

**Frontiers in Pharmaceutical, Material, and
Environmental Sciences: Innovative Approaches
and Applications**

Editors

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Chapter – 2

Synthesis of p-Toulenesulfonylisocyanate and amines with acetonitrile solvent

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Abstract

The reaction between Para-toluenesulfonyl isocyanate (PTSI) and amine with the acetonitrile solvent is investigated to explain its kinetics, mechanism and synthetic utility. Kinetic studies reveal a second-order reaction dependence on both PTSI and aniline concentrations, with reaction rate constants determined over a range of temperatures. Spectroscopic analysis FT-IR confirms the formation of the desired product provides insights into reaction intermediates. The influence of reaction parameters such as temperature, concentration, and solvent composition on product yield and selectivity is explored. Mechanistic investigations suggest a stepwise addition elimination pathway with the solvent playing an important role in facilitating the reaction. Optimization of reaction conditions yields high product yields with minimal formation of byproducts. The synthetic utility of the reaction product is evaluated demonstrating its potential applications in organic synthesis. Environmental and safety considerations regarding the reaction are also discussed. Ultimately this research contributes to the broader understanding of organic synthesis of sulfonamides from para-toluenesulfonyl isocyanate with amines with the help of solvent acetonitrile.

Keywords: Para-toluenesulfonyl isocyanate, environment, kinetic studies, sulfonamides

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