

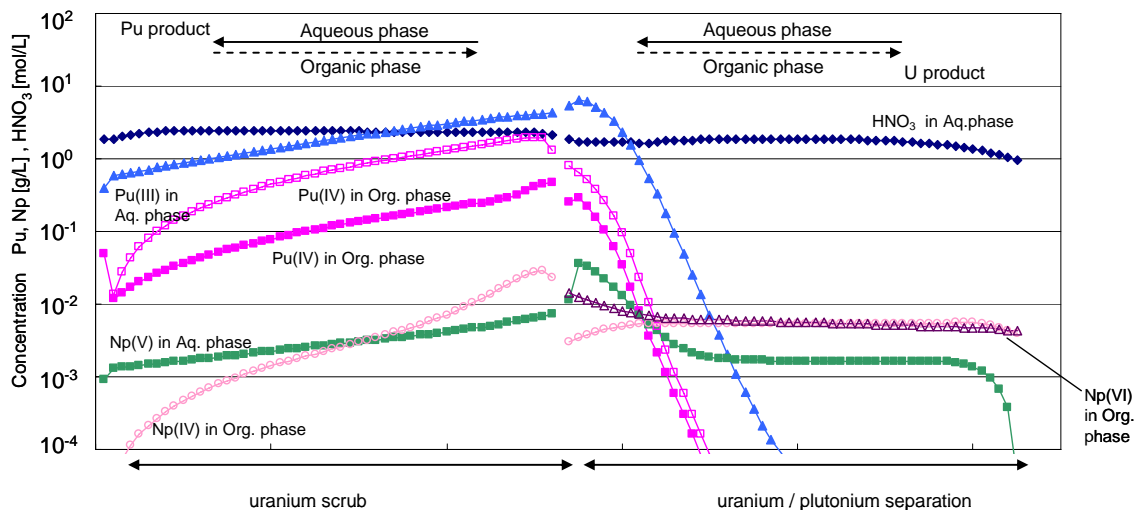
Simulation of Solvent Extraction Process in Reprocessing - Development of a Computer Code , PARC -

A computer code PARC (Program for Advanced Extraction Process with Radiation Effect Calculation) has been developed in our laboratory for simulation of multistage countercurrent extraction process in PUREX reprocessing plants. PARC is able to predict transient behavior and profiles at equilibrium of radioactive materials in the system of TBP (Tri-n-butyl phosphate) , n-dodecane and aqueous nitrate solution.

In this code, oxidation-reduction reactions and distribution ratio of radioactive materials described below are considered :

nitric acid, nitrous acid, uranium(IV) and (VI), plutonium(III) and (IV), neptunium(IV), (V) and (VI), zirconium, technetium, hydroxylamine nitrate, hydrazine nitrate, hydrazoic acid, di-butyl phosphate , mono-butyl phosphate and several kind of fission products.

Addition to the fundamental chemical process simulation, we developed a model to estimate absorbed dose of the organic solvent, and furthermore, generation and distribution model of decomposition products in radiolytic solvent degradation. These simulation models are expected to contribute to development of future reprocessing for high burnup UO_2 or MOX spent fuel.



An example of concentration profiles of plutonium and neptunium
in a plutonium separation process with two pulsed columns