Title: Exploring Pyridine-Based Schemes: A Comprehensive Review on their Synthesis and Therapeutic Applications

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Abstract: Pyridine and its derivatives are six-membered aromatic rings containing nitrogen, which are abundant in nature and indispensable in studying heterocyclic chemistry. They constitute significant chemical substances with numerous applications. The application of pyridine derivatives by incorporating metals in modern medicine is growing in relevance. Due to their convenient parallelization and various testing capabilities in the chemical domain, pyridine derivatives have attracted increased interest in the treatment of various disease states. This review aims to systematically evaluate and highlight the recent advancements in the synthesis (conventional, synthetic, and green approach) and biological activities of metal-based pyridine derivatives, including antioxidant, antimicrobial, and antitumor activities, while identifying promising candidates for further drug development. By consolidating all this knowledge underlying their biological effects, this review aims to pave the way for future research endeavors and encourage the exploration of pyridine derivatives as viable therapeutic agents across a diverse array of medical applications.

Keywords: Biological effects; characterization; drug development; green approach; pyridine; therapeutic agents.

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