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1. Introduction

Hydrazone Schiff base compounds are formed usually through the condensation reaction of stoichiometric amounts of the appropriate hydrazine/hydrazide with carbonyl compounds such as aldehydes and ketones in alcoholic solvents like ethanol [1] to yield a product with the general formula, R-CO-NH-N=CR'R'' [2]. These compounds have been found to possess interesting biological properties, such as anticonvulsant [3] [4], anti-inflammatory and antimicrobial [5], anti-tuberculosis [6], antitumor [7] [8], and antiviral [9] activities. Furthermore, they are important compounds for drug design, as possible ligands for metal complexes, organo-catalysis and also for the syntheses of heterocyclic compounds [10]. In recent years, a lot of biologically important hydrazide-hydrazone derivatives have been synthesized from different carbonyl compounds [11] [12] [13] [14] [15]. The biological activities of many of these compounds have been shown to be related to their metal-chelating abilities [16] [17] [18]. Therefore this class of compounds could be a good starting point to develop new led compounds in the treatment of multidrug-resistant bacteria.

Inspired by these considerations and in continuation with our studies on hydrazones ligands [19] [20], we herein report on the synthesis, spectroscopic, molecular modeling and antifungal activity of 4-hydroxyacetophenone isonicotinoyl hydrazone nickel(II) and manganese(II) metal complexes.

2. Materials and Method

All the reagents and chemicals used in this work were of analytical grade and used without further purification. Perkin-Elmer spectrum 100-FT-IR spectrometer was used for functional group identification. ¹H-NMR spectra were obtained on a variant unity plus 400 MHz instrument. PXRD analysis was conducted using the Bruker D8 Advance for crystal structure determination and 6545 QT used for mass spectroscopy. Thermogravimetric analysis experiments were performed on a Shimadzu simultaneous TGA/DTG-60A compositional analysis instrument and the GallenKampe melting point apparatus fitted with a mercury-in-glass thermometer having a temperature range of 10 °C to 360 °C was used for melting point determination.

2.1. Synthesis of 4-Hydroxyacetophenone Isonicotinoyl Hydrazone

A solution of 4-hydroxyacetophenone (1.36 g, 0.01 mol) in 15 mL of methanol as solvent was added to a solution of isoniazid (1.37 g, 0.01 mol) in 15 mL methanol. Three drops of glacial acetic acid were added to the resulting mixture and refluxed for 6 hours at a temperature of 70 °C. On cooling, the precipitate was filtered and washed several times with methanol and dried over CaCl₂ in a desiccator. Percentage yield was 84.2% (Scheme 1).

2.2. Synthesis of Manganese(II) Complex

The ligand (0.286 g, 1.12 mmol) dissolved in 10 mL of methanol was added to



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