

UNIVERSITI TEKNOLOGI MARA

**BIOSORPTION OF HEAVY METALS
IN LEACHATE BY USING
COCONUT SHELL ACTIVATED
CARBON AS AN ADSORBENT**

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Project submitted in fulfillment of the requirements for
the degree of
**Bachelor in Environmental Health and Safety
(Hons.)**

Faculty of Health Sciences

July 2017

DECLARATION BY STUDENT

Project entitled “Biosorption Of Heavy Metals In Leachate By Using Coconut Shell Activated Carbon As An Adsorbent” is a presentation of my original research work. Whenever contributions of others are involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Project Supervisor, Mr Razi Ikhwan bin Md Rashid. It has been submitted to the Faculty of Health Sciences in partial fulfilment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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2013232716

940315-08-6268

Date: 1st August 2017

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful.

Assalamualaikum and Alhamdulillah, all praise to Allah S.W.T The Supreme Lord of the Universe. Deepest pleasure and salaam to the Prophet Muhammad PBUH, all prophets and their families. I praise Allah S.W.T. for the strength and His blessings in completing my final year project entitle ‘Biosorption of the heavy metals in the leachate by using ‘Activated Carbon Coconut Shell’.

Hence, I would like to extend my deepest gratitude and thank you to my family members especially to my parents, Mr. Mohd Tajudin Bin Jamil and Mrs. Zainol Azizah Binti Mohd Aris, for the faith and endless support throughout this study, to my mentor and main supervisor Mr. Razi Ikhwan Bin Md. Rashid who has guided me and taught me along the way in completing my final year project, to Dr Mujid Bin Abdullah, Head of Department of Environmental Health and Safety for the inspiration and encouragement.

I am also grateful to all lecturers and supporting staff in the Department of Environmental Safety and Health for the teaching and guidance. Only God can reward all of you with goodness. Last but not least, I would also like to convey my heart and appreciation to all my colleagues and friends who have directly or indirectly contributed to my study and become part of my experience in finishing my study.

TABLE OF CONTENTS

TITLE PAGE	
DECLARATION BY STUDENT	ii
INTELLECTUAL PROPERTIES	iii
APPROVAL BY SUPERVISOR	v
ACKNOWLEDGEMENT	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF EQUATION	xii
ABSTRACT	xiii
ABSTRAK	xiv
CHAPTER 1: INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	4
1.3 Significance of Study	4
1.4 Objectives of study	6
1.4.1 General objective	6
1.4.2 Specific objectives	6
1.5 Hypothesis	6
1.6 Conceptual Framework	7
1.7 Conceptual and Operational Definition	9
CHAPTER 2: LITERATURE REVIEW	
2.1 Landfill	10
2.1.1 Landfill Management in Malaysia	11
2.2 Leachate	12
2.3 Heavy Metals	12

ABSTRACT

Abstract. Introduction: Activated carbon produced from coconut shell was used to remove Cadmium, Copper and Manganese from the Panchang Bedena Landfill's leachate. The activated carbon coconut shell was produced by pyrolysis process. **Objective:** The objective of the study is to investigate the effectiveness of adsorbent (Activated Carbon Coconut Shell) on removing the heavy metals (Cd, Cu and Mn) from Panchang Bedena Landfill's Leachate. **Methodology:** The adsorbent was prepared by pyrolysis process (pyrolysis in tube furnace at 500-800°C for one to two hours). The samples leachate from the Panchang Bedena landfill was collected for characterized for three weeks in order to get the average data/results. Batch adsorption experiment was conducted to examine the effect of contact time and pH on adsorption of Cadmium, Copper and Manganese from the leachate. Equation of heavy metal removal is used to get the percentage of heavy metal removal. **Results:** The obtained result showed that, the adsorption of the metal ions was pH and Contact time dependent. The removal percentage of heavy metals with in the varying contact time 20 minute, 40 minute, 60 minute and 80 minute was different for every heavy metals. For copper, the optimum removal of heavy metal was at 80 minutes contact time (90.84%). Differ from copper, for cadmium, the optimum removal percentage was at 60 minutes with 54.38% removal. Lastly, for heavy metal manganese, 80 minutes (56.93%) was the optimum time for removal of the heavy metal. Next, the removal percentage of heavy metals with in the varying pH (pH 2, pH 4, pH 6 and pH 8) also different for every heavy metals. For copper, the optimum removal of heavy metal was at pH 6 (79.96 %). For cadmium, the optimum removal percentage was at pH 8 with 55.56% removal. Lastly, for heavy metal manganese, pH 8 (56.93%) was the optimum pH for removal of the heavy metals. **Conclusion:** The study showed that activated carbon prepared from coconut shell can be efficiently used as low cost alternative for removal of metal ion.

Keywords: *Activated Carbon, Coconut Shell, Heavy Metal, Adsorption, Leachate.*