Figures:

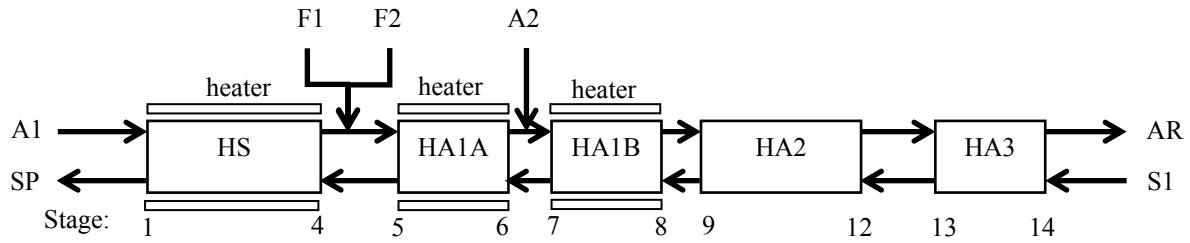
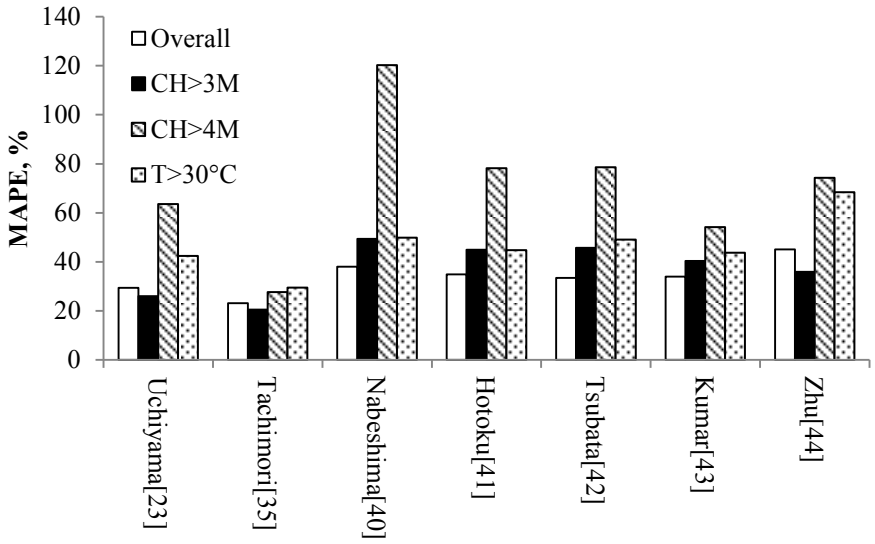
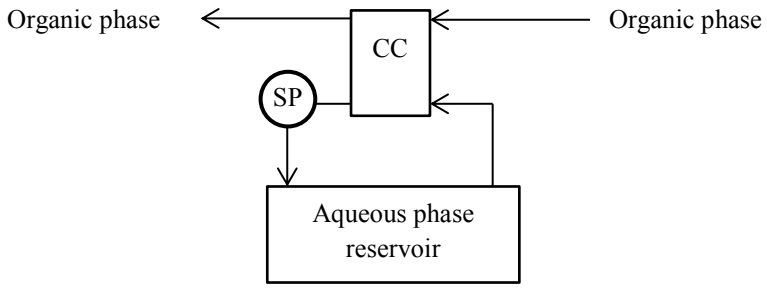


Figure 1 Neptunium extraction flowsheet being simulated (primary extract-scrub section of an advanced PUREX process)[11]



