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TREATMENT OF AGING LEACHATE USING BIO-CHAR DERIVED FROM GAHARU WASTE

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ABSTRACT

The present study demonstrates the preparation of bio-char using gaharu waste for the treatment of aging leachate. The physical and chemical properties of gaharu bio-char were evaluated by pore structural analysis by BET analyzed. The effect of retention time, solution pH and adsorbent dosage on adsorption performance were examined. The absorption efficiency of the gaharu bio-char was determined by a series experiment using jar test. In this study, the parameter that evaluate the adsorption performance of leachate is quality test and heavy metals. The BET surface area, Langmuir surface area and total pore volume were identified to be 1.073m^2/g, 1.095m^2/g and 1.246 cm^3/g. The findings of optimum conditions is at solution pH 10 and dosage at the range 1 - 2 gram of gaharu bio-char, according from the examination through variation effect at pH 5, 9, and 10 and gaharu bio-char dosage at 1g, 2g, 4g and 6g. For the heavy metal analysis, every variable were analyzed to study the adsorption uptake of metal ions from gaharu bio-char. The result shows the capabilities of the gaharu bio-char to adsorb metal ions depend on the variable parameter.

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TABLE OF CONTENTS

	Pages
CONFIRMATION BY PANEL OF EXAMINERS	
AUTHOR'S DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF SYMBOLS	viii
LIST OF ABBREVIATION/NOMENCLATURE	ix
CHAPTER ONE: INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statement	2
1.3 Objectives	2
1.4 Scope of Research	2
CHAPTER TWO: LITERATURE REVIEW	4
2.1 Introduction	4
2.2 Environment Act	5
2.3 Sanitary Landfill	7
2.4 Characteristic of Landfill Leachate	8
2.5 Landfill Leachate Treatment	9
2.6 Bio-char	10
2.7 Gaharu Waste	12
CHAPTER THREE: RESEARCH METHODOLOGY	13
3.1 Introduction	13
3.2 Apparatus	13
3.3 Equipment, Raw Materials And Chemicals	14
3.4 Sampling Location	14
3.5 Schematic Diagram For Sample Preparation	15
3.6 Experiment Procedure	16
3.7 Characterize Technique	18
CHAPTER FOUR: RESULTS AND DISCUSSIONS	21
4.1 Background of Study	21

CHAPTER 1
INTRODUCTION

1.1 RESEARCH BACKGROUND

Landfill leachate in a long period term will continue poisonous and harmless to the ecosystems due to the self-generation of highly contamination of leachate. The crucial part is to expels pollution from the leachate, there a few strategy used to treat landfill leachate for instance precipitation, adsorption, oxidation, evaporation, turn around osmosis, and particle trade (Shehzad *et al*, 2015). All of this method have been try to removed contamination leachate from the old landfill leachate.

There are a lot of researcher try to use the cheapest and unconventional adsorbents to adsorb heavy metals from leachate for example agriculture waste, plant wastes, aquatic plant, and also industrial by-product (Manaf *et al*, 2009). This is because, normally physicochemical treatment processes used activated carbon as adsorbent due to highly degree of surface reactivity but it expensive material. On the other hand, the combination of biological-chemical process can be the effective technology for manipulation and management of leachate treatment.

Attention to the biomass as renewable energy resource and chemical feedstock source due to the widely available, cheap and eco-friendly. Mostly biomass source can be found from forest residual, municipal wastes, low grade plants, and forest residues. There are several common biomass renewable energy in Malaysia, such as rice husk, palm kernel shell, coconut fibre, empty fruit bunch, mesocarp fibre, wood chip and dust pellet.

According to the Malaysia Action Plan (1988), the government has try to increases the efficiency of disposal site in Malaysia of solid waste by divided into four level of improvement which is level one is controlled dumping, level two is sanitary landfill with everyday cover, level three is sanitary landfill with leachate spreading and level four is sanitary landfill with treatment of the leachate (Manaf *et al*, 2009). In this study aim at the last level which is to investigate the treatment of the leachate through small cost treatment from renewable resources which is gaharu waste, in order to reduce cost of treatment aging in sanitary landfill due to high cost to treat