

**RAPID AND EFFICIENT MIXING IN LEACHATE TREATMENT  
BY USING CHARCOAL AS ADSORPTION MEDIA**

By

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## TABLE OF CONTENTS

	PAGE
Declaration by candidate	i
Acknowledgement	ii
Table of content	iii
List of Figures	vi
List of Tables	viii
List of Appendices	ix
List of Abbreviation	x
Abstract	xi

### CHAPTER

#### **1.0 INTRODUCTION**

1.1	Introduction	1
1.2	Objective of the Study	5
1.3	Significant of the study	6
1.4	Scope of Study	6

#### **2.0 LITERATURE REVIEW**

2.1	Background of Pulau Burung Landfill Site	7
2.1.1	Leachate	8
2.1.2	Sanitary landfill	9
2.1.3	Recirculation	9

## ABSTRACT

Activated carbon is widely use as adsorbent in leachate treatment but the cost of activated carbon is expensive. The use of charcoal as low cost adsorbents has been investigated as an alternative method of activated carbon. For this purpose 2g of charcoal was added into the leachate in the conical flask with agitation speed of 50-200 rpm and mixing time of 30 minutes-2 hours. The sizes of charcoal used were 2mm and 600 $\mu$ m and pH of leachate were adjusted to pH 2 and pH 9. Result shows that charcoal show good performance in reducing COD, color and suspended solid. The highest adsorption capacity of COD was observed at 97.5% at 30 minutes of shaking time and 50 rpm of mixing speed while for color, the highest percentage was 76.34% at 30 minutes of shaking time and 100 rpm of mixing speed. The highest percentage of suspended solid was observed at 78.26% at 30 minutes of shaking time and 200 rpm of mixing speed. From the result the optimum shaking time was obtained at 30 minutes with optimum mixing speed is at 50 rpm. This finding is interesting because it contribute to cost effectiveness with reasons of only short time and slow mixing speed required for achieving high percentage of removal for each parameter. From the study, charcoal is recommended as low cost adsorbent media in leachate treatment as an alternative of activated carbon since it show a good performance in organic removal.

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

An average Malaysian household produces 0.8kg of waste a day. That seems little enough, until it is multiplied across a population of 25 million. Last year, Malaysians generated in excess of 7.3 million tonnes of garbage. Local authorities spend about RM854 million - or 60% - of their annual budget on waste disposal services. For decades, this by-product of urbanization had been tipped into 246 dumpsites that dotted the peninsula. Most of these facilities are anything but sanitary, receiving all kinds of hazardous discards that make them environmental disasters. The problem is due to the copious leachate that seeps into the ground or flows into nearby rivers, contaminating the water supply in many places (The Sun, 06/01/2006).

Leachate is produced when moisture enters the refuse in a landfill, extracts contaminants into the liquid phase, and produces moisture content sufficiently high to initiate liquid flow. Leachate composition depends on many factors such as the waste composition, site hydrology, the availability of moisture and oxygen, design and operation of the landfill and its age (Aziz *et al.*, 2004). Landfill leachate is a very dark coloured liquid formed primarily by the percolation of precipitation through open landfill or through the cap of the completed site. The decomposition of organic matter such as humic acid may