Environmental Engineering and Management Journal December 2015, Vol.14, No. 12, 2771-2782
http://omicron.ch.tuiasi.ro/EEMJ/

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REMOVAL OF LEAD (II) IONS BY ACTIVATED CARBON PREPARED FROM DURIAN PEEL: ADSORPTION KINETICS AND ISOTHERMS

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Abstract

In this study, activated carbon was synthesized from durian peel and used for the removal of lead (II) ions from water. The activated carbon was produced with physical activation method using CO_2 as the activating agent at 900 ^oC. Prior to the activation process, durian peel was carbonized under either nitrogen atmospheric or vacuum pyrolysis in order to compare the properties of the synthesized activated carbons. Suitable adsorption kinetics and isotherm models for the lead (II) removal in a batch system were evaluated. The experimental data were analyzed based on five adsorption kinetics models (pseudo-first-order, pseudo-second-order, Elovich, intraparticle diffusion and liquid film diffusion models) in order to determine the best fit model for the adsorption of lead (II) ions on durian peel-derived activated carbons. Langmuir and Freundlich adsorption isotherms were applied to the experimental data at equilibrium. Characterization of the synthesized activated carbon included N_2 adsorption, FTIR, iodine number and methylene blue adsorption. The results showed that the activated carbon synthesized under vacuum pyrolysis had greater BET surface area, pore volume and lead (II) adsorption capacity than that synthesized under nitrogen atmospheric pyrolysis. The adsorption kinetics followed the pseudo-second-order model, suggesting chemisorption as the rate controlling step. Langmuir adsorption isotherm better fitted to the experimental data than Freundlich adsorption isotherm. Durian peel-derived activated carbon is a useful adsorbent to remove lead (II) ions from water since durian peel is abundant and locally acquired with no cost.

Key words: activated carbon, adsorption, durian peel, lead (II) ion

Received: May, 2012; Revised final: October, 2012; Accepted: November, 2012

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