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Research Article

**SPECTROPHOTOMETRIC COMPLEXATION STUDY OF Cu^{2+}
METAL ION WITH B-NAPHTHOL AZO DYE****N. V. Rathod^{1*}, M.N. Lokhande² P. M. Jadhao³, J. S. Jadhao³, P.J. Sakhare³, S. M. Chavan³, P.S. Game⁴**¹Department of Chemistry, R.A. Arts, Shri, M. K. Commerce and Shri, S. R. Rathi Science College, Washim 444505, India²Department of Chemistry, M. N. Ghaphalkar College Bhabulgaon³Department of Chemistry P.N. College, Pusad⁴Department of Chemistry, G.E.S.Arts, Commerce & Science College, Shriwardhan.402110. India.**Abstract:**

Azo dye based ligand have been well established for complexation of metal ions. In present study β - naphthol azo dye is used to complexation study with Cu^{2+} metal ions. The stoichiometry between M: L is 1:1 and effect of pH on complexation study have been established. IR spectra provides the complexing nature between the metal and ligand.

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INTRODUCTION:

Among the dyes azo dyes play vital role in the complexation studies and more than half are the commercial dyes are the azo dye [1,3]. Azo dyes are the important class and widely used for scientific research, they are the colored and used as pigments [4-6]. Azo dye metal chelate have lot importance due to their electronic and geometrical features. In the present work, β - naphthol azo dye with metallic ion Cu^{2+} complex was synthesized and characterized by IR and stoichiometry between 1:1 have been established.

EXPERIMENTAL:**Instrumentation**

UV-Vis spectra were recorded on a (Bioera Single beam UV-Visible Spectrophotometer. The FT-IR spectra were obtained using IR spectrometer of Shimadzu make, with samples prepared as KBr discs.

Synthesis of complex:

The salt of CuNO_3 0.44gm were dissolved in 10ml of water ethanol, and added 0.5g of azo dye to 20ml an ethanol solution, in 1:1 molar ratio. This reacting mixture was stirred for a while and mixture was heated under reflux for three hours, during this period, the precipitation was completed from, and collected by filtration, then washed with ethanol, and dried under vacuum for 4 hours. The complex was characterized by IR spectra.

Stoichiometry of the Complex:

The Jobs method is used to determine the stoichiometry of complex, solutions of azo dye and metal ion Cu (II) were mixed in different mole ratios keeping the some of dye and metal ion concentration constant and the absorbance were measured at 620 nm of wavelength. The plot of absorbance versus mole fractions is shown in Figure. The maximum absorption was observed for the mole ratio of 0.5, therefore it indicates the reaction stoichiometry between azo dye and Cu^{2+} is 1:1 shown in figure1.

