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Last update: 03/12/2024
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Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Tin(II)

Equilibrium reactions	lg*K* 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
$Sn^{2+} + H_2O \rightleftharpoons SnOH^+ + H^+$	–3.40		–3.8 ± 0.2	–3.4	–3.52 ± 0.05	–3.53 ± 0.40	–3.53 ± 0.40
$Sn^{2+} + 2\ H_2O \rightleftharpoons Sn(OH)_2 + 2\ H^+$	–7.06		–7.7 ± 0.2	–7.1	–6.26 ± 0.06	–7.68 ± 0.40	–7.68 ± 0.40
$Sn^{2+} + 3\ H_2O \rightleftharpoons Sn(OH)_3^- + 3\ H^+$	–16.61		–17.5 ± 0.2	–16.6	–16.97 ± 0.17	–17.00 ± 0.60	–17.56 ± 0.40
$2\ Sn^{2+} + 2\ H_2O \rightleftharpoons Sn_2(OH)_2^{2+} + 2\ H^+$	–4.77			–4.8	–4.79 ± 0.05		
$3\ Sn^{2+} + 4\ H_2O \rightleftharpoons Sn_3(OH)_4^{2+} + 4\ H^+$	–6.88		–5.6 ± 1.6	–6.88	–5.88 ± 0.05	–5.60 ± 0.47	–5.60 ± 0.47
$Sn(OH)_2(s) \rightleftharpoons Sn^{2+} + 2\ OH^-$				–25.8	–26.28 ± 0.08		

$SnO(s) + 2\ H^+ \rightleftharpoons Sn^{2+} + H_2O$	1.76		2.5± 0.5				1.60 ± 0.15
$SnO(s) + H_2O \rightleftharpoons Sn^{2+} + 2\ OH^-$		–26.2					
$SnO(s) + H_2O \rightleftharpoons Sn(OH)_2$		–5.3					
$SnO(s) + 2\ H_2O \rightleftharpoons Sn(OH)_3^- + H^+$		–0.9					

