

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)

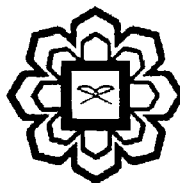
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Faridah Yusof

**Department of Biotechnology Engineering
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REMOVAL OF AQUEOUS ZINC (II) USING PROCESSED *MORINGA OLEIFERA* SEEDS

Suleyman A. Muyibi, Isam Y. Qudsieh, M. H. A. Rahman

Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, Gombak, 50728 Kuala Lumpur, Malaysia.

ABSTRACT

Moringa Oleifera is a tropical plant with multiple benefits used as a source of nutrition in some developing nations. In this study, a salt extract of *Moringa Oleifera* seed was applied to a synthetic water (distilled water dissolved with zinc (II) ions) to study its biosorption capacity on zinc (II). Four factor parameters have been developed which focused on the effect of varying the bioactive dosage, pH, agitation speed and contact time on the rate of zinc (II) removal. The analysis was done using the Response Surface Methodology (RSM) to study the zinc uptake. The results were examined using the quadratic model of Central Composite Design (CCD) which shows better correlations between all parameters involved. Significant interaction between the rate of zinc (II) removal with the amount of bioactive dosage and pH used. Finally the Department of environment Malaysia standard for zinc (II) of 1 mg/L was fulfilled.

Keywords: *moringa oleifera* seed, salt extract, zinc removal, bio-sorption capacity,

INTRODUCTION

Agricultural activities and industrial applications may become the dominant factor for the severe contamination of heavy metals in the wastewater. The metals have received special attention due to its recalcitrant and persistent characteristics in nature where concern was based on its threat to the aqueous and surrounding environment (Garg *et al*, 2007). Few heavy metals are present in wastewater including chromium, cadmium, lead, zinc, arsenic, nickel and silver. One of these elements, Zinc (II) possesses beneficial factor as essential element for human bodies and plants. However, when it is toxic in the environmental due to high concentration causing health problems such as nonfatal fume fever and pneumotitis (Lu *et al* 2004). Zinc (II) may be found in wastewater discharges from acid mine drainage (AMD), galvanizing plants, as a leachate from galvanized structures and natural ores, and from municipal wastewater treatment plant discharges where, as metal ions, it can travel through the food chain via bioaccumulation (Bhatti *et al*. 2007). Biomaterials, through the passive sorption or biosorption, are capable to retain relatively high quantities of metal ions (Mahviet *al*, 2005). *Moringa oleifera*, which belongs to the family of *Moringaceae*, is considered as one of the world's most useful trees due to its multiple benefits including its role in water treatment such as removing the turbidity and softening hard water (Muyibi & Evison, 1994).