

Analysis of the Oxidation and Vaporization Behavior of Fission Products by Thermodynamic Calculations

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Fission products created by irradiation of nuclear fuel remained in spent nuclear fuel. Spent nuclear fuel could be reused when fission products are properly removed from the resource materials and the removal of the fission products could be accomplished by using dry processes.

A voloxidation process is a suitable step to remove volatile fission products from spent nuclear fuels. In order to assess operation conditions of an advanced voloxidation process, analysis of oxidation and vaporization behavior of metals with low melting point among fission products was required with respect to thermal treatment atmosphere conditions.

In this work, the vapor pressures of fission products were calculated and volatile behaviors were analyzed with respect to oxidizing gas conditions. Some oxides and metals such as In_2O_3 , SnO , Rh and Pd wouldn't be vaporized even at 1400°C under an oxygen atmosphere. In order to vaporize 99% of RuO_2 the temperature should be increased up to 1300°C under an air atmosphere.