ADSORPTION OF MANGANESE AND ZINC IN SYNTHETIC WASTEWATER USING TEA WASTE

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DECLARATION BY THE CANDIDATE

I declared that the work in this thesis was carried ot in accordance with the regulations of Universsiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Conventional methods to treat metal loaded wastewater effluents are found to be limited as it involves high capital and operational cost with low efficiencies. Such constraints have encourage researchers to find and invent efficient, cost effective and environmentally-friendly alternative technologies for heavy metal adsorption. Adsorptive potential of tea waste was evaluated for the treatment of Mn(II) and Zn(II) in synthetic wastewater. Batch adsorption study was performed using an orbital shaker at 200rpm at different contact time of 20, 40, 60, 80, 100 and 120 minutes and various tea waste dosage of 0.5, 1, 1.5, 2, 2.5 and 3g/100ml. The experimental data for various dosages were fitted in Isotherm models whilst the different contact time were fitted into Kinetic models. The equilibrium data satisfactorily fitted into Langmuir Isotherm model for both Mn(II) and Zn(II) with R^2 value of 0.9906 and 0.9854, respectively. Result showed that the tea waste was capable to adsorbed 94.7% Mn(II) and 99.5% Zn(II). Both adsorption of Mn(II) and Zn(II) was found to be increase as dosage of tea waste increased up to 2g/100ml after which the adsorption tend to become saturated. Pseudo-Second-Order model best represents the equilibrium data with R^2 value of 0.9998 and 1.0000 for Mn(II) and Zn(II), respectively. The maximum adsorption achieved was up to 95.5% for Mn(II) and 99.5% for Zn(II) but it was increased only until the 60th minute for Mn(II) and 80th minute for Zn(II) before the adsorption become consistent. Thus, the Langmuir Isotherm and Pseudo-Second-Order Kinetic models have proved that the tea waste is capable to be an efficient and effective adsorbent for Mn(II) and Zn(II) removal.

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