Supporting Information: Electron Transfer Between Neptunium and Sodium Chlorite in Acidic Chloride Media

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Table S1: Neptunium rate law kinetics in low $HCl_{(aq)}$ and $LiCl_{(aq)}$ conditions.

Transition	Rate Law
$Np^{4+} \rightarrow NpO_2^{+}$	$\frac{dNpO_2^{+}}{dt} = -\frac{dNp^{4+}}{dt} = (49 \pm 7\ mM \cdot s^{-1})[Np^{4+}]^{0.300\pm0.008}[NaClO_2]^{0.110\pm0.002}$
$NpO_2^{+} \rightarrow NpO_2^{2+}$	$\frac{dNpO_2^{2+}}{dt} = -\frac{dNpO_2^{+}}{dt} = (3 \pm 1\ mM \cdot d^{-1})[NpO_2^{+}]^{0.98\pm0.02}[NaClO_2]^{1.71\pm0.01}$

Table S2: Neptunium rate law kinetics in high $Cl^{-}_{(aq)}$ (>9 M LiCl) conditions.

Transition	Rate Law
$Np^{4+} \rightarrow NpO_2^{2+}$ (LiCl)	$\frac{dNpO_2^{2+}}{dt} = -\frac{dNp^{4+}}{dt} = (0.24 \pm 0.09\ mM \cdot min)[Np^{4+}]^{4.11\pm0.09}[NaClO_2]^{0.50\pm0.07}$

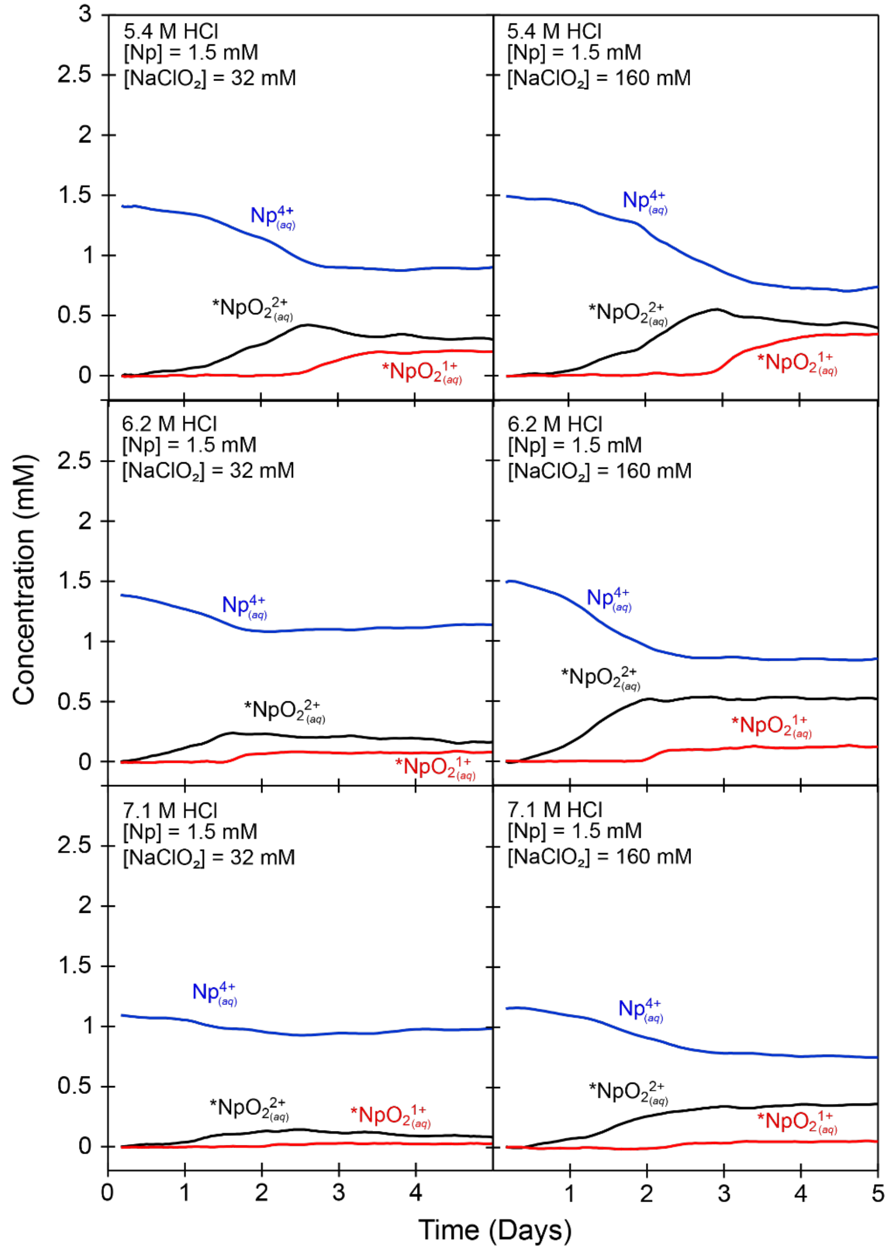

Figure S1: 1.5 mM $Np^{4+}{}_{(aq)}$ 25°C in various concentrations of $HCl_{(aq)}$ reacted with different concentrations of $NaClO_{2(aq)}$. *signifies estimated concentrations of $NpO_2{}^{+}{}_{(aq)}$ and $NpO_2{}^{2+}{}_{(aq)}$ using molar extinction coefficients from a previous report.[52]

