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ADSORPTION BEHAVIOR OF GADOLINIUM(III) FROM AQUEOUS SOLUTION BY D418 RESIN

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Abstract

Adsorption, desorption, and kinetics behavior of Gd(III) ion on chelating resin were investigated in this paper. Batch adsorption studies were carried out with different pH, contact time, and temperature. The adsorption of Gd(III) follows the Langmuir model better than the Freundlich model. The apparent activation energy E_a and adsorption rate constant are k_{308} 4.16 kJ/mol and $6.01 \times 10^{-5} \text{ s}^{-1}$, respectively. Thermodynamic parameters such as ΔH , ΔS and ΔG indicated that Gd(III) ion adsorption by D418 resin was an endothermic and spontaneous process in nature. Column adsorption experiments indicated the maximum dynamically adsorption capacity of 281mg/g for Gd(III). The desorption rate of Gd(III) was 98.3% when the elution agent is 2.0 mol/L HCl solution and the chelating resin can be regenerated and reused. Analysis of IR spectroscopy for D418 resin before and after adsorption of Gd(III) ions and after desorption indicated the attendance of coordination and good regenerative ability of resin. Thermo gravimetric analysis for D418 resin before and after adsorption of Gd(III) ions proved the adsorption of Gd(III) ions.

Keywords: adsorption, desorption, D418 resin, gadolinium

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