

Lead(II)

Equilibrium	Baes and Mesmer, 1976	NIST46	Powell et al., 2009	Brown and Ekberg, 2016	Cataldo et al., 2018
$\text{Pb}^{2+} + \text{H}_2\text{O} = \text{PbOH}^+ + \text{H}^+$	-7.71 ± 0.1	-7.6	-7.46 ± 0.06	-7.49 ± 0.13	-6.47 ± 0.03
$\text{Pb}^{2+} + 2 \text{H}_2\text{O} = \text{Pb}(\text{OH})_2 + 2 \text{H}^+$	-17.12 ± 0.1	-17.1	-16.94 ± 0.09	-16.99 ± 0.06	-16.12 ± 0.01
$\text{Pb}^{2+} + 3 \text{H}_2\text{O} = \text{Pb}(\text{OH})_3^- + 3 \text{H}^+$	-28.06 ± 0.05	-28.1	-28.03 ± 0.06	-27.94 ± 0.21	-28.4 ± 0.1
$\text{Pb}^{2+} + 4 \text{H}_2\text{O} = \text{Pb}(\text{OH})_4^{2-} + 4 \text{H}^+$			-40.8		
$2 \text{Pb}^{2+} + \text{H}_2\text{O} = \text{Pb}_2(\text{OH})^{3+} + \text{H}^+$	-6.36 ± 0.1	-6.4	-7.28 ± 0.09	-6.73 ± 0.31	
$3 \text{Pb}^{2+} + 4 \text{H}_2\text{O} = \text{Pb}_3(\text{OH})_4^{2+} + 4 \text{H}^+$	-23.88 ± 0.2	-23.9	-23.01 ± 0.07	-23.43 ± 0.10	

$3 \text{ Pb}^{2+} + 5 \text{ H}_2\text{O} = \text{Pb}_3(\text{OH})_5^+ + 5 \text{ H}^+$				-31.11 ± 0.10	
$4 \text{ Pb}^{2+} + 4 \text{ H}_2\text{O} = \text{Pb}_4(\text{OH})_4^{4+} + 4 \text{ H}^+$	-20.88 ± 0.1	-20.9	-20.57 ± 0.06	-20.71 ± 0.18	
$6 \text{ Pb}^{2+} + 8 \text{ H}_2\text{O} = \text{Pb}_6(\text{OH})_8^{4+} + 8 \text{ H}^+$	-43.61 ± 0.1	-43.6	-42.89 ± 0.07	-43.27 ± 0.47	
$\text{Pb}^{2+} + \text{H}_2\text{O} + \text{Cl}^- = \text{PbOHCl} + \text{H}^+$					-7.0 ± 0.3
$\text{PbO(s)} + 2 \text{ H}^+ = \text{Pb}^{2+} + \text{H}_2\text{O}$			12.62 (red) ^a 12.90 (yellow) ^b		
$\text{PbO(s)} + \text{H}_2\text{O} = \text{Pb}^{2+} + 2 \text{ OH}^-$	-15.28 ± 0.05 (red)	-15.3	-15.3 (red) ^a -15.1 (yellow) ^a	-15.37 ± 0.04 (red) -15.1 ± 0.08 (yellow)	
$\text{Pb}_2\text{O(OH)}_{2(\text{s})} + \text{H}_2\text{O} = 2 \text{ Pb}^{2+} + 4 \text{ OH}^-$			-14.9 ^a		
$\text{PbO}_{(\text{s})} + \text{H}_2\text{O} = \text{Pb(OH)}_2$			-4.4 (red) ^a -4.2 (yellow) ^a		
$\text{Pb}_2\text{O(OH)}_{2(\text{s})} + \text{H}_2\text{O} = 2 \text{ Pb(OH)}_2$			-4.0		

$\text{PbO}_{(s)} + 2 \text{H}_2\text{O} = \text{Pb}(\text{OH})_3^- + \text{H}^+$			-1.4 (red) ^a -1.2 (yellow) ^a		
$\text{Pb}_2\text{O}(\text{OH})_2(s) + 2 \text{H}_2\text{O} = 2 \text{Pb}(\text{OH})_3^- + 2 \text{H}^+$			-1.0		

^aFeitknecht and Schindler (1963).

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

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

S. Cataldo, G. Lando, D. Milea, S. Orecchio, A. Pettignano, S. Sammartano, A novel thermodynamic approach for the complexation study of toxic metal cations by a landfill leachate. New J. Chem., 42, 7640–7648, 2018.

W. Feitknecht and P. Schindler, Solubility constants of metal oxides, metal hydroxides and metal hydroxide salts in aqueous solution. Pure Appl. Chem., 6, 125–206, 1963.

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

K.J. Powell, P.L. Brown, R.H. Byrne, T. Gajda, G. Hefter, A.K. Leuz, S. Sjöberg, H. Wanner, Chemical speciation of environmentally significant metals with inorganic ligands. Part 3: The $\text{Pb}^{2+} + \text{OH}^-$, Cl^- , CO_3^{2-} , SO_4^{2-} , and PO_4^{3-} systems (IUPAC Technical Report). Pure Appl. Chem., 81, 2425–2476, 2009.