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Thiadiazole and Its Derivatives: Emerging Synthetic Methods Using Thiosemicarbazides and Hydrazides

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Abstract: *Thiadiazoles and their derivatives have attracted considerable interest due to their wide-ranging pharmacological and industrial applications. Recent progress in their synthesis has predominantly centered on the use of thiosemicarbazides and hydrazides as fundamental precursors. Various catalytic and non-catalytic methodologies, including green chemistry approaches, microwave-assisted techniques, and solvent-free conditions, have been explored to improve efficiency and yield. Structural modifications of thiadiazoles have resulted in compounds exhibiting enhanced biological activities, such as antimicrobial, anticancer, and anti-inflammatory effects. This review provides an overview of recent advancements in synthetic strategies, reaction mechanisms, and novel applications of thiadiazole derivatives, with a focus on sustainable and cost-effective methods*

Keywords: Thiadiazole, thiosemicarbazides, hydrazides, green chemistry, catalytic methods, biological activities

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