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Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Tantalum

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K	
	Baes and Mesmer, 1976	Filella and May, 2019[a]
$Ta(OH)_5 + H^+ \rightleftharpoons Ta(OH)_4^+ + H_2O$	~1	0.7007
$Ta(OH)_5 + H_2O \rightleftharpoons Ta(OH)_6^- + H^+$	~ –9.6	
$Ta_6O_{19}^{8-} + H^+ \rightleftharpoons HTa_6O_{19}^{7-}$		16.35
$HTa_6O_{19}^{7-} + H^+ \rightleftharpoons H_2Ta_6O_{19}^{6-}$		14.00
$1/2\ Ta_2O_5(act) + 5/2\ H_2O \rightleftharpoons Ta(OH)_5$	~ –5.2	
$Ta(OH)_5(s) \rightleftharpoons Ta(OH)_5$		–5.295
$Ta_2O_5(s) + 5\ H_2O \rightleftharpoons 2\ Ta(OH)_5$		–20.00

[a]The number of significant figures are retained to minimise propagation of round-off errors; they should not be taken to indicate the relative uncertainty of the values, which is always at least one order of magnitude less than indicated.

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 252.

M. Filella and P.M. May, The aqueous solution thermodynamics of tantalum under conditions of environmental and biological interest. Applied Geochemistry, 109, 104402 (2019). doi:10.1016/j.apgeochem.2019.104402

Distribution diagrams

These diagrams have been computed at two Ta concentrations (1 mM = $1x10^{-3}$ mol L^{-1} and 1 μM = $1x10^{-6}$ 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). The polynuclear species could not be included because isolated.