Removal of copper (II) ions from aqueous solutions onto chitosan/carbon nanotubes composite sorbent

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\textbf{ABSTRACT}

Carbon nanotubes (CNTs) have been considered as promising materials in various applications including water treatment. Manipulation of CNT’s with polymer offers unique properties as a composite in treatment of wastewater and removal of heavy metal ions. In the present work, we have developed a chitosan (CS)/multiwall carbon nanotubes (MWCNTs) composite sorbent by mixing the naturally occurring biopolymer CS and functionalized MWCNTs in 1\% acetic acid solution. The obtained composite adsorbent was used successfully for the removal of copper (II) ions from aqueous solutions. The influence of variable parameters like pH, concentration of the metal ion, amount of adsorbent, and contact time on the extent of adsorption was investigated by batch method. Graphical correlations of various adsorption isotherm models such as Langmuir and Freundlich have been carried out. The data were analyzed by the Lagergren pseudo-first-order and pseudo-second-order kinetic models. Further the adsorption performance of the CS/MWCNTs composite was compared with CS and cation exchange resin. The maximum monolayer capacity of CS/MWCNTs composite and CS was found to be 454.55 and 178.57 mg/g, respectively. The prepared adsorbents were characterized by Fourier transform infrared spectroscopy and scanning electron microscopy analysis.

\textbf{Keywords:} Chitosan; Multi wall carbon nanotubes; Biosorption; Copper; Kinetics; Langmuir adsorption

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