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THOMSON REUTERS
[FRTSSDS- June 2018]
DOI: 10.5281/zenodo.1293879
ISSN 2348 – 8034
Impact Factor- 5.070
GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

SYNTHESIS AND CHARACTERIZATION OF COPPER COMPLEX OF SCHIFF BASE

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ABSTRACT

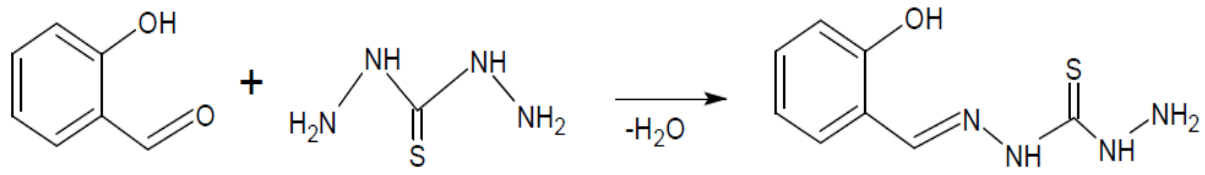
Schiff base metal complexes have been studied extensively because of their wide range of applications in different scientific areas and their chemical and physical properties. Many of them are centred on the catalytic activity of Schiff base complexes in a large number of homogeneous and heterogeneous reactions. By this paper we throw light on the IR, UV studies of synthesised copper complex of schiff base.

I. INTRODUCTION

The class of organic compounds containing the azomethine (–HC=N–) group in their structure is called imine compounds or the molecule containing carbon nitrogen (HC=N) double bond is called as imine or a Schiff base. Schiff base was first prepared by German chemist Hugo Schiff in 1864 [1] and therefore, is referred to as Schiff base. Schiff bases are playing an important role in the development of coordination chemistry.
Schiff base can coordinate to metal as neutral molecules or after deprotonation, as anionic ligands and adopt a variety of different coordination modes[2]. The possibility of their being able to transmit electronic effects between a reduce unit and a metal centre is suggested by the delocalization of the ∏ bonds in the Schiff base chain [3].

II. SYNTHESIS OF LIGAND WITH SCHIFF BASE

The thiosemicarbazones used in this work was prepared by refluxing in ethanol an equimolar amount of salicylaldehyde and thiosemicarbazide for 30 minutes. The reaction mechanism is shown below-



Synthesis of Copper Complexes:
The complex synthesized by mixing the warm solution (~ 45°C) of the appropriate Copper Sulphate (0.01 mmol) in an ethanol water mixture (1:1, 10ml) with a warm suspension (~ 45°C) of the Thiosemicarbazone (0.01 mmol) in chloroform (50ml). The resulting mixture was stirred under reflux for 4h. The solid complexes did not separate on standing but when a few drops of aqueous ammonia solution (1:10) were slowly added with stirring, the solid metal chelates precipitated. In case of the preparation of all the complexes, the precipitates were collected by filtration, washed with a 1:1 ethanol-water mixture and diethyl ether and dried over anhydrous $CaCl_2$.

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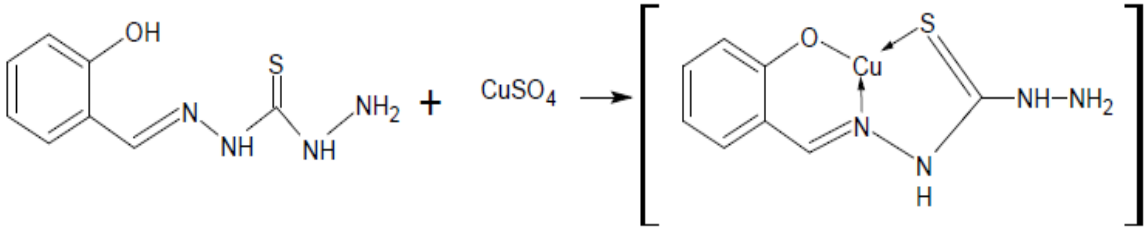
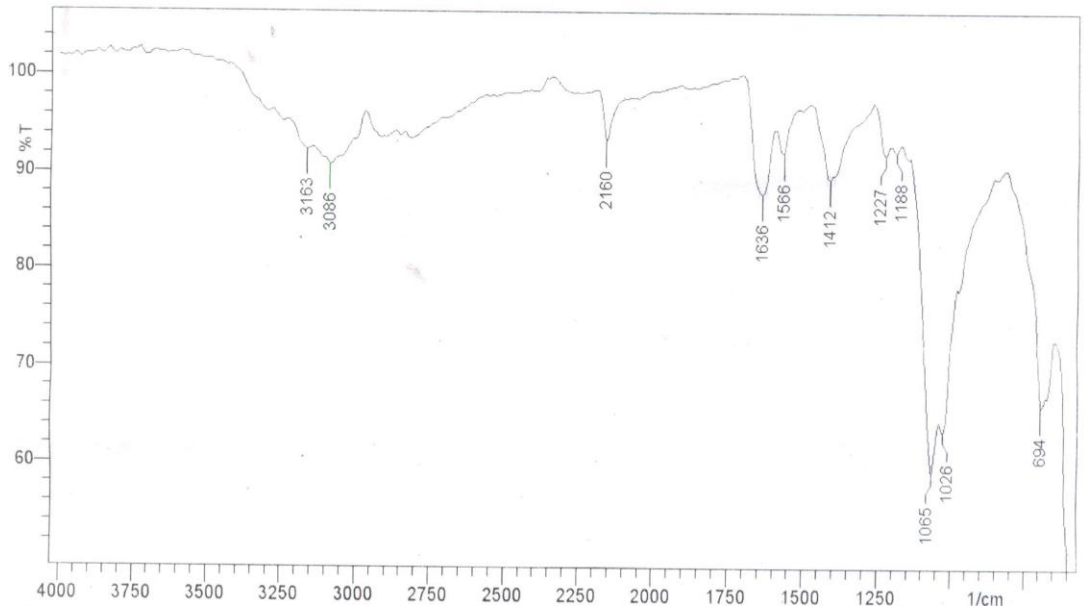


