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Schiff bases are an important class of ligands in coordination chemistry and find extensive applications in different spheres. Transition metal complexes with Schiff bases as ligands have been amongst the widely studied coordination compounds. Because of the great synthetic flexibility of Schiff base formation many ligands of diverse structural type can be synthesised. The present study is focused mainly on the metal complexes of Schiff bases derived from furoin. Four new ligands viz furoin-2-aminothiophenol (FATP), furoin-2-aminophenol (FAP), furoin thiosemicarbazone (FTSC), furoin semicarbazone (FSC) and their transition metal chelates have been synthesised and characterised.

The thesis is divided into five parts. Part I deals with the synthesis and characterisation of various complexes derived from Schiff base ligands. Part I comprises of six chapters. The first chapter consists of an introduction and a critical review of the published work on metal complexes of Schiff bases. In the second chapter, materials, methods and instruments used for the various studies are described. Synthesis and characterisation of Co(II), Ni(II), Cu(II) and Zn(II) complexes of FATP are described in the Chapter 3. Structural elucidation of these complexes has been made on the basis of micro analytical, spectral and magnetic data. These data suggest that FATP act as a
dianionic tridentate ligand for the metal ions. All these complexes possess 1:1 metal ligand stoichiometry and they are non-electrolyte in nature. All complexes are found to be paramagnetic except Zn(II) complex which is diamagnetic. Based on the above physicochemical studies, an octahedral structure is suggested for all the four complexes. The synthesis and characterisation of Co(II), Ni(II), Cu(II) and Zn(II) complexes of FAP, FTSC and FSC are described in the Chapters 4, 5 and 6. These complexes are characterised and structural elucidation have been made. All the complexes of FAP, FTSC and FSC possess 1:1 metal ligand stoichiometry and they are non electrolyte in nature. The ligands FAP, FTSC and FSC acted as dianionic tridentate and the geometry of their complexes are found to be octahedral one. Part I ends with reference.

Thermogravimetric investigations of Co(II), Ni(II), Cu(II) and Zn(II) complexes of FATP along with the Cu(II) and Zn(II) complexes of FAP, FTSC and FSC were carried out using TG techniques and results are presented in part II. This part comprises of three chapters. The first Chapter describes introduction and Chapter 2 explains the materials, methods and instruments used for the present study. The thermal decomposition studies of selected ten complexes are discussed in chapter 3. All the TG curves were subjected to kinetic analysis and the kinetic parameters namely energy of activation, Arrhenius frequency factor and entropy of activation for decomposition have been calculated from the TG data using the Coats-
Redfern equation. On the basis of the temperature of inflection and initial decomposition, the relative thermal stabilities of the chelates were determined.

The Co(II) and Cu(II) complexes of FATP follow a two stage decomposition pattern while the Ni(II) and Zn(II) complexes follow a three stage decomposition pattern. The thermal decomposition data are represented in tables 2.3.1 to 2.3.4. The relative thermal stabilities of FATP complexes follow the order, Ni(II) > Co(II) ≈ Cu(II) ≈ Zn(II).

The Cu(II) and Zn(II) complexes of FTSC and FAP follow decomposition in two stages while the complexes of FSC follow a three stage decomposition pattern as summarised in the tables 2.3.5 to 2.3.7. The kinetic parameters calculated for all the complexes are given in table 2.3.8. The relative thermal stabilities of the Cu(II) metal complexes were higher than the Zn(II) complexes of FAP, FTSC and FSC. Part II concludes with reference.

Part III consist of unit cell determination of eight newly synthesised Schiff base complexes using X-ray powder diffraction technique. Chapter 1 and 2 give the introduction, materials and methods employed respectively. In the Chapter 3, the X-ray diffraction studies of Ni(II) and Cu(II) complexes of FATP, FAP, FSC along with the Cu(II) and Zn(II) complexes of FTSC are presented. It was found that Ni(II) complexes of FATP and FSC as well as Cu(II) and Zn(II) complexes of FTSC belong to orthorhombic crystal system. But in the case of Cu (II) complex of FATP, FAP and FSC tetragonal system
is identified. A cubic crystal system is reported for the Ni(II) complex of FAP. The calculated density of each complex was in good agreement with experimental value found out, which confirm the proposed molecular formula and existence of 1:1 stoichiometry between the metal ion and the ligands for all the complexes. References are given at the end of part III.

Studies of corrosion inhibition efficiency of four Schiff bases FTSC, FATP, FAP and FSC towards mild steel in hydrochloric acid are described in Part IV. A critical review of Schiff base based corrosion inhibitors is included in first chapter. A detailed description about the theory and methods used for the corrosion inhibition studies are discussed in Chapter 2. In Chapter 3, the results of the corrosion inhibition efficiency determined using laboratory corrosion immersion technique (weight loss method) and electrochemical methods like potentiodynamic polarization method and electro chemical impedance spectroscopy are presented. Results reveal that all the four Schiff bases act as good corrosion inhibitors, having efficiency of 85% and above towards mild steel in 1M hydrochloric acid solutions. Hence they can be used as corrosion inhibitors for industrial applications. The efficiency of the investigated compounds varied depending upon their chemical structure and constituents present in them. The adsorption isotherm analysis and thermodynamic parameters calculated indicate that the Schiff bases inhibit corrosion through the physical adsorption process and follow
Langmuir adsorption isotherm. Relevant references are given at the end of Part IV.

The Part V of this thesis deals with electrical characterisation of the prepared Schiff bases and their selected metal complexes using D.C electrical conductivity measurements. The Chapter 1 of this part contains introduction and review of literature related to the electrical conductivity studies of metal complexes and Chapter 2 explains the material and methods adopted. The results of D.C. electrical conductivity of Co(II), Ni(II), Cu(II) and Zn(II) complexes of FATP, Cu(II) complexes of the FAP, FTSC, FSC and four Schiff bases are presented in the Chapter 3. The conductivity values obtained for the investigated samples show that these materials can be classified into the category of organic semiconductors. Among the studied materials few of them show typical semiconductor behaviour of increasing conductivity with increasing temperature in the studied temperature region which suggest another potential application of these studied compounds. The probable mechanism of electrical conduction in these materials is also discussed. Part V concludes with references.