Thermal behaviour of the lanthanide compounds in the phase of strongly basic cross-linked ionic polymer

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Lantanides and their compounds are used extensively in various fields of science and industry. The largest amounts of lantanides are used in catalysis [1]. Special interest represented fluorescent properties of the lanthanide compounds [2].

The sorption of metal cations on the cation exchangers has been investigated sufficiently. The sorption of lanthanides in the form of anionic complexes on the anion exchangers has also been investigated. But there are no known papers in which the sorption of lanthanide cations on strongly basic anion exchangers has been investigated. This is because such polymers do not contain negatively charged or electron donor atoms in their matrix. Yet we have demonstrated that the cross-linked ionic polymers containing strongly basic groups (R_4N^+) under certain conditions can retain trivalent metal cations from sulphate solutions but not from chloride or nitrate ones [3]. The retention of metallic cations takes place due to the formation in the polymer phase of the ultrafine particles of the jarosite mineral type compounds: R_4N $[M_3(OH)_6(SO_4)_2]$.

In the present work, the commercial anion exchanger AV-17(Cl), containing R_4N^+ functional groups, was used. The characteristics of the polymer are shown in Ref.[4]. The polymer was loaded with metal cations in solutions of $La_2(SO_4)_3$, $Nd_2(SO_4)_3$), $Eu_2(SO_4)_3$ and $Er_2(SO_4)_3$. Composites were investigated thermogravimetrically in the temperature range of 20-1000 ºC. For comparison, the thermograms of samples AV-17(Cl) and AV-17(Cr) sorbents in the air and nitrogen atmosphere were obtained. The sorbent AV-17(Cr) is the AV-17 polymer containing jarosite mineral type compounds of the Cr(III)).

Data analysis allows us to consider that the thermal stability of the investigated samples decreases in the following order:AV-17(Cl) > AV-17(Eu) > AV-17(Cr) = AV-17(La) >
> AV-17(Er) > AV-17(Nd). The thermal behavior of the AV-17(Nd) differs from other composites containing Lanthanides (III).

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