

**ภาคผนวก**



## ภาคผนวกที่ 1 Ionization constants of weak acids

Acid	K	Acid	K
Acetic acid.....	$1.8 \times 10^{-5}$	Hydrosulfuric acid... $K_1 = 1.1 \times 10^{-7}$	
Aluminum hydroxide.	$4 \times 10^{-13}$	$K_2 = 1 \times 10^{-15}$	
Ammonium ion.....	$5.5 \times 10^{-9}$	Hydrotelluric acid... $K_1 = 2.3 \times 10^{-3}$	
Antimonous acid..... $K_1 =$	$10^{-11}$	$K_2 = 1 \times 10^{-5}$	
Arsenic acid..... $K_1 =$	$5 \times 10^{-8}$	Hypobromous acid..	$2 \times 10^{-9}$
$K_2 =$	$1 \times 10^{-7}$	Hypochlorous acid...	$6.4 \times 10^{-8}$
$K_3 =$	$1 \times 10^{-13}$	Hypoiodous acid.....	$1 \times 10^{-11}$
Arsenious acid..... $K_1 =$	$6 \times 10^{-10}$	Hyponitrous acid.... $K_1 =$	$9 \times 10^{-8}$
Benzoic acid.....	$6.6 \times 10^{-5}$	$K_2 =$	$1 \times 10^{-11}$
Boric acid.....	$5.8 \times 10^{-10}$	Hypophosphorus acid	
Carbonic acid..... $K_1 =$	$3 \times 10^{-7}$	H( $H_2PO_2$ )..... $K_1 =$	$1 \times 10^{-3}$
$K_2 =$	$7 \times 10^{-11}$	Iodic acid.....	$1.67 \times 10^{-1}$
Chloroacetic acid....	$1.4 \times 10^{-3}$	Lead hydroxide	
Chlorous acid.....	$4.9 \times 10^{-8}$	$Pb(OH)_2 \rightleftharpoons$	
Chromic acid..... $K_1 =$ strong		$H^+ + HPbO_2^- \dots$	$2 \times 10^{-16}$
$K_2 =$	$3.2 \times 10^{-7}$	Mercuric hydroxide	
Chromic hydroxide... $K_1 =$	$1 \times 10^{-18}$	$Hg(OH)_2 \rightleftharpoons$	
Citric acid..... $K_1 =$	$8.7 \times 10^{-4}$	$H^+ + HHgO_2^- \dots$	$1 \times 10^{-15}$
$K_2 =$	$1.8 \times 10^{-5}$	Nitrous acid.....	$4.5 \times 10^{-4}$
$K_3 =$	$4 \times 10^{-8}$	Oxalic acid..... $K_1 =$	$5.9 \times 10^{-2}$
Cyanic acid.....	$1.2 \times 10^{-4}$	$K_2 =$	$6.4 \times 10^{-5}$
Formic acid.....	$2 \times 10^{-4}$	Periodic acid ( $HIO_4$ )	$2.3 \times 10^{-3}$
Germanic acid..... $K_1 =$	$3 \times 10^{-9}$	Phosphoric acid..... $K_1 =$	$7.5 \times 10^{-3}$
Hydrazoic acid.....	$2.6 \times 10^{-5}$	$K_2 =$	$6.3 \times 10^{-8}$
Hydrocyanic acid....	$7.2 \times 10^{-10}$	$K_3 =$	$3.6 \times 10^{-13}$
Hydrofluoric acid....	$6.9 \times 10^{-4}$	Phosphorus acid..... $K_1 =$	$1.6 \times 10^{-3}$
Hydrogen peroxide		$K_2 =$	$7 \times 10^{-7}$
$H_2O_2 \rightleftharpoons$		Pyrophosphoric acid. $K_1 =$	$1.4 \times 10^{-1}$
$H^+ + HO_2^- \dots$	$2.4 \times 10^{-12}$	$K_2 =$	$1.1 \times 10^{-3}$
Hydroselenic acid.... $K_1 =$	$1.7 \times 10^{-4}$	$K_3 =$	$2.1 \times 10^{-7}$
$K_2 =$	$1 \times 10^{-10}$	$K_4 =$	$4.1 \times 10^{-10}$
Selenic acid..... $K_1 =$ large		Sulfurous acid..... $K_1 =$	$1.2 \times 10^{-2}$
$K_2 =$	$1 \times 10^{-2}$	$K_2 =$	$1 \times 10^{-7}$
Selenious acid..... $K_1 =$	$3 \times 10^{-3}$	Tartaric acid..... $K_1 =$	$9.6 \times 10^{-4}$
$K_2 =$	$5 \times 10^{-8}$	$K_2 =$	$2.9 \times 10^{-5}$
Silicic acid ( $H_2SiO_3$ ).. $K_1 =$	$3.1 \times 10^{-10}$	Telluric acid..... $K_1 =$	$6 \times 10^{-7}$
$K_2 =$	$1.7 \times 10^{-12}$	$K_2 =$	$4 \times 10^{-11}$
Silver hydroxide.....	$8 \times 10^{-18}$	Tellurous acid..... $K_1 =$	$2 \times 10^{-3}$
Stannic acid ( $H_2SnO_3$ )	$4 \times 10^{-10}$	Thiocyanic acid.....	$1 \times 10^{-4}$
Stannous hydroxide		Thiosulfuric acid.....	$1 \times 10^{-3}$
$Sn(OH)_2 \rightleftharpoons$		Zinc hydroxide..... $K_1 =$	$2 \times 10^{-16}$
$H^+ + HSnO_2^- \dots$	$6 \times 10^{-18}$	$K_2 =$	$1 \times 10^{-22}$
Sulfuric acid..... $K_1 =$ large			
$K_2 =$	$1.2 \times 10^{-2}$		

