

R&D on recovery and separation of americium and curium under "Proryv" project

Thursday, 21 April 2022 13:40 (2 hours)

New nuclear fuel cycles include reducing the long-term radiotoxicity of nuclear waste by separation and transmutation of long-lived transplutonium elements. Therefore, selective recovery of transuranic elements, especially actinides (III) –americium and curium –from high-level waste generated during spent nuclear fuel reprocessing is an important issue. Processes for extracting americium (III) from PUREX-process raffinates are under development in Europe, USA, Russia, Japan and other countries.

Russia is currently actively working on the separation of americium and curium under the "Proryv" project. A two-stage flowsheet is envisaged, including extraction group recovery of americium and curium, followed by sorption separation of americium and curium. Dynamic tests of different extraction systems (CMPO, TODGA, Dyp7 in polar fluorinated diluent (F3), UNEX-T) were carried out after intensive laboratory studies. Based on the results of the tests, TODGA - F3 system was chosen to test on the real high-level radioactive waste. "Hot" dynamic test of actinides (III) recovery from PUREX-process raffinates using extraction system TODGA - F-3 was carried out at Production Association "Mayak". No less than 99.9% of americium was extracted from during processing of BN 600 and VVER-440 spent nuclear fuel. The total working time of the test was 70 hours. Extractants based on asymmetric diglycolamides (DGA) are currently being studied for transplutonium elements extraction, instead of TODGA, will make it possible to use saturated hydrocarbons as diluents and to abandon fluorine containing F-3.

The chromatography separation of Cm and Am from rare earth and transplutonium elements concentrate was tested at the Production Association "Mayak". The used concentrate was obtained during processing of VVER-440 SNF. Around 14 g Cm was allocated. The Cm-Am fraction contained about 4.6 g Cm and about 40 g Am. 65 g of pure Am fraction were obtained.

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Session Classification: Poster Session

Track Classification: Track 3. Fuels, Fuel Cycles and Waste Management