

Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Silicon

Equilibrium reaction	lgK at infinite dilution and $T = 298 \text{ K}$	
	Baes and Mesmer, 1976	Thoenen et al., 2014
$\text{Si(OH)}_4 \rightleftharpoons \text{SiO(OH)}_3^- + \text{H}^+$	-9.86	-9.81 ± 0.02
$\text{Si(OH)}_4 \rightleftharpoons \text{SiO}_2(\text{OH})_2^{2-} + 2 \text{H}^+$	-22.92	-23.14 ± 0.09
$4 \text{Si(OH)}_4 \rightleftharpoons \text{Si}_4\text{O}_6(\text{OH})_6^{2-} + 2 \text{H}^+ + 4 \text{H}_2\text{O}$	-13.44	
$4 \text{Si(OH)}_4 \rightleftharpoons \text{Si}_4\text{O}_8(\text{OH})_4^{4-} + 4 \text{H}^+ + 4 \text{H}_2\text{O}$	-35.80	-36.3 ± 0.2
$\text{SiO}_2(\text{quartz}) + 2 \text{H}_2\text{O} \rightleftharpoons \text{Si(OH)}_4$	-4.0	-3.739 ± 0.087
$\text{SiO}_2(\text{am}) + 2 \text{H}_2\text{O} \rightleftharpoons \text{Si(OH)}_4$		-2.714

C.F. Baes and R.E. Mesmer, *The Hydrolysis of Cations*. Wiley, New York, 1976; p. 342.

T. Thoenen, W. Hummel, U. Berner and E. Curti, *The PSI/Nagra Chemical Thermodynamic Database 12/07*, Paul Scherrer Institut, Villigen PSI, Switzerland, 2014, pp. 205–212.

Distribution diagrams

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