ภาคผนวกที่ 2 Solubility Product Constants

Compound	$K_s$	Compound	$K_s$
Al(OH) <sub>3</sub>	$1.1 \times 10^{-15}$	Cu <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	$2.9 \times 10^{-8}$
Ba(BrO <sub>3</sub> ) <sub>2</sub>	$5.5 \times 10^{-6}$	CuS	$3.5 \times 10^{-42}$
BaCO <sub>3</sub>	$8.1 \times 10^{-9}$	CuBr	$4.1 \times 10^{-8}$
BaCrO <sub>4</sub>	$2.0 \times 10^{-10}$	CuCl	$1.0 \times 10^{-6}$
BaF <sub>2</sub>	$1.7 \times 10^{-6}$	CuI	$5.0 \times 10^{-12}$
Ba(IO <sub>3</sub> ) <sub>2</sub> · 2H <sub>2</sub> O	$6.5 \times 10^{-10}$	Cu <sub>2</sub> S	$2 \times 10^{-47}$
BaC <sub>2</sub> O <sub>4</sub> · 2H <sub>2</sub> O	$1.2 \times 10^{-7}$	CuSCN	$1.6 \times 10^{-11}$
BaSO <sub>4</sub>	$1.0 \times 10^{-10}$	Fe(OH) <sub>3</sub>	$1.1 \times 10^{-36}$
Bi <sub>2</sub> S <sub>3</sub>	$1.6 \times 10^{-72(?)}$	Fe <sub>2</sub> S <sub>3</sub>	$10^{-63(?)}$
BiOCl	$7 \times 10^{-9}$	FeCO <sub>3</sub>	$2.1 \times 10^{-11}$
CdCO <sub>3</sub>	$2.5 \times 10^{-14}$	Fe(OH) <sub>2</sub>	$1.6 \times 10^{-14}$
Cd(OH) <sub>2</sub>	$1.2 \times 10^{-14}$	FeC <sub>2</sub> O <sub>4</sub>	$2.1 \times 10^{-7}$
CdC <sub>2</sub> O <sub>4</sub> · 3H <sub>2</sub> O	$1.5 \times 10^{-8}$	FeS	$3.7 \times 10^{-19}$
CdS	$7.1 \times 10^{-28}$	H <sub>2</sub> S	$1.1 \times 10^{-23}$
CaCO <sub>3</sub>	$1.2 \times 10^{-8}$	PbBr <sub>2</sub>	$6.3 \times 10^{-6}$
CaCrO <sub>4</sub>	$2.3 \times 10^{-2}$	PbCO <sub>3</sub>	$3.3 \times 10^{-14}$
CaF <sub>2</sub>	$3.5 \times 10^{-11}$	PbCl <sub>2</sub>	$1 \times 10^{-4}$
Ca(IO <sub>3</sub> ) <sub>2</sub> · 6H <sub>2</sub> O	$6.4 \times 10^{-7}$	PbCrO <sub>4</sub>	$1.8 \times 10^{-14}$
CaC <sub>2</sub> O <sub>4</sub> · H <sub>2</sub> O	$2.3 \times 10^{-9}$	PbF <sub>2</sub>	$3.2 \times 10^{-8}$
Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	$1 \times 10^{-25}$	Pb(OH) <sub>2</sub>	$2.8 \times 10^{-15}$
CaSO <sub>4</sub>	$2.4 \times 10^{-6}$	Pb(IO <sub>3</sub> ) <sub>2</sub>	$1.2 \times 10^{-13}$
CaC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 2H <sub>2</sub> O	$7.7 \times 10^{-7}$	PbI <sub>2</sub>	$1.4 \times 10^{-8}$
Cr(OH) <sub>3</sub>	$6.7 \times 10^{-31}$	PbC <sub>2</sub> O <sub>4</sub>	$2.7 \times 10^{-11}$
CoCO <sub>3</sub>	$1.0 \times 10^{-12}$	Pb <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	$3 \times 10^{-44}$
Co(OH) <sub>2</sub>	$2.5 \times 10^{-43}$	PbSO <sub>4</sub>	$1 \times 10^{-8}$
Co(OH) <sub>3</sub>	$2 \times 10^{-16}$	PbS	$3.4 \times 10^{-28}$
CoS	$1.9 \times 10^{-27}$	Li <sub>2</sub> CO <sub>3</sub>	$1.7 \times 10^{-3}$
K <sub>2</sub> Na[Co(NO <sub>2</sub> ) <sub>6</sub> ]	$2.2 \times 10^{-11}$	MgNH <sub>4</sub> PO <sub>4</sub> · 6H <sub>2</sub> O	$2.5 \times 10^{-13}$
CuCO <sub>3</sub>	$1.4 \times 10^{-10}$	MgCO <sub>3</sub>	$2.0 \times 10^{-4}$
Cu(OH) <sub>2</sub>	$5.6 \times 10^{-20}$	MgF <sub>2</sub>	$7.0 \times 10^{-9}$
Cu(IO <sub>3</sub> ) <sub>2</sub>	$1.4 \times 10^{-7}$	Mg(OH) <sub>2</sub>	$1.2 \times 10^{-11}$
MgC <sub>2</sub> O <sub>4</sub>	$8.6 \times 10^{-6}$	AgNO <sub>3</sub>	$5.9 \times 10^{-4}$
MnCO <sub>3</sub>	$8.8 \times 10^{-11}$	Ag <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	$1.3 \times 10^{-11}$
Mn(OH) <sub>2</sub>	$4 \times 10^{-14}$	Ag <sub>3</sub> PO <sub>4</sub>	$1.8 \times 10^{-18}$
MnS	$7 \times 10^{-16}$	Ag <sub>2</sub> SO <sub>4</sub>	$1.2 \times 10^{-6}$
HgS	$3 \times 10^{-54}$	Ag <sub>2</sub> S	$1 \times 10^{-50}$
Hg <sub>2</sub> Br <sub>2</sub>	$3 \times 10^{-23}$	AgSCN	$1 \times 10^{-12}$
Hg <sub>2</sub> Cl <sub>2</sub>	$1 \times 10^{-15}$	SrCO <sub>3</sub>	$1.6 \times 10^{-9}$
Hg <sub>2</sub> I <sub>2</sub>	$1.2 \times 10^{-28}$	SrCrO <sub>4</sub>	$3.6 \times 10^{-5}$
Hg <sub>2</sub> S	$1 \times 10^{-47}$	SrF <sub>2</sub>	$2.8 \times 10^{-9}$
NiCO <sub>3</sub>	$1.4 \times 10^{-7}$	SrC <sub>2</sub> O <sub>4</sub>	$5.6 \times 10^{-5}$
Ni(OH) <sub>2</sub>	$1.6 \times 10^{-14}$	SrSO <sub>4</sub>	$2.8 \times 10^{-7}$
NiS	$1.1 \times 10^{-27}$	TlBr	$4 \times 10^{-6}$
KHC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	$3.8 \times 10^{-4}$	TlCl	$2.7 \times 10^{-4}$
Ag <sub>2</sub> C <sub>2</sub> H <sub>2</sub> O <sub>2</sub>	$1.8 \times 10^{-3}$	TlOH	$2.2 \times 10^{-8}$
AgBrO <sub>3</sub>	$4 \times 10^{-5}$	Tl <sub>2</sub> S	$2.8 \times 10^{-3}$
AgBr	$4.1 \times 10^{-13}$	Tl <sub>2</sub> SO <sub>4</sub>	$3.6 \times 10^{-4}$
Ag <sub>2</sub> CO <sub>3</sub>	$6.2 \times 10^{-12}$	Tl <sub>2</sub> S <sub>3</sub>	$1.2 \times 10^{-24}$
AgCl	$1.2 \times 10^{-10}$	TISCN	$2.3 \times 10^{-4}$
Ag <sub>2</sub> CrO <sub>4</sub>	$9 \times 10^{-12}$	Sn(OH) <sub>4</sub>	$1 \times 10^{-56}$
AgCN	$2.2 \times 10^{-12}$	Sn(OH) <sub>2</sub>	$5 \times 10^{-28}$
Ag <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	$2 \times 10^{-7}$	SnS	$8 \times 10^{-29}$
AgOH	$1.5 \times 10^{-8}$	ZnCO <sub>3</sub>	$6 \times 10^{-11}$
Ag <sub>4</sub> [Fe(CN) <sub>6</sub> ]	$1.6 \times 10^{-41}$	Zn(OH) <sub>2</sub>	$1.8 \times 10^{-14}$
AgIO <sub>3</sub>	$2.0 \times 10^{-9}$	ZnC <sub>2</sub> O <sub>4</sub>	$1.4 \times 10^{-9}$
AgI	$1.0 \times 10^{-16}$	ZnS	$7 \times 10^{-26}$
Ag <sub>2</sub> MnO <sub>4</sub>	$3.1 \times 10^{-11}$		

