

## Equilibrium constants for hydrolysis and associated equilibria in critical compilations

### Tin(II)

Equilibrium reactions	lgK at infinite dilution and T = 298 K						
	Baes and Mesmer, 1976	Feitknecht and Schindler, 1963	Hummel et al., 2002	NIST46	Cigala et al., 2012	Gamsjäger et al, 2012	Brown and Ekberg, 2016
$\text{Sn}^{2+} + \text{H}_2\text{O} \rightleftharpoons \text{SnOH}^+ + \text{H}^+$	-3.40		$-3.8 \pm 0.2$	-3.4	$-3.52 \pm 0.05$	$-3.53 \pm 0.40$	$-3.53 \pm 0.40$
$\text{Sn}^{2+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{Sn}(\text{OH})_2 + 2 \text{H}^+$	-7.06		$-7.7 \pm 0.2$	-7.1	$-6.26 \pm 0.06$	$-7.68 \pm 0.40$	$-7.68 \pm 0.40$
$\text{Sn}^{2+} + 3 \text{H}_2\text{O} \rightleftharpoons \text{Sn}(\text{OH})_3^- + 3 \text{H}^+$	-16.61		$-17.5 \pm 0.2$	-16.6	$-16.97 \pm 0.17$	$-17.00 \pm 0.60$	$-17.56 \pm 0.40$
$2 \text{Sn}^{2+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{Sn}_2(\text{OH})_2^{2+} + 2 \text{H}^+$	-4.77			-4.8	$-4.79 \pm 0.05$		
$3 \text{Sn}^{2+} + 4 \text{H}_2\text{O} \rightleftharpoons \text{Sn}_3(\text{OH})_4^{2+} + 4 \text{H}^+$	-6.88		$-5.6 \pm 1.6$	-6.88	$-5.88 \pm 0.05$	$-5.60 \pm 0.47$	$-5.60 \pm 0.47$
$\text{Sn}(\text{OH})_2(\text{s}) \rightleftharpoons \text{Sn}^{2+} + 2 \text{OH}^-$				-25.8	$-26.28 \pm 0.08$		

$\text{SnO(s)} + 2 \text{H}^+ \rightleftharpoons \text{Sn}^{2+} + \text{H}_2\text{O}$	1.76		2.5 ± 0.5				1.60 ± 0.15
$\text{SnO(s)} + \text{H}_2\text{O} \rightleftharpoons \text{Sn}^{2+} + 2 \text{OH}^-$		-26.2					
$\text{SnO(s)} + \text{H}_2\text{O} \rightleftharpoons \text{Sn(OH)}_2$		-5.3					
$\text{SnO(s)} + 2 \text{H}_2\text{O} \rightleftharpoons \text{Sn(OH)}_3^- + \text{H}^+$		-0.9					

C.F. Baes and R.E. Mesmer, *The Hydrolysis of Cations*. Wiley, New York, 1976, p. 357.

P.L. Brown and C. Ekberg, *Hydrolysis of Metal Ions*. Wiley, 2016, pp. 836–842.

R.M. Cigala, F. Crea, C. De Stefano, G. Lando, D. Milea and S. Sammartano, The inorganic speciation of tin(II) in aqueous solution. *Geochim. Cosmochim. Acta*, 87, 1–20 (2012).

W. Feitknecht and P. Schindler, Solubility constants of metal oxides, metal hydroxides and metal hydroxide salts in aqueous solution. *Pure and Applied Chemistry*, 6, 125-206 (1963).

H. Gamsjäger, T. Gajda, J. Sangster, S. K. Saxena and W. Voigt, *Chemical Thermodynamics of Tin*. Chemical Thermodynamics Volume 12. OECD, Paris, 2012.

W. Hummel, U. Berner, E. Curti, F.J. Pearson and T. Thoenen, *Nagra / PSI Chemical Thermodynamic Data Base 01/01*, July 2002.

NIST46, NIST Critically Selected Stability Constants of Metal Complexes: Version 8.0. Available at: [www.nist.gov/srd/nist46](http://www.nist.gov/srd/nist46)

# Distribution diagrams

These diagrams have been computed at two Sn(II) concentrations (1 mM =  $1 \times 10^{-3}$  mol L<sup>-1</sup> and 1  $\mu$ M =  $1 \times 10^{-6}$  mol L<sup>-1</sup>) 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).

