

**DETERMINATION OF HEAVY METALS IN DUST FROM DIFFERENT
LEVEL OF STUDENTS' RESIDENTIAL BUILDING**

NURUL SHUHADAH BINTI BAHARUDDIN

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

JANUARY 2019

ABSTRACT

DETERMINATION OF HEAVY METALS IN DUST FROM DIFFERENT LEVEL OF STUDENTS' RESIDENTIAL BUILDING

Most students spend their time doing indoor activities. Indoor air pollutants might affect the student's health. The objectives of the study are to determine the concentration of heavy metals in indoor dust from different level of students' residential building and to estimate the potential health risk by using health risk assessment (HRA). The dust samples was collected at three different level of a students' residential building which are level 1, level 4 and level 10. The selected heavy metals studied were lead (Pb), copper (Cu), iron (Fe) and cadmium (Cd). The samples were analyzed by using Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES). The highest concentration of heavy metals is Fe with 1.60 to 3.10 μgg^{-1} , followed by Cu with 0.64 to 1.00 μgg^{-1} , Pb with 0.06 to 0.09 μgg^{-1} and 0.04 μgg^{-1} to 0.06 μgg^{-1} for Cd. The overall concentrations of heavy metal were in order of Fe > Cu > Pb > Cd. The results showed that low potential health risks were determined from metal exposure in indoor dust. Moreover, through the survey assessment, most of student does not have any respiratory diseases (87%) although 63% of respondents claimed they were allergic to dust. The accumulation of these heavy metals in different level at students' residential may be influenced by the wind blowing from outdoor environment as well as the distance of level from main sources of heavy metal.

TABLE OF CONTENTS

| | Page |
|--|-------------|
| ACKNOWLEDGEMENT | iii |
| TABLE OF CONTENTS | iv |
| LIST OF TABLES | vi |
| LIST OF FIGURES | vii |
| LIST OF ABBREVIATIONS | viii |
| ABSTRACT | ix |
| ABSTRAK | x |
| | |
| CHAPTER 1 INTRODUCTION | |
| 1.1 Background of study | 1 |
| 1.2 Problem statement | 2 |
| 1.3 Significance of study | 3 |
| 1.4 Scope and limitation of study | 3 |
| 1.5 Objectives of study | 4 |
| | |
| CHAPTER 2 LITERATURE REVIEW | |
| 2.1 Air pollution | 5 |
| 2.1.1 Indoor air pollution | 6 |
| 2.1.2 Dust | 7 |
| 2.2 Indoor air quality | 7 |
| 2.2.1 Street dust | 8 |
| 2.2.2 Industries | 8 |
| 2.2.3 Indoor material | 9 |
| 2.3 Heavy metal | 9 |
| 2.4 Effect to health due to heavy metal contamination | 10 |
| 2.4.1 Lead (Pb) | 10 |
| 2.4.2 Cadmium (Cd) | 11 |
| 2.4.3 Copper (Cu) | 11 |
| 2.4.4 Iron (Fe) | 12 |
| | |
| CHAPTER 3 METHODOLOGY | |
| 3.1 Chemical | 14 |
| 3.2 Equipment and analytical instrument | 14 |
| 3.3 Sampling location | 15 |
| 3.4 Sample collection | 15 |
| 3.5 Sample preparation | 16 |
| 3.6 Standard preparation | 16 |
| 3.7 Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) | 17 |
| 3.8 Calibration curve | 18 |
| 3.9 Health risk assessment | 18 |

| | | |
|------|-------------------|----|
| 3.10 | Survey Assessment | 21 |
| 3.11 | Quality control | 21 |

CHAPTER 4 RESULTS AND DISCUSSION

| | | |
|-------|--|----|
| 4.1 | Heavy metals concentration | 22 |
| 4.1.1 | Cd concentration | 22 |
| 4.1.2 | Cu concentration | 23 |
| 4.1.3 | Fe concentration | 24 |
| 4.1.4 | Pb concentration | 25 |
| 4.2 | Potential effect of heavy metal exposure to health | 26 |
| 4.3 | Survey assessment | 28 |

CHAPTER 5 CONCLUSION AND RECOMMENDATION 31

REFERENCES 33

APPENDIX 36

LIST OF TABLES

| Table | Caption | Page |
|--------------|--|-------------|
| 2.1 | Heavy metal sources and their effects on human bodies | 13 |
| 3.1 | The wavelength of heavy metal analyses using ICP-OES | 17 |
| 3.2 | Regression coefficient for each element analyze by ICP-OES | 18 |
| 3.3 | Reference dose of heavy metal | 20 |
| 4.1 | Potential health risk of heavy metal exposure | 28 |
| 4.2 | Percentage of students that have allergic to dust and duration of allergic | 29 |
| 4.3 | Percentage of students that have respiratory diseases | 30 |