## ภาคผนวกที่ 3 ไอออนชนิดต่างๆ

<b>Positive Ions (Cations)</b>	Mercury(II) or mercuric ( $\text{Hg}^{2+}$ )	Hydrogen sulfite or bisulfite ( $\text{HSO}_3^-$ )
1+	Strontium ( $\text{Sr}^{2+}$ )	Hydroxide ( $\text{OH}^-$ )
Ammonium ( $\text{NH}_4^+$ )	Nickel(II) ( $\text{Ni}^{2+}$ )	Iodide ( $\text{I}^-$ )
Cesium ( $\text{Cs}^+$ )	Tin(II) or stannous ( $\text{Sn}^{2+}$ )	Nitrate ( $\text{NO}_3^-$ )
Copper(I) or Cuprous ( $\text{Cu}^+$ )	Zinc ( $\text{Zn}^{2+}$ )	Nitrite ( $\text{NO}_2^-$ )
Hydrogen ( $\text{H}^+$ )		Perchlorate ( $\text{ClO}_4^-$ )
Lithium ( $\text{Li}^+$ )	3+	Permanganate ( $\text{MnO}_4^-$ )
Potassium ( $\text{K}^+$ )	Aluminum ( $\text{Al}^{3+}$ )	Thiocyanate ( $\text{SCN}^-$ )
Silver ( $\text{Ag}^+$ )	Chromium(III) or chromic ( $\text{Cr}^{3+}$ )	
Sodium ( $\text{Na}^+$ )	Iron(III) or ferric ( $\text{Fe}^{3+}$ )	2-
2+		Carbonate ( $\text{CO}_3^{2-}$ )
Barium ( $\text{Ba}^{2+}$ )	<b>Negative Ions (Anions)</b>	Chromate ( $\text{CrO}_4^{2-}$ )
Cadmium ( $\text{Cd}^{2+}$ )	1-	Dichromate ( $\text{Cr}_2\text{O}_7^{2-}$ )
Calcium ( $\text{Ca}^{2+}$ )	Acetate ( $\text{C}_2\text{H}_3\text{O}_2^-$ )	Hydrogen phosphate ( $\text{HPO}_4^{2-}$ )
Chromium(II) or chromous ( $\text{Cr}^{2+}$ )	Bromide ( $\text{Br}^-$ )	Oxide ( $\text{O}^{2-}$ )
Cobalt(II) or cobaltous ( $\text{Co}^{2+}$ )	Chlorate ( $\text{ClO}_3^-$ )	Peroxide ( $\text{O}_2^{2-}$ )
Copper(II) or cupric ( $\text{Cu}^{2+}$ )	Chloride ( $\text{Cl}^-$ )	Sulfate ( $\text{SO}_4^{2-}$ )
Iron(II) or ferrous ( $\text{Fe}^{2+}$ )	Cyanide ( $\text{CN}^-$ )	Sulfide ( $\text{S}^{2-}$ )
Lead(II) or plumbous ( $\text{Pb}^{2+}$ )	Dihydrogen phosphate ( $\text{H}_2\text{PO}_4^-$ )	Sulfite ( $\text{SO}_3^{2-}$ )
Magnesium ( $\text{Mg}^{2+}$ )	Fluoride ( $\text{F}^-$ )	
Manganese(II) or manganous ( $\text{Mn}^{2+}$ )	Hydride ( $\text{H}^-$ )	3-
Mercury(I) or mercurous ( $\text{Hg}_2^{2+}$ )	Hydrogen carbonate or bicarbonate ( $\text{HCO}_3^-$ )	Arsenate ( $\text{AsO}_4^{3-}$ )
		Phosphate ( $\text{PO}_4^{3-}$ )

ภาคผนวกที่ 4 สมบัติของสารประกอบอนินทรีย์ชนิดต่าง ๆ

SILVER

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Silver	Ag	white	insol.	H <sub>2</sub> SO <sub>4</sub> , HNO <sub>3</sub>
Acetate	AgC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	white	1.04	HNO <sub>3</sub> , NH <sub>4</sub> OH
Arsenate (ortho)	Ag <sub>3</sub> AsO <sub>4</sub>	red	8.5 × 10 <sup>-4</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Arsenite (ortho)	Ag <sub>3</sub> AsO <sub>3</sub>	yellow	1.2 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Borate (meta)	AgBO <sub>2</sub>	white	0.9	HNO <sub>3</sub> , NH <sub>4</sub> OH
Bromide	AgBr	lt. yel.	8.4 × 10 <sup>-6</sup>	conc. NH <sub>4</sub> OH
Carbonate	Ag <sub>2</sub> CO <sub>3</sub>	yellow	3.3 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Chlorate	AgClO <sub>3</sub>	white	10	
Chloride	AgCl	white	2.1 × 10 <sup>-4</sup>	NH <sub>4</sub> OH, KCN
Chromate	Ag <sub>2</sub> CrO <sub>4</sub>	red	2.8 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Cyanide	AgCN	white	1.6 × 10 <sup>-3</sup>	NH <sub>4</sub> OH, KCN
Dichromate	Ag <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	red	8.3 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Ferricyanide	Ag <sub>3</sub> Fe(CN) <sub>6</sub>	orange	6.6 × 10 <sup>-3</sup>	NH <sub>4</sub> OH
Ferrocyanide	Ag <sub>4</sub> Fe(CN) <sub>6</sub> ·H <sub>2</sub> O	yellow	insol.	KCN
Fluoride	AgF	yellow	182	
Fluosilicate	Ag <sub>3</sub> SiF <sub>6</sub> ·4H <sub>2</sub> O	white	very sol.	
Iodide	AgI	yellow	3.5 × 10 <sup>-7</sup>	KCN, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>
Nitrate	AgNO <sub>3</sub>	white	227	
Nitrite	AgNO <sub>2</sub>	white	0.36	HNO <sub>3</sub>
Oxalate	Ag <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	white	3.5 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Oxide	Ag <sub>2</sub> O	brown	1.3 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Phosphate (ortho)	Ag <sub>3</sub> PO <sub>4</sub>	yellow	6.5 × 10 <sup>-4</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Sulfate	Ag <sub>2</sub> SO <sub>4</sub>	white	0.8	HNO <sub>3</sub> , NH <sub>4</sub> OH
Sulfide	Ag <sub>2</sub> S	black	insol.	KCN, HNO <sub>3</sub>
Sulfite	Ag <sub>2</sub> SO <sub>3</sub>	white	very slightly sol.	HNO <sub>3</sub> , NH <sub>4</sub> OH
Tartrate	Ag <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	0.2	HNO <sub>3</sub> , NH <sub>4</sub> OH
Thiocyanate	AgSCN	white	2.1 × 10 <sup>-5</sup>	NH <sub>4</sub> OH
Thiosulfate	Ag <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	white	slightly sol.	NH <sub>4</sub> OH

LEAD

Lead	Pb	gray	insol.	HNO <sub>3</sub>
Acetate	Pb(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·3H <sub>2</sub> O	white	50	
Arsenate	PbHAsO <sub>4</sub>	white	insol.	HNO <sub>3</sub> , NaOH
Arsenate (meta)	Pb(AsO <sub>2</sub> ) <sub>2</sub>	white	insol.	HNO <sub>3</sub>
Borate (meta)	Pb(BO <sub>2</sub> ) <sub>2</sub> ·H <sub>2</sub> O	white	insol.	HNO <sub>3</sub> , NaOH
Bromide	PbBr <sub>2</sub>	white	0.97	HNO <sub>3</sub> , KBr
Carbonate	PbCO <sub>3</sub>	white	1.1 × 10 <sup>-4</sup>	HNO <sub>3</sub> , NaOH
Carbonate (basic)	2PbCO <sub>3</sub> ·Pb(OH) <sub>2</sub>	white	insol.	HNO <sub>3</sub>

\* The solubility for each compound is measured at approximately room temperature.

