CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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BIOPROCESSING OF *MORINGA OLEIFERA* FOR REMOVAL OF HEAVY METALS (CADMIUM AND CHROMIUM)

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ABSTRACT

Studies have been made to exploit the sorption properties of plant *Moringa Oleifera* for decontamination of cadmium and chromium. Sorption studies using standard practices were carried out in batch experiments as a function of dosage of processed *Moringa Oleifera* seed, contact time, metal concentrations, agitation speed and pH by using salt extraction. The maximum removal of cadmium and chromium was 72% and 77% .The maximum removal of heavy metals resulted through these optimum conditions as follows; removal of cadmium and chromium were 0.2 g/l and 0.5 g/l for processed *Moringa Oleifera* seed dosage, 200 rpm and 150 rpm for speed agitation, 40 min and 60 min for contact time, 4.5 and 8.5 for pH . The findings open up new avenues in the removal of toxic metals by *Moringa Oleifera* seeds from water bodies as low cost, domestic and environmentally friendly safe technology.

Keywords: *moringa oleifera* seed, chromium, cadmium, sorption, salt extraction

INTRODUCTION

Heavy metals are hazardous to public health because they tend to bio- accumulate. Bioaccumulation means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment. Compounds accumulate in living things any time they are taken up and stored faster than they are broken down (metabolized) or excreted. Cadmium derives its toxicological properties from its chemical similarity to zinc, an essential micronutrient for plants, animals and humans. (Evans J. R *et al* 2002).

Cadmium is bio-persistent and, once absorbed by an organism, remains resident for many years (over decades for humans) although it is eventually excreted. High exposure can lead to obstructive lung disease and has been linked to lung cancer, bone defects (osteomalacia, osteoporosis) in humans and animals, increased blood pressure and effects on the myocardium in animals(Costa, G. *et al* 1997)

Chromium has both beneficial and detrimental properties. Two stable oxidation states of chromium persist in the environment, Cr (III) and Cr (VI), which have contrasting toxicities, mobility, and bio-availabilities. Whereas Cr (III) is essential in human nutrition (especially in glucose metabolism), most of the hexavalent compounds are toxic, several can even cause lung cancer. While Cr (III) is relatively innocuous and immobile, Cr (VI) moves