Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Scandium

Equilibrium reactions	lg$K$ at infinite dilution and T = 298 K	
	Baes and Mesmer, 1976	Brown and Ekberg, 2016
$Sc^{3+} + H_2O \rightleftharpoons ScOH^{2+} + H^+$	−4.3	−4.16 ± 0.05
$Sc^{3+} + 2 H_2O \rightleftharpoons Sc(OH)_2^+ + 2 H^+$	−9.7	−9.71 ± 0.30
$Sc^{3+} + 3 H_2O \rightleftharpoons Sc(OH)_3 + 3 H^+$	−16.1	−16.08 ± 0.30
$Sc^{3+} + 4 H_2O \rightleftharpoons Sc(OH)_4^- + 4 H^+$	−26	−26.7 ± 0.3
$2 Sc^{3+} + 2 H_2O \rightleftharpoons Sc_2(OH)_2^{4+} + 2 H^+$	−6.0	−6.02 ± 0.10
$3 Sc^{3+} + 5 H_2O \rightleftharpoons Sc_3(OH)_5^{4+} + 5 H^+$	−16.34	−16.33 ± 0.10
$Sc(OH)_3(s) + 3 H^+ \rightleftharpoons Sc^{3+} + 3 H_2O$		9.17 ± 0.30
$ScO_{1.5}(s) + 3 H^+ \rightleftharpoons Sc^{3+} + 1.5 H_2O$		5.53 ± 0.30
$ScO(OH)(c) + 3 H^+ \rightleftharpoons Sc^{3+} + 2 H_2O$	9.4	
$Sc(OH)_3(c) + OH^- \rightleftharpoons Sc(OH)_4^-$		−3.5 ± 0.2

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 225–236.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 135–145.

Distribution diagrams

These diagrams have been computed at two Sc concentrations (1 mM = 1×10^{-3} mol L^{-1} and 1 μM = 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).

1 mM
- Sc^{3+}
- $Sc(OH)^{2+}$
- $ScO_{1.5}(s)$

1 μM
- Sc^{3+}
- $Sc(OH)^{2+}$
- $Sc(OH)_2^+$
- $Sc(OH)_4^-$
- $ScO_{1.5}(s)$