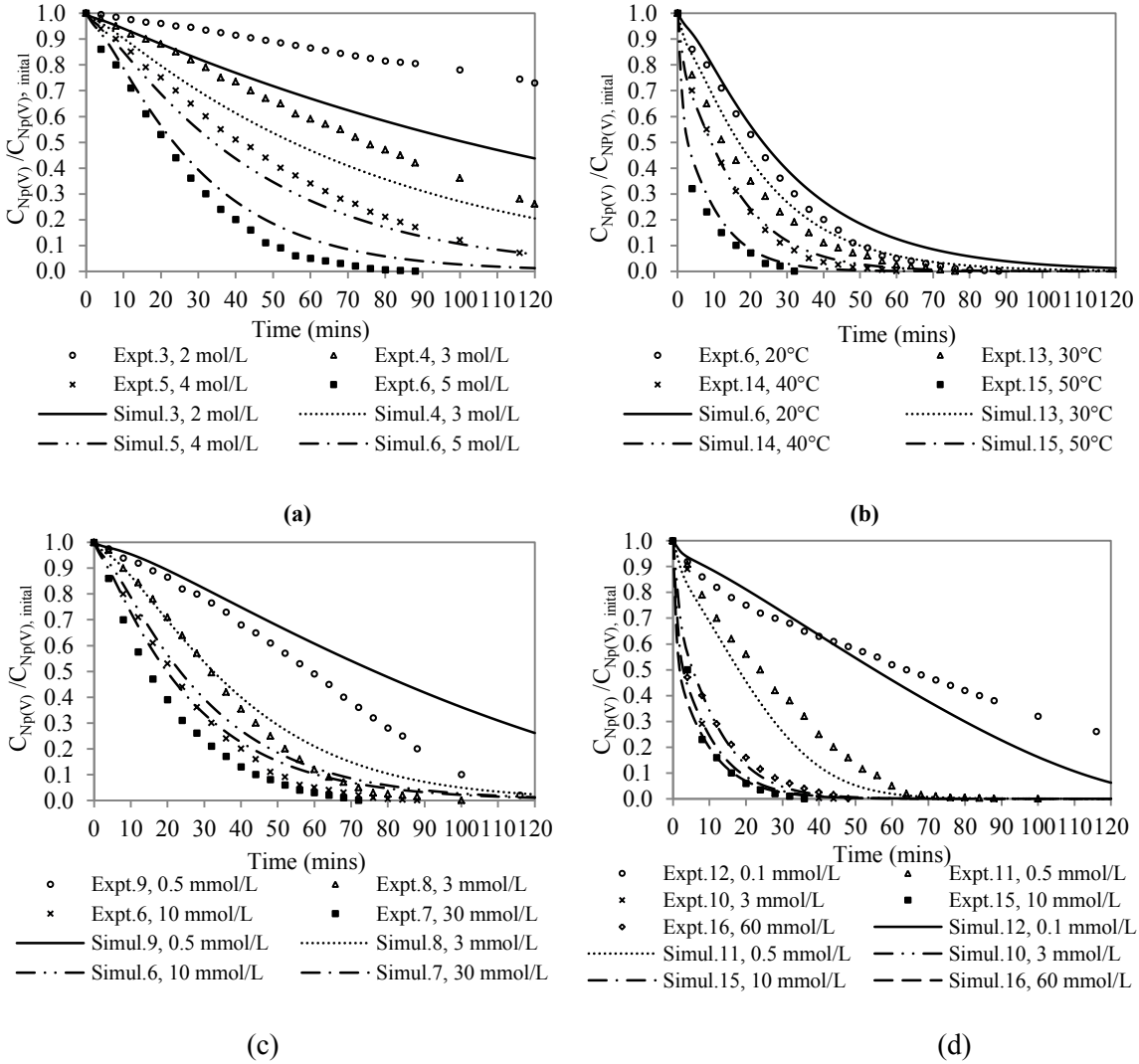
CH: concentration of HNO_3, mol/L

Figure 2 Evaluation of various nitrous acid distribution coefficient models



CC: centrifugal contactor; SP: sample analysis point

Figure 3 Single-stage test flowsheet[11]



(a) variable HNO_3 concentration at 20°C, 10 mmol/L HNO_2; (b) variable temperature with 5 mol/L HNO_3, 10 mmol/L HNO_2; (c) variable HNO_2 concentration at 20°C, 5 mol/L HNO_3; (d) variable HNO_2 concentration at 50°C, 5 mol/L HNO_3

Figure 4 Simulation of single-stage experiments with new developed redox kinetics

