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A Comprehensive Study on Acylation of Amine through Novel Techniques

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Abstract: An environmentally sustainable and efficient alternative to conventional acylation methods is essential in modern organic synthesis. Acylation of amines is a fundamental transformation in organic chemistry, playing a crucial role in pharmaceuticals, agrochemicals, and material sciences. However, traditional acylation techniques often rely on toxic reagents, prolonged reaction times, and hazardous solvents, raising concerns about sustainability, efficiency, and environmental impact. To address these limitations, advanced acylation techniques such as microwave-assisted synthesis, biocatalysis, and solventfree methodologies have emerged as promising eco-friendly substitutes. Microwave-assisted acylation significantly enhances reaction rates by providing uniform heating, reducing energy consumption, and improving product yields. Biocatalytic approaches utilize enzyme specificity to achieve highly selective transformations under mild conditions, making them an attractive green alternative. Solvent-free methodologies further minimize environmental waste and align with green chemistry principles by eliminating the need for hazardous solvents, thereby reducing toxic byproducts. A comparative analysis of these methods highlights their advantages over conventional techniques in terms of reaction efficiency, selectivity, and sustainability. This study underscores the urgent need for greener and more economically viable alternatives in organic synthesis, paving the way for sustainable advancements in chemical processes and industrial applications.

Keywords: Green synthesis, Acylation, ecofriendly Synthesis, Microwave-Assisted Reaction, Biocatalysis, Solvent-Free Methods

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