

**REMOVAL OF LEAD (Pb) BY USING SULPHURIC ACID  
H<sub>2</sub>SO<sub>4</sub>TREATED DURIAN (*DURIO ZIBETHINUS*) LEAF POWDER**

**NURUL AIDA BINTI ABDUL JABAR**

**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**

**JANUARY 2017**

## ABSTRACT

### REMOVAL OF LEAD (PB) BY USING SULPHURIC ACID H<sub>2</sub>SO<sub>4</sub> TREATED *Durio zibethinus* LEAF POWDER

Ability to remove Pb(II) from aqueous solution by sulphuric acid modified durian leaves (SDLP) was evaluated. SDLP was characterized by using  $\text{pH}_{\text{slurry}}$ ,  $\text{pH}_{\text{zpc}}$  analysis of biosorbent. The effect of physicochemical such as pH, adsorbent dosage, initial concentration of Pb(II) and contact time had been studied to obtain the optimum condition to remove Pb(II) ion from aqueous solution. The studies were conducted at pH 4 optimum, SDLP dosage 0.03 g, in contact time of 90 minutes and temperature of 30 °C. Kinetic data were analyzed by using two adsorption kinetic models which are pseudo-first-order and pseudo-second-order. The data showed high correlation coefficient based on pseudo-first-order model with  $R^2$  between 0.998 to 0.999 rather than pseudo-first-order model.

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENT</b>	<b>iii</b>
<b>TABLE OF CONTENTS</b>	<b>iv</b>
<b>LIST OF TABLE</b>	<b>vi</b>
<b>LIST OF FIGURE</b>	<b>vii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>viii</b>
<b>ABSTRACT</b>	<b>x</b>
<b>ABSTRAK</b>	<b>xi</b>
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Background	1
1.2 Problem statements	4
1.3 Significance of study	5
1.4 Objectives of study	6
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Absorptions	7
2.2 Plant	9
2.3 Agricultural	10
2.4 Leaves	11
2.5 Heavy metal	12
<b>CHAPTER 3 METHODOLOGY</b>	
3.1 Materials	
3.1.1 Raw materials	14
3.1.2 Chemicals	14
3.1.3 Instruments	15
3.2 Methods	
3.2.1 Adsorbent Preparation	16
3.2.2 Adsorption Characterization	17
3.2.3 Adsorption study	18

## **CHAPTER 4 RESULTS AND DISCUSSION**

4.1	Adsorbent characteristic	
4.1.1	pH <sub>slurry</sub>	22
4.1.2	pH <sub>zpc</sub>	22
4.2	Adsorption study	
4.2.1	Effect of pH	24
4.2.2	Effect of dosage	25
4.2.3	Effect of initial concentration and contact time	26
4.2.4	Kinetic study	28

## **CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS**

5.1	Conclusions	32
5.2	Recommendations	33

<b>CITED REFERENCES</b>	34
<b>APPENDICES</b>	39
<b>CURRICULUM VITAE</b>	49

## LIST OF FIGURES

<b>Figure</b>	<b>Caption</b>	<b>Page</b>
4.1	Plot of $pH_{zpc}$ for SDLP	23
4.2	Effect of pH on Pb(II) adsorption on SDLP	25
4.3	Effect of adsorbent dosage on Pb(II) adsorption by SDLP	26
4.4	Effect of initial Pb (II) ion concentration and contact time of Pb (II) ion adsorption of SDLP (adsorbent weight: 0.03 g, pH: 4, volume: 50 mL, shaking speed: 120 strokes per min)	27
4.5	Pseudo-first-order plot on Pb(II) ions adsorption by SDLP ( adsorption weight: 0.03 g, pH: 4, volume: 50 mL, shaking speed: 120 stroke per min)	29
4.6	Pseudo-second-order plot on Pb(II) ions adsorption by SDLP (adsorbent weight: 0.03 g, pH: 4, volume: 50 mL, shaking speed: 120 stroke per min)	30