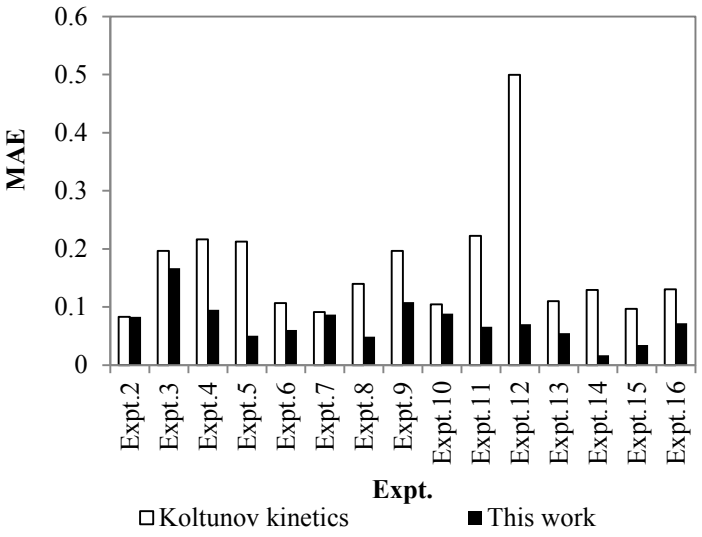


Figure 5 Deviations of simulations to experiments with variable neptunium redox kinetics

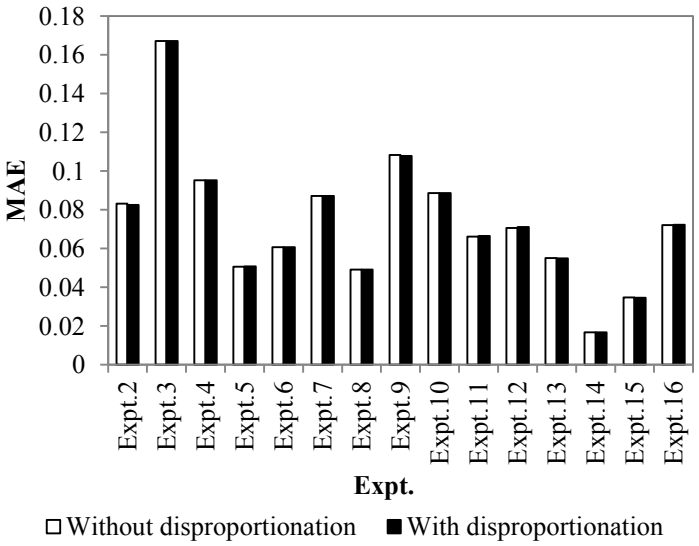


Figure 6 Deviations of simulations to experiments with and without disproportionation reactions

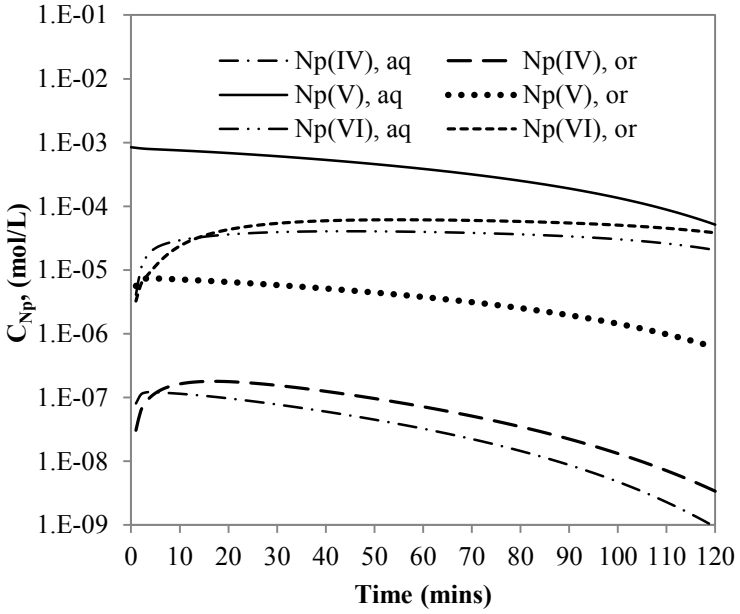


Figure 7 Calculated concentrations of neptunium species present in aqueous and organic phases, based on simulation of single-stage experiment 12 in ref. [11]

