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CONVERSION OF FERROUS SULPHATE TO FERRIC CHLORIDE USING CHLORINE GAS.

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ABSTRACT

This study of the reaction between cuprus of Ferrous chloride and chlorine emphasizes the role chlorine catalysts play in the deferrization process. In this method to convert ferrous sulphate to ferric chloride reaction follows first order kinetics and reaction carried at room temperature.

KEYWORDS: Chlorine as oxidising agent, chloride formation, oxidation, room temperature.

INTRODUCTION

Ferrous sulphate is precursor for many ferrous originate compounds in chemical industry. Mostly used in cement industry and the textile industry from 17^{th} century. In medicinal field it is used in treatment of the anemia and other constipation related.[1-4] problems. Most important application of ferrous sulphate is used in manufacture of ink and glowing ink and used as moderant in wool dying.[5-6] Mostly it is used in preparation of two types of the indigo dye. It is also used to concrete lime stones and sand stones. Ferrous sulfate provides the iron needed by the body to produce red blood cells.[6-9] It is used to treat or prevent iron-deficiency anemia, a condition that occurs when the body has few red blood cells because of pregnancy, poor diet, excess bleeding, or other medical problem.

Ferric chloride is industrially important chemical with iron in the +3 oxidation state it has original colour dark green and on taking moisture it turns to brown. When it is dissolved in water it gives the exothermic reaction and used in treatment of sewage water treatment.

Ferric chloride on reaction with water forms ferric hydroxide as flock.

It is also used as a leaching agent in chloride hydrometallurgy,[16-17] for example in the production of Si from Fe-Si. important application of iron(III) chloride is etching copper in two-step redox reaction to copper(I) chloride and then to copper(II) chloride in the production of printed circuit boards.[18]

$FeCl_3 + Cu \rightarrow FeCl_2 + CuCl$

$FeCl_3 + CuCl \rightarrow FeCl_2 + CuCl_2$

It is used as reagent for addition to ethane to form dichloromethane. also used in manufacture of PVC.
$H_2C{=}CH_2 + Cl_2 \rightarrow ClCH_2CH_2Cl$

It can BE also dehydrating agent in chemical reactions. it also used as reagent in qualitative analysis of phenol and aspirin. It is also used to remove iron phosphate. This is main catalyst for fridle craft reaction.

In this paper we try to produce ferric chloride from ferrous sulphate using chlorine gas. simple inorganic displacement reaction formation of the product indicated by reaction with the ferric chloride soulation.

MATERIAL AND METHOD

All chemicals used are of A.R.Grade and from LOBA.

Experimental

Chlorine gas cylinder is used for reaction it pass through trap of sulphuric acid to avoided moisture. Solution with known concentration of ferrous sulphate taken in conical flask of 1000 ml capacity and chlorine gas of known concentration pass through it for interval of time and absorbance is measured. From absorbance concentration and rate calculated.

Mechanism

potassium ferrocynide Fe (II) $+Cl_2 \rightleftharpoons$ Fe (III) $+KCl +Cl^-$

From Potassium ferrocynide Fe (II) $+Cl^{-\cdot} \rightleftharpoons$ Fe (III) +KCl

