Removal of hexavalent chromium ions from aqueous solution using chitosan/polypyrrole composite

Rathinam Karthik, Sankaran Meenakshi*
Department of Chemistry, The Gandhigram Rural Institute-Deemed University, Gandhigram, Dindigul, Tamil Nadu 624 302, India, Tel. +91 451 2452371; Fax: +91 451 2454466; email: drs_meena@rediffmail.com (S. Meenakshi)
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ABSTRACT
In the present investigation, chitosan/polypyrrole composite (CS/PPy) was synthesized and used as an adsorbent for the first time to remove the Cr(VI) ions from aqueous solution. The CS/PPy composite was characterized using FTIR, X-ray diffraction, scanning electron microscopy and energy dispersive X-ray analyzer, and BET. Batch equilibrium experiments were carried out to optimize various parameters for the water treatment process. The optimized conditions revealed that adsorption of Cr(VI) ions onto the CS/PPy composite was highly pH dependent. The maximum Cr(VI) removal capacity of CS/PPy composite was 78.61 mg/g at 303 K. Equilibrium data fitted well with the Freundlich model. Thermodynamic parameters for the adsorption system were calculated and concluded that the nature of sorption was spontaneous and endothermic in nature. The kinetic study reveals that the sorption of Cr(VI) ions by the composite follows the pseudo-second-order and pore diffusion models. The Cr(VI) uptake of CS/PPy composite was mainly governed by electrostatic attraction-coupled reduction.

Keywords: Chitosan; Polypyrrole; Adsorption; Reduction; Kinetics

*Corresponding author.
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