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ULTILIZATION OF MANGO LEAVES *(Mangifera Indica sp.)* **AS LOW-COST ADSORBENT FOR THE REMOVAL OF COPPER(II) IONS FROM AQUEOUS SOLUTION**

NUR FATIMATUL SYAHIDA BINTI ROSLI

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ABSTRACT

UTILISATION OF MANGO LEAVES (*Mangifera Indica sp.*) AS LOW-COST ADSORBENT FOR THE REMOVAL OF COPPER((II) IONS FROM AQUESOUS SOLUTION

Contamination of environment by heavy metal especially in aquatic ecosystems is a serious problem due to increasing of the industrial activity. One of the alternative ways with an economical way is biosorption as it is used the various natural resources and industrial waste. Besides that, to improve the biosorption process and its effectiveness, the biosorbent is modified by chemically treated. Therefore, the efficiencies of treated mango leaves powder (*Mangifera Indica sp.*) as a low cost adsorbent for the removal of Cu(II) ions from aqueous solution which will assumed as the original wastewater containing Cu(II) ions was investigated in this study. The influences of pH, biosorbent dosage, contact time and initial concentration of Cu(II) ions were studied in batch experiments at room temperature and the percentage removal with uptake capacity were determined by using Atomic Absorption Spectrometry (AAS). The mango leaves used in this study were characterised by FTIR spectroscopy and it was found that O-H, C-H, C=C and C-O stretching were present. From the studies, it showed the optimum pH of initial solution was pH 5 with 0.8002mg/g and 80.91% of metal uptake capacity and percentage removal respectively. Optimum amount of biosorbent dosages was 0.5g with 0.9158mg/g of metal uptake capacity and 88.92% of percentage removal while the optimum contact time in biosorption was 120 minutes with 0.9197mg/g and 88.67% of percentage removal. The initial concentration of Cu(II) ions was found optimum to be at 50 mg/L with 4.7688mg/g of metal uptake and 91.93% of percentage removal. For the biosorption isotherm study, the biosorption data was well fitted with Freundlich Iostherm model. The value of $n = 0.6545$ which is not in the range of ($1< n <10$) indicates that adsorption was unfavorable. From all the result that have been obtained, it can be concluded that adsorbent from treated mango leaves powder can be utilized for the treatment of Cu(II) ions in aqueous solution and have the potential to be applied as alternative low-cost biosorbent in the remediation of heavy metal contamination in wastewater.

CHAPTER 1

INTRODUCTION

1.1 Background

Now a day, various toxins that are released into water had leading to a great deal of water pollution. Many heavy metal such as cadmium, zinc, nickel, lead, mercury and chromium that are detected from various industries like battery plants, metal processing industries, pharmaceuticals, petroleum refining, smelting, mining fields, paint manufacture, pesticides and photographic industries are being released into the water bodies leading to unsafe water for normal consumption and created a major global concern.(Kanyal and Bhatt, 2015).

Heavy metal ions are now a days among the most important pollutants in surface and ground water.(Brinza *et al.,* 2009).Metals are essential minerals for all aerobic and most anaerobic organisms, but it has proven that in large amounts some of them, such copper (Cu), lead (Pb), cadmium (Cd) and mercury (Hg) had seriously affect human health (WHO, 2007).

The discharging of heavy metals causes a significant effect to the environment and public health due of their higher toxicity. According to Sheen (2011), heavy metal is a member of a loosely-defined subset of elements that shows metallic properties, which mainly includes the transition metals, some metalloids, lanthanides, and actinides.

The term "heavy metal" is collectively applied to a group of metals (and metal-like elements) with density greater than 5 g/cm^3 and atomic number above 20. Removal of