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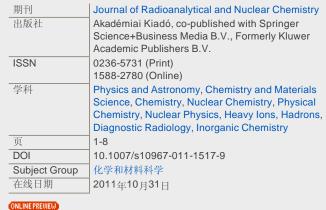
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摘要

Herein, the sorption properties of Eu(III) on Na-attapulgite were performed by using batch sorption experiments under different experimental conditions, such as contact time, pH, ionic strength, humic acid and temperatures. The results indicated that the sorption of Eu (III) on Na-attapulgite was strongly dependent on pH and temperature. At low pH values, the sorption of Eu(III) was influenced by ionic strength, whereas the sorption was not affected by ionic strength at high pH values. The sorption of Eu(III) was mainly dominated by ion exchange or outer-sphere surface complexation at low pH values, and by innersphere surface complexation or surface precipitation at high pH values. The sorption of Eu (III) onto Na-attapulgite increased with increasing temperature. The Langmuir and Freundlich models were applied to simulate the sorption isotherms, and the results indicated that the Langmuir model simulated the sorption isotherms better than the Freundlich model. The thermodynamic parameters (ΔG^{0} , ΔS^{0} , ΔH^{0}) were calculated from the temperature dependent sorption isotherms at 293, 313 and 333 K, respectively, and the results indicated that the uptake of Eu(III) on Na-attapulgite was an endothermic and spontaneous process. The results of high Eu(III) sorption capacity on Na-attapulgite suggest that the attapulgite is a suitable material for the preconcentration and immobilization of Eu(III) ions from large volumes of aqueous solutions.

Keywords

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Uptake properties of Eu(III) on Na-attapulgite as a function of pH, ionic strength and temperature

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Abstract Herein, the sorption properties of En(III) on Na-attapulgite were performed by using batch sorption experiments under different experimental conditions, such as contact time, pH, ionic strength, humic acid and temperatures. The results indicated that the sorption of Eu(III) on Na-attapulgite was strongly dependent on pH and temperature. At low pH values, the sorption of Eu(III) was influenced by ionic strength, whereas the sorption of Eu(III) was mainly doministed by ion exchange or outersphere surface complexation or surface perceipitation of Eu(III) was mainly doministed by ion exchange or outersphere surface complexation or surface precipitation at high pH values. The sorption of Eu(III) onto Na-attapulgite increased with increasing temperature. The Langmuir and Freundlich models were applied to simulate the sorption isotherms and the results indicated that the Langmuir model simulated the sorption isotherms better than the Freundlich model. The thermodynamic parameters (ACP, ASP, AFP) were calculated from the temperature dependent sorption isotherms at 293, 313 and 333 K, respectively, and the results indicated that the uptake of Eu(III) on Na-attapulgite was an endothermic and

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Keywords Eu(III) - Sorption - Na-attapulgite - pH Ionic strength - Thermodynamic data

Introduction

The understanding of physicochemical behavior of long-lived lanthanides and actinides in the environment is crucial to evaluate their potential pollution and human healthy [1-7]. In the last decade, the interactions of radionuclides with clay minerals and oxides have been studied extensively [8-14]. The sorption of the long-lived radiomuclides is important for the assessment of nuclear waste repository at the solid-water interface. Europium belongs to the lantha-nide group and only the trivalent oxidation state is stable in water [15, 16]. The ionic radii of Eu(III) is almost the same for all the trivalent lanthanides and actinides, which results in the similar chemical properties of Eu(III) as compared with other trivalent lanthanides and actinides [17]. In recent years, sorption of Eu(III) on hydrous metal-oxides and clay minerals has been studied extensively [18-26]. Takahashi et al. [27] studied Eu(III) sorption on non-porous silica and found that the inner-sphere complex of Eu(III) with silanol groups at the silica surface was the main sorption mechanism of Eu(III) uptake. Tan et al. [1, 4] studied the sorption of Eu(III) onto TiO₂, and found that the presence of fulvic acid (FA) strongly enhanced the sorption of Eu(III) onto ${\rm TiO_2}$ at low pH values, and the sorption was attributed to inner-sphere surface complexation. The extended X-ray

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