


Article

# Synthesis, Spectral Characterization and Biological Activities of Co(II) and Ni(II) Mixed Ligand Complexes

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**Abstract:** 2,4-Dinitrophenylhydrazine and two thiocyanate ions in a (M:L1:L2) 1:2:2 molar ratio was synthesized in the complexes of Co(II) and Ni(II). The prepared compounds were identified through a C.H.N.S. analysis, conductivity measurements, powder X-ray diffraction (PXRD), the infrared spectrum, and a UV-visible spectrum analysis, in addition to the magnetic properties being measured. The measurements of the molar conductance implied a nonelectrolytic nature of compounds Co(II) and Ni(II). The magnetic susceptibility, as well as electronic spectra, represented all the metal complexes through octahedral geometry, respectively. The PXRD patterns suggested that all the complexes were an orthorhombic system with unit cell parameters. The in-vitro biological activity of the ligand and the metal complexes were screened against the Gram-positive and negative pathogenic bacteria *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Escherichia coli*, as well as the fungal species of *Aspergillus niger* and *Candida albicans*. Thus, the metal complexes showed a high efficiency of antimicrobial activity compared with the ligand. Furthermore, applications of the ligand, as well as the metal complexes, were tested for in-vitro antioxidant potential in a DPPH assay. The results showed that the activity of the metal complexes with the in-vitro antioxidant was more active than that of 2,4-dinitrophenylhydrazine (DNPH).

**Keywords:** mixed-ligand complexes; DNPH; antimicrobial; DPPH assay



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## 1. Introduction

Mixed chelating metal complexes are the focus for lots of researchers, as they are more than ever hugely important within the biological organism in pharmacological applications like antibacterial and fungal, anticancer, anti-inflammatory and antitumor [1]. The coordination chemistry of transition metal ions through different forms of ligands has been improved through the recent developments within the field of bioinorganics, as well as medicinal chemistry [2]; transition metals have a significant role to play in utilizing transition metal complexes as drugs for treatments for many diseases, which is an important field of research [3]. As a probe of the biological system, steady and harmless metal complexes among active metal places are valuable [4]. The environment of the metal center,