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Adsorption of cationic dye from aqueous solution by the shells of apricot kernels of N'gaous -Algeria: isotherm, kinetic and thermodynamic studies

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Abstract

The adsorption capacity of shells of apricot kernels (SAK) of **N'gaous -Algeria**, a low-cost and locally available biomaterial, for methylene blue (MB) removal from aqueous solutions was examined using a batch process. The effects of operational conditions such as initial dye concentration (0–25 mg/L), adsorbent dose (0.1–3 g/L), temperature (20°C–45°C) and pH 2–12 on the removal of MB by **SAK** were studied. The adsorption of MB is favored by low temperatures. Near neutral and acid pHs are more favorable for the dye adsorption. Three models were employed to describe experimental adsorption isotherm data: Langmuir, Freundlich and Temkin equations.

Experimental equilibrium data were best represented by the Langmuir isotherm model. The thermodynamic parameters such as ΔG° , ΔH° and ΔS° were determined for the adsorption of MB. The removal kinetics of MB by SAK was examined using the pseudo-first-order, pseudo-second-order model equations and intraparticle diffusion model. Pseudo-second-order model was found to define the adsorption process better than the pseudo-first-order equation. The results of the present work showed that SAK was a main alternative for removing cationic dyes from wastewater.

Keywords: Adsorption; Methylene blue; shells of apricot kernels; Kinetics; Mechanism; Isotherms; Thermodynamics