Removal of Cd(II) from aqueous solution using cross-linked chitosan–zeolite composite

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ABSTRACT

Cross-linked chitosan–zeolite composite was prepared and characterized by Fourier transform infrared spectroscopy and scanning electron microscope. Adsorption of Cd(II) by the cross-linked chitosan–zeolite composite as a function of solution pH, contact time, initial Cd (II) concentration, and temperature was investigated systematically by batch experiments. The obtained results showed that the removal of Cd(II) was pH dependent and the optimum adsorption was achieved at pH 7.0. The adsorption process could be described by pseudo-second-order kinetic model. Thermodynamic parameters revealed the spontaneous and endothermic nature of the adsorption. The batch adsorption data could be well elucidated by the Langmuir model. The maximum adsorption capacity of Cd(II) on the cross-linked chitosan–zeolite composite at 25˚C determined from the Langmuir model was 102.15 mg/g. The adsorbent was successfully regenerated using EDTA, HNO 3, and HCl solution as desorbent, respectively.

Keywords: Cadmium; Chitosan–zeolite composite; Adsorption; Kinetics; Isotherm