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ADSORPTION OF HEXAVELENT CHROMIUM, Cr (VI) BY USING LEUCAENA LEUCOCEPHALA PODS

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ABSTRACT

Industrialization and urbanization were the most factors of large amount of heavy metals and other pollutants presents in the wastewater. One of the heavy metals that presents in the wastewater is hexavalent chromium Cr (VI). The present studies have been done by using Leucaena Leucocephala Pods (LLP) as adsorbent in the removal of heavy metals present in the waste water. In the experiment, LL was used in the removal of hexavalent chromium Cr (VI) ions. Thermo Gravimetric Analysis (TGA), Point of zero charge (pHpzc) and Fourier Transform Infrared Spectroscopy (FTIR) were used to characterise the pods of LL. The experimental adsorption parameters investigated include effect of pH, adsorbent dosage and contact time. The best condition of parameters such as 0.25 g of LLP dosage, time of contact of 120 min, pH of 2 indicated the maximum Cr (VI) uptake. This study shows that LLP is an efficient and cost-effective adsorbent for removing Cr (VI) and it can be a solution for Cr (VI) discharging industries.

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CHAPTER 1

INTRODUCTION

1. Introduction

1.1. Background of research

Industrialization and urbanization were the most factors of large amount of heavy metals and other pollutants presents in the wastewater. This wastewater containing all the heavy metals and pollutants were then released into the aquatic ecosystem (Khalid et al., 2018). Both human and aquatic lives were affected due to the high release amount of heavy metals present in the wastewater (Owalude & Tella, 2016). One of the heavy metals that presents in the wastewater is hexavalent chromium Cr (VI). Due to its harmful effects to the human, hexavalent chromium was listed as one of top sixteen most pollutants heavy metals. Malaysia encountered quick expansions in terms of industrialization and urbanization to become one of the most advanced country by 2020. However, the activities conducted to make the country advanced have effected in water pollution around the areas of the country (Oh, Leong, Poh, Chong, & Lau, 2018).

Electroplating, fertilizer, textile mill, paint and dye were the industry that generates hexavalent chromium as their effluent (Rangabhashiyam & Balasubramanian, 2018). Disease such as kidney and liver damage, lungs and digestive tract cancer were reported when exposed to high dosage amount of hexavalent chromium (Malwade, Lataye, Mhaisalkar, Kurwadkar, & Ramirez, 2016). Skin irritation and ulceration were also reported if a person were exposed to the metals in a low concentration. In order to reduce the amount of these heavy metals that presents in the wastewater, many applications such as membrane filtration, biological methods, ion exchange, reverse osmosis, solvent extraction, reduction and also precipitation (Enniya, Rghioui, & Jourani, 2018). However, by using these types of applications, further disposal will be needed as the toxic sludge was formed. These methods or application cannot be used to extract a too low or too high concentration of hexavalent chromium. The costs of these applications also were high due to the equipment maintenance and supervision.