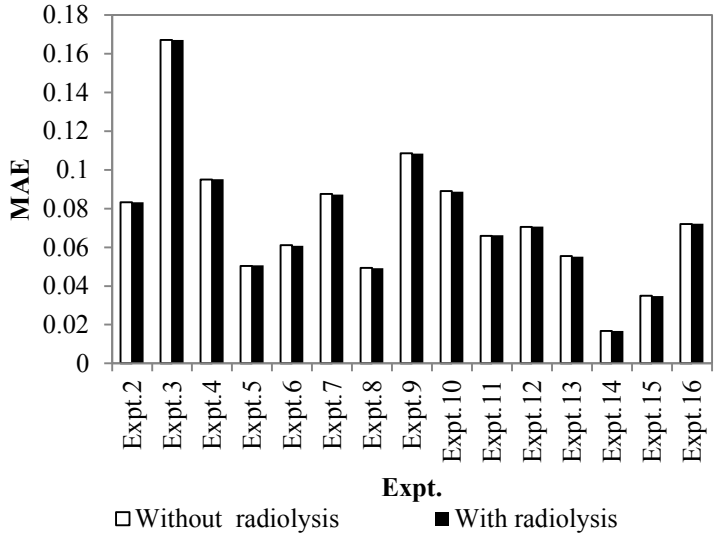


Figure 8 Deviations of simulations to experiments with and without radiolysis

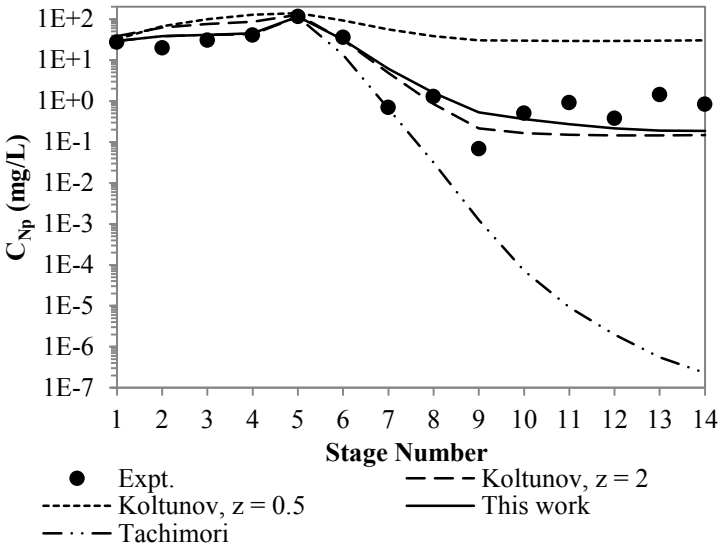


Figure 9 Flowsheet simulation results using various descriptions of Np(V) oxidation kinetics

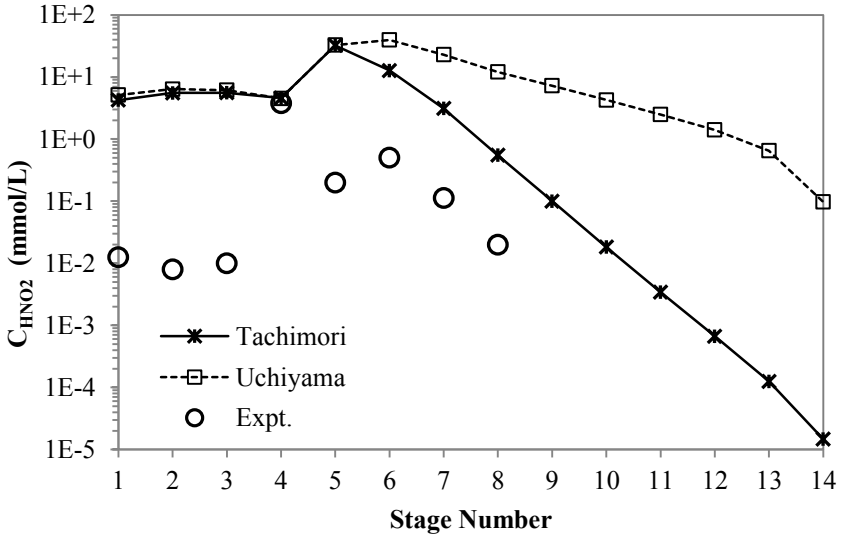


Figure 10 Aqueous HNO_2 profiles with different HNO_2 distribution coefficient models compared to experimental results

