

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

Editors:

Ma'an Alkhatib
Abdullah Al Mamun
Faridah Yusof



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(VOLUME IV)

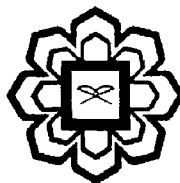
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CHAPTER 3

REMOVAL TECHNIQUES OF CADMIUM FROM WASTEWATER BY CNTS

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ABSTRACT

This study is aimed to identify and determine the factors such as pH, CNT dosage, time contact and agitation speed that can influence in the removal of the cadmium from synthetic water, and thus the optimum condition could be obtained. Furthermore, this study was intended to fulfill and achieve the Department of Environment (DOE) discharge requirements of the Standard Water Quality, which is supposed to be lower than 10 µg/L (Standard A). A Two-Level Factorial Design had been used to obtain a complete randomized experiment statistically. For results analysis, one plot factor and three-dimensional interactions plot of cadmium removal had been used in order to analyze and explain about the percentage of cadmium removal while regression analysis had been used to study the empirical statistics of the experiment. It was also to identify the significance of the parameters used towards the removal percentage obtained. From this study, it was found that at CNT dosage of 10 mg in pH 9 solution within 120 min at 150 rpm of speed are the best conditions for the adsorption of cadmium ions which give 95.74% of removal. Lastly, it is expected that this project has the potential to become a successful achievement and finding for the development of nanotechnology, especially in environmental area.

Keyword: cadmium, CNT, DOE, environment, synthetic water

INTRODUCTION

It has been well established that excess cadmium exposure produces adverse health effects on human beings. For virtually all chemicals, adverse health effects are noted at sufficiently high total exposures. For certain elements such as copper and zinc which are essential to human life, a deficiency as well as an excess can cause adverse health effects. Cadmium is not regarded as essential to human life. The relevant questions with regard to cadmium exposure are the total exposure levels and the principal factors which determine the levels of cadmium exposure and the adsorption rate of the ingested/inhaled cadmium by the individual, in other words, the pathways by which cadmium enters the food chain, the principal pathway of cadmium exposure for most human beings. Provision of sufficient clean water for daily consumption, industrial sectors, and agricultural sector is an increasing challenge as a result of population increase and numerous demands. In addition, today's environment has been threatened by much pollution, for example water pollution. The