LEAD (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Chlorate	Pb(ClO <sub>3</sub> ) <sub>2</sub> · H <sub>2</sub> O	white	very sol.	
Chloride	PbCl <sub>2</sub>	white	0.96	HCl, NaOH, hot H <sub>2</sub> O
Chromate	PbCrO <sub>4</sub>	yellow	7 × 10 <sup>-6</sup>	HNO <sub>3</sub> , NaOH
Cyanide	Pb(CN) <sub>2</sub>	white	slightly sol.	KCN
Ferricyanide	Pb <sub>2</sub> [Fe(CN) <sub>6</sub> ] <sub>2</sub> · 6H <sub>2</sub> O	red	slightly sol.	HNO <sub>3</sub> , NaOH
Ferrocyanide	Pb <sub>2</sub> Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O	yel.-white	insol.	
Fluoride	PbF <sub>2</sub>	white	0.064	HNO <sub>3</sub>
Fluosilicate	PbSiF <sub>6</sub> · 2H <sub>2</sub> O	white	very sol.	
Hydroxide	Pb(OH) <sub>2</sub>	white	0.016	HNO <sub>3</sub> , NaOH
Iodide	PbI <sub>2</sub>	yellow	0.06	KI, NaOH
Nitrate	Pb(NO <sub>3</sub> ) <sub>2</sub>	white	52.3	
Nitrate	Pb(NO <sub>3</sub> ) <sub>2</sub> · H <sub>2</sub> O	yellow	very sol.	
Oxalate	PbC <sub>2</sub> O <sub>4</sub>	white	1.6 × 10 <sup>-4</sup>	HNO <sub>3</sub>
Oxide (mono)	PbO	yellow	1.7 × 10 <sup>-3</sup>	HNO <sub>3</sub> , NaOH
Oxide (di)	PbO <sub>2</sub>	brown	insol.	
Oxide (red)	Pb <sub>2</sub> O <sub>3</sub>	br. red	insol.	
Phosphate (ortho)	Pb <sub>2</sub> (PO <sub>4</sub> ) <sub>3</sub>	white	1.4 × 10 <sup>-5</sup>	HNO <sub>3</sub> , NaOH
Sulfate	PbSO <sub>4</sub>	white	4.3 × 10 <sup>-3</sup>	NaOH, NH <sub>4</sub> Ac
Sulfide	PbS	black	insol.	HNO <sub>3</sub>
Sulfite	PbSO <sub>3</sub>	white	insol.	HNO <sub>3</sub>
Tartrate	PbC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	0.01	HNO <sub>3</sub>
Thiocyanate	Pb(SCN) <sub>2</sub>	white	0.05	HNO <sub>3</sub>
Thiosulfate	PbS <sub>2</sub> O <sub>3</sub>	white	0.03	HNO <sub>3</sub> , Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>

MERCURY (-OUS)

Mercury	Hg	gray	insol.	HNO <sub>3</sub> , aq. reg.
Acetate	Hg <sub>2</sub> (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	white	0.75	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub>
Arsenate	(Hg <sub>2</sub> ) <sub>2</sub> (AsO <sub>4</sub> ) <sub>2</sub>	red	insol.	HNO <sub>3</sub>
Bromide	Hg <sub>2</sub> Br <sub>2</sub>	yellow	insol.	HNO <sub>3</sub>
Carbonate	Hg <sub>2</sub> CO <sub>3</sub>	yel.-brown	insol.	HNO <sub>3</sub>
Chlorate	Hg <sub>2</sub> (ClO <sub>3</sub> ) <sub>2</sub>	white	sol.	
Chloride	Hg <sub>2</sub> Cl <sub>2</sub>	white	2.1 × 10 <sup>-4</sup>	aq. reg.
Chromate	Hg <sub>2</sub> CrO <sub>4</sub>	red	very slightly sol.	HNO <sub>3</sub>
Fluoride	Hg <sub>2</sub> F <sub>2</sub>	yellow	decomp.	
Fluosilicate	Hg <sub>2</sub> SiF <sub>6</sub> · 2H <sub>2</sub> O	white	slightly sol.	
Iodide	Hg <sub>2</sub> I <sub>2</sub>	yellow	insol.	KI
Nitrate	Hg <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> · H <sub>2</sub> O	white	very sol.	
Oxalate	Hg <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	gray-white	insol.	HNO <sub>3</sub>
Oxide	Hg <sub>2</sub> O	black	7 × 10 <sup>-4</sup>	HNO <sub>3</sub> , HAc
Phosphate	(Hg <sub>2</sub> ) <sub>2</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	HNO <sub>3</sub>
Sulfate	Hg <sub>2</sub> SO <sub>4</sub>	white	0.06	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub>
Sulfide	Hg <sub>2</sub> S	black	insol.	aq. reg.
Thiocyanate	Hg <sub>2</sub> (SCN) <sub>2</sub>	white	insol.	HCl, KSCN

MERCURY (-IC)

Acetate	Hg(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	white	25	
Arsenate	Hg <sub>2</sub> (AsO <sub>4</sub> ) <sub>2</sub>	yellow	slightly sol.	HCl, HNO <sub>3</sub>
Bromide	HgBr <sub>2</sub>	white	0.5	hot water
Carbonate (basic)	2HgO · HgCO <sub>3</sub>	red	insol.	
Chloramide	Hg(NH <sub>2</sub> )Cl	white	insol.	aq. reg.
Chlorate	Hg(ClO <sub>3</sub> ) <sub>2</sub>	white	25	
Chloride	HgCl <sub>2</sub>	white	7.4	
Chromate	HgCrO <sub>4</sub>	red	slightly sol.	HCl, NH <sub>4</sub> Cl
Cyanide	Hg(CN) <sub>2</sub>	white	11.8	
Ferrocyanide	Hg <sub>2</sub> Fe(CN) <sub>6</sub>	brown	insol.	
Fluoride	HgF <sub>2</sub>	white	decomp.	HNO <sub>3</sub>
Iodide	HgI <sub>2</sub>	red	6 × 10 <sup>-3</sup>	HCl
Nitrate	Hg(NO <sub>3</sub> ) <sub>2</sub>	white	very sol.	

