# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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Abdullah Al Mamun
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*(VOLUME IV)*

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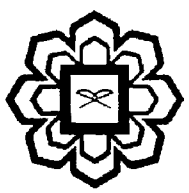

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## CONTENTS

# CHAPTER 1

# REMOVAL OF ZINC FROM WASTEWATER BY CARBON NANOTUBES

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## ABSTRACT

Heavy metal refers to any metallic chemical element that has relatively high density and yet it's toxic and poisonous at low concentrations. As trace element, some heavy metals (e.g. zinc, selenium, copper, etc.) are essential to maintain the metabolism in the human body but most of them are toxic for our body. To a small extent they enter our bodies via food, drinking water and air. Therefore, it is very much important to remove these compounds from the wastewater during the treatment process. Nowadays, one of the great nanomaterials that are getting interest of many researchers and engineers is carbon nanotubes. This research intended to study the performance of carbon nanotubes as adsorbent for removal heavy metal (zinc) from artificial water. The effect of contact time, dosage of carbon nanotubes, agitation speed and pH were studied for optimal adsorption of the zinc in synthetic water. Matrix method was used to determine the number of runs and its variation. It is hoped that the results of this project would indicate some possibilities to use carbon nanotubes.

***Keywords***: zinc, carbon nanotube, pH, synthetic wastewater

## INTRODUCTION

Zinc is an essential element, necessary for sustaining all life. It is estimated that 3000 of the hundreds of thousands of proteins in the human body contain zinc prosthetic groups, one type of which is called zinc finger. In addition, there are over a dozen types of cells in the human body that secrete zinc ions, and the roles of these secreted zinc signals in medicine and health are now being actively studied. Zinc ions are now considered neurotransmitters. Cells in the salivary gland, prostate, immune system and intestine are other types that secrete zinc (Adhoum, 2004).

Carbon nanotubes (CNTs) are relatively new adsorbents that have proven very efficient for treating many kinds of trace pollutants such as dioxin from air or lead, cadmium, fluoride, 1,2-dichlorobenzene from wastewater. The comparisons of CNTs with other commercial adsorbents made by the foregoing researchers suggest that CNTs have great potential in environmental protection applications. However, the studies on the adsorption of heavy metals with CNTs are still very limited in the literature. Although consequences of zinc deficiency have been recognized for many years, it is only recently that attention has been directed to the consequences of excessive zinc intake. Zinc is considered to be relatively nontoxic, particularly if taken orally. However, manifestations of overt toxicity symptoms