"Efficient Synthesis and Antimicrobial Potential of N-Mannich Bases of 3, 4- Dihydropyrimidin-2-(1H)-ones Catalyzed by Cobalt Chloride Doped Polyaniline Composite"

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Abstract:

This study explores a novel, eco-friendly protocol for synthesizing N-Mannich bases of 3,4-dihydropyrimidin-2(1H)-ones using cobalt chloride doped polyaniline composite (Co-PANI) as a catalyst under solvent-free conditions. Employing the Biginelli reaction with aldehydes, alkyl acetoacetate, and urea or thiourea at 80°C, we demonstrate that Co-PANI catalysis yields high efficiency, mild reaction conditions, and excellent reusability, making it a cost-effective and environmentally benign option. The synthesized compounds were structurally characterized through spectroscopic techniques, and their antimicrobial efficacy was evaluated. Results indicate that these compounds exhibit significant activity against various bacterial strains. This method highlights the potential of Co-PANI as an effective, reusable catalyst, advancing sustainable practices in organic synthesis and offering promising antimicrobial applications for dihydropyrimidinones.

Keywords: N-Mannich Bases of DHPMs, biological activities, Biginelli reaction, MIC.

Introduction:

Pharmaceutical industries have shown a strong interest in multicomponent reactions, green chemistry approaches, and solvent-free synthesis methods for producing complex drugs. These methodologies are essential for exploring the molecular diversity involved in complex reactions, particularly with heterocyclic compounds [1-6]. Among these, the Biginelli synthesis stands out as a valuable multicomponent reaction in organic and medicinal chemistry, enabling the efficient production of multifunctional compounds, such as 3,4-dihydropyrimidin-2(1H)-ones and related heterocycles [7].