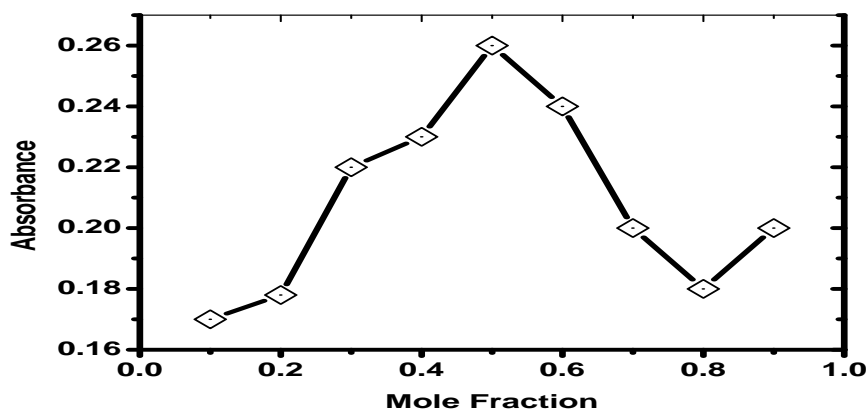


Fig.1: Jobs plot of Complex for the stoichiometry

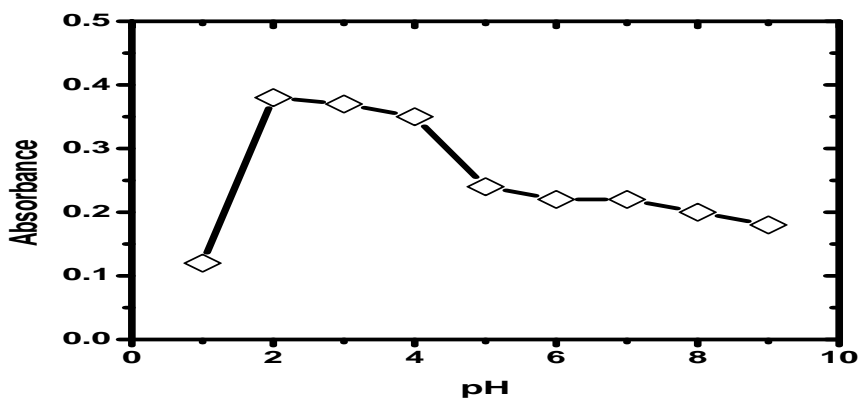


Fig.2: Effect of pH on complex

Effect of pH:

The effect of pH on complexation has been studied for the dye and copper metal ion by varying the pH from 1 to 10. From the graph it is cleared that the effect of pH has pronounced effect on complex formation. As pH increases there is slight increase in absorption of complex at pH 3 there is sharp enhancement of absorption. Further increased in pH there is decrease in the absorption of complex shown in figure2.

IR Study:

The IR spectroscopic analyses were studied and it helps to interpret the possible mode of interaction between azo dye and copper metal ion. A strong band at 3055 cm^{-1} which belongs to phenolic $-\text{OH}$ group of azo dye which shifted to 3037 cm^{-1} supports the complex formation. The band assigned for $-\text{N}=\text{N}-$ were at 1365 cm^{-1} which is shifted to 1317 cm^{-1} . The stretching frequency attributed to C-N vibration decreases to 1145 cm^{-1} in complex is shifted to 1143 cm^{-1} shown in figure3.

