



Research Article

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Synthesis and structural characterization studies of cobalt(III), manganese(III) and iron(III) schiff base complexes

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ABSTRACT

Coordination behaviour of the ligands towards trivalent metal ions has been investigated by IR, molar conductance, magnetic moments and electronic spectral measurements. The ligands employed are TAA, PAA, ISA and IDA. The ligands and their metal complexes have been investigated with particular reference to the structure and bonding of the ligand moiety in the metal complexes. All the complexes are intensely coloured and are insoluble in water and methanol and soluble in DMSO. They possess 1:2 metal-ligand stoichiometry and formulation of the complexes has been made on the basis of their analytical data and magnetic susceptibility measurements. Molar conductance values were in the range expected for a 1:1 electrolytic species. The bonding nature of the ligands to the metal ion has been determined by careful comparison of the IR spectra of the complexes and the ligands. All the ligands function as neutral tridentate/bidentate, in all the complexes utilizing the carbonyl oxygen atoms and azomethine nitrogen atoms for coordination. IR spectra together with molar conductance values adequately confirmed the ionic nature of acetate group. The cyclic voltammogram of $[\text{Fe}(\text{PAA})_2\text{Cl}_2]\text{Cl}$ showed the quasi-reversible reduction nature. The indexing of the X-ray diffraction pattern obtained for the $[\text{Fe}(\text{TAA})_2]\text{Cl}_3$ complex indicated that it has an orthorhombic crystal lattice. The Schiff base ligands and their metal complexes were tested against four pathogenic bacteria (*Staphylococcus aureus*, *Bacillus subtilis*) as Gram-positive bacteria, and (*Escherichia coli*, *Klebsiella pneumonia*) as Gram-negative bacteria. All the metal complexes exhibit higher antibacterial activity than the free ligand. Iron(III) complexes have higher bacterial activity than the other complexes.

Keywords: Schiff base, IR, Cyclic voltammogram, X-ray diffraction, Antibacterial activity.

INTRODUCTION

Schiff bases are an important class of ligands in coordination chemistry and find extensive applications in different fields. Schiff bases and their biologically active complexes have been often used as chelating ligands in the coordination chemistry of transition metals, radiopharmaceuticals for cancer targeting, agrochemicals, model systems for biological macro molecules and catalysts [1-5]. The main target of the present study is to synthesize a series of trivalent metal complexes with some potentially tridentate and bidentate ligands which showed more coordination ability of the highly coloured ligands that incorporate several binding sites. The ligands and their metal complexes have been examined with particular reference to the structure and bonding of the ligand moiety in the metal complexes [6-9]. Coordination behaviour of the ligands towards trivalent metal ions has been investigated by IR, molar conductance, magnetic moments and electronic spectral measurements. The trivalent Schiff base metal complexes are investigated for antibacterial properties.

EXPERIMENTAL SECTION

Reagents

The chemicals used for synthesis in this study were of A.R. grades (Fluka and E-Merck). For physico-chemical