Copper ions removal from aqueous solutions using acid-chitosan functionalized carbon nanotubes sheets

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ABSTRACT

Copper ions (Cu$^{2+}$) removal from aqueous solutions using carbon nanotubes (CNTs) sheets was performed. CNTs sheets were synthesized via chemical vapor deposition of cyclohexanol and ferrocene in nitrogen atmosphere at 750°C, and functionalized with concentrated nitric acid and chitosan. The as-synthesized and functionalized CNTs sheets were used as adsorbents for copper ions removal from water. The results demonstrated that functionalization with concentrated nitric acid and chitosan improves copper ions adsorption capacity of CNTs sheets from 23.32 to 57.34 mg/g at initial copper ions concentration of 800 mg/l. Therefore, the acid–chitosan-functionalized CNTs sheets can be used as an effective adsorbent for copper ions removal from water and have a good potential application in the environmental protection. Langmuir and Freundlich isotherm models were used to describe the adsorption behavior of copper ions by CNTs sheets. Two kinetics models including the pseudo-first-order and the pseudo-second-order equations were applied to fit the experimental data.

Keywords: Carbon nanotubes sheets; Copper ions; Adsorption; Isotherm; Kinetics

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