UNIVERSITI TEKNOLOGI MARA
Cawangan Terengganu
Kampus Bukit Besi

TITLE:

THE CORRELATION OF THERMAL DECOMPOSITION BEHAVIOUR WITH THE FUNCTIONAL GROUP COMPOSITION OF K/AC CATALYST WITH MASS RATIO K:AC OF 1:3 AND 1:4 FOR BIODIESEL PRODUCTION

SUPERVISOR:
TS. NORKAMRUZITA BINTI SAADON

SCHOOL OF CHEMICAL ENGINEERING
COLLEGE OF ENGINEERING

2024

AUTHOR'S DECLARATION

" I hereby declare that this report is the resof my own work except for quotations and summaries which have been duly acknowledged."

Name of Student	:	Nor Adibah Amni binti Nordin
Student I.D. No.	:	2022880306
Programme	:	Diploma in Chemical Engineering
College/School	:	College of Engineering/School of Chemical Engineering
Signature of Student	:	
Date	:	29/1/2024

ABSTRACT

The exhaustion of fossil fuel reserves has triggered a growing demand for biodiesel, particularly Fatty Acid Methyl Ester (FAME), as a more sustainable and environmentally friendly alternative. Nonetheless, the elevated production costs present a significant challenge, especially in optimizing catalyst efficacy. Considering Malaysia's robust palm oil industry, this study investigates the utilization of palm kernel shells (OPKS) as a renewable resource for the development of potassium-supported activated carbon (K/AC) catalysts in biodiesel production. The research aims to analyse the relationship between the thermal decomposition behaviour and functional group composition of K/AC catalysts with mass ratios of 1:3 and 1:4. The catalysts were synthesized through carbonization, wet impregnation, and calcination, followed by characterization using Thermogravimetric Analysis (TGA) and Fourier Transform Infrared Spectroscopy (FTIR). TGA results indicate that the 1:3 K/AC catalyst demonstrated superior thermal stability, retaining greater mass at elevated temperatures compared to the 1:4 catalyst. FTIR analysis confirmed the existence of hydroxyl and alkyne functional groups, with the 1:3 catalyst exhibiting a more stable surface structure. These findings imply that the 1:3 K/AC catalyst is more suitable for high-temperature applications, particularly in biodiesel production. This study underscores the potential of OPKS-based catalysts as a cost-effective and sustainable alternative to conventional catalysts. Future research should concentrate on refining the potassium impregnation process, assessing catalyst performance in large-scale applications, and evaluating its reusability for industrial biodiesel production.

TABLE OF CONTENTS