

Appendix 10: Solubility Products

The following table provides pK_{sp} and K_{sp} values for selected compounds, organized by the anion. All values are from Martell, A. E.; Smith, R. M. *Critical Stability Constants*, Vol. 4. Plenum Press: New York, 1976. Unless otherwise stated, values are for 25 °C and zero ionic strength.

Bromide (Br ⁻)	pK_{sp}	K_{sp}
CuBr	8.3	$5. \times 10^{-9}$
AgBr	12.30	5.0×10^{-13}
Hg ₂ Br ₂	22.25	5.6×10^{-13}
HgBr ₂ ($\mu = 0.5$ M)	18.9	1.3×10^{-19}
PbBr ₂ ($\mu = 4.0$ M)	5.68	2.1×10^{-6}

Carbonate (CO ₃ ²⁻)	pK_{sp}	K_{sp}
MgCO ₃	7.46	3.5×10^{-8}
CaCO ₃ (calcite)	8.35	4.5×10^{-9}
CaCO ₃ (aragonite)	8.22	6.0×10^{-9}
SrCO ₃	9.03	9.3×10^{-10}
BaCO ₃	8.30	5.0×10^{-9}
MnCO ₃	9.30	5.0×10^{-10}
FeCO ₃	10.68	2.1×10^{-11}
CoCO ₃	9.98	1.0×10^{-10}
NiCO ₃	6.87	1.3×10^{-7}
Ag ₂ CO ₃	11.09	8.1×10^{-12}
Hg ₂ CO ₃	16.05	8.9×10^{-17}
ZnCO ₃	10.00	1.0×10^{-10}
CdCO ₃	13.74	1.8×10^{-14}
PbCO ₃	13.13	7.4×10^{-14}

Chloride (Cl ⁻)	pK_{sp}	K_{sp}
CuCl	6.73	1.9×10^{-7}
AgCl	9.74	1.8×10^{-10}
Hg ₂ Cl ₂	17.91	1.2×10^{-18}
PbCl ₂	4.78	2.0×10^{-19}

Chromate (CrO_4^{2-})	$\text{p}K_{\text{sp}}$	K_{sp}
BaCrO_4	9.67	2.1×10^{-10}
CuCrO_4	5.44	3.6×10^{-6}
Ag_2CrO_4	11.92	1.2×10^{-12}
Hg_2CrO_4	8.70	2.0×10^{-9}

Cyanide (CN^-)	$\text{p}K_{\text{sp}}$	K_{sp}
AgCN	15.66	2.2×10^{-16}
$\text{Zn}(\text{CN})_2$ ($\mu = 3.0 \text{ M}$)	15.5	$3. \times 10^{-16}$
$\text{Hg}_2(\text{CN})_2$	39.3	$5. \times 10^{-40}$

Ferrocyanide [$\text{Fe}(\text{CN})_6^{4-}$]	$\text{p}K_{\text{sp}}$	K_{sp}
$\text{Zn}_2[\text{Fe}(\text{CN})_6]$	15.68	2.1×10^{-16}
$\text{Cd}_2[\text{Fe}(\text{CN})_6]$	17.38	4.2×10^{-18}
$\text{Pb}_2[\text{Fe}(\text{CN})_6]$	18.02	9.5×10^{-19}

Fluoride (F^-)	$\text{p}K_{\text{sp}}$	K_{sp}
MgF_2	8.18	6.6×10^{-9}
CaF_2	10.41	3.9×10^{-11}
SrF_2	8.54	2.9×10^{-9}
BaF_2	5.76	1.7×10^{-6}
PbF_2	7.44	3.6×10^{-8}

Hydroxide (OH^-)	$\text{p}K_{\text{sp}}$	K_{sp}
$\text{Mg}(\text{OH})_2$	11.15	7.1×10^{-12}
$\text{Ca}(\text{OH})_2$	5.19	6.5×10^{-6}
$\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$	3.6	$3. \times 10^{-4}$
$\text{La}(\text{OH})_3$	20.7	$2. \times 10^{-21}$
$\text{Mn}(\text{OH})_2$	12.8	1.6×10^{-13}
$\text{Fe}(\text{OH})_2$	15.1	$8. \times 10^{-16}$
$\text{Co}(\text{OH})_2$	14.9	1.3×10^{-15}
$\text{Ni}(\text{OH})_2$	15.2	$6. \times 10^{-16}$
$\text{Cu}(\text{OH})_2$	19.32	4.8×10^{-20}
$\text{Fe}(\text{OH})_3$	38.8	1.6×10^{-39}