MERCURY (-IC) (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Oxalate.....	HgC <sub>2</sub> O <sub>4</sub>	gray-white	insol.	HCl, HNO <sub>3</sub>
Oxide.....	HgO	red	5 × 10 <sup>-3</sup>	HCl, HNO <sub>3</sub>
Phosphate.....	Hg <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	HCl, HNO <sub>3</sub>
Sulfate.....	HgSO <sub>4</sub>	white	0.06	HCl, HNO <sub>3</sub>
Sulfide.....	HgS	black	insol.	aq. reg.
Thiocyanate.....	Hg(SCN) <sub>2</sub>	white	0.07	HCl, HNO <sub>3</sub>

BISMUTH

Bismuth.....	Bi	gray-white	insol.	HNO <sub>3</sub>
Acetate.....	Bi(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>3</sub>	white	hydr.	HAc, HCl
Arsenate.....	BiAsO <sub>4</sub>	white	slightly sol.	HCl
Bromide.....	BiBr <sub>3</sub>	yellow	hydr.	HCl, HNO <sub>3</sub>
Carbonate (sub).....	Bi <sub>2</sub> O <sub>3</sub> ·CO <sub>2</sub> ·H <sub>2</sub> O	white	insol.	HCl, HNO <sub>3</sub>
Chloride.....	BiCl <sub>3</sub>	white	hydr.	HCl
Chromate.....	Bi <sub>2</sub> (CrO <sub>4</sub> ) <sub>3</sub>	orange-red	8 × 10 <sup>-5</sup>	HCl, HNO <sub>3</sub>
Fluoride.....	BiF <sub>3</sub>	white	insol.	HCl, HNO <sub>3</sub>
Hydroxide.....	Bi(OH) <sub>3</sub>	white	insol.	HCl, HNO <sub>3</sub>
Iodide.....	BiI <sub>3</sub>	black	insol.	HNO <sub>3</sub> , KI
Nitrate.....	Bi(NO <sub>3</sub> ) <sub>3</sub> ·5H <sub>2</sub> O	white	hydr.	HNO <sub>3</sub>
Oxalate.....	Bi <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub>	white	insol.	HCl, HNO <sub>3</sub>
Oxide (tri).....	Bi <sub>2</sub> O <sub>3</sub>	yellow	insol.	HCl, HNO <sub>3</sub>
Oxide (pent).....	Bi <sub>2</sub> O <sub>5</sub>	brown	insol.	HCl, HNO <sub>3</sub> , NaOH
Oxybromide.....	BiOBr	white	insol.	HBr, HCl
Oxychloride.....	BiOCl	white	insol.	HCl
Oxyiodide.....	BiOI	red	insol.	HCl
Oxynitrate.....	BiONO <sub>3</sub> ·H <sub>2</sub> O	white	insol.	HNO <sub>3</sub>
Phosphate.....	BiPO <sub>4</sub>	white	insol.	HCl
Sulfate.....	Bi <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	white	hydr.	H <sub>2</sub> SO <sub>4</sub> , HCl
Sulfide.....	Bi <sub>2</sub> S <sub>3</sub>	dk. brown	1.8 × 10 <sup>-4</sup>	HNO <sub>3</sub>

COPPER (-IC)

Copper.....	Cu	red	insol.	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub>
Acetate.....	Cu(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·H <sub>2</sub> O	dk. green	7.2	
Arsenate (ortho).....	Cu <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	blue-green	insol.	HCl, HNO <sub>3</sub>
Borate (meta).....	Cu(BO <sub>2</sub> ) <sub>2</sub>	green	insol.	conc. HCl
Bromide.....	CuBr <sub>2</sub>	black	very sol.	
Carbonate (basic).....	CuCO <sub>3</sub> ·Cu(OH) <sub>2</sub>	green	insol.	HCl, HNO <sub>3</sub>
Chlorate.....	Cu(ClO <sub>3</sub> ) <sub>2</sub>	green	240	
Chloride.....	CuCl <sub>2</sub>	yel.-brown	76.2	
Chromate.....	CuCrO <sub>4</sub>	brown	insol.	acids
Cyanide.....	Cu(CN) <sub>2</sub>	yel.-green	insol.	KCN
Ferrocyanide.....	Cu <sub>2</sub> [Fe(CN) <sub>6</sub> ]	yel.-green	insol.	NH <sub>4</sub> OH
Ferrocyanide.....	Cu <sub>2</sub> Fe(CN) <sub>6</sub>	red-brown	insol.	NH <sub>4</sub> OH
Fluoride.....	CuF <sub>2</sub> ·2H <sub>2</sub> O	lt. blue	slightly sol.	acids
Fluosilicate.....	CuSiF <sub>6</sub> ·6H <sub>2</sub> O	blue	234	
Hydroxide.....	Cu(OH) <sub>2</sub>	blue	insol.	acids, NH <sub>4</sub> OH
Nitrate.....	Cu(NO <sub>3</sub> ) <sub>2</sub> ·3H <sub>2</sub> O	blue	125	
Nitrate.....	Cu(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	blue	243.7	
Oxalate.....	2CuC <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	blue	insol.	acids, NH <sub>4</sub> OH
Oxide.....	CuO	black	insol.	acids
Phosphate.....	Cu <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> ·3H <sub>2</sub> O	blue	insol.	acids, NH <sub>4</sub> OH
Sulfate.....	CuSO <sub>4</sub>	green-white	20.8	
Sulfate.....	CuSO <sub>4</sub> ·5H <sub>2</sub> O	blue	33	
Sulfide.....	CuS	black	insol.	HNO <sub>3</sub>
Tartrate.....	CuC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·3H <sub>2</sub> O	green	0.02	acids, NH <sub>4</sub> OH
Thiocyanate.....	Cu(SCN) <sub>2</sub>	black	decomp.	acids



COPPER (-OUS)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Bromide.....	Cu <sub>2</sub> Br <sub>2</sub>	white	insol.	acids, NH <sub>4</sub> OH
Carbonate.....	Cu <sub>2</sub> CO <sub>3</sub>	yellow	insol.	acids, NH <sub>4</sub> OH
Chloride.....	Cu <sub>2</sub> Cl <sub>2</sub>	white	6.2 × 10 <sup>-3</sup>	acids, NH <sub>4</sub> OH
Cyanide.....	Cu <sub>2</sub> (CN) <sub>2</sub>	white	insol.	HCl, NH <sub>4</sub> OH, KCN
Ferrocyanide.....	Cu <sub>4</sub> Fe(CN) <sub>6</sub>	red	insol.	NH <sub>4</sub> OH
Fluoride.....	Cu <sub>2</sub> F <sub>2</sub>	red	insol.	HNO <sub>3</sub> , HCl
Hydroxide.....	CuOH	yellow	insol.	acids, NH <sub>4</sub> OH
Iodide.....	Cu <sub>2</sub> I <sub>2</sub>	white	8 × 10 <sup>-4</sup>	KI, NH <sub>4</sub> OH
Oxide.....	Cu <sub>2</sub> O	red	insol.	acids, NH <sub>4</sub> OH
Sulfide.....	Cu <sub>2</sub> S	black	5 × 10 <sup>-4</sup>	HNO <sub>3</sub> , NH <sub>4</sub> OH
Sulfite.....	Cu <sub>2</sub> SO <sub>3</sub> · H <sub>2</sub> O	red	slightly sol.	acids, NH <sub>4</sub> OH
Thiocyanate.....	Cu <sub>2</sub> (SCN) <sub>2</sub>	white	5 × 10 <sup>-4</sup>	NH <sub>4</sub> OH