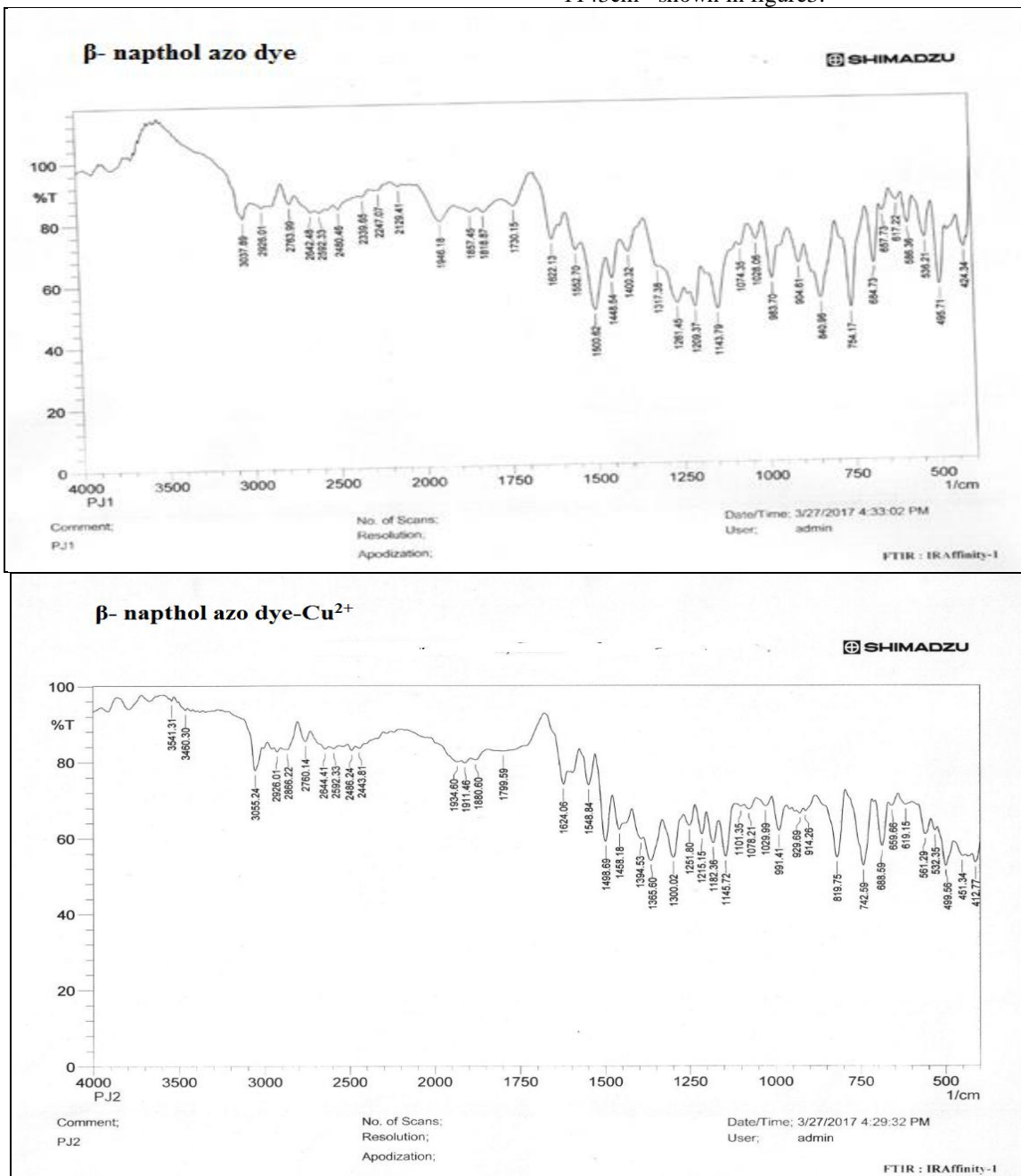


Fig.4: IR spectra of Complex

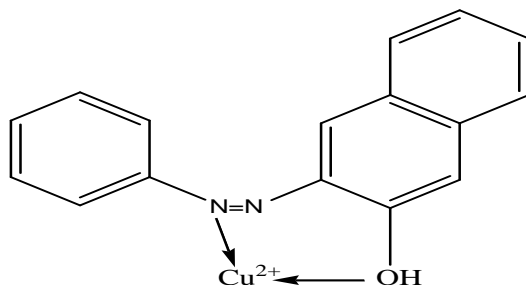


Fig.5: Proposed structure of Complex

Proposed Structure:

Based on the stoichiometry it is clear that there is one copper metal ion interact with only one dye molecule. The IR data also shows that there is strong decrease in IR stretching frequency of $-\text{OH}$ and $-\text{N}=\text{N}-$ confirmed the binding site of metal ion to the dye in the complex. Therefore, following proposed structure can be established shown in figure5

CONCLUSION:

In conclusion, β - naphthol azo dye has good complexing ability with the Cu^{2+} metal ions. 1:1 stoichiometry found between M:L. Effect of pH influenced the complex formation. The decreasing stretching frequency in the IR shift values of $-\text{OH}$ and $-\text{N}=\text{N}-$ functional group of ligand confirmed the complexing nature.

REFERENCES:

- 1.Eren T., Kose M., Kurtoglu N., Ceyhan G., McKee V. and Kurtoglu M., *Inorg. Chim. Acta*,2015; 430: 268-279.
- 2.Abdel-Ghani N.T., Mansour A. M., Abo El-Ghar M. F., El-Borady O. M. and Shorafa H., *Inorg. Chim. Acta*, 2015;435: 187-193.
- 3.Ferreira G.R., Marcial B.L., Garcia H.C., Faulstich F. R. L., Dos Santos H. F. and de Oliveira L F.C., *Supramol. Chem.*, 2015;27(1-2):13-20.
- 4.Kirkan B. and Gup R.; *Turk. J. Chem*; 32, 9-17, 2008.
- 5.SI Y., Hu Q., Huang Z., Yang G. and Yin Turk. J .Chem; 2005;29: 135- 140.
- 6.Maradiya H. R. and Patel V. S. J. *Serb. Chem. Soc*; 2001;66: 87-93,