

Synthesis, Characterization and Thermal Studies of Schiff Bases Derived from 2,4-Dihydroxy benzaldehyde and their Complexes with Co(II), Ni (II), Cu(II)

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Abstract: The synthesis characterization of new imine prepared via condensation of 2,4-Dihydroxy benzaldehyde with 3,3'-diaminobenzidine. The structure of imine was characterized by elemental analysis FTIR, ¹H-NMR, UV-Vis, mass spectroscopic and TG/DSC. The results show an agreement with the proposed structure. Was used to synthesize the complexes of type [M₂(L)] [M= Co (II), Ni (II), Cu(II)] and their complexes were characterized by methods of spectral analysis FTIR, UV-Vis, mass spectroscopic, molar conductivity, thermal analysis was carried out using the DSC knowing if these complexes contain water molecules that are consistent with the central atom and also study some thermodynamic functions of prepared compounds and was included evaluation of magnetic properties of prepared complexes. The results showed that the complexes of Co(II), and Cu(II) have paramagnetic properties and Shape would be tetrahedral, while the complex of nickel (II) have diamagnetic properties. So square planar with four nitrogen and four oxygen atoms from the Schiff base ligand.

Keywords: Schiff base, 2,4-Dihydroxy benzaldehyde, Cobalt, Complexes

1. Introduction

In recent years, interest in the design, synthesis and coordination chemistry of polydentate chelating ligands capable of forming stable complexes with metal ions has resulted in the study of a large number of new chelating agents. Schiff bases are the ligands which give these opportunities and for this reason have attracted the attention of researchers for many decades [1,2]. These compounds are widely spread due to several characteristics, including the high degree of complexity of the complex. There are many attempts to increase the solubility and stability of these complexes, especially when used as symmetric factors and asymmetric [3,4]. It was also used in nanotechnology applications asymmetric catalysis as well [5].

Some complexions were used as second-line nonlinear optics (NLO) because they provide additional flexibility when compared with organic chromophores through the presence of metals (color, magnetism, polarization, oxidation behavior, thermal stability, brilliance, etc.) [6-9]. They are very useful for applications in electrical devices because they have the properties of liquid crystal light emitting [10, 11]

2. Experimental

2.1 Materials and Instrumentation

The 2,4-Dihydroxy benzaldehyde and 3,3'-diaminobenzidine used for the preparation of the Schiff base were obtained from the Sigma Aldrich. The metal salts, MCl₂.xH₂O [M=Co, Ni, x=6; Cu, x=2] was purchased from British Drug House. All the organic solvents from Fisher Chemical. All solvents and chemicals were used without further purification.

Infrared (IR) spectra were recorded on a FTIR-84005-SHIMADZU by using KBr pellets. The ¹H-NMR spectra were obtained on Bruker-400HZ. the spectra have been recorded in DMSO, at room temperature. UV-Vis spectra were obtained in DMF on uv-win5, using 10mm quartz cells. Mass spectra were recorded on 5975C-Agilent Technologies and EI technology at electronic power of 70eV. Magnetic properties were measured using a device called the Auto magnetic susceptibility Balance. Using glass tubes with a diameter of 0.324 cm. The transition temperatures of the prepared complexes were measured using a DSC-60 device, with a temperature range starting at room temperature to 350 °C at heating rate of 10 °C/min.

2.2 Synthesis of Schiff base ligand

The ligand 4,4',4'',4''' (E,1'E,1''E,1'''E) ([1,1'-biphenyl] 3,3',4,4' Tetrakis (azanylylidene)) tetrakis (benzene 1,3-diol) prepared from 2,4-Dihydroxybenzaldehyde (0.552g, 4mmol) dissolved in 5ml of methanol and drops of glacial acetic acid were added to this solution, then added dropwise from 3,3'-diaminobenzidine (0.214g, 1mmol) in 15ml Methanol solution. The contents were refluxed (3h) where the formation of an orange deposit during the interaction and followed by interaction using (TLC). Interaction is an inert atmosphere of Argon gas.

Schiff base ligand (C₄₀H₃₀N₄O₈): yield: 75%, color: orange, M.P.: 303°C

2.3 Synthesis of the Metal complexes

The complexes of Schiff base ligand were prepared by the addition of Schiff base ligand (1mmol) was dissolved in (2:4:4 ml) of [DMF:EtOH:MeOH] respectively to metal salt