

**HEAVY METAL DETERMINATION FROM SOIL SURFACE NEAR  
A CONSTRUCTION SITE**

**MOHAMMAD SYAHIRUL AIMAN BIN JUSOH**

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

**JULY 2019**

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	<b>iii</b>
<b>TABLE OF CONTENTS</b>	<b>v</b>
<b>LIST OF TABLES</b>	<b>vii</b>
<b>LIST OF FIGURES</b>	<b>viii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>ix</b>
<b>ABSTRACT</b>	<b>xi</b>
<b>ABSTRAK</b>	<b>xii</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Background of study	1
1.2 Problem statement	2
1.3 Significance of study	3
1.4 Objectives	3
1.5 Limitation of study	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>5</b>
2.1 Heavy metal	5
2.1.1 Lead	6
2.1.2 Cadmium	7
2.1.3 Chromium	7
2.1.4 Zinc	8
2.2 Environmental effects of heavy metals	9
2.2.1 Soil pollution from heavy metals	10
2.3 Urban soil	11
2.4 Health Risk Assessment (HRA)	12
<b>CHAPTER 3 METHODOLOGY</b>	<b>14</b>
3.1 Materials	14
3.1.1 Chemicals and reagents	14
3.1.2 Glassware and apparatus	14
3.1.3 Equipment and analytical instrument	15
3.2 Site description	15
3.3 Soil sampling and sample preparation	15
3.4 Quality control	16
3.5 Sample digestion and analysis of metal	16

3.6	Health Risk Assessment (HRA)	17
3.6.1	Non-cancer risk assessment on human via dermal contact and inhalation	17
3.6.2	Cancer risk assessment on human via inhalation and dermal contact pathways.	18
<b>CHAPTER 4 RESULTS AND DISCUSSION</b>		<b>21</b>
4.1	Concentration of heavy metal	21
4.1.1	Concentration of cadmium (Cd)	21
4.1.2	Concentration of chromium Cr)	23
4.1.3	Concentration of lead (Pb)	25
4.1.4	Concentration of zinc (Zn)	26
4.2	Comparison with previous studies	28
4.3	Health Risk Assessment (HRA) of heavy metal in urban soil	30
<b>CHAPTER 5 CONCLUSION AND RECOMMENDATIONS</b>		<b>33</b>
5.1	Conclusion	34
5.1	Recommendation	34
<b>CITED REFERENCES</b>		<b>35</b>
<b>CURRICULUM VITAE</b>		<b>40</b>

## LIST OF TABLES

Table	Caption	Page
3.1	Parameters used for estimation of ADD via dermal contact and inhalation exposure pathways and some biological characteristics of the investigated heavy metals used for health risk assessments.	19
3.2	References dose (RfD) values for, Zn, Pb, Cd and Cr.	20
4.1	Average concentration (mg/kg) of metal in soil from this study compared to metals in soils from previous studies.	29
4.2	Estimated non-cancer risk of heavy metal exposure.	31
4.3	Estimated cancer risk (CR) of heavy metal exposure	32

## **ABSTRACT**

### **HEAVY METAL DETERMINATION FROM SOIL SURFACE NEAR A CONSTRUCTION SITE**

This study aimed to determine the concentration of selected heavy metals (Cd, Cr, Pb, Zn) in urban soil samples of new large shopping place in Bandar Tun Abdul Razak Jengka. A total of 15 samples were collected from five sampling points. This study also aimed to evaluate health risk assessment (HRA) of heavy metals on adults from different pathways. All of the concentration of heavy metal selected lie above control soil which are Cd ( $0.011 \text{ mgkg}^{-1}$ ), Cr ( $0.28 \text{ mgkg}^{-1}$ ), Pb ( $0.33 \text{ mgkg}^{-1}$ ) and Zn ( $0.21 \text{ mgkg}^{-1}$ ). Hazard Index (HI) and Lifetime Cancer Risk (LCR) were used to determine both non-carcinogenic and carcinogenic risks. The HRA found to be at the safe level indicating no non-carcinogenic and carcinogenic risks that may affect human health. Further study should be done to evaluate other metal element such as As and Cu that may contribute to human health problem due to high concentration accumulated.