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Synthesis, spectral, structural and antibacterial studies of ONO donor aroylhydrazone and its Mo(VI) complex

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ABSTRACT

A tridentate ONO donor aroylhydrazone, 3′,5′-dichloro-2′-hydroxyacetophenone-3-methoxybenzoylhydrazone monohydrate ($H_2CAB·H_2O$) and its *cis*-MoO_2 complex $[MoO_2(CAB)(DMF)]_2$ (DMF) (**1**) have been synthesized and characterized by elemental analysis, LCMS, FT-IR, UV–Vis and ^{1}H NMR. The molecular structures were confirmed by single crystal X-ray diffraction studies. $H_2CAB·H_2O$ and **1** got crystallized in a triclinic space group $P\bar{1}$ as monohydrated and DMF solvated respectively. The asymmetric unit of complex **1** contains two complex molecules. All the synthesized compounds are subjected to *in vitro* antibacterial studies against a series of selected bacterial strains, by agar well diffusion method, using ampicillin as standard. Both the compounds are more active against *Escherichia coli.*

1. Introduction

The antimicrobial drug resistance of the microorganism forces the research community to design and synthesise novel chemotherapeutic agents to overcome these difficulties. The designing of compounds with bioactivity becomes very necessary. Due to the availability of variety of metals and the capability of organic ligand part to tune the reactivity and structure of metal complexes, the field of coordination chemistry occupies a major share of the current inorganic research. Aroylhydrazones constitute a well-established class of pro-ligands [1–3]. The reaction parameters such as nature and denticity of the hydrazone, metal ion and its concentration and the pH of the medium contribute to the coordinating ability these flexible, polydentate ligand systems [4,5]. The increased biological activities allow hydrazones to occupy pre-eminent position in the area of medicinal chemistry. They exhibit antifungal, antimicrobial, antituberculosis, antiproliferative, anti-cancer and enzyme inhibitor properties [6–9]. These biological properties of hydrazones might be altered significantly upon complexation with transition metal ions.

Recent studies show the importance of molybdenum in the field of biology. They are relevant to active sites of various molybdoenzymes present in various living organisms such as bacteria, fungi, algae, plants and animals [10–12]. Several molybdenum compounds are reported to show antitumor and pharmaceutical properties. For example, tetrathiomolybdate acts as a copper chelator and this makes it suitable to act as a drug to treat Wilson's disease [13]. They also show antiangiogenic and anti-cancer effects [14].

The present article describes the syntheses, spectral and structural characterization of a new ONO-donor hydrazone ligand, 3′,5′-dichloro-2′-hydroxyacetophenone-3-methoxybenzoylhydrazone monohydrate ($H_2CAB·H_2O$) and a dioxidomolybdenum(VI) complex $[MoO_2(CAB)(DMF)]_2·DMF$ (**1**) derived from $H_2CAB·H_2O$. The antibacterial studies were examined for the aroylhydrazone and its Mo(VI) complex against *Bacillus subtilis*, *Escherichia coli* and *Klebsiella pneumoniae* human pathogenic bacteria.

2. Experimental

2.1. Materials

The chemicals and solvents used in the syntheses were used without further purification. The chemicals, 3′,5′-dichloro-2′-hydroxyacetophenone (Aldrich), 3-methoxybenzhydrazide (Alfa Aesar) and bis(acetylacetonato)dioxomolybdenum(VI) (Aldrich) used were of analar quality. Solvents, CH_3OH, DMF were purchased

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