



الجامعة
UNIVERSITI
TEKNOLOGI
MARA

Cawangan Terengganu
Kampus Bukit Besi

TITLE:

**FUNCTIONAL GROUP OF THE SODIUM SUPPORTED
BY ACTIVATED CARBON CATALYST WITH MASS
RATIO NA:AC OF 1:1, 1:3, 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	:	MUHAMMAD HAFIZI BIN RAZALI
Student I.D. No.	:	2022862984
Programme	:	Diploma in Chemical Engineering
College/School	:	College of Engineering/School of Chemical Engineering
Signature of Student	:
Date	:	12/2/2025

ABSTRACT

For my Final Year Project (FYP), the title is **“Functional Group of The Sodium Supported by Activated Carbon Catalyst with Mass Ratio Na/AC of 1:1, 1:3, and 1:4 For Biodiesel Production”** using transesterification process. The research is to identify and determine the functional groups of Na/AC and to find the efficiency of catalyst for biodiesel production. Malaysia is the second largest country, which produce the waste of Oil Palm Kernel Shell (OPKS). Every year, the rate of waste of OPKS increases.

Fourier Transform Infrared Spectroscopy (FTIR) is a method to analyze the functional groups of catalytic activities. The result showed the variations of the Na:AC at mass ratio 1:1, 1:3, and 1:4 had a significant effect on the functional groups contribution and catalytic performance. This project also found the Sodium Hydroxide (NaOH) as a heterogeneous catalyst increased biodiesel yield by increasing selectivity and reducing the formation of byproducts compared to homogeneous catalysts. Overall, this project is research to find the potential of Na/AC composites to optimize the heterogenous catalyst for production of biodiesel while managing the renewable fuels and reducing the waste.

TABLE OF CONTENTS

	Page
AUTHOR'S DECLARATION	2
ABSTRACT	3
TABLE OF CONTENTS	4-5
CHAPTER ONE BACKGROUND	6-9
1.1 Introduction	
1.2 Literature Review	
1.2.1 Introduction of Na/AC Catalyst	
1.2.2 Sodium's Role in Catalyst Modification	
1.2.3 Effect of Na/AC Mass Ratios on Functional Group Composition	
1.3 Problem Statement	
1.4 Objectives	
1.5 Scope of Study	
CHAPTER TWO METHODOLOGY	10-13
2.1 Introduction	
2.2 Materials	
2.3 Method/synthesis	
2.3.1 Preliminary Treatment	
2.3.2 Carbonization Process	
2.3.3 Impregnation Process	
2.3.4 Calcination Process	
CHAPTER THREE RESULT AND DISCUSSION	14-20
3.1 Introduction	
3.2 Data Analysis	
3.2.1 Fourier Transform Infrared (FTIR) Analysis, 1:1	
3.2.2 Fourier Transform Infrared (FTIR) Analysis, 1:3	

- 3.2.3 Fourier Transform Infrared (FTIR) Analysis, 1:4
- 3.2.4 Comparison Between Result of FTIR Graph Analysis

CHAPTER FOUR CONCLUSION AND RECOMMENDATION	21
4.1 Conclusion	
4.2 Recommendation	
REFERENCES	22