CADMIUM

Cadmium.....	Cd	white	insol.	acids
Acetate.....	Cd(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> · 2H <sub>2</sub> O	white	very sol.	
Arsenate.....	Cd <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub>	white	insol.	acids
Arsenite.....	Cd <sub>3</sub> (AsO <sub>3</sub> ) <sub>2</sub>	white	slightly sol.	acids
Borate (meta).....	Cd(BO <sub>2</sub> ) <sub>2</sub>	white	insol.	acids
Bromide.....	CdBr <sub>2</sub>	white	94	
Carbonate.....	CdCO <sub>3</sub>	white	insol.	acids, NH <sub>4</sub> Cl
Chlorate.....	Cd(ClO <sub>3</sub> ) <sub>2</sub>	white	372	
Chloride.....	CdCl <sub>2</sub>	white	141	
Chromate.....	CdCrO <sub>4</sub>	yellow	insol.	acids
Cyanide.....	Cd(CN) <sub>2</sub>	white	1.7	acids, KCN
Ferrocyanide.....	Cd <sub>2</sub> Fe(CN) <sub>6</sub>		insol.	HCl
Fluoride.....	CdF <sub>2</sub>	white	4.35	acids
Fluosilicate.....	CdSiF <sub>6</sub> · 6H <sub>2</sub> O		very sol.	
Hydroxide.....	Cd(OH) <sub>2</sub>	white	2.6 × 10 <sup>-4</sup>	acids, NH <sub>4</sub> OH
Iodide.....	CdI <sub>2</sub>	white	93	
Nitrate.....	Cd(NO <sub>3</sub> ) <sub>2</sub> · 4H <sub>2</sub> O	white	127	
Oxalate.....	CdC <sub>2</sub> O <sub>4</sub> · 3H <sub>2</sub> O	white	3.7 × 10 <sup>-3</sup>	acids, NH <sub>4</sub> OH
Oxide.....	CdO	brown	insol.	acids, NH <sub>4</sub> Cl
Phosphate.....	Cd <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	acids, NH <sub>4</sub> Cl
Sulfate.....	CdSO <sub>4</sub>	white	76	
Sulfide.....	CdS	yellow	insol.	HNO <sub>3</sub>
Sulfite.....	CdSO <sub>3</sub>	white	slightly sol.	acids, NH <sub>4</sub> OH
Tartrate.....	CdC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	insol.	acids
Thiocyanate.....	Cd(SCN) <sub>2</sub>		slightly sol.	acids
Thiosulfate.....	CdS <sub>2</sub> O <sub>3</sub> · 2H <sub>2</sub> O	white	sol.	

ARSENIC (-OUS)

Arsenic.....	As <sub>4</sub>	gray	insol.	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub>
Bromide.....	AsBr <sub>3</sub>	yellow	hydr.	acids
Chloride.....	AsCl <sub>3</sub>	colorless	hydr.	acids
Fluoride.....	AsF <sub>3</sub>		hydr.	
Iodide.....	AsI <sub>3</sub>	red	30	
Oxide.....	As <sub>2</sub> O <sub>3</sub>	white	1.7	acids, bases
Oxide.....	As <sub>2</sub> O <sub>5</sub>	white	3.7	acids, bases
Sulfide.....	As <sub>2</sub> S <sub>3</sub>	yellow	5 × 10 <sup>-5</sup>	HNO <sub>3</sub> , bases

ARSENIC (-IC)

Arsenic acid.....	2H <sub>2</sub> AsO <sub>4</sub> · H <sub>2</sub> O	white	16.7	bases
Oxide.....	As <sub>2</sub> O <sub>5</sub>	white	150	
Sulfide.....	As <sub>2</sub> S <sub>5</sub>	yellow	insol.	HNO <sub>3</sub> , base

ANTIMONY (-OUS)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Antimony.....	Sb	white	insol.	aq. reg.
Bromide.....	SbBr <sub>3</sub>	white	hydr.	acids
Chloride.....	SbCl <sub>3</sub>	white	hydr.	acids
Fluoride.....	SbF <sub>3</sub>	gray-white	445	
Iodide.....	SbI <sub>3</sub>	red-yellow	hydr.	acids
Oxalate.....	2Sb <sub>2</sub> O(C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ·3H <sub>2</sub> O	white	insol.	acids
Oxide.....	Sb <sub>2</sub> O <sub>3</sub>	white	1.8 × 10 <sup>-3</sup>	HCl, bases
Oxide (tetra).....	Sb <sub>2</sub> O <sub>4</sub>	white	insol.	
Sulfate.....	Sb <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	white	hydr.	acids
Sulfide.....	Sb <sub>2</sub> S <sub>3</sub>	orange-red	1.7 × 10 <sup>-4</sup>	bases
Tartrate.....	Sb <sub>2</sub> (C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ) <sub>3</sub> ·6H <sub>2</sub> O	white	sol.	

ANTIMONIC (-IC)

Chloride.....	SbCl <sub>5</sub>	liquid	hydr.	acids
Oxide.....	Sb <sub>2</sub> O <sub>5</sub>	yellow	0.3	HCl, NaOH
Sulfide.....	Sb <sub>2</sub> S <sub>5</sub>	red	insol.	bases

TIN (STANNOUS)

Tin.....	Sn	white	insol.	HCl, aq. reg.
Acetate.....	Sn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	yellow	hydr.	acids
Bromide.....	SnBr <sub>2</sub>	yellow	sol.	
Chloride.....	SnCl <sub>2</sub>	white	270	
Chloride.....	SnCl <sub>2</sub> ·2H <sub>2</sub> O	white	sol.	
Chromate.....	SnCrO <sub>4</sub>	brown	slightly sol.	HCl
Ferrocyanide.....	Sn <sub>2</sub> Fe(CN) <sub>6</sub>	white	insol.	HCl
Fluoride.....	SnF <sub>2</sub>	white	very sol.	
Hydroxide.....	Sn(OH) <sub>2</sub>	lt. yellow	2.1 × 10 <sup>-4</sup>	acids, bases
Iodide.....	SnI <sub>2</sub>	red	1	acids, bases
Oxalate.....	SnC <sub>2</sub> O <sub>4</sub>	white	insol.	acids
Oxide.....	SnO	black	insol.	acids
Sulfate.....	SnSO <sub>4</sub>	white	19	
Sulfide.....	SnS	brown	2 × 10 <sup>-4</sup>	HCl
Tartrate.....	SnC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	insol.	HCl

TIN (STANNIC)

Bromide.....	SnBr <sub>4</sub>	white	sol.	
Chloride.....	SnCl <sub>4</sub>	liquid	very sol.	
Chloride.....	SnCl <sub>4</sub> ·5H <sub>2</sub> O	white	very sol.	
Chromate.....	Sn(CrO <sub>4</sub> ) <sub>2</sub>	br.-yellow	sol.	
Fluoride.....	SnF <sub>4</sub>	white	very sol.	
Hydroxide.....	Sn(OH) <sub>4</sub>	white	sol.	
Hydroxide (stannic acid).....	H <sub>2</sub> SnO <sub>3</sub>	white	insol.	NaOH
Hydroxide (stannic acid).....	H <sub>10</sub> Sn <sub>5</sub> O <sub>15</sub>	white	insol.	bases
Iodide.....	SnI <sub>4</sub>	orange-red	hydr.	
Oxide.....	SnO <sub>2</sub>	white	insol.	
Sulfate.....	Sn(SO <sub>4</sub> ) <sub>2</sub>	white	very sol.	
Sulfide.....	SnS <sub>2</sub>	yellow	2 × 10 <sup>-5</sup>	acids, (NH <sub>4</sub> ) <sub>2</sub> S

