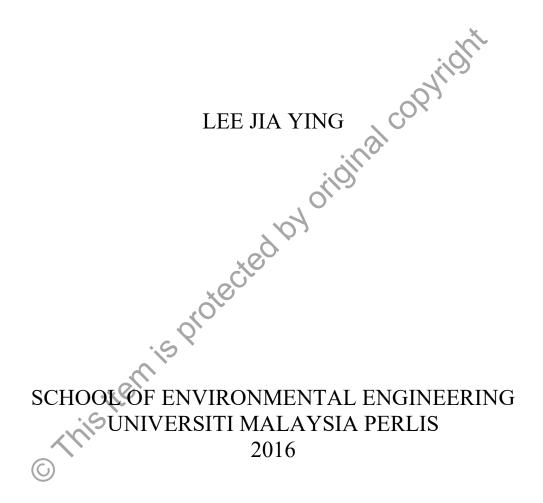
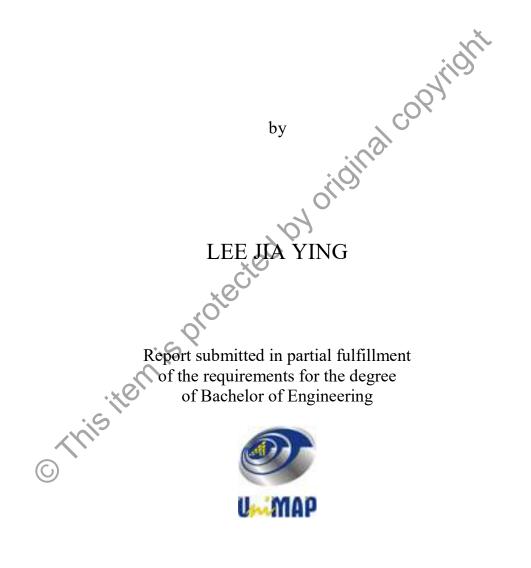
CATALYTIC PYROLYSIS OF BIOMASS FOR BIO-OIL PRODUCTION



CATALYTIC PYROLYSIS OF BIOMASS FOR BIO-OIL PRODUCTION



MAY 2016

ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude to my supervisor Dr Khairuddin Md Isa for his supervision, guidance and encouragement throughout the course of the research. Thank you Dr Khairuddin for allowing me to change my project title by proposing this interesting topic that is new in the research field. Dr Khairuddin is always there to offer a helping hand when I met problem during my experiment without any hesitation. When I am loss during the research period, Dr Khairuddin always provides me with a lot of useful advises and shares me a lot of informative technical papers to assist me on my report writing. Meanwhile, Dr Khairuddin has put a lot of efforts in urging the maintenance of specific analyzers and coordinating with the laboratory PLV to ease my laboratory work. Moreover, Dr Khairuddin always stop his work when I met him in his office for sudden discussion and always check my paper work immediately and corrected my grammatical error to enhance the quality of my writing. Thank you Dr Khairuddin and I am very grateful for that.

I also would like to thank both of my examiners Dr Abdul Haqi Ibrahim and Dr Naimah Ibrahim for spending their precious time in examining my paper works and reports. Meanwhile, they also provided useful opinions and suggestions during the presentation of mid-viva and progress report in order to improve the quality of my research work. I am very thankful for that.

I also would like to express my gratitude to the Vocational Training Officers (PLVs) of School of Environmental Engineering in lending a helping hand throughout the course of research. Thank you Mr Mohamad Zahir Hanafi in guiding me on using the fixed-bed reactor and helping me conducting Thermogravimetric analysis, thank you Mr Nazerry Rosmady Rahmat on helping me to run gas chromatography-mass spectrometer analysis, thank you Mr Mohd Affandi Derman on helping me to carry out Frontier

transform infrared analysis, and thank you Ir Roshasmawi Abdul Wahab and Mr Zalizam Mulyadi Bin Ghazali for allowing me to use the air compressor in Civil laboratory.

I also would like to express my gratitude to Dr Farah Naemah Mohd Saad, and others coordinators of this Final Year Project, thank you for guiding and supervising us from the beginning till the end of the entire course of research. Meanwhile, I wish to thank Dr Nasrul Bin Hamidin, the dean of School of Environmental Engineering, for allowing me to carry out the whole research in the campus.

Last but not least, none of this would have been possible without the love and patience of my friends and family. I am very grateful for them who supported and encouraged me throughout my research. Without their love and support, this accomplishment would not have been possible. My heartfelt thanks.

