

**EFFECTS OF IMPREGNATION TO THE POROSITY OF  
ACTIVATED CARBON**

By

**FAZLIN BINTI MEOR HUSSIN**

Under the supervision of

**Assoc. Prof. Dr. Ku Halim Bin Ku Hamid**

Submitted in partial fulfilment of the requirements for  
the Bachelor of Science (Hons.) in Applied Chemistry

Faculty of Applied Science  
Universiti Teknologi MARA  
Shah Alam

October 2000

## **ABSTRACT**

The purpose of this project is to find out the effect of impregnation to the porosity of activated carbon using two techniques, i.e., spray and immersed method. The samples from coconut shell based of GAC were characterised using ASAP 2000 for area and volume, Methylene Blue method and Iodine Number before and after impregnation. Parameter for both of the method was the contact time. The result shows that the surface areas of activated carbon were changed due to the impregnation process. The spray method has a significant effect to the porosity of activated carbon.

## **ACKNOWLEDGEMENT**

The author wishes to express his sincere gratitude and appreciation to the thesis supervisor, Dr. Ku Halim Bin Ku Hamid for his guidance, advice and encouragement during the study and completion of her thesis.

A special thanks goes to Pn. Zarila Mohd. Shariff as the course tutor of Applied Chemistry Department and also to all Applied Chemistry Lecturers.

Also the author would like to thank her fellow friends for their assistance, advice and support during completion her thesis.

Above all, very special thanks goes to the author's family for their understanding, moral and financial support during the completion of her thesis and also during her study in UiTM.

## TABLE OF CONTENT

	<b>Page</b>
<b>ABSTRACT</b>	i
<b>ACKNOWLEDGEMENT</b>	ii
<b>TABLE OF CONTENT</b>	iii
<b>LIST OF FIGURES</b>	vi
<b>LIST OF TABLES</b>	vii
 <b>CHAPTER</b>	
<b>1.0 INTRODUCTION</b>	<b>1</b>
<b>2.0 LITERATURE REVIEW</b>	<b>3</b>
2.1 Introduction	3
2.2 Granular Activated Carbon	4
2.2.1 Coconut Shell Granular Activated Carbon	6
2.3 Properties of Activated Carbon	7
2.4 Composition of Activated Carbon	8
2.5 Characteristics of Activated Carbon	9
2.6 Porosity of Activated Carbon	12
2.7 Adsorption Theory	13
2.7.1 Adsorption with Activated Carbon	14
2.7.2 Adsorption Properties and Effects of Porosity	15
2.7.3 Factors Affecting Adsorption	16

# CHAPTER 1

## INTRODUCTION

Activated carbon is defined as a group of material with highly developed internal surface area and porosity, hence a large capacity for adsorbing chemical from gases or liquid. It is an extremely volatile adsorbents of major industrial significance and are used in a wide range of application which are concerned principally with the removal of species by adsorption from the liquid or gas phase in order to effect purification or recovery of the chemicals (Joyce, 1969).

Activated carbon is the collective name of a group of porous carbon in which they are manufactured either by treatment of carbon with gases (physical method) or by carbonization of carbonaceous materials with simultaneous activation by chemical activation. Activated carbon is used intensively developed countries as United States, Europe and Japan for air and gas purification and wastewater treatment. It also used to form the black layer in mineral water pots. As there is no local industry, which directly uses activated carbon, all the mineral water pots currently imported from the United States, Japan, Britain and Korea (Joyce, 1969).

Activated carbon which also known as black magic material. The idea inspired by 16<sup>th</sup> Egyptians and ancient Hindus who used carbonated wood (charcoal) as trapping agent for medical purposes and purifying agent. According to Standard Definition of Terms relating to activated carbon by American Society for Testing and Materials (ASTM), activated carbon is a family of carbonaceous substances manufactured by processes that develop adsorptive properties (Hassler, 1974).