Equilibrium and thermodynamics for adsorption of uranium onto potassium hydroxide oxidized carbon

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**A B S T R A C T**

In this study, the potential of KOH-oxidized rice straw-based activated carbon for uranium adsorption from aqueous solution was studied. Effect of different parameters including contact time, initial uranium concentration; initial pH and temperature were studied. Uranium uptake was fast and needed a short time of 40 min. Adsorption isotherms were well fitted by Langmuir model ($R^2 = 0.999$) and Dubinin–Radushkevich (D–R) model ($R^2 = 0.99$) with activation energy values in the energy range of an ion-exchange reaction. A temperature was found to increase the adsorption of uranium from 100 mg/g to 127 mg/g when it was increased from 298K to 328K. Thermodynamic parameters including $\Delta H^\circ$, $\Delta S^\circ$, and $\Delta G^\circ$ were calculated, which showed that uranium adsorption was spontaneous, exothermic nature and there is evident of decreasing metal ions randomness at the solid-liquid interface. Findings from the present study showed that potassium hydroxide-modified straw-based carbon can be successfully used for removal of uranium from aqueous solution.

**Keywords:** Uranium; Adsorption; Isotherm; Thermodynamics; Activated carbon; Surface modification

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