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Adsorption of phenol from aqueous solutions using activated carbon prepared from crofton weed

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ABSTRACT

Activated carbon derived from crofton weed (ACCW) was evaluated for its ability to remove phenol from an aqueous solution. The kinetics study, adsorption isotherm, pH effect, and thermodynamic study were examined in batch experiments. Adsorption data for phenol uptake by ACCW were analyzed according to Langmuir, Freundlich and Temkin adsorption models. Thermodynamic parameters for the adsorption system were determined at 293 K, 313 K and 333 K ($\Delta H° = -22.92$ kJ mol^{-1}; $\Delta G° = -2.87$ to -5.28 kJ mol^{-1} and $\Delta S° = -60.20$ J/K·mol). $\Delta G°$ values obtained were negative, indicated that the adsorption of the phenol on the surface of ACCW was a spontaneous adsorption process. The kinetics process can be described by a pseudo-second-order rate equation very well. These results show that the ACCW could be considered as a potential adsorbent for phenol in aqueous solutions.

Keywords: Phenol; Adsorption; Crofton weed; Isotherms; Kinetics; Activated carbon

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