

Advances in Waste Management and Resource Utilization

4th International Conference on Sustainable Waste Management 2025

Abstract Book

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Sustainable Waste Management

12th - 14th September, 2025



Chief Editor

Rahul Baidya

Editor

Anirban Mukherjee

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Edited by

Rahul Baidya

Office of Sustainability
Department of Mechanical Engineering
Institute of Engineering & Management,
School of University of Engineering and Management Kolkata
Salt Lake, Kolkata – 700091

Anirban Mukherjee

Somdipta Bagchi

Office of Sustainability
Institute of Engineering & Management,
School of University of Engineering and Management Kolkata
Salt Lake, Kolkata – 700091

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Centre for Research and Innovation (CRI)

**Department of Mechanical Engineering
Institute of Engineering & Management,
School of University of Engineering and Management Kolkata
Salt Lake, Kolkata – 700091**

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Centre for Research and Innovation (CRI),
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Email: icswm@iem.edu.in

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Properties of Oil and Char Derived from Slow Pyrolysis of Different Biomass at Different Conditions

Naveen Kumar Gupta^{1,2,*}, Nitesh Kumar¹, Rahul Baidya^{2,3}

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

³ Office of Sustainability, Institute of Engineering & Management,
School of University of Engineering and Management, Kolkata – 700091, West Bengal, India

*Corresponding Author: nvnkumargupta@gmail.com

Abstract

This study aims at identifying the characteristics of oil and char produced as a result of slow pyrolysis of two crop wastes rice husk and wheat husk under varied particle sizes, temperatures, and pre-treatment. The primary objective was to compare High Heating Value (HHV) and quality of fuel of the pyrolysis product in order to ascertain the best conditions for optimum energy yield. The biomass was subjected to composting, acid hydrolysis, and alkaline hydrolysis and then paralyzed at temperatures of 300°C to 550°C with particle sizes of 150 µm, 300 µm, and 600 µm. The results indicated that lower particle size and increased temperature provided increased oil yield and quality. Out of all, composted rice husk at 550°C and 150 µm size provided maximum oil yield (42.8%) and HHV of 25.3 MJ/kg and was thus the best condition. Acid and base treatment enhanced the fuel quality by minimizing lignin and maximizing cellulose, which facilitated improved thermal breakdown. The char obtained under alkaline hydrolysis revealed the maximum HHV (28.6 MJ/kg), improved fixed carbon, and minimum ash content, which renders it a good solid fuel. Wheat husk produced lower HHV values than rice husk under identical conditions. This research evidently demonstrates that the energy content and quality of oil and char strongly vary with particle size, temperature, and treatment of biomass. These results will aid in the selection of the optimal biomass type and condition for efficient biofuel generation in Indian industries.

Keywords: Slow pyrolysis; High Heating Value; Rice husk; Wheat husk; Biomass pre-treatment.