COBALT (-OUS)

Cobalt.....	Co	gray	insol.	acids
Acetate.....	Co(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	red-violet	sol.	
Arsenate.....	Co <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·8H <sub>2</sub> O	violet	insol.	acids, NH <sub>4</sub> OH
Arsenite.....	Co <sub>3</sub> (AsO <sub>3</sub> ) <sub>2</sub>	red	insol.	acids

COBALT (-OUS) (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Bromide.....	CoBr <sub>2</sub>	green	sol.	
Bromide.....	CoBr <sub>2</sub> ·6H <sub>2</sub> O	red	sol.	
Carbonate.....	CoCO <sub>3</sub>	rose	insol.	acids
Chlorate.....	Co(ClO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	red	sol.	
Chloride.....	CoCl <sub>2</sub>	blue	sol.	
Chloride.....	CoCl <sub>2</sub> ·6H <sub>2</sub> O	red	sol.	
Chromate.....	CoCrO <sub>4</sub>	yel.-brown	insol.	acids
Cyanide.....	Co(CN) <sub>2</sub> ·2H <sub>2</sub> O	buff	insol.	HCl, KCN
Ferrocyanide.....	Co <sub>2</sub> [Fe(CN) <sub>6</sub> ] <sub>2</sub>	red	insol.	HCl, NH <sub>4</sub> OH
Ferrocyanide.....	Co <sub>2</sub> Fe(CN) <sub>6</sub>	gray-green	insol.	HCl, KCN
Fluoride.....	CoF <sub>2</sub> ·4H <sub>2</sub> O	red	2	acids
Fluosilicate.....	CoSiF <sub>6</sub> ·6H <sub>2</sub> O		very sol.	
Hydroxide.....	Co(OH) <sub>2</sub>	blue to red	insol.	acids, NH <sub>4</sub> Cl
Iodide.....	CoI <sub>2</sub>	green-black	sol.	
Nitrate.....	Co(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	red	99	
Oxalate.....	CoC <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	pink	insol.	acids, NH <sub>4</sub> OH
Oxide.....	CoO	green-brown	insol.	acids, NH <sub>4</sub> OH
Phosphate.....	Co <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	red to blue	insol.	acids, NH <sub>4</sub> OH
Sulfate.....	CoSO <sub>4</sub>	red	34.5	
Sulfide.....	CoS	black	3.8 × 10 <sup>-4</sup>	acids
Sulfite.....	CoSO <sub>3</sub> ·5H <sub>2</sub> O	red	insol.	acids
Tartrate.....	CoC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	red	slightly sol.	acids
Thiocyanate.....	Co(SCN) <sub>2</sub> ·3H <sub>2</sub> O	violet	sol.	
Thiosulfate.....	CoS <sub>2</sub> O <sub>3</sub> ·6H <sub>2</sub> O		sol.	

COBALT (-IC)

Chloride.....	CoCl <sub>2</sub>	red	sol.	
Hydroxide.....	Co(OH) <sub>2</sub>	black	insol.	acids
Oxide.....	Co <sub>2</sub> O <sub>3</sub>	black	insol.	acids
Sulfate.....	Co <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub>	blue	dec.	acids
Sulfide.....	Co <sub>2</sub> S <sub>3</sub>	black	insol.	acids, dec.

NICKEL (-OUS)

Nickel.....	Ni	silvery	insol.	HNO <sub>3</sub>
Acetate.....	Ni(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	green	16.6	
Arsenate (ortho).....	Ni <sub>2</sub> (AsO <sub>4</sub> ) <sub>2</sub>	green	insol.	acids
Arsenite (ortho).....	Ni <sub>2</sub> (AsO <sub>3</sub> ) <sub>2</sub>	green	insol.	acids
Borate (meta).....	Ni(BO <sub>2</sub> ) <sub>2</sub> ·2H <sub>2</sub> O	green	insol.	acids
Bromide.....	NiBr <sub>2</sub>	yellow	sol.	
Bromide.....	NiBr <sub>2</sub> ·3H <sub>2</sub> O	yel.-green	sol.	
Carbonate.....	NiCO <sub>3</sub>	blue-green	9 × 10 <sup>-3</sup>	acids
Chlorate.....	Ni(ClO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	red	156	
Chloride.....	NiCl <sub>2</sub>	yellow	64	
Chloride.....	NiCl <sub>2</sub> ·6H <sub>2</sub> O	green	very sol.	
Chromate.....	NiCrO <sub>4</sub>		insol.	conc. HNO <sub>3</sub>
Cyanide.....	Ni(CN) <sub>2</sub> ·4H <sub>2</sub> O	green	insol.	KCN
Dimethylglyoxime.....	NiC <sub>4</sub> H <sub>14</sub> N <sub>2</sub> O <sub>4</sub>	red	insol.	acids
Ferrocyanide.....	Ni <sub>2</sub> Fe(CN) <sub>6</sub> ·11H <sub>2</sub> O	green	insol.	HCl, NH <sub>4</sub> OH
Fluoride.....	NiF <sub>2</sub>	green	0.02	NH <sub>4</sub> OH
Fluosilicate.....	NiSiF <sub>6</sub> ·6H <sub>2</sub> O	green	very sol.	
Hydroxide.....	Ni(OH) <sub>2</sub>	green	insol.	acids, NH <sub>4</sub> OH
Iodide.....	NiI <sub>2</sub>	black	148	
Nitrate.....	Ni(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	green	very sol.	
Nitrite.....	Ni(NO <sub>2</sub> ) <sub>2</sub>	green	very sol.	
Oxalate.....	NiC <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	green	insol.	acids
Oxide.....	NiO	green	insol.	acids, NH <sub>4</sub> OH
Phosphate.....	Ni <sub>2</sub> (PO <sub>4</sub> ) <sub>2</sub> ·7H <sub>2</sub> O	green	insol.	acids
Silicate.....	Ni <sub>2</sub> SiO <sub>4</sub>	green	insol.	acids, dec.

NICKEL (-OUS) (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Sulfate.....	NiSO <sub>4</sub>	yellow	39.7	
Sulfate.....	NiSO <sub>4</sub> ·7H <sub>2</sub> O	green	75.6	
Sulfide.....	NiS	black	3.6 × 10 <sup>-4</sup>	aq. reg.
Sulfite.....	NiSO <sub>3</sub> ·6H <sub>2</sub> O	green	insol.	acids
Thiocyanate.....	Ni(SCN) <sub>2</sub>		sol.	
Thiosulfate.....	NiS <sub>2</sub> O <sub>3</sub> ·6H <sub>2</sub> O		sol.	

