Ponomareva Mariya, Chem Sci J 2016, 7:2(Suppl)
http://dx.doi.org/10.4172/2150-3494.C1.003

European Chemistry Congress

Thermodynamic characteristics of sorption extraction of anionic complexes of erbium with trilon B on weakly basic anionite

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The adsorption of anionic complexes of erbium with Trilon B on D-403 anionite is studied at ionic strengths of 1 mol/kg (NaNO3) and temperatures of 298 and 343 K. D-403 anionite is Chinese-made weakly basic macroporous polystyrene chelate anionite. Before the experiment anionite was transfered to nitrate form. Sorption was studied from erbium nitrates standard solutions. Trilon B was added as complexing agent with mole ratio of 1:1 in accordance with the following reaction stoichiometry. Formation of complexes with composition $[ErTr]^-$ was proven by conductometric and potentiometric titration of 10 ml aliquot erbium nitrate (3+) with concentration of 0.05 mol/l with Trilon B solution with concentration of 0.05 mol/l. Values of the stability constants of anionic complexes of Er3+ with Trilon B, plus the Gibbs energies of the complexation reaction is $K_{stability}=2.32\cdot10^{18}$; $\Delta_{compl}G^0_{298} = -104.58 \pm 4.18$ kJ/mol. A thermodynamic description of the sorption isotherm was created using a linear form of the law of mass action, modified for the ion exchange reaction. At a temperature of 298 K the total adsorption of anionite the total adsorption of anionite is $\Gamma\infty=0.095\pm0.05$ mol/kg, equilibrium constant K=42±2, and the Gibbs energy of ion exchange $\Delta G^0_{298} = -9200 \pm 500$ J/mol. At a temperature of 343 K the total adsorption of anionite is $\Gamma\infty = 0.15 \pm 0.05$ mol/kg, equilibrium constant K=54±3, and the Gibbs energy of ion exchange $\Delta G^0_{298} = -11400 \pm 600$ J/mol. The following values were obtained: $\Delta H^0_{298-343} = 630 \pm 2$ J/mol $\Delta S^0_{298} = 3 \pm 2$ J/mol·K $\Delta S^0_{343} = 3 \pm 2$ J/mol·K

Biography

Dr. Ponomareva Maria has completed her PhD at the age of 24 years from National mineral resources university. She is the assistant of the department of general and physical chemistry of National mineral resources university. She is engaged in research in the field of adsorption and ion exchange of rare and rare-earth metals from complex salt solutions. She has published more than 20 papers in scientific journals.

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