

**A CHEMOMETRIC ANALYSIS OF THE AIRBORNE HEAVY METALS IN
SELECTED LOCATION IN MALAYSIA**

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

AUGUST 2022

ACKNOWLEDGEMENTS

First, I would want to offer all the gratitude to Allah S.W.T. for providing me strength and opportunity to be able to accomplish my thesis in the allotted period, and for giving me patience in finishing this long and tough trip.

I would want to express my sincere appreciation to, Sir Mohd Lias Kamal, my supervisor for this final year project who had led be a lot of job over two semesters session 2018/2019. Apart from that, I also want to thanks the Faculty of Applied Science lecturers' and staffs of Uitm Arau, Perlis for their cooperation during I complete the final year project that had given valuable information, suggestions and guidance in the compilation and preparation for this final year project report.

My appreciation to my co-supervisor from UniSZA, Mrs Nadiana binti Ariffin for the information imparted about multivariate analysis. In spite of everything, the deepest gratitude and appreciation to my parents, relatives, and others for their collaboration, encouragement, constructive suggestion and full of support for the report completion, from the beginning until the finish. Also thanks to all of my friends and everyone, that have been contributing by supporting my work and aid myself throughout the final year project development until it is entirely accomplished.

ABSTRACT

A CHEMOMETRIC ANALYSIS OF THE AIRBORNE HEAVY METALS IN SELECTED LOCATION IN MALAYSIA

The purpose of this research was to assess the content of heavy metals in four separate treated regions. These heavy metal contaminants were identified using a technique using the bark of the Jati tree (*Tectona grandis*). During the sampling, tree bark samples were gathered. These samples were taken from four distinct zones in four different treated locations. The rise of human activities, along with the limitations of particular technologies for detecting substances in the atmosphere, has led to the widespread use of methods such as biomonitoring, which involves the use of living creatures in the region as biomonitors. This biomonitoring method was used in this study, which included four study areas: Malaysian Cement Plant, Chuping, Perlis, Lafarge Cement Plant, Langkawi, Kedah, Penang Urban Area and Coal Power Plant Manjung in order to detect the heavy metal element present in the atmosphere, as the quality of air in the areas has drastically changed due to the increase of these activities, particularly industrial activities. All heavy metal contaminants were analysed using ICP-OES (inductively coupled plasma - optical emission spectrometry) (ICP-OES). This study was based on secondary data that surveyed public opinion on the variables that contribute to rising air pollution in the Penang Industrial Area, Malaysian Cement Plant, Chuping, Perlis, Lafarge Cement Plant, Langkawi, Kedah and the Manjung Coal Plant. The data was analysed in order to assess and identify heavy metal contaminants, as well as their levels of preference, which may be altered by the development of certain places. The instrument's output was then analysed utilising chemometric analysis, which included descriptive analysis, analysis of variance (ANOVA), cluster analysis (CA), discriminant analysis (DA), and principal component analysis (PCA). These techniques are widely used when dealing with complex and large data, in which the techniques simplify the data into information that are easily to be understand.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

Exposures to airborne metals are known to cause physiological responses in organisms and wide-ranging health effects in humans. Human health, well-being, and the environment are all affected by air pollution. Cadmium, lead, and mercury are heavy metals that are often found in the air and are released mostly as a result of industrial activities. Even low air levels lead to the build-up of contaminants in soils, where they remain in the ecosystem and accumulate in the food chain on both land and water. In addition, metals can exist as vapour or particles in the air. Metal emissions are generated by mining, metal casting, and other industrial activities. Metal particles can be inhaled or consumed by humans through food and drink. Humans are exposed to heavy metals in three ways which are through inhalation, ingestion, and skin absorption. Some metals, such as lead, have negative health impacts. Health effect associated with trace metals in atmospheric particles will damage on all the cells of the body especially in respiratory, cardiovascular problems premature mortality and etc. (Preiditis & Adamson 2002; Magas et al. 2007; Callen et al. 2009; Wild et al. 2009; Lippmann 2009) It is vital to emphasise this since numerous environmental changes are occurring, resulting in ecological mistakes and hazardous phenomena. Atmospheric particles are one of the most serious issues in the