

Structural, morphological and biological investigations after the formation of nanocomposite of Cu, Co and Fe complexes derived from N-(4-chlorophenyl)salicylaldimine

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Abstract- Schiff bases and metal complexes have previously been studied by many researchers who could pinpoint their features. The development of nanocomposites combining metal (Cu, Co and Fe) complexes and Schiff base ligands has garnered significant attention due to their versatile applications in materials science and biomedicine. This study focuses on the synthesis of nanocomposites of copper (Cu), cobalt (Co), and iron (Fe) complexes based on the Schiff base ligand N-(4-chlorophenyl)salicylaldimine and evaluate their structural, morphological, and biological characteristics. Salicylaldehyde is used as a precursor in the synthesis of our Schiff base because it is a multipurpose compound with various applications in the fields of organic synthesis and biochemistry. Structural investigations were carried out using X-ray diffraction (XRD) and Fourier-transform infrared (FTIR) spectroscopy, revealing successful coordination and phase purity of the nanocomposites. Morphological studies through scanning electron microscopy (SEM) highlighted nanoscale features and uniformity in particle distribution. Additionally, antibacterial studies against Gram-positive and Gram-negative bacteria, were conducted to understand the potential applications of these nanocomposites in biomedical fields. The findings demonstrate that the Cu, Co, and Fe-based nanocomposites exhibit promising structural stability, controlled morphology, and significant biological activity, paving the way for further application-driven research in nanomaterial science.

Keywords: Nanocomposites, Schiff base, Metal Complex, Aniline, XRD, SEM, and FTIR.