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Sorption Preconcentration of Eu(III) Ions from CsI Solutions by Silica Gel Impregnated with 5,11,17,23-tetrakis(diisoprpoxy-phosphorylmethyl)25,26,27,28-tetrahydroxythiacalix[4]arene

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A novel selective sorption material allowing 99% Eu(III) recovery from CsI solutions was obtained by non-covalent immobilization of 5,11,17,23-tetrakis(diisoprpoxyphosphorylmethyl)25,26,27,28-tetrahydroxythiacalix[4]arene on silanized silica gel surface. According to the elemental analysis, the material contains 10 wt.% of thiacalixarene; specific surface area of the material under study is ~300 m^2/g. The maximum recovery rate of Eu(III) ions is achieved within the pH range of 5.5–6.5 with the contact time of 24 h and is practically independent of CsI concentration in solution. The Eu(III) ions distribution coefficient reached 14.6 L/g. It was found that quantitative desorption of Eu(III) ions from the sorbent surface was ensured by using 1.5 M HNO_3 solution as an eluent. The sorption preconcentration procedure followed by ICP-OES determination of Eu(III) in CsI single crystals and CsI raw material within the Eu(III) concentration range of $5 \cdot 10^{-7}$-$1 \cdot 10^{-5}$ wt.% with the relative standard deviation as low as 5% was developed.

Keywords: CsI, Eu(III), thiacalix[4]arene sorption, atomic emission spectrometry, silica gel