

**BIODIESEL PRODUCTION CATALYZED BY ALUMINA
SUPPORTED POTASSIUM IODIDE**

ZURAIDAH BINTI MOHD SHUKERI

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

JANUARY 2016

ACKNOWLEDGEMENT

First and foremost, I would like to express my thanks to Allah S.W.T because with His blessing I finally succeed in final year project which is title Biodiesel Production Catalysed by Alumina Supported Potassium Iodide. Not forget to my family that always support me especially my parents.

I also want to express my appreciation towards my beloved supervisor, Ms. Shahida Hanum binti Kamarullah for guiding me to complete my Final Year Project. Not forget million thanks to my co-supervisor, Mr. Zainal Kifli bin Abdul Razak for guiding me during the project work.

For all the laboratory assistants that involve directly or indirectly in helping me, thanks a lot for the support and for helping me finished up my project. Last but not least, I would like to thank to all my fellow friends who support and help me in completing my project and thanks to Universiti Teknologi Mara (UiTM) for provide me facilities and instruments in order to complete my Final Year Project.

Zuraidah binti Mohd Shukeri

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Objectives of study	5
1.3 Problems statement	5
1.4 Significance of study	6
1.4.1 As reference for the next study	6
1.4.2 Rubber seed oil as source of biodiesel	6
1.4.3 Extraction of rubber seed oil	7
1.4.4 Abundant of rubber seed tree	7
CHAPTER 2 LITERATURE REVIEW	
2.1 Sources biodiesel	8
2.1.1 Edible oil	8
2.1.2 Non-edible oil	9
2.2 Transesterification reaction	11
2.3 Catalysts	14
2.3.1 Acid catalyst	14
2.3.2 Base catalyst	16
2.3.3 Enzyme catalyst	17
2.4 Homogenous and heterogenous base catalyst	18
2.4.1 Homogenous base catalyst	18
2.4.2 Heterogenous base catalyst	21

CHAPTER 3 METHODOLOGY

3.1	Materials	25
3.2	Apparatus	26
3.3	Instruments	26
3.4	Rubber seed	27
3.5	Extraction of rubber seed oil	27
3.6	Alumna supported potassium iodide	27
3.7	Solid alkali-catalyzed transesterification of rubber seed oil (Effects of loading amount on the percent biodiesel yield)	28
3.8	Determination of saponification value	28
3.9	Determination of acid value	29
3.10	Standardization of hydrochloric acid, HCl	30
3.11	Standardization of potassium hydroxide, KOH	30
3.12	Characterization of catalyst	31
3.13	Gas Chromatography Mass Spectroscopy, GC-MS analysis	31

CHAPTER 4 RESULTS AND DISCUSSION

4.1	Introduction	33
4.2	Molar ratio of MeOH:oil	33
4.3	Reaction temperature	34
4.4	Reaction time	36
4.5	Amount of catalyst	37
4.6	Effect of acid value on the percentage FAME yield	39
4.7	Saponification value	41
4.8	Fourier Transform Infrared (FTIR) analysis	42
4.9	Gas chromatography analysis for the determination of compounds	45

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1	Conclusion	47
5.2	Recommendation	48

CITED REFERENCES	49
-------------------------	----

APPENDICES	55
-------------------	----

<i>CURRICULUM VITAE</i>	59
--------------------------------	----

ABSTRACT

BIODIESEL PRODUCTION CATALYZED BY ALUMINA SUPPORTED POTASSIUM IODIDE

The conversion of rubber seed oil (RSO) to biodiesel by using transesterification reaction was studied. Heterogeneous base catalyst which is alumina supported potassium iodide, KI/Al_2O_3 was used to carry out the transesterification reaction. The main objective of this study is to determine effect of loading amount of catalyst on the percent yield of biodiesel. The transesterification reaction was carried out in a condition where 12:1 for molar ratio of methanol to oil (MeOH:oil), 60 °C for reaction temperature, 6 hour reaction time and 600 rpm for agitation rate. The different loading amount of catalyst shows significance effect to the percent yield of biodiesel. The optimum amount of catalyst that is 2.0% gives the highest percent yield which is 84.1%. The types of fatty acids that present in the RSO was determined by using gas chromatography-mass spectrometry (GC-MS). GC-MS analysis shows that there are palmitic, stearic, linoleic, and linolenic acid present in the RSO. The free fatty acid (FFA) in RSO was 17.5% whereas the acid value and saponification value are 37.2 mg KOH/g and 191.1 mg KOH/g. Therefore, KI/Al_2O_3 has great potential to be used as a catalyst for producing biodiesel.