

Synthesis and characterization of mixed ligand metal(II) complexes with Schiff base and 8-hydroxyquinoline as ligands

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ABSTRACT

Co(II), Ni(II) and Cu(II) mixed ligand complexes have been synthesized from a Schiff base (L) obtained by the condensation reaction of acetophenone and 2-aminophenol, as primary ligand and 8-hydroxyquinoline (HQ) as secondary ligand. The Schiff base and metal(II) mixed ligand complexes were accordingly investigated using some physicochemical techniques. The Schiff base ligand was shiny brown crystalline solid obtained in low yield of 36.21 % with melting point of 240 °C. The metal(II) complexes were obtained as brown to deep brown coloured solids, air stable with decomposition temperatures of 310 – 340 °C. The molar conductivity values of the complexes in dimethylformamide (DMF) was found to be 2.13 - 3.77 $\text{Ohm}^{-1}\text{cm}^2\text{mol}^{-1}$ indicating their non-electrolytic nature. The determination of water of crystallization showed presence of $1\frac{1}{2}$ uncoordinated water molecules in the Co(II) and Cu(II) complexes while 2 was estimated for Ni(II) complex. The infrared spectral data allude that, on complexation, the Schiff base ligand loses its phenolic hydrogen and coordinated bidentately to the metal(II) ions through deprotonated phenolic oxygen and imine nitrogen ($\text{HC}=\text{N}-$) as monobasic ligand. Similarly, HQ coordinated *via* deprotonated phenolic oxygen and quinoline nitrogen. The resultant data showed that the mixed ligand might formulated as $[\text{ML}(\text{HQ})]\cdot n\text{H}_2\text{O}$ exhibiting four-coordinate square planar geometry.

1. Introduction

Schiff bases are compounds containing the carbon-nitrogen double bond ($-\text{HC}=\text{N}-$), obtainable by condensation of primary amines with carbonyl compounds. They are also called imines, anils or azomethines. The presence of imine group in these compounds have contributed to their chemical and biological importance [1].

Schiff bases are generally excellent chelating agents especially when a functional group like $-\text{OH}$ or $-\text{SH}$ is present close to the azomethine group so as to form a five or six membered ring with the metal ion [2].

8-Hydroxyquinoline is a chelating agent which has been used for the quantitative determination of metal ions. It reacts with metal ions, losing the proton and forming 8-hydroxyquinolinato-chelate complexes [3]. The structure of 8-hydroxyquinoline is shown in Fig. 1.

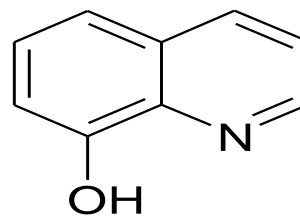


Fig.1. Structure of 8- hydroxyquinoline

The literature survey revealed that the strategy of designing metal complexes with mixed ligands is a promising approach for developing new compounds bearing better biological activity [4-7].

The objective of the present investigation is to prepare Schiff base derivable from acetophenone and 2-aminophenol and then coordinate it to Co(II), Ni(II) and

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