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APPROVAL AND DECLARATION SHEET

This project report titled Catalytic Pyrolysis Of Biomass For Bio-oil Production was prepared and submitted by Lee Jia Ying (Matrix Number: 121130641) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Environmental Engineering) in Universiti Malaysia Perlis (UniMAP).

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May 2016

PIROLISIS BIOJISIM BERPEMANGKINAN UNTUK PENGHASILAN BIO-MINYAK

ABSTRAK

Satu kajian pirolisis berpemangkinan pada pelapah kelapa sawit *(Elaeis guineensis)*, OPF telah dijalankan dalam reaktor fixed-bed. Hasil produk adalah bio-minyak, bio-char dan bio-gas. Komposisi bio-minyak dan bio-gas dianalisis melalui gas kromatografi-mass spectrometer, GC-MS dan penganalisis 5 gas pelepasan mudah alih. Kesan parameter pirolisis seperti suhu, jenis pemangkin dan nisbah jisim pemangkin / biojisim ke atas pengagihan hasil produk dan ciri-ciri bio-minyak telah disiasat. Pirolisis telah dijalankan pada 500 °C dan 600 °C dan dipanaskan selama 10 minit. Proses tanpa pemangkin dan dengan pemangkin pada pelepah kelapa sawit dilakukan pada keadaan optimum dengan pemangkin NaOH / C, zeolite ZSM-5 dan dolomit. Hasil bio-minyak, bio-char dan bio-gas yang diperolehi masing-masing adalah antara 16.90 - 23.63 %, 20.00 - 28.06 % dan 43.59 - 55.20 % masing-masing, pada keadaan pirolisis yang berbeza. Hasil bio-minyak tertinggi untuk pirolisis tanpa pemangkin adalah 23.63 % pada suhu pirolisis 600 °C, manakala hasil bio-minyak paling tinggi untuk pirolisis dengan pemangkin adalah 21.97 % dengan NaOH / C pada nisbah jisim pemangkin / biojisim 1:3.

CATALYTIC PYROLYSIS OF BIOMASS FOR BIO-OIL PRODUCTION

ABSTRACT

A study of the catalytic pyrolysis of oil palm (*Elaeis guineensis*) fronds, OPF was conducted in a fixed-bed reactor. The product yield are bio-oil, bio-char and bio-gas. The composition of bio-oil and bio-gas were analyzed through gas chromatography-mass spectrometer GC-MS and portable 5 gas emission analyzer. The effects of pyrolysis parameters such as temperature, type of catalyst and catalyst/biomass mass ratio on the distribution of product yield and bio-oil charaoterization were investigated. Pyrolysis runs were carried out at 500°C and 600°C each within 10 minutes of heating. The non-catalytic and catalytic process of oil palm fronds was performed at the optimum conditions with sodium hydroxide impregnated char, NaOH/C, zeolite ZSM-5 and dolomite catalyst. The obtained bio-oil, bio-char and bio-gas yields ranged between 16.90 - 23.63 %, 20.00 - 28.06 % and 43.59 - 55.20 % respectively, at different pyrolysis conditions. The highest bio-oil yield for catalytic pyrolysis was 21.97 % with NaOH/C at catalyst/biomass mass ratio of 1:3.

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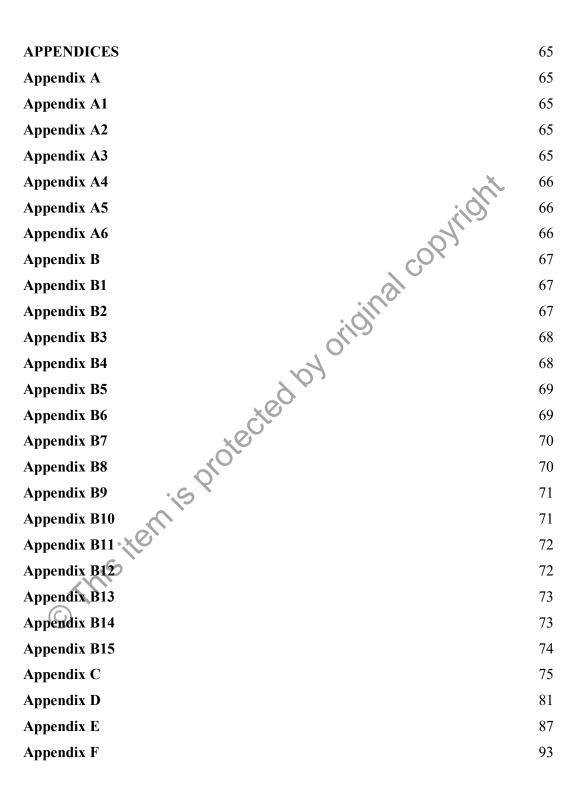
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