Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 32 2024

Colloquium on Applied Sciences - CAS 2023
17-18 July 2023, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Effect of Methanol-Oil-Molar Ratio & Catalyst Loading on Conversion of Waste Cooking Oil into Biodiesel Using Chicken Manure as Solid Base Catalyst

Nor Anisah Rosley[a], Noraini Hamzah[a*]

Structured Abstract

Background: In this study, the objective was to explore an alternative to conventional diesel that causes less harm to the environment. Biodiesel, derived from waste cooking oil (WCO), serves as a renewable source and addresses the issue of improper WCO disposal, contributing to environmental damage. Utilizing WCO as a feedstock offers economic benefits and helps minimize biodiesel production costs.

Methods: The method involved transesterification process of WCO with chicken manure as a solid base catalyst. The study focused on modifying the molar ratio, as it significantly impacts the conversion rate.

Results: Chicken manure, chosen for its availability and low cost, proved to be highly effective with up to 82% FAME yield at optimal reaction conditions (7.5 wt% of catalyst, 15:1 methanol-to-oil molar ratio, 4.5 hours, and 65°C). The physicochemical properties of the chicken manure catalyst were characterized using TGA, XRD, FESEM, and FTIR analyses. TGA analysis confirmed stability at high temperatures, XRD revealed the presence of CaO in the catalyst, FTIR exhibited CaO stretching, and FESEM demonstrated improved particle morphology with increasing temperature. The study demonstrated the potential of WCO as a feedstock for biodiesel production, reducing environmental harm and offering societal benefits. The use of chicken manure as a catalyst showcased a low-cost option for biodiesel production techniques, expanding its applications beyond farming.

Conclusion: This research contributes to more sustainable biodiesel production and highlights the versatility of porous materials like chicken manure in various sectors.

Keywords: Biodiesel production, CaO catalysts, Transesterification, Chicken manure, Waste cooking oil

*Correspondence: pnoraini@uitm.edu.my

[a]School of Chemistry and Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia