PROPERTIES OF LIGHTLY USED COOKING OIL AND THEIR INFLUENCE ON BIODIESEL QUALITY

MUHAMMAD AFIF AZMAN BIN NOOR AZMAN

BACHELOR OF SCIENCE (Hons.)
APPLIED CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

AUGUST 2024

UNIVERSITI TEKNOLOGI MARA | Fakulti Sains Gunaan

SUBMISSION FOR EVALUATION

FINAL YEAR PROJECT 2 - RESEARCH PROJECT

PROPERTIES OF LIGHTLY USED COOKING OIL AND THEIR INFLUENCE ON BIODIESEL QUALITY

Name	:	MUHAMMAD AFIF AZMAN BIN NOOR AZMAN
Student ID	:	2021604082
Program	:	AS245
Course code	:	FSG671
Mobile Phone	:	
E-mail	:	2021604082@student.uitm.edu.my

Approval by Main Supervisor :

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name	:	
Date	:	
Turnitin Similarity %	:	
Signature	:	

DR [illegible] NUR IA BINTI ALI
Pensyarah K[illegible]san (Kimia)
Fakulti Sains Gunaan
Universiti Teknologi MARA Caw. Perlis
Kampus Arau
02600 Arau, Perlis.

PROPERTIES OF LIGHTLY USED COOKING OIL AND THEIR INFLUENCE ON BIODIESEL QUALITY

MUHAMMAD AFIF AZMAN BIN NOOR AZMAN

Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA

AUGUST 2024

ABSTRACT

PROPERTIES OF LIGHTLY USED COOKING OIL AND THEIR INFLUENCE ON BIODIESEL QUALITY

The increasing consumption of cooking oil has led to a significant rise in waste cooking oil (WCO), presenting environmental disposal challenges. WCO has been reported to have high FFA value, moisture content, and degree of degradation due to multiple usage. This study investigates the properties of lightly used cooking oil (WCO A: 2 times usage and WCO B: 3 times usage) and their influence on the quality of biodiesel produced through the transesterification process. FFA value, moisture content, viscosity, and functional groups of the biodiesel produced were then analyzed to determine the suitability of WCO for biodiesel production. Based on the results, WCO B had higher FFA value (3.64%) and moisture content (0.83%) which later caused lower biodiesel yield compared to WCO A. The optimal condition of temperature (60 ℃) and reaction time (150 min) shows the production of higher biodiesel yield for WCO A (94.18%) and WCO B (87.58%), respectively. In terms of analysis results for both Biodiesel A has a lower FFA value and moisture content (1.89% - FFA value and 0.29% - moisture content) than Biodiesel B (2.29% and 0.54%, respectively). For viscosity analysis, Biodiesel A has a lower viscosity than Biodiesel B at temperatures 40 ℃ (5.952 mm^2/s) and 100 ℃ (5.029 mm^2/s). Lastly, for functional groups that have been analyzed in Biodiesel A and BiodieselB. FT-IR spectroscopy further highlighting characteristic peaks of ester carbonyl groups and C-H stretching vibrations at peak 2850 cm^{-1} and 2960 cm^{-1} typical of fatty acid methyl esters (FAMEs) in both biodiesels but there were differences inthe intensity of peak at 2400 cm^{-1} – 1900 cm^{-1} which Biodiesel A contains higher ester carbonyl group than Biodiesel B. Thus, the results from the analysis of Biodiesel A and Biodiesel B indicate that lightly used cooking oil can be effectively converted into biodiesel. However, to ensure the biodiesel produced meet the standards, the WCO needs to be pretreated to remove the contaminants, especially the FFA.

TABLE OF CONTENTS