Co(OH) ₃ (<i>T</i> = 19 °C)	44.5	3. × 10 ⁻⁴⁵
Ag ₂ O (+ H ₂ O ⇌ 2Ag ⁺ + 2OH ⁻)	15.42	3.8 × 10 ⁻¹⁶
Cu ₂ O (+ H ₂ O ⇌ 2Cu ⁺ + 2OH ⁻)	29.4	4. × 10 ⁻³⁰
Zn(OH) ₂ (amorphous)	15.52	3.0 × 10 ⁻¹⁶
Cd(OH) ₂ (β)	14.35	4.5 × 10 ⁻¹⁵
HgO (red) (+ H ₂ O ⇌ Hg ²⁺ + 2OH ⁻)	25.44	3.6 × 10 ⁻²⁶
SnO (+ H ₂ O ⇌ Sn ²⁺ + 2OH ⁻)	26.2	6. × 10 ⁻²⁷
PbO (yellow) (+ H ₂ O ⇌ Pb ²⁺ + 2OH ⁻)	15.1	8. × 10 ⁻¹⁶
Al(OH) ₃ (α)	33.5	3. × 10 ⁻³⁴

Iodate (IO ₃ ⁻)	p <i>K</i> _{sp}	<i>K</i> _{sp}
Ca(IO ₃) ₂	6.15	7.1 × 10 ⁻⁷
Ba(IO ₃) ₂	8.81	1.5 × 10 ⁻⁹
AgIO ₃	7.51	3.1 × 10 ⁻⁸
Hg ₂ (IO ₃) ₂	17.89	1.3 × 10 ⁻¹⁸
Zn(IO ₃) ₂	5.41	3.9 × 10 ⁻⁶
Cd(IO ₃) ₂	7.64	2.3 × 10 ⁻⁸
Pb(IO ₃) ₂	12.61	2.5 × 10 ⁻¹³

Iodide (I ⁻)	p <i>K</i> _{sp}	<i>K</i> _{sp}
AgI	16.08	8.3 × 10 ⁻¹⁷
Hg ₂ I ₂	28.33	4.7 × 10 ⁻²⁹
HgI ₂ (μ = 0.5 M)	27.95	1.1 × 10 ⁻²⁸
PbI ₂	8.10	7.9 × 10 ⁻⁹

Oxalate (C ₂ O ₄ ²⁻)	p <i>K</i> _{sp}	<i>K</i> _{sp}
CaC ₂ O ₄ (μ = 0.1 M, <i>T</i> = 20 °C)	7.9	1.3 × 10 ⁻⁸
BaC ₂ O ₄ (μ = 0.1 M, <i>T</i> = 20 °C)	6.0	1. × 10 ⁻⁶
SrC ₂ O ₄ (μ = 0.1 M, <i>T</i> = 20 °C)	6.4	4. × 10 ⁻⁷

Phosphate (PO ₄ ³⁻)	p <i>K</i> _{sp}	<i>K</i> _{sp}
Fe ₃ (PO ₄) ₂ • 8H ₂ O	36.0	1. × 10 ⁻³⁶
Zn ₃ (PO ₄) ₂ • 4H ₂ O	35.3	5. × 10 ⁻³⁶
Ag ₃ PO ₄	17.55	2.8 × 10 ⁻¹⁸

$\text{Pb}_3(\text{PO}_4)_2$ ($T=38^\circ\text{C}$)	43.55	3.0×10^{-44}
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Sulfate (SO_4^{2-})	$\text{p}K_{\text{sp}}$	K_{sp}
CaSO_4	4.62	2.4×10^{-5}
SrSO_4	6.50	3.2×10^{-7}
BaSO_4	9.96	1.1×10^{-10}
Ag_2SO_4	4.83	1.5×10^{-5}
Hg_2SO_4	6.13	7.4×10^{-7}
PbSO_4	7.79	1.6×10^{-8}

Sulfide (S^{2-})	$\text{p}K_{\text{sp}}$	K_{sp}
MnS (green)	13.5	$3. \times 10^{-14}$
FeS	18.1	$8. \times 10^{-19}$
CoS (β)	25.6	$3. \times 10^{-26}$
NiS (γ)	26.6	$3. \times 10^{-27}$
CuS	36.1	$8. \times 10^{-37}$
Cu_2S	48.5	$3. \times 10^{-49}$
Ag_2S	50.1	$8. \times 10^{-51}$
ZnS (α)	24.7	$2. \times 10^{-25}$
CdS	27.0	$1. \times 10^{-27}$
Hg_2S (red)	53.3	$5. \times 10^{-54}$
PbS	27.5	$3. \times 10^{-28}$

Thiocyanate (SCN^-)	$\text{p}K_{\text{sp}}$	K_{sp}
CuSCN ($\mu = 5.0 \text{ M}$)	13.40	4.0×10^{-14}
AgSCN	11.97	1.1×10^{-12}
$\text{Hg}_2(\text{SCN})_2$	19.52	3.0×10^{-20}
$\text{Hg}(\text{SCN})_2$ ($\mu = 1.0 \text{ M}$)	19.56	2.8×10^{-20}