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A Comprehensive Study on Synthesis of Pyridine Using Novel Techniques

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Abstract: *Pyridine is a basic Heterocyclic organic compound. It is structurally related to benzene, with one methene group (=CH-) replaced by nitrogen atom (=N-). It is highly flammable, weakly alkaline, water miscible liquid with a distinctive. This research focuses on developing an environmentally friendly and sustainable approach to the synthesis of pyridine using green chemistry principles. Pyridine derivatives are an important class of heterocyclic compounds with diverse applications in pharmaceuticals, agrochemicals, and materials science. This study explores the synthesis, characterization, and biological evaluation of new pyridine derivatives, highlighting their structure-activity relationships (SAR) and potential applications in drug discovery. The synthesis of heterocyclic compounds under various conditions like solvent-free, reactants immobilized on solid Support, microwave irradiation condition a very important role with plenty of rational therapeutic activities such as antiulcer, antihypertensive, analgesic, Anti-inflammatory, anti-viral, antifungal, anticancer, and antihistaminic. Advanced spectroscopic techniques were employed for structural confirmation, and in vitro assays demonstrated promising pharmacological activities, suggesting further exploration for therapeutic development. Traditional synthetic approaches often suffer from limitations such as harsh reaction conditions, low yields, and environmental concerns. This study presents a novel technique for the synthesis of pyridine derivatives, utilizing a more sustainable and efficient catalytic system. The proposed method employs eco-friendly reagents and optimized reaction conditions to enhance selectivity and yield while minimizing by-products. Advanced spectroscopic techniques (NMR, FTIR, and MS) confirm the structural integrity of the synthesized compounds. The novel approach offers a promising alternative to conventional methods, providing a more viable and scalable route for pyridine derivative synthesis in both academic and industrial applications.*

Keywords: Pyridine, Eco- friendly, solvent free, green synthesis, microwave assist catalyst

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