



الْأَبْنَاءُ الْمُسْلِمُونَ
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MARA

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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**

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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.”


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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

	Page
AUTHOR’S DECLARATION	2
ABSTRACT	3
TABLE OF CONTENTS	4
 CHAPTER ONE BACKGROUND	 6
1.1 Introduction	6-8
1.2 Literature Review	
1.2.1 Activated Carbon	8
1.2.2 Catalyst	8-9
1.2.3 Introduction to K/AC Catalysts	9
1.2.4 Thermal Decomposition in Catalysts	10
1.2.5 Functional Groups in Activated Carbon Catalysts	10
1.2.6 Influence of K:AC Mass Ratios on Catalyst Properties	10-11
1.2.7 Correlation Between Functional Group Composition and Thermal Behaviour	11
1.2.8 Analytical Techniques for Characterizing Catalysts	11-12
1.2.9 Research Gaps and Need for Current Study	12
1.3 Problem Statement	13
1.4 Objectives	13
1.5 Scope of Study	14
 CHAPTER TWO METHODOLOGY	 15
2.1 Introduction	15
2.2 Materials	15
2.3 Method/synthesis	16-20

CHAPTER THREE RESULT AND DISCUSHION

3.1	Introduction	21
3.2	Data Analysis	22
	i) Thermal Gravimetric Analysis	22-25
	ii) Fourier Transform Infrared Spectroscopoy	26-31

CHAPTER FOUR CONCLUSION AND RECOMMENDATION

4.1	Conclusion	32
4.2	Recommendation	32

REFERENCES	33-36
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