peroxides  
In the event of fire: see section 5

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## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male and female - 5,150 mg/kg  
(OECD Test Guideline 401)

Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages: , damage of respiratory tract, Lung edema

LD50 Dermal - Rabbit - 7,378 mg/kg

Remarks: (RTECS)

#### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 20 h

Remarks: (IUCLID)

### **Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Eye irritation

(OECD Test Guideline 405)

Remarks: (Regulation (EC) No 1272/2008, Annex VI)

### **Respiratory or skin sensitization**

Maximization Test - Guinea pig

Result: negative

(Regulation (EC) No. 440/2008, Annex, B.6)

### **Germ cell mutagenicity**

Test Type: Ames test

Test system: Salmonella typhimurium

Metabolic activation: with and without metabolic activation

Method: OECD Test Guideline 471

Result: negative

Test Type: In vitro mammalian cell gene mutation test

Test system: Chinese hamster ovary cells

Metabolic activation: with and without metabolic activation

Method: OECD Test Guideline 476

Result: negative

Test Type: Chromosome aberration test in vitro

Test system: Chinese hamster ovary cells

Metabolic activation: with and without metabolic activation

Result: negative

Remarks: (ECHA)

Test Type: dominant lethal test

Species: Mouse

Application Route: Intraperitoneal injection

Result: negative

Remarks: (ECHA)

### **Carcinogenicity**

Presumed to have carcinogenic potential for humans

### **Reproductive toxicity**

No data available

### **Specific target organ toxicity - single exposure**

May cause respiratory irritation. - Respiratory system

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

### **Specific target organ toxicity - repeated exposure**

No data available

### **Aspiration hazard**

No data available

## **11.2 Additional Information**

Repeated dose toxicity - Rat - male - Oral - 716 Days - NOAEL (No observed adverse effect level) - 9.6 mg/kg

Remarks: (ECHA)

Nausea, Vomiting, Weakness, Dizziness, Vertigo, Headache, Sweating, loss of appetite, Kidney injury may occur., Liver injury may occur.



To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The substance has delayed effects.

After absorption:

Headache  
Dizziness  
Nausea  
Vomiting

Absorption can result in damage to:

Liver  
Kidney

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

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## SECTION 12: Ecological information

### 12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates      semi-static test EC50 - Daphnia magna (Water flea) - > 1,000 mg/l - 48 h  
(OECD Test Guideline 202)

Toxicity to algae      static test ErC50 - Pseudokirchneriella subcapitata (green algae) - > 1,000 mg/l - 72 h  
(OECD Test Guideline 201)

Toxicity to fish(Chronic toxicity)      flow-through test NOEC - Pimephales promelas (fathead minnow) - > 103 mg/l - 32 d  
Remarks: (ECHA)

Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)      NOEC - Daphnia magna (Water flea) - 1,000 mg/l - 21 d  
(OECD Test Guideline 211)

### 12.2 Persistence and degradability

Biodegradability      aerobic - Exposure time 29 d  
Result: < 10 % - Not readily biodegradable.  
(OECD Test Guideline 301F)

### 12.3 Bioaccumulative potential

Bioaccumulation      Cyprinus carpio (Carp) - 10 mg/l(1,4-Dioxane)  
  
Bioconcentration factor (BCF): 0.3 - 0.7  
(OECD Test Guideline 305C)

### 12.4 Mobility in soil

No data available

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## 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

## 12.6 Endocrine disrupting properties

No data available

## 12.7 Other adverse effects

Forms toxic mixtures in water, dilution measures notwithstanding.  
Discharge into the environment must be avoided.

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## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

#### Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See [www.retrologistik.com](http://www.retrologistik.com) for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

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## SECTION 14: Transport information

### 14.1 UN number

ADR/RID: 1165                      IMDG: 1165                      IATA-DGR: 1165

### 14.2 UN proper shipping name

ADR/RID:                      DIOXANE  
IMDG:                      DIOXANE  
IATA-DGR:                      Dioxane

### 14.3 Transport hazard class(es)

ADR/RID: 3                      IMDG: 3                      IATA-DGR: 3

### 14.4 Packaging group

ADR/RID: II                      IMDG: II                      IATA-DGR: II

### 14.5 Environmental hazards

ADR/RID: no                      IMDG Marine pollutant: no                      IATA-DGR: no

### 14.6 Special precautions for user

None

### 14.7 Incompatible materials

various plastics, copper compounds

#### Other regulations

Hazchem Code                      : •2YE

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## SECTION 15: Regulatory information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

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## SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

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H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H350	May cause cancer.

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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