PRODUCTION OF ACTIVATED CARBON FROM OIL PALM SHELL BY CHEMICAL METHOD USING POROUS CERAMIC

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OCTOBER 2000

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Oil palm shell was used as the raw material to produce activated carbon by chemical method using porous ceramic burning system. The activation process was performed in the porous ceramic and burned at various activation temperatures at different activation period. The raw material was impregnated first at various soaking time with concentrated phosphoric acid in order to compare their effect on pore development in activated carbon. Besides that, the sample prepared also was done under two methods, non-washing and washing sample before being activated in the muffle furnace. The main parameters varied were activation temperature, activation period and impregnation period of the sample.

The result showed that the most suitable condition for production of activated carbon from oil palm shell by chemical method using porous ceramic was at 700°C, 3 hours activation and 8 hours impregnation period. At this condition, activated carbon produced shows the high S_{BET} and V_{MIC} values, besides high iodine number and percent of fixed carbon content. The samples used were derived from the washing method at pH approximately 7.0 before activation. However, the quality test showed that the activated carbon produced using porous ceramic was low as compared to the activated carbon produced by the other system such as fluidised bed reactor, continuous-self burning system, rotary kiln and steam stripping system.

ACKNOWLEDGEMENT

In the name of ALLAH S.W.T., the most Beneficent and Merciful. Thanks to ALLAH S.W.T. for its guidance for me to finish this thesis proposal, although I have to face a lot of difficulties. First and foremost, I would like to thanks to Associate Professor Dr. Ku Halim Bin Ku Hamid for supervising me in completing this thesis. I would like to thank him for the knowledge, guidance, meticulous supervision and encouragement in making this thesis successful.

I would like to express my thanks and grateful to all lecturers and staffs of Applied Chemistry Department, especially to an Associate Professor Dr. Lee Pat Moi as a Thesis (CMT 679) coordinator, and Tn. Hj. Nik Roslan Bin Nik Abd. Rashid for their guidance throughout the course.

A special thanks also goes to my teammates, LtM. Pn. Nurul Huda Abd. Karim, Pn. Fazlin Meor Hussin, Ms. Norazilah Sulaiman, YM Tengku Fazilah Tengku Osman, Ms. Salina Sabudin and Mr. Imran Ismail, which were doing the same thesis in Lab 409A & B for their guidance, advice and support in making this thesis successful.

This appreciation also goes to Director-General of Malaysian Palm Oil Board (MPOB), Dato' Dr. Mohd. Yusof Basiron, Dr. Ariffin Darus, Dr. Mohd. Haniff Harun, Dr. Ma Ah Ngan and all staffs of MPOB, especially in Biological Department in helping me preparing my literature review and collecting data related to this research.

Thanks also to Pn. Zarila Mohd. Shariff, Course Tutor of B. Sc. (Hons.) in Applied Chemistry; Associate Professor Lee Kok Kheng, all lab assistants in Level 3, Level 5 and Level 6, and all my classmates for their help and support during my research.

Last but not least, I would like to express my gratitude and sincere appreciation to my parents, my beloved family and also my housemates for their encouragement, advice and support throughout my studies.

Thank you.

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CHAPTER 1

INTRODUCTION

The oil palm (*Elais guineensis*) is one of the oil-bearing plantation crops grown in the region of equatorial tropics; Africa and the U.S. of oil-bearing plants; oil palm is the highest yielding. The oil palm belongs to the family *Palmae*, a distinct group of monocotyledons. Hutchinson grouped *Elais guineensis* with *Cocos*, *Corozo* and other genera of the palmae family, in the order palmates, under the tribe *Cocoineae*. Janssens recognised that the fruit forms of the palm, namely *Dura* and *Tenera*, distinguished by the thickness of shell, could be found among fruit types of different external appearance. Janssens divided both the common fruit types nigrescens and the green-fruited virescences into three forms, namely *Dura*, *Pesifera* and *Tenera* (Gunstone, 1987).

There are currently 305 oil palm mills in Malaysia with a total milling capacity of 51 million tonnes of fresh fruit bunches (FFB) per year (PORLA, 1996). Palm mesocarp fibres, palm shell and empty fruit bunches (EFB) are produced as wastes besides crude palm oil as the major product of milling process. Palm shells are used mainly for land filing, temporary road making or other less important uses.

Currently, all palm oil mills in Malaysia utilise fibre and shell fuel for thermal and motive generation and it is estimated that about 1120 kg of palm shells are produced per hectare of oil palm planted area. Research shows that palm shell can be used to produce high quality charcoal to feed the activated carbon industry. And at present, Malaysia is still importing granular activated carbon for local consumption, mainly in air pollution control (Ku Halim, 1997).