OBSERVATIONS

Observation Table 1

Concentration of ferrous sulphate: 0.1M

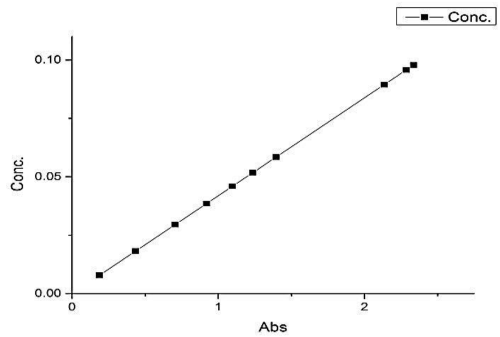
Sr.No.	Time in min.	Absorbance	Concentration	1/Concentration	Rate of reaction
1	2	0.187	0.007831	127.697	0.2123×10^{-9}
2	4	0.435	0.01821	54.915	0.70979×10^{-4}
3	6	0.705	0.029525	33.87	0.33892×10^{-4}
4	8	0.920	0.03852	25.95	0.19874×10^{-4}
5	10	1.096	0.04590	21.79	0.1298×10^{-4}
6	12	1.235	0.05172	19.335	3.1586×10^{-4}
7	14	1.395	0.05842	17.119	6.3395×10^{-4}
8	16	2.135	0.08941	11.184	11.185×10^{-4}
9	18	2.286	0.09573	10.450	40.349×10^{-4}
10	20	2.336	0.09783	10.22	18.281×10^{-4}

Observation Table 2

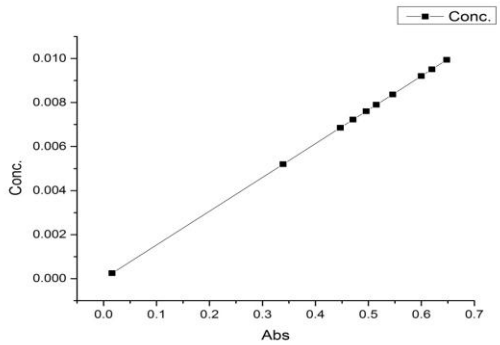
Concentration of **ferrous sulphate**: 0.01M

Sr.No.	Time in min.	Absorbance	Concentration	1/Concentration	Rate of reaction
1	2	0.016	0.000245	4081.63	0.3091×10^{-9}
2	4	0.339	0.005199	192.345	0.27259×10^{-4}
3	6	0.447	0.006855	145.88	0.4049×10^{-4}
4	8	0.471	0.007224	138.43	6.77×10^{-4}
5	10	0.496	0.007607	131.46	9.5594×10^{-4}
6	12	0.515	0.007898	126.61	13.114×10^{-4}
7	14	0.546	0.00837	119.47	21.11×10^{-4}
8	16	0.600	0.009202	108.67	42.454×10^{-4}
9	18	0.620	0.009509	105.164	50.455×10^{-4}
10	20	0.648	0.009939	100.614	56.00×10^{-4}

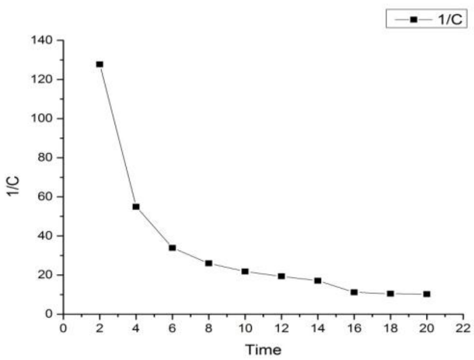
Calculations and graphs



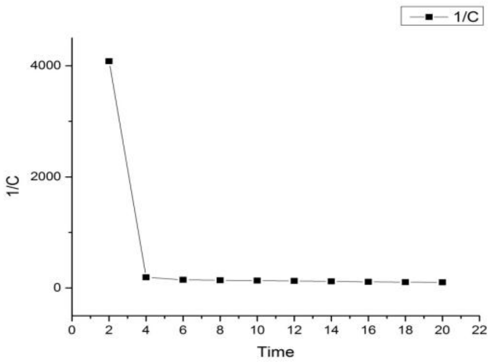
Graph of Absorbance vs. Change Concentration when concentration of ferrous sulphate is 0.1M



Graph of Absorbance vs. Change Concentration when concentration of ferrous sulphate is 0.01M



Graph of reciprocal of change in concentration vs time t of ferrous sulphate is 0.1



Graph of reciprocal of change in concentration vs time t of ferrous sulphate is 0.1

CONCLUSIONS

From the graph is straight line and passing through indicating that reaction must follow first order reaction kinetic.

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