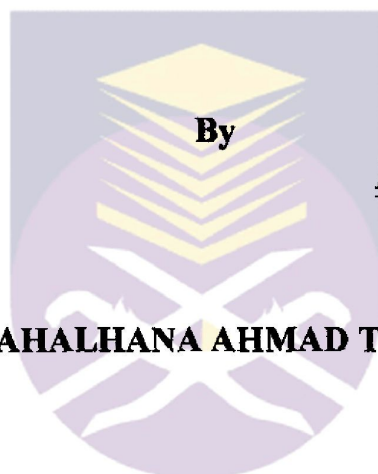


**DETERMINATION OF LEAD AND CHROMIUM IN
WASTEWATER USING GRAPHITE FURNACE ATOMIC
ABSORPTION SPECTROMETRY WITH AND WITHOUT MATRIX
MODIFIER**



SALWAHALHANA AHMAD TAJUDDIN

**Thesis submitted in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
in the Faculty of Applied Science
University Teknologi MARA**

October 2002

ACKNOWLEDGEMENTS

In the name of Allah, The Merciful and The Mercyiying.

I would like to express my deepest gratitude to my thesis coordinator, Prof. Dr. Lee Pat Moi for her support and understanding in final preparation of this thesis. I also like to take this opportunity to thank Assoc. Prof. Dr. Nor Hadiani, Head of Programme, B. Sc. (Hons.) Applied Chemistry, for her co-operation in allowing me to gain knowledge from my research and her constant support in making all the equipments in laboratory available to me in the course of my research. Secondly, I would like to thank my supervisor, puan Haliza Kassim for her support, guidance, advice, suggestions and always given the opinion in helping me to complete my thesis. Her ideas and suggestion contributed a lot in final preparation of this report. Thanks for Mr. Zulkifli, Assistant Manager of Nippon Paint, Shah Alam for his help in giving me more information about wastewater treatment. I wish to record my thank to Assoc. Prof. Mr. Lee Kok Kheng for his suggestion in taking the sample in Nippon Paint Factory and lastly to my family and my classmate, for their kindness in sharing their knowledge explain with me during the completion of my thesis.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	vii
LIST OF TABLES	ix
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
ABSTRAK	xii
CHAPTER	
1 INTRODUCTION	1
2 LITERATURE REVIEW	4
2.1 Lead	4
2.1.1 Physical and chemical properties	4
2.1.2 Sources of lead	5
2.1.3 Effect on organism in environment	5
2.2 Chromium	6
2.2.1 Physical and chemical properties	7
2.2.2 Sources of chromium	7
2.2.3 Effect on organism in environment	8

ABSTRACT

DETERMINATION OF LEAD AND CHROMIUM IN WASTEWATER USING GRAPHITE FURNACE ATOMIC ABSORPTION SPECTROMETRY WITH AND WITHOUT MATRIX MODIFIER

In this study, the amount of lead and chromium was determined in wastewater samples from Nippon Paint Factory, section 22 Shah Alam. The wastewater was treated by wet digestion method. The lead and chromium metals were then determined by graphite furnace atomic absorption spectrometry, Perkin- Elmer Model 2380 atomic absorption spectrophotometer, equipped with an HGA-300 graphite furnace, deuterium background corrector, nitrogen as the inert gas, lead and chromium electrodeless discharge lamp and coated graphite tube were employed to all adsorption measurements with and without matrix modifier. The matrix modifiers used were nitrate salts of magnesium and calcium. Before the wastewater was tested, an optimization study was done on the most suitable ashing temperatures to be used. Calibration curve of standard lead and chromium were plotted from 0.4 ppm till 2.0 ppm at ashing temperatures 750 °C and 1550 °C without matrix modifier while 850 °C and 1650 °C for metals with matrix modifier. Magnesium is the best matrix modifier in comparison to calcium because the increase in percentage of absorbance and also concentration of lead and chromium. From the analysis the concentration of lead and chromium without using matrix modifiers are 0.028 ppm respectively while using matrix modifier magnesium and calcium, the concentration increased to 0.048 ppm and 0.043 ppm for lead and 0.047 ppm and 0.043 ppm for chromium. However it still under the Environment Quality Act and it shows that the treatment system in Nippon Paint Factory is efficient in removing heavy metals from their effluent water.

CHAPTER 1

INTRODUCTION

Atomic absorption is a physical process involving the absorption of a beam of light by an assembly of free atoms. A technique can be developed for the determination of metallic elements in a wide variety of sample types. Atomic absorption photometry is capable of determining metal concentrations ranging from ultra-trace to major constituent levels. The principle of atomic absorption has been known to astronomers for over 150 years, but it's history in analytical chemistry is recent.

Free atoms of an element will absorb light of very specific wavelengths. By precisely choosing the wavelength of light used, the atomic absorption of a particular element can be selectively measured.

In this work, the determination of lead in industrial wastewater samples is performed directly by GFAAS after sample digestion by HT and HNO₃ in sealed Teflon bombs. The different modifiers can use for lead such as nitrates of calcium, magnesium, nickel, palladium and ammonium hydrogen phosphate.(Perkin Elmer)

The industrial wastewater from paint industry is classified as an industrial waste which requires treatment before it is allowed to be discharged into the public drain. A large proportion of the water was contaminated in order to convert raw material to