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Utilization of an agricultural waste material, melon (*Cucumis melo* L.) peel, as a sorbent for the removal of cadmium from aqueous phase

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ABSTRACT

Melon (*Cucumis melo* L.) peel, an agricultural solid waste material, was utilized as a novel nonconventional sorbent for the removal of cadmium from aqueous phase. The effects of sorbent dose, pH, ionic strength, temperature, stirring speed, initial concentration and contact time on the sorption of cadmium were evaluated. Results indicate an increase in uptake by the sorbent with increasing initial cadmium concentration, solution pH and contact time. The amount of cadmium sorption decreases with increasing temperature, ionic strength and sorbent dose. Mixing rates up to 400 rpm increase uptake, however, higher mixing rates result in insignificant enhancement of uptake compared to the dissipated energy. The equilibrium sorption data of cadmium by melon peel were analyzed by Langmuir, Freundlich and Temkin isotherm models. The results indicate that the Langmuir model provides the best correlation of the experimental data, with maximum monolayer sorption capacity of 81.97 mg g^{-1}. Pseudo-first-order, pseudo-second-order and intraparticle diffusion models were used to analyze the kinetic data obtained at different initial concentrations. Among the kinetic models studied, the pseudo-second-order model was the best applicable to describe the sorption of cadmium by melon peel. The results demonstrated that melon peel is very effective for the sorption of cadmium from aqueous solutions.

Keywords: Cadmium; Sorption; Melon peel; Kinetics; Equilibrium

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