



Removal of fluoride and arsenate ions from aqueous solutions and natural water by modified natural materials

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ABSTRACT

Fluoride adsorption by modified zeolitic tuff and pozzolana was conducted from aqueous solutions and hot-spring water. The thermodynamic parameters (ΔS , ΔG and ΔH) were calculated from the sorption data obtained at temperatures between 293 and 343 K. Column experiments were carried out using different bed depths; the breakthrough curves obtained for fluoride and arsenic ions from aqueous solutions and natural water were fitted and indicated spontaneous and thermodynamically favorable adsorption for fluoride and arsenic ions by modified zeolitic tuff. The sorption processes of fluoride ions by both adsorbents are endothermic and the mechanisms are physical sorption. The adsorption process of fluoride by modified pozzolana is nonspontaneous, and the sorption of arsenic is endothermic. The highest uptake capacity was obtained with a 3 cm bed depth column and a flow rate of 1 mL/min using a 5 mg/L fluoride solution; the adsorption capacities decreased with the use of hot-spring water.

Keywords: Arsenic; Fluoride; Adsorption; Zeolite; Pozzolan

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