

## Abstract

Synthesis, Characterization and Biological Applications of Mixed Ligands Schiff base Transition Metal Complexes synthesized from aniline, salicylaldehyde and 4-nitroaniline were examined in this work. The synthesized Schiff base ligands were complexed with Cu(II), Zn(II), Ni(II) and Co(II) ions using reflux techniques, Fourier Transform Infrared (FTIR), UV-visible and Photoluminescence (PL) spectroscopy were used for structural elucidation, which confirmed that ligands and metal centres were effectively coordinated. The antibacterial efficiency of the complexes was assessed against *Escherichia coli*, *Staphylococcus aureus* and *Aspergillus niger*. According to the findings, the metal complexes exhibited better antibacterial activity than the free Schiff base ligand, following the order of activity: Cu(II) > Zn(II) > Ni(II) > Co(II) > ligand. This improvement can be attributed due to the chelation effects, increased lipophilicity and improved membrane penetration. Additionally, studies on photoluminescence highlighted these compounds' potential for use in optoelectronics. The results justified that Schiff base transition metal complexes, particularly Cu(II) and Zn(II) forms, are viable candidates for antibacterial applications and functional materials, with prospective usage in biological and luminescent fields