

Equilibrium and kinetic studies of fluoride adsorption by chitosan coated perlite

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ABSTRACT

A new biosorbent was developed by coating chitosan, a naturally and abundantly available biopolymer, on to perlite. The surface morphology of chitosan coated perlite (CCP) was observed using scanning electron microscopic (SEM) studies. Fourier transform infrared spectroscopy (FTIR) was used for the determination of functional groups responsible for fluoride sorption. The adsorption characteristics of CCP towards fluoride were studied under batch equilibrium and column flow experimental conditions. The effect of different process parameters such as pH, time, and concentration of fluoride and adsorbent dose on adsorption of fluoride was investigated. The data were analyzed on the basis of Lagergren first-order, pseudo-second-order and Weber–Morris models. The adsorption of fluoride on CCP followed pseudo-second-order kinetics. Break through curves were obtained from column flow adsorption data. The fluoride loaded CCP was regenerated using 0.1 N NaOH.

Keywords: Fluoride; Adsorption; CCP; Kinetics; Isotherms; SEM; FTIR

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