

PAPER-ID-032

Optimization of Biofuel Production from Treated Rice Husk: A Study on Temperature and Particle Size Variation

Naveen Kumar Gupta^{1*}, Nitesh Kumar¹, Rahul Baidya²

¹*Department of Mechanical Engineering, Brainware University, Kolkata -700125,
West Bengal, India*

²*Department of Mechanical Engineering, Institute of Engineering & Management, School of
University of Engineering and Management, Kolkata – 700091, West Bengal, India*

**Corresponding author: nvnkumargupta@gmail.com*

Abstract

This study explores the optimization of biofuel production from rice husk by varying particle sizes, pyrolysis temperatures, and pre-treatment methods. The experiments focused on enhancing biofuel yield and quality, utilizing rice husk—a widely available agricultural residue with high lignocellulosic content. The study aimed to maximize biofuel yield and quality, using rice husk as a sustainable feedstock. Experiments were conducted at temperatures ranging from 400°C to 700°C, with a heating rate of 4°C/min and a retention time of 30 minutes. The rice husk was separated into different particle sizes (0.5 mm, 1 mm, and 2 mm) to evaluate the effect of particle size on biofuel yield and quality.

The results revealed that smaller particle sizes (0.5 mm) significantly increased biofuel yield due to better heat transfer and surface area exposure. The highest biofuel production occurred at 600°C, with the 0.5 mm particles yielding approximately 15% more biofuel than larger particles. Pre-treatment methods also played a critical role; composted rice husk consistently showed the highest biofuel yields, while alkaline hydrolysis led to decreased yields, particularly in larger particle sizes.

This study demonstrates the importance of optimizing pyrolysis conditions, particle size, and pre-treatment methods to enhance biofuel production from rice husk. The findings contribute valuable insights for developing more efficient biofuel production processes, aligning with global sustainability goals. The presentation will cover the experimental methods, key findings, and practical implications for scaling biofuel production, offering a comprehensive overview of the potential of rice husk as a renewable energy source.

Keywords: Biofuel; Pyrolysis; Particle size; Pre-treatment; Sustainability