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# Ferrocenyl chalcone-based Schiff bases and their metal complexes: highly efficient, solvent-free synthesis, characterization, biological research

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## Abstract

This study highlights the synthesis and characterization of Schiff base ligands namely 1-ferrocenyl-3-(2-furyl) propenone diamino (thio) urea and selected metal complexes including Pb(II), Bi(III), Cu(II), Cr(III), Ba(II), Cd(II), Fe(II), Ni(II), Sn(II), Nd(II) as a central metal. The stoichiometric ratios of the prepared complexes were estimated using complementary techniques such as elemental analyses (C,H,N), FT-IR and molar conductivity. Furthermore, their physicochemical studies were carried out using thermal TGA. Antimicrobial activities of both the Schiff base ligand and its metal complexes were tested against strains of *Gram (-ve)*, such as *E. coli* and *S. aureus* and *MRSA*, *C. albicans* and *A. flavus fungi*. The investigated Schiff base complexes showed higher activity and stability than their corresponding Schiff base ligands. and the addition of ferrocene group also achieved the function of drug superposition. Moreover, the prepared Schiff base ligand and its Cu(II) and Cd(II) and Ni(II) complexes have been evaluated for their anticancer activities against two cancer cell lines namely mouse leukemia cells (P-388) and lung cancer (A-549) cell lines.

**Keywords:** ferrocenyl; Schiff base; complex; solid phase synthesis; biological activity

## 1. Introduction

Organometallics and their metal ion complexes are considered as privileged class of compounds due to their biochemical synthesis, electrochemic-analysis, antifungal, antimicrobial as well as catalytic activities<sup>[1-6]</sup>. As an important part of organometallic

compounds, ferrocene and its complexes are used in various fields such as catalysis, material science, crystal engineering and bio-organometallic chemistry<sup>[7-10]</sup>. It had been reported that the activities of certain drugs were enhanced by introducing ferrocene into their structures such as ferrocene aspirin<sup>[11]</sup>,

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