Removal of chromium (VI) from aqueous solutions using activated carbon prepared from crofton weed

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ABSTRACT

Activated carbon from crofton weed (ACCW) was evaluated for its ability to remove Cr(VI) from aqueous solutions. Batch experiments were used to examine kinetics, adsorption isotherm, pH effect, and thermodynamic parameters. Adsorption data for Cr(VI) uptake by ACCW were analyzed according to Langmuir and Freundlich adsorption models. Thermodynamic parameters for the adsorption system were determined at 293, 303, and 313 K (ΔH° = 15.02 kJ mol⁻¹; ΔG° = -0.76 to -2.91 kJ mol⁻¹, and ΔS° = 53.85 J K⁻¹ mol⁻¹). The ΔG° values obtained were negative, indicating that the adsorption of Cr(VI) on the surface of ACCW was a spontaneous adsorption process. The kinetics of this process was described very well by a pseudo-second-order rate equation. These results show that the ACCW could be considered as a potential adsorbent for Cr(VI) in aqueous solutions.

Keywords: Chromium(VI); Activated carbon; Adsorption; Isotherms; Thermodynamics; Crofton weed

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