SYNTHESIS AND CATALYTIC PERFORMANCE OF CHROMIUM-BASED CATALYST IN ESTERIFICATION PALM FATTY ACID DISTILLATE TO PRODUCE PALM FATTY ACID METHYL ESTER

MOHD FIRDAUS BIN ROSLAN

BACHELOR OF CHEMICAL ENGINEERING (ENVIRONMENT) WITH HONOURS

UNIVERSITI TEKNOLOGI MARA

2017

AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own, unless otherwise indicated or acknowledge as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

Signed: .....

Date : 11/7/2017

Mohd Firdaus Roslan

Student ID: 2014811796

SUPERVISOR'S CERTIFICATION

We declared that we read this thesis and in our point of view this thesis is qualified in terms of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

Signed: .....
Date : 11/7/17

Main Supervisor
Dr. Wan Zuraida Wan Kamis
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

Signed: .....
Date : 11/7/17

Co-Supervisor
Siti Fatimah Abdul Halim
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

ACKNOWLEDGEMENT

I would like to express the deepest appreciation to my main supervisor, Dr. Wan Zuraida Wan Kamis, who has the attitude and the substance of a genius: she continually and convincingly motivates me to build-up confidence and attitude of never give up in doing this research. Without her guidance and persistent help this research and thesis would not have been possible.

I would also like to thank my co-supervisor, Puan Siti Fatimah Abdul Halim, who always supported by the engagement in the analysis of my findings and give solutions for any problems during my research.

In additions, a thank you to the coordinator for the final year project course, Puan Rasyidah Alrozi who gave the guidelines to make the thesis completed according to the format and regulations of Universiti Teknologi MARA. Besides that, a very much thank to my team members in this research, Muhammad Imran bin Sulaiman for assisting me and discussing with me along the path of this research. I thank Universiti Teknologi MARA Cawangan Pulau Pinang for permission in terms of using the facilities during the experiment conducted for my thesis. I also thank all the laboratory technician and assistant for assisting me in my lab work.

ABSTRACT

Fatty acid methyl ester (FAME), a potential biodiesel was widely being highlighted for its role as an alternative source for fuel and diesel used in manufacturing industry and transportation. In this study, mixed oxide catalyst which is chromium-based (Cr, Cr-Mn, Cr-Ti) was synthesized by using sol-gel method and analyzed for the production of fatty acid methyl ester (FAME) from palm fatty acid distillate (PFAD) via esterification process. The reactions were conducted in a batch reactor with the temperature of 160°C and reaction time of 2 hours. Two parameters were studied for reaction condition which is the effects of catalyst dosage and reaction time. The chromium-based catalyst that has best performance in production of FAME was $CrTiO_2$ catalyst with lowest density of FAME is 0.7585 g/cm^3. This shows that the $CrTiO_2$ can be a good and potential solid catalyst for enhancing FAME production.