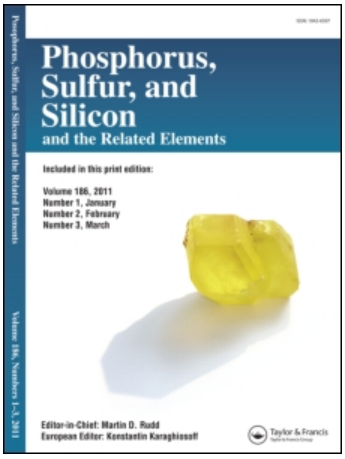

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Isolation of Rare Earth Element's Radionuclides from Phosphoric Acid Solutions on Cerium (III) Phosphate

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ISOLATION OF RARE EARTH ELEMENT'S RADIONUCLIDES FROM PHOSPHORIC ACID SOLUTIONS ON CERIUM (III) PHOSPHATE

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The isolation of the lanthanide phosphates by crystallization from the solutions of phosphoric acid with the concentration of 2-5 $mol \cdot dm^{-3}$, produced during destruction of the apatite, was investigated. The kinetic parameters of crystallization of the lanthanide phosphates and the values of their solubility in phosphoric acid with various impurities under temperatures between 60-90°C have been obtained from the data on distribution of Ce^{144} and $Eu^{152-154}$ radionuclides between the solution and the solid phase. The wide region of supersaturated solution metastability has been determined. The possibility to remove supersaturation in the metastable region by introduction of the cerium (III) phosphate seeds has been proved. Separation of the lanthanides from calcium and other accompanying elements in the apatites by crystallization of the phosphates on the $CePO_4 \cdot 0.5H_2O$ seed in the region of small supersaturation of strongly acid solutions has been studied. Calcium phosphate demonstrates the "salting out" effect on the lanthanide phosphates. By thermodynamic computations the ionic compositions of the produced solutions from breaking down the apatite and the solubilities of the lanthanide phosphates were obtained, which agrees with the experimental data. The distribution coefficients for the solid phase and the liquid phase are $1.1 \cdot 10^4$ for cerium and $4 \cdot 10^3$ for europeum. The lanthanides/calcium separation coefficient is $1.3 \cdot 10^3$.