

UNIVERSITI TEKNOLOGI MARA



SYNTHESIS AND CHARACTERISATION OF TiO BASED
CATALYST FOR THE PRODUCTION OF FAME FROM
THE ESTERIFICATION OF PFAD

MUHAMMAD IMRAN BIN SULAIMAN

(2014670342)

BACHELOR OF CHEMICAL ENGINEERING
(ENVIRONMENT) WITH HONOURS
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 :

Muhammad Imran bin Sulaiman

Student ID : 2014670342

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.

.....
SITI FATIMAH ABDUL HALIM
Pensyarah
Fakulti Kejuruteraan Kimia
UiTM Pulau Pinang

Signed :
Date : 24/7/17

Main Supervisor

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

Signed :
Date : 21/7/17

Co-Supervisor

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

ACKNOWLEDGEMENT

First and foremost, I would like to express my uttermost gratefulness and praise upon Allah S.W.T for providing unconditional health and opportunity at all times, let alone finishing this project with great success.

My indebted gratitude and special thanks to Mdm. Siti Fatimah Abdul Halim for spending his precious time to supervise my progress every week and keep me in the right path despite being extremely tight with his schedule. I would also like to express my deepest thanks to Dr. Wan Zuraida Wan Kamis for her continuous advice and guidance throughout the project duration. Thank you also for the creative idea sharing and advising me throughout my progress.

Last but not least, my deepest gratitude to Madam Rasyidah Alrozi as the coordinator for her guidance during this project duration. Your commitment in ensuring our project to be successful is very much appreciated. Also, to my parents Mr. Sulaiman Hasan and Mrs. Rehannah Abd Rahman, and my family for their support as without them I may not be where I am now. Also, I wish my gratitude to all my fellow colleagues that directly or indirectly involved in helping me throughout this project. Thank you very much to all of you.

ABSTRACT

TiO based catalyst mixed oxides solid catalysts were prepared and evaluated in the esterification of palm fatty acid distillate (PFAD) to produce fatty acid methyl ester (FAME). Esterification was conducted in a batch reactor at 100-170°C temperature ranges. The catalysts were characterized by several techniques such as BET and FTIR. The effect of catalyst preparation condition (catalyst ratio) and the influence of reaction conditions (methanol/PFAD ratio, temperature) were studied. The prepared catalyst with formula TiCr (calcined at 500°C for 2h) gave the maximum FAME conversion at best reaction conditions (160°C, 2h, 4:1 methanol/PFAD molar ratio, 1.5 wt% catalyst dosage). Thus, TiCr has shown promising potentials as heterogeneous catalyst for FAME synthesis from high acid value oils.