



## Synthesis, Characterization and Thermal Studies of Schiff Bases derived from 2-Pyridinecarboxaldehyde and Benzaldehyde and their Complexes with Copper (II) and Cobalt (II)

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### ABSTRACT

Two new Schiff base ligands (L1, L2) derived from 2-pyridinecarboxaldehyde, benzaldehyde and 5-amino-1,3,4-thiadiazol-2-*thiol* have been synthesized. These ligands were treated with Cu (II) and Co (II) chloride with a metal : ligand ratio of 1:1 to afford the four new complexes [CuL1(H<sub>2</sub>O)<sub>2</sub>]Cl<sub>2</sub>, [CoL1Cl<sub>2</sub>], [CuL2(H<sub>2</sub>O)<sub>2</sub>]Cl<sub>2</sub> and [CoL2(H<sub>2</sub>O)<sub>2</sub>]Cl<sub>2</sub>. These ligands and complexes have been characterized by IR, UV-visible absorption, molar conductance, magnetic measurements and atomic absorption. The data shows that the ligands are coordinate to metal atom by nitrogen to form square planar or tetrahedral complexes with Cu (II) and Co (II). The thermal properties were studied by TGA and DTG to discover the thermal stability of the complexes. The thermal behaviours of all the metal complexes were studied from room temperature to 700 °C in nitrogen atmosphere. The TGA and DTG studies of complexes expose that the decomposition continues in three steps.

**Key words:** Schiff bases, transition metal complexes, Spectrophotometric, Conductivity, thermal analysis.

### INTRODUCTION

Schiff bases are first known by Hugo Schiff [1] since 1864 and they are produced by condensation of a primary amine with carbonyl compounds [2]. The anomethine group is common structural feature of these compounds with a general formula RHC=N-R1, where R and R1 are alkyl, aryl, or heterocyclic groups which might be variously substituted [3, 4]. These compounds are also significant class of ligands in coordination chemistry [5]. Schiff base ligands have been used to synthesis a large number of the metal complexes with different electronic structures [6]. In recent years, metal complexes of Schiff bases have been presented to exhibit a broad range of biological and pharmaceutical activities, counting antibacterial, antioxidative and antitumor activities [7]. The metal complexes of Schiff bases resulted from 4- hydroxy salicylaldehyde and amines have strong anticancer activities. The Schiff base Ligand, Tetradentate N<sub>4</sub>S<sub>2</sub>, achieved by the condensation of thiophene-2- carboxaldehyde and 1,8-diaminonaphthalene, has been used to synthesize a complex of the type, [CuL] (NO<sub>3</sub>)<sub>2</sub> [6]. A series of new 2,5-disubstituted-1,3,4-thiadiazole hitched 1,2,4-triazole, 1,3,4-thiadiazole, 1,3,4-oxadiazole and Schiff base derivatives were manufactured. All these compounds were separated for their antibacterial, antifungal and antiproliferative activity [8]. The thermal behaviours of metal complexes of Schiff bases were explored [9, 10]. The thermal analysis techniques, such as (DTG, TGA, and DTA) show a significant role in studying the thermal behaviour and the structure of metal complexes [11]. In the present work, we report the synthesis and structural studies of the complexes isolated from the reactions of copper (II) and cobalt (II) chloride with (L1), (L2).