Adsorption of Ni(II) from aqueous solution by activated carbons derived from tobacco stem

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\textbf{ABSTRACT}

Activated carbons from tobacco stem were identified as the most potent Ni(II) sorbent ($Q_0 = 97.32$ mg/g). The tested plant material adsorbed Ni(II) optimally at pH 5.3. The efficiency of the adsorbent was investigated using batch adsorption technique under different experimental conditions such as solution pH, initial metal ion concentration, and agitation time. The adsorption of Ni(II) followed pseudo-second-order kinetics. Adsorption isotherms were expressed by Langmuir and Freundlich models. Langmuir adsorption model fits the experimental data reasonably well than Freundlich model for the present study. The thermodynamic parameters such as standard Gibb’s free energy change ($\Delta G^\circ$), standard enthalpy change ($\Delta H^\circ$), and standard entropy change ($\Delta S^\circ$) were evaluated. The thermodynamics of Ni(II) on activated carbons from tobacco stem indicates its spontaneous and endothermic nature. The results obtained show that activated carbons from tobacco stem, which has a very low economic value, may be used for the effective treatment of aqueous solutions contaminated with Ni(II).

\textit{Keywords:} Biosorption; Activate carbons from tobacco stem; Isotherms; Kinetics; Thermodynamics