

Preparation of a Bentonite Matrix Composite for Heavy Metal Removal

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Abstract

This study examines the adsorption process of Ni²⁺ on bentonite, a clay material, as well as the effect of the composite prepared based on bentonite and natural polymer. The modified bentonite was thoroughly characterized using various analytical techniques such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and scanning electron microscopy (SEM). The results revealed significant improvements in mineralogical and surface structures compared with untreated bentonite. To study adsorption, variable nickel concentrations ranging from 200 to 4000 mg/L were tested. Experimental isotherm data were analyzed using Langmuir, Freundlich and Temkin models. The fits showed that the Freundlich model best described nickel adsorption on bentonite-biopolymers, with an adsorption capacity of 475 mg/g.

Keywords

Composite, Bentonite, Biopolymers, Adsorption, Heavy Metal and Nickel Removal