

ADSORPTION OF LEAD BY USING DURIAN LEAVES

RABIHAH BINTI AWANG ALI

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2016

ABSTRACT

ADSORPTION OF LEAD BY USING DURIAN LEAVES

Ability to remove Pb(II) from aqueous solution by Durian leaves (DL) was evaluated. DL was characterized by using $\text{pH}_{\text{slurry}}$ and pH_{zpc} of biosorbent. The effect of physicochemical such as pH, adsorbent dosage, initial concentration of Pb(II) and contact time has been studied to obtain the optimum condition to remove Pb(II) ion from the aqueous solution. The studies were conducted at pH 4, DLP dosage 0.02 g, in contact time of 90 minutes. Kinetic data were analyzed by using two adsorption kinetic model which is pseudo-first-order and pseudo-second-order. The data shows high correlation coefficient based on pseudo-second-order model with R^2 is 0.9966 rather than pseudo-first-order model.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	iii
TABLES OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	4
1.3 Significant study	6
1.4 Objective of study	8
CHAPTER 2 LITERATURE REVIEW	
2.1 Lead in the environment	9
2.2 Wastewater treatment method	12
2.3 Adsorption	16
2.4 Biomaterial adsorbent	17
2.5 Durian residue as adsorbent	20
CHAPTER 3 METHODOLOGY	
3.1 Materials	21
3.1.1 Raw material	21
3.1.2 Chemicals and reagents	21
3.1.3 Apparatus	21
3.1.4 Equipments and analytical instruments	22
3.2 Methods	22
3.2.1 Sampling preparation	22
3.2.2 Sample collection	22
3.2.3 Lead aqueous solution preparation	23
3.3 Adsorbent characterization	23
3.3.1 pH aqueous slurry ($\text{pH}_{\text{slurry}}$)	23
3.3.2 pH zero point charge (PH_{zpc})	23
3.4 Batch adsorption study	24
3.4.1 Effect of pH	24
3.4.2 Effect of adsorbent dosage	24
3.4.3 Effect of initial concentration and contact time	24
3.4.4 Kinetic study	25
3.4.5 Expression of results	25

CHAPTER 4 RESULTS AND DISCUSSION	
4.1 Introduction	27
4.2 Characterization of adsorbent	27
4.2.1 pH_{slurry}	27
4.2.2 pH_{zpc}	27
4.3 Batch adsorption studies	29
4.3.1 Effect of pH	29
4.3.2 Effect of adsorbent dosage	30
4.3.3 Effect of initial concentration and contact time	31
4.4 Kinetic studies	33
4.4.1 Pseudo-First-Order kinetic model	33
4.4.2 Pseudo-Second-Order	35
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS	
5.1 Conclusion	38
5.2 Recommendations	38
CITED REFERENCES	40
APPENDICES	45
<i>CURRICULUM VITAE</i>	54

LIST OF TABLES

Table	Caption	Page
2.1	Chemical and physical properties of lead	11
2.2	Some methods to remove ions from wastewater	11
2.3	Current technology for removing or reducing of heavy metal involving physical and/or chemical processes	15
4.1	Pseudo-first-order and pseudo-second-order parameter at various Pb(II) concentration	37