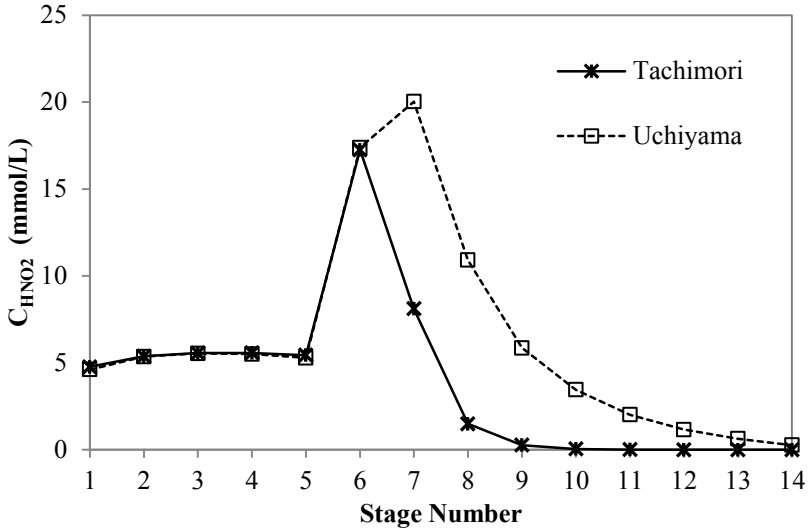


Figure 11 Organic HNO_2 profiles with different HNO_2 distribution coefficient models

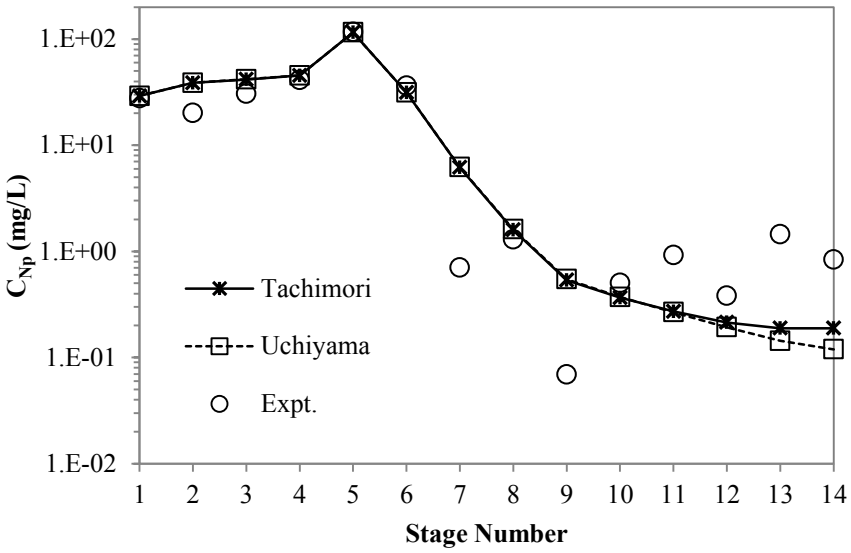


Figure 12 Simulated neptunium aqueous profiles with different HNO_2 distribution coefficient models

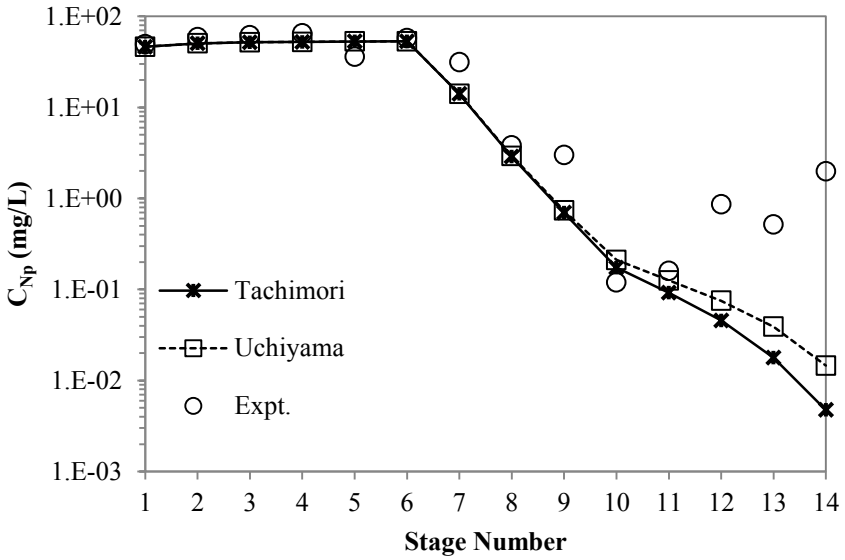


Figure 13 Simulated neptunium organic profiles with different HNO_2 distribution coefficient models

