

# Sustainable Process for Ibuprofen Synthesis Utilizing Renewable Energy Sources

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**Abstract:** *This research report investigates the feasibility of employing renewable energy sources for the synthesis of ibuprofen. The study evaluates the environmental impact, cost efficiency, and comparative performance between renewable energy and traditional energy sources in chemical synthesis. Specifically, renewable energy sources such as solar, wind, and biomass were selected to power the synthesis process via a modified Friedel-Crafts acylation reaction. Advanced statistical tests—including analysis of variance (ANOVA), multiple linear regression, and paired t-tests—were used to analyse experimental data. Six tables summarize key data points such as energy consumption, efficiency metrics, environmental impact indicators, and cost analyses. The results indicate that renewable energy sources offer significant environmental benefits while maintaining competitive efficiency and cost-effectiveness compared to conventional fossil fuel-based processes. This report thus supports further development and industrial application of renewable energy technologies in pharmaceutical synthesis.*

**Keywords:** Renewable, Energy, Source, Ibuprofen, Sustainability

