

Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Plutonium(VI)

Equilibrium reactions	lgK at infinite dilution and $T = 298\text{ K}$			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$\text{PuO}_2^{2+} + \text{H}_2\text{O} \rightleftharpoons \text{PuO}_2(\text{OH})^+ + \text{H}^+$	-5.6	-5.6	-5.36 ± 0.09	-5.5 ± 0.5
$\text{PuO}_2^{2+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{PuO}_2(\text{OH})_2 + 2 \text{H}^+$			-12.9 ± 0.2	-13 ± 1
$\text{PuO}_2^{2+} + 3 \text{H}_2\text{O} \rightleftharpoons \text{PuO}_2(\text{OH})_3^- + 3 \text{H}^+$				-24 ± 1
$2 \text{PuO}_2^{2+} + 2 \text{H}_2\text{O} \rightleftharpoons (\text{PuO}_2)_2(\text{OH})_2^{2+} + 2 \text{H}^+$	-8.36	-8.36	-7.8 ± 0.5	-7 ± 1
$3 \text{PuO}_2^{2+} + 5 \text{H}_2\text{O} \rightleftharpoons (\text{PuO}_2)_3(\text{OH})_5^+ + 5 \text{H}^+$	-21.65	-21.65		
$\text{PuO}_2^{2+} + 2 \text{OH}^- \rightleftharpoons \text{PuO}_2(\text{OH})_2(\text{am, hyd})$				22.8 ± 0.6

C.F. Baes and R.E. Mesmer, *The Hydrolysis of Cations*. Wiley, New York, 1976, pp. 190–191.

P.L. Brown and C. Ekberg, *Hydrolysis of Metal Ions*. Wiley, 2016, pp. 403–405.

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 Pu(VI) 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).