III. INFRARED SPECTRUM

Infrared spectra were recorded in ABB Fourier Transform Infrared (FTIR) Spectrophotometer. Infrared spectroscopy is the most widely used tools for the detection of functional groups in pure compounds and mixtures and gives information on molecular vibrations or more precisely on transition between vibrational and rotational energy levels in molecules. Absorption of radiation in the infrared region results in the excitation of bond deformations, either stretching or bending.



Infrared Spectra of Cu (II) Complex with Schiff base

3163 cm^{-1}	$-NH_2$
3086 cm^{-1}	C–H
2160 cm^{-1}	C≡N
1636 cm^{-1}	-CH=N-
1556 cm^{-1}	Aromatic nitro compounds
1412 cm^{-1}	C–C
1227 cm^{-1}	-C=S
1188 cm^{-1}	C–O
1065 cm^{-1}	C-N
1026 cm^{-1}	=C–H
694 cm^{-1}	C-H out-of-plane bend

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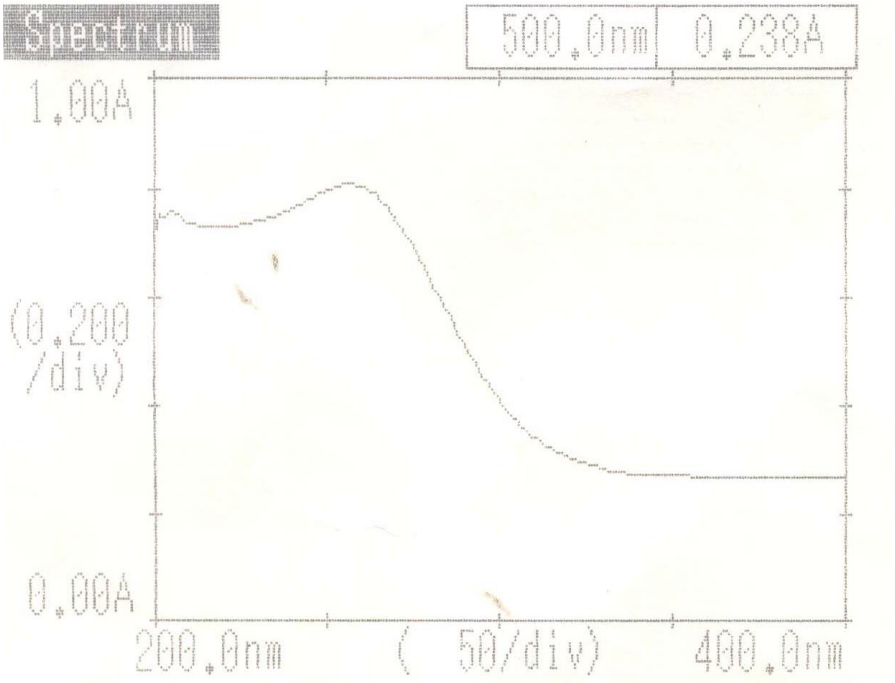
IV. ULTRAVIOLET-VISIBLE SPECTRUM

Ultraviolet absorption spectroscopy deals with the measurement of energy absorbed when electrons are promoted to higher energy levels. The Ultraviolet spectrum is simply a plot of wavelength of light absorbed versus the absorption intensity (absorbance or transmittance) and is conveniently recorded by plotting molar absorptive (ε) against wavelength (nm).

Electronic spectra were recorded in Shimadzu, UV- 1700 pharmaspec, UV-Visible Spectrophotometer in Methanol solution.



Ultraviolet-Violet Spectra of Cu Complex with Schiff bases
λ max = 257 nm ; ε = 0.808

Point peak

S. No.	Wavelength	Absorbance
1	400 nm	0.270
2	380 nm	0.270
3	360 nm	0.271
4	340 nm	0.274
5	320 nm	0.308
6	300 nm	0.412
7	280 nm	0.635
8	260 nm	0.805
9	240 nm	0.763
10	220 nm	0.728
11	200 nm	0.709

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V. CONCLUSION

In the elemental analysis of the synthesized compound both calculated and found percentages of elements are matched so elemental analysis confirms the structure of the thiosemicarbazones. Mass spectral data confirm the structure of the ligand as indicated by the molecular ion peak (M^+) corresponding to their molecular weight. Selected diagnostic bands of the IR spectra of the synthesized thiosemicarbazones showed useful information about the structure of the compound.

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[3] *P. G. Kulkarni, G. B. Avaji, S. A. Patil, P. S. Badami, Journal of Coordination Chemistry, 62, 481-492 (2009).*