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

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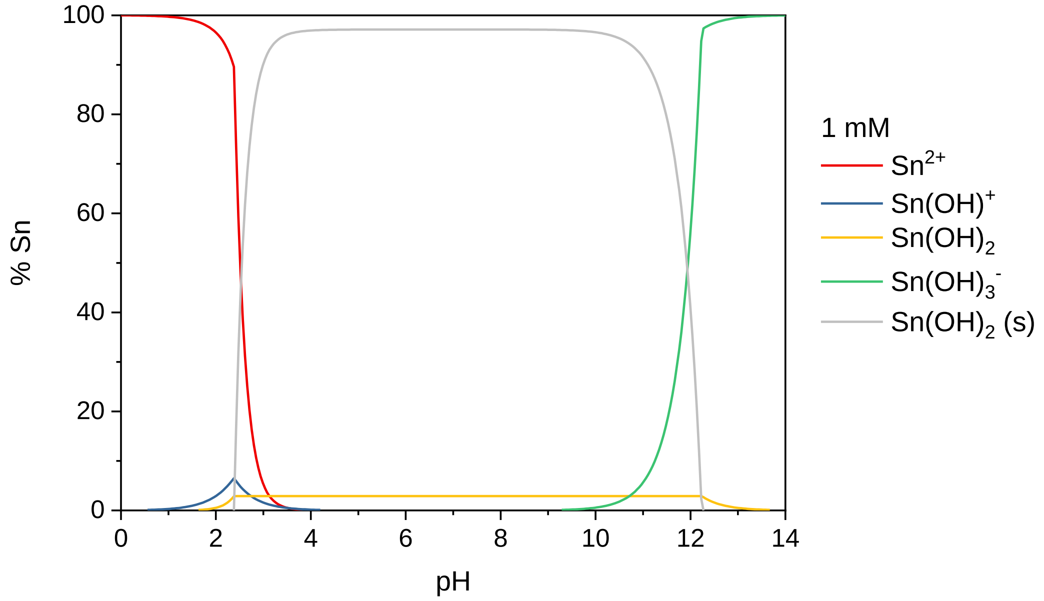
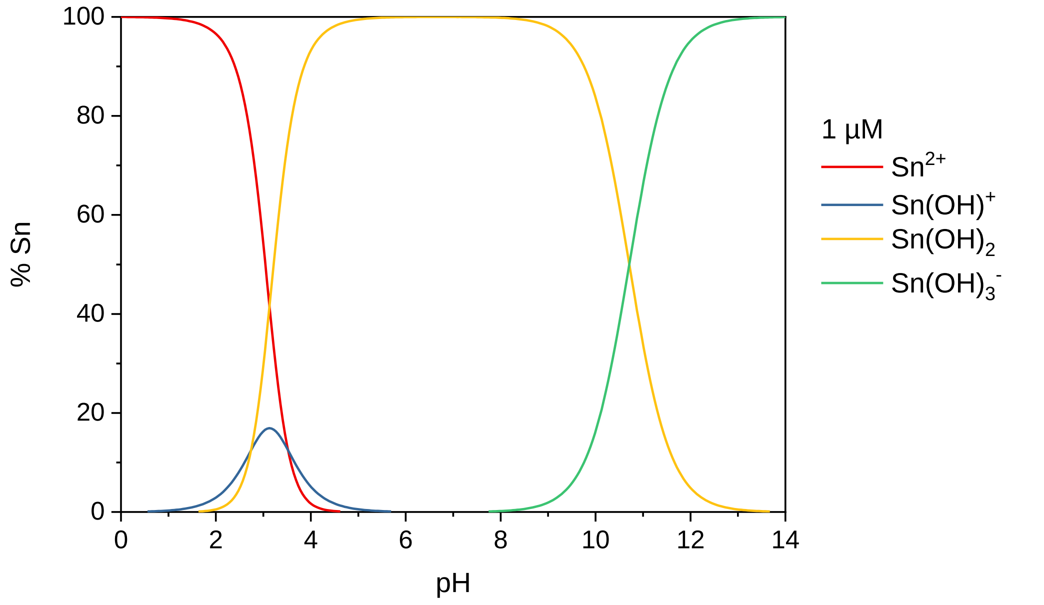
NIST46, NIST Critically Selected Stability Constants of Metal Complexes: Version 8.0. Available at: www.nist.gov/srd/nist46

Distribution diagrams

These diagrams have been computed at two Sn(II) 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).





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Tin(IV)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K		
	Hummel et al., 2002	Gamsjäger et al, 2012	Brown and Ekberg, 2016
$Sn^{4+} + 4\ H_2O \rightleftharpoons Sn(OH)_4 + 4\ H^+$			7.53 ± 0.12
$Sn^{4+} + 5\ H_2O \rightleftharpoons Sn(OH)_5^- + 5\ H^+$			–1.07 ± 0.42
$Sn^{4+} + 6\ H_2O \rightleftharpoons Sn(OH)_6^{2-} + 6\ H^+$			–11.14 ± 0.32
$Sn(OH)_4 + H_2O \rightleftharpoons Sn(OH)_5^- + H^+$	–8.0 ± 0.3	–8.60 ± 0.40	
$Sn(OH)_4 + 2\ H_2O \rightleftharpoons Sn(OH)_6^{2-} + 2\ H^+$	–18.4 ± 0.3	–18.67 ± 0.30	
$SnO_2(cr) + 2\ H_2O \rightleftharpoons Sn(OH)_4$	–8.0 ± 0.2	–8.06 ± 0.11	
$SnO_2(am) + 2\ H_2O \rightleftharpoons Sn(OH)_4$	–7.3 ± 0.3	–7.22 ± 0.08	
$SnO_2(s) + 4\ H^+ \rightleftharpoons Sn^{4+} + 2\ H_2O$			–15.59 ± 0.04

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

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

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

Distribution diagrams

These diagrams have been computed at two Sn(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).