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Last update: 03/12/2024
Source: Compilation COST Action 1802

Thorium

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K			
	Baes and Mesmer, 1976	Rand et al., 2008	Thoenen et al, 2014	Brown and Ekberg, 2016
$Th^{4+} + H_2O \rightleftharpoons ThOH^{3+} + H^+$	–3.20	–2.5 ± 0.5	–2.5 ± 0.5	–2.5 ± 0.5
$Th^{4+} + 2\ H_2O \rightleftharpoons Th(OH)_2^{2+} + 2\ H^+$	–6.93	–6.2 ± 0.5	–6.2 ± 0.5	–6.2 ± 0.5
$Th^{4+} + 3\ H_2O \rightleftharpoons Th(OH)_3^{+} + 3\ H^+$	< –11.7			
$Th^{4+} + 4\ H_2O \rightleftharpoons Th(OH)_4 + 4\ H^+$	–15.9	–17.4 ± 0.7	–17.4 ± 0.7	–17.4 ± 0.7
$2\ Th^{4+} + 2\ H_2O \rightleftharpoons Th_2(OH)_2^{6+} + 2\ H^+$	–6.14	–5.9 ± 0.5	–5.9 ± 0.5	–5.9 ± 0.5
$2\ Th^{4+} + 3\ H_2O \rightleftharpoons Th_2(OH)_3^{5+} + 3\ H^+$		–6.8 ± 0.2	–6.8 ± 0.2	–6.8 ± 0.2
$4\ Th^{4+} + 8\ H_2O \rightleftharpoons Th_4(OH)_8^{8+} + 8\ H^+$	–21.1	–20.4 ± 0.4	–20.4 ± 0.4	–20.4 ± 0.4
$4\ Th^{4+} + 12\ H_2O \rightleftharpoons Th_4(OH)_{12}^{4+} + 12\ H^+$		–26.6 ± 0.2	–26.6 ± 0.2	–26.6 ± 0.2
$6\ Th^{4+} + 15\ H_2O(l) \rightleftharpoons Th_6(OH)_{15}^{9+} + 15\ H^+$	–36.76	–36.8 ± 1.5	–36.8 ± 1.5	–36.8 ± 1.5
$6\ Th^{4+} + 14\ H_2O(l) \rightleftharpoons Th_6(OH)_{14}^{10+} + 14\ H^+$		–36.8 ± 1.2	–36.8 ± 1.2	–36.8 ± 1.2
$ThO_2(c) + 4\ H^+ \rightleftharpoons Th^{4+} + 2\ H_2O$	6.3			
$ThO_2(am) + 4\ H^+ \rightleftharpoons Th^{4+} + 2\ H_2O$				8.8 ± 1.0
$ThO_2(am,hyd,fresh) + 4\ H^+ \rightleftharpoons Th^{4+} + 2\ H_2O$			9.3 ± 0.9	

ThO_2(am,hyd,aged) + $4H^+ \rightleftharpoons Th^{4+} + 2H_2O$			8.5 ± 0.9	
$Th^{4+} + 4OH^- \rightleftharpoons ThO_2$(am,hyd,fresh) + $2H_2O$		46.7 ± 0.9		
$Th^{4+} + 4OH^- \rightleftharpoons ThO_2$(am,hyd,aged) + $2H_2O$		47.5 ± 0.9		

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 168.

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Distribution diagrams

These diagrams have been computed at two Th(IV) 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).