

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

Editors:

Ma'an Alkhatib
Abdullah Al Mamun
Faridah Yusof



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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(VOLUME IV)

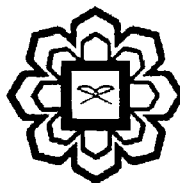
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Faridah Yusof

**Department of Biotechnology Engineering
Faculty of Engineering
International Islamic University Malaysia**



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Ma'an Alkhatib, Abdullah Al Mamun & Faridah Yusof: Current Research and Development in Biotechnology Engineering at IIUM Volume IV

ISBN: 978-967-418-136-9

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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CHAPTER 34

PRODUCTION OF ACTIVATED CARBON FROM PALM OIL EMPTY FRUIT BUNCH BY CHEMICAL ACTIVATION

Ma'an Alkhatib, Monawar Munjid

Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, Gombak, 50728 Kuala Lumpur, Malaysia.

ABSTRACT

The huge amounts of waste produced from empty fruit bunch (EFB) as well as the need for producing cheap commercial activated carbon directed this study to the production of activated carbon from (EFB). In this paper, $ZnCl_2$ was used for chemical activation while three major parameters including temperature, holding time and impregnation ratio, were considered. The activated carbons produced had the BET surface areas ranging from 10.29 to 2711 m^2/g . The total pore volume was increased from 0.009761 to 1.864 cm^3/g . The maximum specific surface area of activated carbon was at 500°C with activation duration of 1h and at an impregnation ratio of 2.0. The activated carbon produced was characterized using proximate analysis, SEM and FTIR observation, surface area, pore volume and yield. Proximate analysis for the raw material was also conducted and results showed that, increasing the carbonization temperature and impregnation ratio decreased the yield, and increased the surface area progressively.

Keywords: activated carbon, impregnation ratio, proximate analysis,

INTRODUCTION

In recent years, many researchers have tried to produce low cost activated carbons to be used for the removal of various pollutants using renewable and cheaper precursors (Hameed et al., 2009). Those precursors are industrial and agricultural by-products resulting from the annual harvesting and industrial processing of various agricultural crops (Zahangir et al., 2009). Some of which are coconut tree sawdust, banana pith, rice husk, rice straw, oil palm stone, olive waste cake, coconut shell, almond shell, date palm seed, waste apricot, apricot shell, bean pod, cherry stone, sunflower seed hull, bamboo oil palm shell, and oil palm fiber (Zahangir et al., 2006; Hameed et al., 2009).

In 2007, Malaysia was one of the largest exporters of palm oil in the international market. One of the significant problems in palm fruit processing is the management of the wastes generated during the processes. Approximately 15 million tons of EFB biomass waste is generated annually throughout Malaysia by palm oil mills (Rahman et al., 2007), a small quantity is used as fuel for the boilers in the oil palm mills while most are unused and disposed in landfills (Zahangir et al., 2009), both of these disposal methods are harmful to the environment.