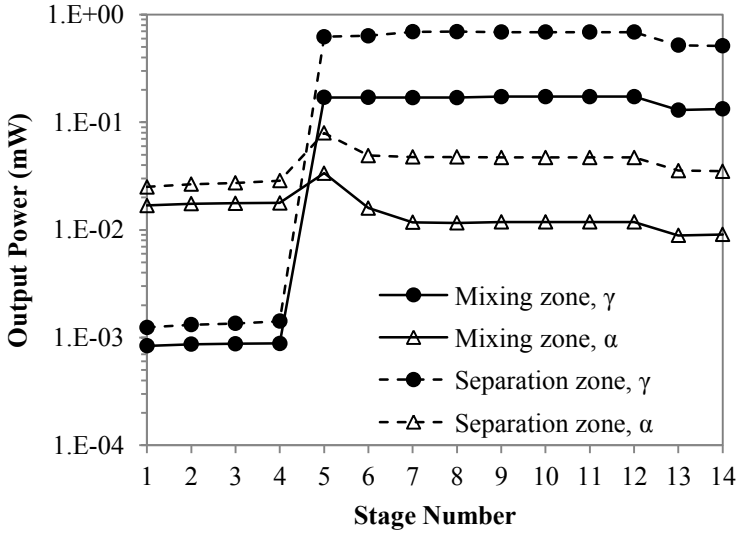
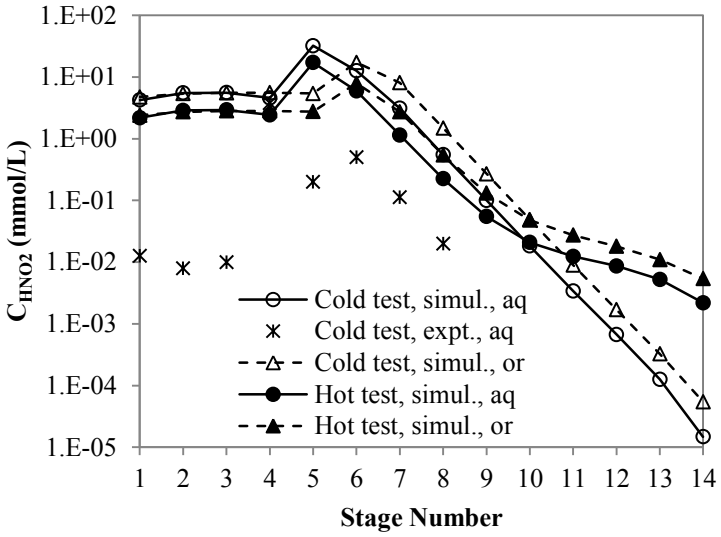
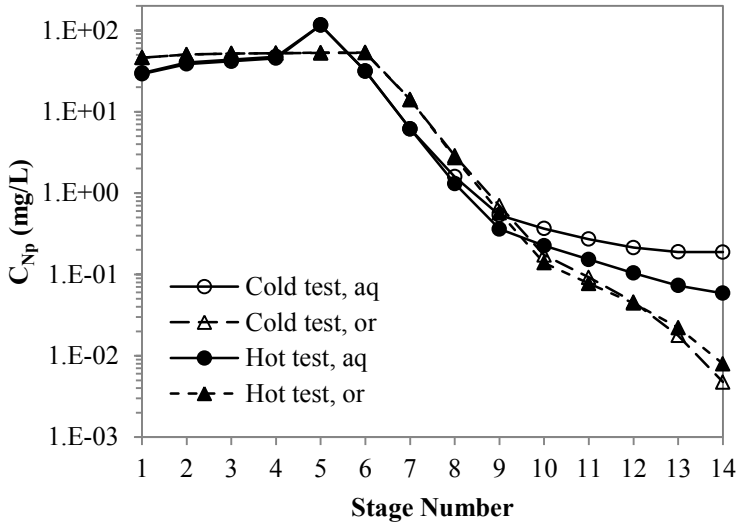


Figure 14 Radiation output power in hot test simulation results



(a)



(b)

Figure 15 Hot test simulation results, (a) nitrous acid profile and (b) neptunium profile