

Synthesis of Ibuprofen Derivatives using Different Solvent Systems and Comparative Study of Different Solvent Systems for Synthesis of Ibuprofen

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Abstract: *This study investigates the synthesis of ibuprofen derivatives using various solvent systems to evaluate their effects on reaction yield, purity, and selectivity. A systematic approach was employed wherein different solvents were selected based on polarity, boiling point, and environmental impact. The ibuprofen derivatives were synthesized using conventional esterification and amidation reactions under optimized conditions. Purification was performed by column chromatography and recrystallization, and the compounds were characterized by infrared spectroscopy, nuclear magnetic resonance (NMR), and mass spectrometry. Advanced statistical analyses—including one-way ANOVA and multivariate regression—were applied to assess the influence of solvent systems on key synthesis parameters. Results indicate that polar aprotic solvents provided significantly higher yields and enhanced selectivity compared to protic solvents, with notable differences in reaction kinetics. In addition, the environmental impact and cost analyses further delineated the optimal solvent system for a sustainable and efficient synthesis process.*

Keywords: Green solvent, Ibuprofen, Regression, ANOVA, statistics

