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An oxidative digestion process applied to SFR MOX fuel recycling to recover plutonium and reduce solid residue volumes

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In the scope of Sodium Fast Reactor (SFR) spent fuels recycling, the chemical composition and irradiation conditions require a specially-adapted head-end treatment process to quantitatively dissolve the plutonium. Dissolution studies are therefore being performed at the CEA ATALANTE facility in Marcoule research center. The R&D is based on the use of experimental irradiated Phenix fuels. The dissolution studies include a primary dissolution step in nitric acid medium. Solid residues are then separated by filtration and dissolved applying an oxidizing digestion process which is more efficient for dissolving high Pu-content particles and metallic elements. The composition of SFR spent fuel residues and their masses are presented and linked to the initial fuel compositions and irradiation conditions. Plutonium recovery rates along with the dissolution process, including primary dissolution and oxidizing digestion, are presented. The efficiency of the oxidizing digestion of dissolution residues is also discussed, illustrating the advantages of this chemical step not only for plutonium recovery but also for metallic element dissolution.

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Country or International Organization

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