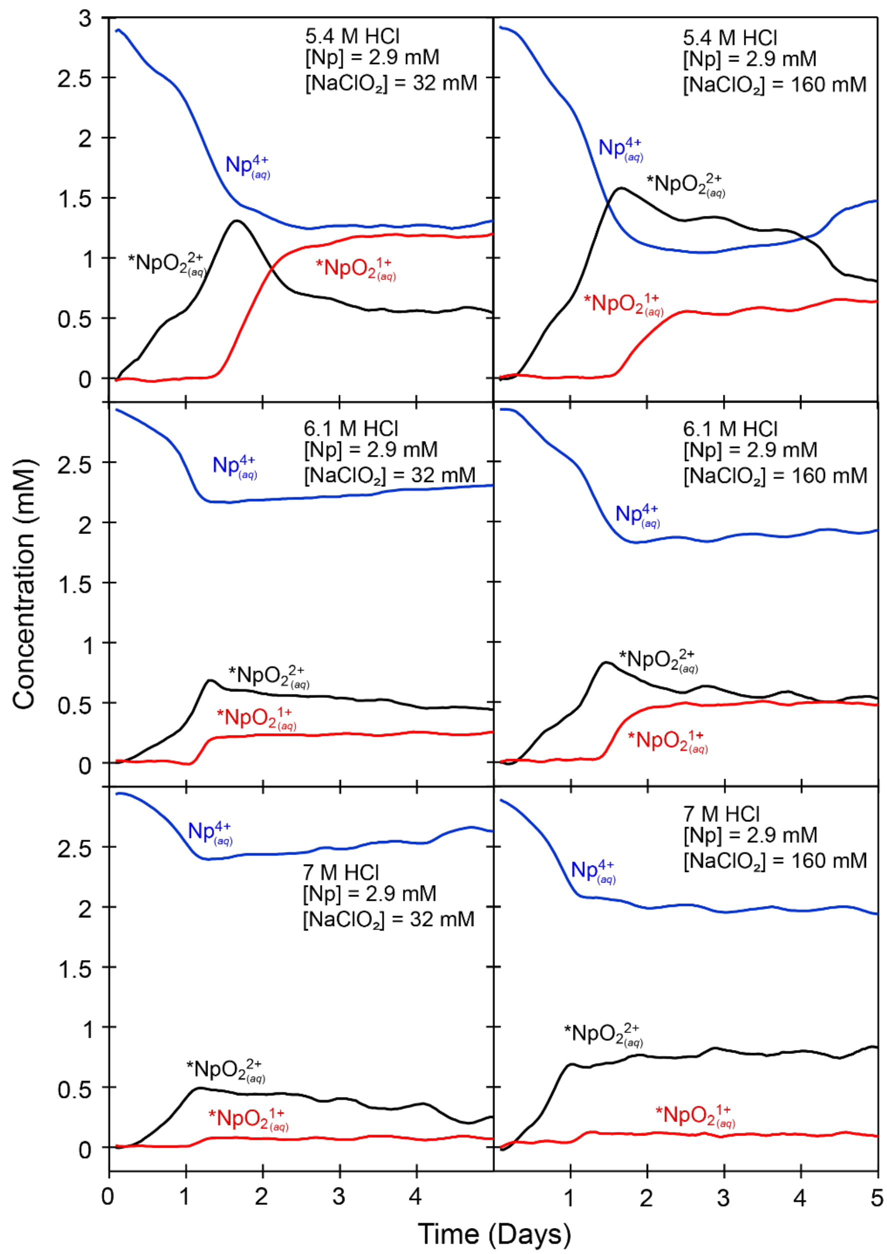

Figure S2: 2.9 mM $Np^{4+}{}_{(aq)}$ 25°C in various concentrations of $HCl_{(aq)}$ reacted with different concentrations of $NaClO_{2(aq)}$. *Signifies estimated concentrations of $NpO_2{}^{+}{}_{(aq)}$ and $NpO_2{}^{2+}{}_{(aq)}$ using molar extinction coefficients from a previous report.[52]

Example calculation of rate constant determination shown in Table S1 and Table S2.

$$\frac{Initial\ Rate_a}{Initial\ Rate_b} = \frac{k[Np]_a^x[NaClO_2]^y}{k[Np]_a^x[NaClO_2]^y}$$

$$\frac{Initial\ Rate_a}{Initial\ Rate_b} = \frac{\cancel{k[Np]_a^x}[NaClO_2]_a^y}{\cancel{k[Np]_a^x}[NaClO_2]_b^y}$$

$$\frac{Initial\ Rate_a}{Initial\ Rate_b} = \frac{[NaClO_2]_a^y}{[NaClO_2]_b^y}$$

$$\ln\left(\frac{Initial\ Rate_a}{Initial\ Rate_b}\right) = \ln\left(\frac{[NaClO_2]_a}{[NaClO_2]_b}\right)^y$$

$$y = \ln\left(\frac{Initial\ Rate_a}{Initial\ Rate_b}\right) \Big/ \ln\left(\frac{[NaClO_2]_a}{[NaClO_2]_b}\right)$$