VARIATION OF MEMBRANE'S THICKNESS : THE EFFECT OF MEMBRANE'S PERFORMANCE ON COPPER (II) ION

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ABSTRACT

The purposes of this study are to characterize the industrial wastewater containing Copper (II) ion and to evaluate the performance of Composite membranes on the removal of Copper (II) ion. The integrated complexation method is used as its benefit is to overcome the restrictions of the existing methods in removing the heavy metal ions. For the characterization of wastewater, the result has shown that the water samples need to undergo further treatment before being discharged to the groundwater as the analysis results are out of the acceptable range of Environmental Quality (Industrial Effluent) Regulations 2009. Before performing the performance testing, the pH of the water sample was altered to 7 as the pre-treatment. Two types of composite membrane with i) a polymer blend of PVA and Chitosan as thin layer and ii) hybrid membrane as thin layer, with varied thickness (60µm and 90µm) of polysulfone membrane were used. The final result shows that composite membrane with hybrid membrane as thin layer of 90µm was the best membrane to be used to filter the water sample with the removal percentage of 99.67%. Besides that, it has fulfilled the Environmental Act's requirement which the copper ion concentration need to be less than 1ppm.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Heavy metals pollution has become one of the most critical environmental problems today. It can give a very harmful risk to the public health and environment because of its hazardousness. The hazardousness depends on its ignitability, corrosivity, toxicity and reactivity. Some of the hazardous heavy metals are Lead, Cadmium, Zinc, Nickel, Manganese and Copper [1].

Copper is one of the most electrically conductive of all the metal elements. It has a physically bright reddish-brown in color which can take on green-hued patina when it is exposed to corrosive environments. Pure Copper has a very high melting point of 1083℃ and it is associated with complex formation in biological systems. Copper is an important engineering metal which is widely used for various engineering purposes. For instance, it is used for manufacturing of several alloys, ceramics and pesticide. Besides that, it is also used in manufacturing of electrical appliances, wires, electronics, automotive and etc [3].

Copper is a toxic metal that causes a disease named “Wilson’s Diseases” [2]. It causes harmful biochemical effects, toxicity and hazards in living organisms including human and other living things. Its toxicity leads to severe mucosal