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Entitled

SYNTHESIS, CHARACTERIZATION AND BIOLOGCAL EVALUATION OF SAFRANAL-LOADED METAL-ORGANIC FRAMEWORK NANOSTRUCTURES

by

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Abstract

Liver cancer remains a primary worldwide health concern, necessitating the development of innovative and effective treatment options. In this study, we present a biocompatible iron-based metal-organic framework (Fe-MOF) consisting of iron ligands connected by terephthalate linkers loaded with safranal, a natural biomolecule extracted from stigmas of Crocus Sativus flower (also known as saffron), a therapeutic intervention with dual efficiency. This compound not only meets the demand for improved liver cancer therapies but also exhibits antibacterial properties against Escherichia coli and Lactobacillus. The synthesis stage of the study focuses on preparing MIL-88B(Fe) and loading safranal into/onto its structure. The material's composition and purity are validated through various characterization techniques, including XRD, FTIR, TGA, and N_2-adsorption. Furthermore, the morphology and uniformity are assessed using the SEM-EDX approach, while the successful loading of safranal is confirmed through the NMR technique. The potential of MIL-88B(Fe) and loaded-MIL-88B(Fe) as promising anticancer/antibacterial agents is highlighted by their substantial inhibitory impact on the growth of HepG2 cells and the examined bacterial strains. The present findings pave the way for developing innovative multifunctional agents with potential applications in biotechnology.

Keywords: Fe-MOFs, MIL-88B(Fe), Safranal, HepG2 cells, Escherichia coli, and Lactobacillus