STUDIES ON METAL CHELATES OF SOME SCHIFF’S BASES

Hugo Schiff described the condensation between an aldehyde and an amine leading to a Schiff base in 1864. Schiff base ligands are able to coordinate metals through imine nitrogen and another group, usually linked to the aldehyde. The coordination chemistry of Schiff bases has attracted the attention of several investigators. Nitrogen, oxygen and/or sulphur-containing ligands and their metal complex have been found to possess significant biological and pharmacological activities and are used as catalyst, fungicides, bactericides, tuberculostatic and anticarcinogenic agents. Schiff bases have been used as corrosion inhibitors.

The coordination complexes have found extensive application in various fields of human interest. These including extraction, dyeing, water softening etc. These metal complexes containing ligands play an important role as catalyst in many bioinorganic systems. Many chelating ligands find extensive applications as reagent and masking agents in various titrimetric, spectrophotometric, chromatographic methods. Thus complexation studies of Schiff bases are particular attention by coordination chemists.

The work presented in the thesis with title "STUDIES ON METAL CHELATES OF SOME SCHIFF'S BASES" has been described into six chapters:

CHAPTER- 1 Introduction and literature survey on Schiff bases and their Metal Chelates.

CHAPTER- 2 Experimental: Synthesis of Schiff base and their Metal Chelates.

CHAPTER- 3 Analytical and spectral study of Schiff base and their Metal Chelates.

CHAPTER- 4 Thermal Analysis of Metal Chelates.

CHAPTER- 5 Magnetic Measurements.

CHAPTER- 6 A comprehensive summary of work

CHAPTER- 1 INTRODUCTION

This chapter of the thesis describes the general introduction, Schiff base, Importance of Schiff bases, uses of coordination compounds, Literature survey, Present work, and Reference.

CHAPTER- 2 EXPERIMENTAL

2.1 Syntheses of Schiff bases

This section is deal with synthesis of amine and their Schiff bases.

- Synthesis of Amine 1, 1' bis (4-aminophenyle) cyclohexane [A]

  Compound [A] was prepared by condensation of cyclohexanone and excess aniline as follow 8-9. To a solution of cyclohexanone 0.101 mole and aniline 0.267 mol in 25 ml of 35% HCl at 110ºC for 17-18 h. (yield 51.48 % of light – yellow crystal M.P.110-112 M.F.C_{18}H_{22}N_{2}, F.W.=266GM)


Synthesis of Schiff base:

- **6,6'-(4,4'-(cyclohexane-1,1-diyl) bis(4,1-phenylene)) bis (azan-1-yl-1-ylidene) bis (methan-1-yl-1-ylidene) bis (2-methoxy phenol)** (L$_1$-o-v-A) and

- **2,2'-(4,4'-(cyclohexane-1,1-diyl)bis(4,1-phenylene))bis(azan-1-yl-1-ylidene)bis(methan-1-yl-1-ylidene) diphenol** (L$_2$- sal-A)

- **1,1'-(4,4'-(cyclohexane-1,1-diyl)bis(4,1-phenylene))bis(azan-1-yl-1-ylidene)bis(methan-1-yl-1-ylidene)dinaphthalen-2-ol** (L$_3$-O-H-Naph.-A)

Synthesis of Schiff base by condensation of 50ml solution of 2-hydroxyl -3- methoxy benzaldehyde (7.6gm , 50mmol.) in hot ethanol and 50ml solution of 1, 1' bis ( 4-aminophenyle) cyclohexane (6.65gm,25mmol) in hot ethanol. using glacial acetic acid as a catalyst and reaction mixture was reflux on water bath for 4-5 h. a solid mass was separated out on cooling, it was suction filtered, washed with sodium bisulfite solution, water and finally with ethanol. Subsequently dried over anhydrous CaCl$_2$ in desiccators. The Schiff base are recrystallized from chloroform and purity was checked by TLC in appropriate solvent system at room temperature The Same procedure was adopted for the other ligands
2.2 Synthesis of Metal Chelates of Schiff base:

The metal chelates of the Schiff base were synthesized by mixing (1:1mol) a chloroform-ethanolic (1:1, 30ml) of Schiff base, \( L_1\)-O-V-A or \( L_2\)-Sal- A or \( L_3\)-O-H-Naph.-A with an ethanolic solution (30 ml ) of metal salt or metal acetate. The resulting mixture was refluxed with stirring on a magnetic stirrer equipped with heater for 5-6 h. on cooling, the colored chelates precipitated out, which was filtered by suction, washed several times with ethanol and finally with ether, and dried over anhydrous CaCl\(_2\). The metal ions selected were Cu (II), Ni (II), Co (II) & Zn (II) proposed structure of metal Chelates will be as following

![Diagram of a chelate structure](image)

CHAPTER – 3 Analytical and spectral study of Schiff bases and their Metal chelates.

This chapter of thesis deals with the Elemental analysis, Conductivity Measurements, Solubility, spectral characterization of Schiff base and their metal chelates it gives functional groups ,quantitative structure of the Compound.
CHAPTER – 4 Thermal Analysis of Metal Chelates:

This Chapter deals with determinations of change in chemical or physical properties of material as a function of temperature in a controlled atmosphere. Thermo gravimetric analysis (TGA), measured weight changed in a material as a function of temperature. The TGA data provide important experimental evidence in determining the number of water molecules present in the metal chelates. It is best tool for understanding decomposition mechanism etc.

CHAPTER – 5 Magnetic Measurements:

This chapter deal with Magnetic susceptibility Measurements on the vibration sample magnetometer (VSM), model 7304, Lake Shore Cryotronics, inc., U.S.A., was used to characterize magnetic prosperities of the metal chelates. The effective Magnetic moment $\mu_{\text{eff}}$ was calculated from the expression: $\mu_{\text{eff}} = 2.84 (\chi_m \times T)^{1/2}$, where $T$ = absolute temperature (K).

CHAPTER – 6 A comprehensive summary of work

This chapter of the thesis describes a comprehensive summary of the work incorporated in the thesis.