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Polyacrylonitrile based composite materials with extraction agents containing chemically bonded CMPO groups for separation of actinoids

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Several extraction agents with functional group of diphenyl-carbamoylmethylphosphine oxide were synthesized and tested in the frame of EUROPART project for actinoids partitioning from nitric acid solutions. Functional groups were chemically bonded with a platform of tert-butylcalix[4]arene, O-pentylcalix[4]arene, and cobalt bis(dicarbollide) cluster ion to enhance extraction properties. The extraction agents were used for preparation of composite materials with polyacrylonitrile (PAN) as a binding polymer to study behavior of these composites in column chromatography. They were compared with CMPO-PAN composite material prepared with neat octyl(phenyl)-N,N'-diisobutylcarbamoylmethylphosphine oxide compound (CMPO). Uptake kinetics was studied with europium as an analog of americium. Weight distribution coefficients (D_g) of europium, americium, plutonium, uranium, and neptunium were determined in nitric acid solutions (0.01 - 5 mol/L) in the presence of sodium nitrate (0.1 mol/L). Europium extraction isotherms from 3M HNO₃ solution were used for capacity determination.

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