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ADSORPTIVE REMOVAL OF Cu (II) IONS BY DATE PITS: KINETIC AND EQUILIBRIUM STUDIES

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Abstract

Date pits were used as a low-cost adsorbent to study the effective removal of copper (II) ions in an aqueous solution on the basis of adsorption kinetics and isotherm equations. Before and after the adsorption process, the date pits were characterized by electron scanning microscope (ESM) as well as Infrared spectroscopy (IR). The effects of the pH, zero point of charge, the adsorbent mass, and the adsorbent particle size on the adsorption of copper (II) were also studied. Equilibrium data were analyzed using different isotherms models. The adsorption kinetics data were evaluated by the pseudo-first-order, second-order kinetic, Elovich and intraparticle diffusion models. Adsorption isotherm analysis data fitted well to the Freundlich model with a maximum adsorption capacity of 3.27 mg/g. The kinetic experimental data correlated well with the pseudo-second-order kinetic model, which indicated that chemisorption processes could be responsible for adsorption. The results demonstrated that date pits have potential to be employed as an effective adsorbent for the removal of copper (II) from aqueous solutions. The copper-loaded adsorbent was investigated for further usage as an adsorbent for the removal of methylene blue from colored water. The adsorption of methylene blue increased 3-15% depending on the mass of adsorbent used.

Key words: adsorption, copper removal, date pits, isotherm, kinetic

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