

Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Neptunium(IV)

Equilibrium reactions	lgK at infinite dilution and $T = 298$ K			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$\text{Np}^{4+} + \text{H}_2\text{O} \rightleftharpoons \text{NpOH}^{3+} + \text{H}^+$	-1.49	-1.5	-1.31 ± 0.05	0.5 ± 0.2
$\text{Np}^{4+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{Np}(\text{OH})_2^{2+} + 2 \text{H}^+$			-3.7 ± 0.3	0.3 ± 0.3
$\text{Np}^{4+} + 4 \text{H}_2\text{O} \rightleftharpoons \text{Np}(\text{OH})_4 + 4 \text{H}^+$			-10.0 ± 0.9	-8 ± 1
$\text{Np}^{4+} + 4 \text{OH}^- \rightleftharpoons \text{NpO}_2(\text{am, hyd}) + 2 \text{H}_2\text{O}$	52	54.9 ± 0.4	57.5 ± 0.3	56.7 ± 0.5

C.F. Baes and R.E. Mesmer, *The Hydrolysis of Cations*. Wiley, New York, 1976, p. 183.

P.L. Brown and C. Ekberg, *Hydrolysis of Metal Ions*. Wiley, 2016, pp. 380–384.

I. Grenthe, X. Gaona, A.V. Plyasunov, L. Rao, W.H. Runde, B. Grambow, R.J.M. Konings, A. L. Smith and E.E. Moore, *Second Update on the Chemical Thermodynamics of Uranium, Neptunium, Plutonium, Americium and Technetium*, OECD Publishing, Paris 2020.

NIST46, NIST Critically Selected Stability Constants of Metal Complexes: Version 8.0. Available at: www.nist.gov/srd/nist46

Distribution diagrams

These diagrams have been computed at two Np(IV) concentrations (1 mM = 1×10^{-3} mol L⁻¹ and 1 μ M = 1×10^{-6} mol L⁻¹) with the 'best' equilibrium constants above (in green). Calculations assume $T = 298$ K for the limiting case of zero ionic strength (*i.e.*, even neglecting plotted ions).

