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KINETIC, EQUILIBRIUM AND THERMODYNAMIC STUDIES OF CESIUM REMOVAL FROM AQUEOUS SOLUTIONS USING AMBERJET UP1400 AND AMBERLITE IR120 RESINS

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Abstract

The performance of two cation exchanger resins, Amberjet UP1400 and Amberlite IR120 in the process of Cs(I) ions removal from aqueous solutions was examined. Batch experiments were carried out to determine the influence of several parameters (resin dosage, contact time, temperature and initial concentration of Cs(I) ions) on the removal process. The equilibrium was reached after 60 min for Amberlite IR120 and after 120 min for Amberjet UP1400, with an overall adsorption performance of ~97% for both materials. The kinetics of the adsorption process was well approximated by the pseudo-second-order kinetic model. The equilibrium adsorption data were well described by the Langmuir model for Amberjet UP1400 and by the Sips model for Amberlite IR120. The calculated maximum adsorption capacities towards Cs(I) were of 6.36 mg/g for Amberjet UP1400 and of 8.67 mg/g for Amberlite IR120. The values of thermodynamic parameters ΔH^o and ΔG^o obtained demonstrated that the adsorption process was endothermic and spontaneous. The values calculated for the activation energy were of 3.48 kJ/mol for Amberjet UP1400 and 4.85 kJ/mol for Amberlite IR120.

Key words: cation exchanger resin, cesium ion, isotherm, kinetic, thermodynamic

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