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Solvent extraction of plutonium from environmental samples

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The solvent extraction was described for determination of the plutonium presented in the environmental samples. Tri-n-octylphosphine oxide (TOPO) and di-2-ethylhexyl phosphoric acid (HDEHP) were used as the significant reagent of extractants of the plutonium. The extraction properties of TOPO and HDEHP for tetravalent plutonium in 5 mol.L⁻¹ HNO₃ into toluene were investigated. The optimal concentration of TOPO for extraction of plutonium was determined (1.10-2 mol.l⁻¹ and higher). These solutions are easily measurable by liquid scintillation method without any further adjustment procedures. The dependences of equilibrium ratios of the plutonium on analytical concentration of chelating agents and pH were studied. The structure of the complex in the organic phase was determined as Pu(NO₃)₄.2TOPO and the value of extraction constant was calculated. Trivalent lanthanides and actinides, important fission products as cesium, zirconium, strontium and also thorium, uranium with concentration up to 1.10⁻⁴ mol l⁻¹ and iron with concentration up to 5.10⁻³ mol l⁻¹ do not interfere. The goal of this work was to develop selective solvent extraction method for the separation of plutonium.

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