NICKEL (-IC)

Hydroxide.....	Ni(OH) <sub>2</sub>	black	insol.	acids
Oxide.....	Ni <sub>2</sub> O <sub>3</sub>	black	insol.	acids
Oxide.....	Ni <sub>3</sub> O <sub>4</sub>	gray	insol.	acids

MANGANESE (-OUS)

Manganese.....	Mn	gray-pink	decomp.	acids
Acetate.....	Mn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	lt. red	3	acids
Arsenate.....	Mn <sub>2</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·H <sub>2</sub> O	brown	insol.	acids
Arsenite.....	Mn <sub>2</sub> (AsO <sub>3</sub> ) <sub>2</sub> ·3H <sub>2</sub> O	red	sol.	
Bromide.....	MnBr <sub>2</sub>	red	sol.	
Carbonate.....	MnCO <sub>3</sub>	brown	6.5 × 10 <sup>-3</sup>	acids
Chloride.....	MnCl <sub>2</sub>	pink	75	
Chloride.....	MnCl <sub>2</sub> ·4H <sub>2</sub> O	rose	117	
Ferrocyanide.....	Mn <sub>2</sub> Fe(CN) <sub>6</sub> ·7H <sub>2</sub> O	green-white	insol.	HCl
Fluoride.....	MnF <sub>2</sub>	red	insol.	acids
Fluosilicate.....	MnSiF <sub>6</sub> ·6H <sub>2</sub> O		140	
Hydroxide.....	Mn(OH) <sub>2</sub>	white-pink	2 × 10 <sup>-4</sup>	acids, NH <sub>4</sub> Cl
Iodide.....	MnI <sub>2</sub> ·4H <sub>2</sub> O	rose-red	very sol.	
Nitrate.....	Mn(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	rose	252	
Oxalate.....	2MnC <sub>2</sub> O <sub>4</sub> ·5H <sub>2</sub> O	white	0.03	acids
Oxide.....	MnO	green	insol.	acids, NH <sub>4</sub> Cl
Phosphate.....	Mn <sub>2</sub> (PO <sub>4</sub> ) <sub>2</sub> ·7H <sub>2</sub> O	white-pink	very slightly sol.	acids
Silicate.....	MnSiO <sub>3</sub>	red	insol.	
Sulfate.....	MnSO <sub>4</sub> ·4H <sub>2</sub> O	pink	95	
Sulfide.....	MnS	pink	7 × 10 <sup>-4</sup>	acids
Sulfite.....	MnSO <sub>3</sub> ·3H <sub>2</sub> O	red	0.01	acids
Tartrate.....	MnC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	slightly sol.	acids
Thiocyanate.....	Mn(SCN) <sub>2</sub> ·3H <sub>2</sub> O		sol.	
Thiosulfate.....	MnS <sub>2</sub> O <sub>3</sub>		sol.	

MANGANESE (-IC)

Oxide.....	Mn <sub>2</sub> O <sub>3</sub>	brown-black	insol.	acids
Oxide.....	Mn <sub>3</sub> O <sub>4</sub>	brown	insol.	HCl, H <sub>2</sub> SO <sub>4</sub>
Oxide (di).....	MnO <sub>2</sub>	black	insol.	HCl
Phosphate.....	MnPO <sub>4</sub> ·H <sub>2</sub> O	gray	insol.	acids
Sulfate.....	Mn <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	dark green	sol.	

IRON (-OUS)

Iron.....	Fe	gray	insol.	acids
Acetate.....	Fe(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	brown	very sol.	
Ammonium sulfate.....	Fe(NH <sub>4</sub> ) <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	green	26.9	
Arsenate.....	Fe <sub>2</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	white	insol.	acids, NH <sub>4</sub> Cl
Bromide.....	FeBr <sub>2</sub>	yellow	116	
Carbonate.....	FeCO <sub>3</sub>	gray	6.5 × 10 <sup>-3</sup>	acids

## IRON (-OUS) (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Chloride	FeCl <sub>2</sub>	green	70	
Ferrocyanide	Fe <sub>2</sub> [Fe(CN) <sub>6</sub> ]	blue	insol.	
Ferrocyanide	Fe <sub>2</sub> Fe(CN) <sub>6</sub>	blue-white	insol.	
Fluoride	FeF <sub>2</sub> ·8H <sub>2</sub> O	green	slightly sol.	acids
Fluosilicate	FeSiF <sub>6</sub> ·6H <sub>2</sub> O		sol.	
Hydroxide	Fe(OH) <sub>2</sub>	green	6.7 × 10 <sup>-4</sup>	acids, NH <sub>4</sub> Cl
Iodide	FeI <sub>2</sub> ·4H <sub>2</sub> O	green	very sol.	
Nitrate	Fe(NO <sub>2</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	green	134	
Oxalate	FeC <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	yellow	0.022	acids
Oxide	FeO	black	insol.	acids
Phosphate	Fe <sub>2</sub> (PO <sub>4</sub> ) <sub>2</sub> ·8H <sub>2</sub> O	gray-blue	insol.	acids
Sulfate	FeSO <sub>4</sub> ·7H <sub>2</sub> O	green	48	
Sulfide	FeS	black	6.2 × 10 <sup>-4</sup>	acids
Sulfite	2FeSO <sub>3</sub> ·5H <sub>2</sub> O	green	very slightly sol.	acids
Tartrate	FeC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>		0.88	acids
Thiocyanate	Fe(SCN) <sub>2</sub> ·3H <sub>2</sub> O	green	very sol.	

## IRON (-IC)

Acetate (basic)	FeOH(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	brown	insol.	acids
Arsenate	FeAsO <sub>4</sub> ·4H <sub>2</sub> O	white	insol.	acids
Bromide	FeBr <sub>2</sub>	yellow	sol.	
Chlorate	Fe(ClO <sub>3</sub> ) <sub>2</sub>		sol.	
Chloride	FeCl <sub>3</sub> ·6H <sub>2</sub> O	yellow-brown	very sol.	
Ferrocyanide	Fe <sub>4</sub> [Fe(CN) <sub>6</sub> ] <sub>3</sub>	blue	insol.	HCl, H <sub>2</sub> SO <sub>4</sub>
Fluoride	FeF <sub>3</sub>	green	slightly sol.	acids
Hydroxide	Fe(OH) <sub>3</sub>	red-brown	insol.	acids
Nitrate	Fe(NO <sub>3</sub> ) <sub>3</sub> ·9H <sub>2</sub> O	pale violet	very sol.	
Oxalate	Fe <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub>	br.-yellow	very sol.	
Oxide	Fe <sub>2</sub> O <sub>3</sub>	red	insol.	HCl
Oxide	Fe <sub>3</sub> O <sub>4</sub>	black	insol.	
Phosphate	FePO <sub>4</sub> ·2H <sub>2</sub> O	yellow	very slightly sol.	acids
Sulfate	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	yellow	slightly sol.	acids
Sulfide	Fe <sub>2</sub> S <sub>3</sub>	green-yellow	3 × 10 <sup>-7</sup>	acids dec.
Tartrate	Fe <sub>2</sub> (C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ) <sub>3</sub> ·H <sub>2</sub> O	red-brown	sol.	
Thiocyanate	Fe(SCN) <sub>3</sub> ·3H <sub>2</sub> O	red	very sol.	

## ALUMINUM

Aluminum	Al	silvery	insol.	acids, NaOH
Acetate	Al(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>3</sub>	white	sol.	
Acetate (basic)	AlOH(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	white	insol.	acids
Arsenate	AlAsO <sub>4</sub>	white	insol.	acids
Arsenite	AlAsO <sub>2</sub>	white	insol.	acids
Bromide	AlBr <sub>3</sub> ·6H <sub>2</sub> O	white	40	
Ferrocyanide	Al <sub>4</sub> [Fe(CN) <sub>6</sub> ] <sub>3</sub> ·17H <sub>2</sub> O	brown	slightly sol.	acids
Fluoride	AlF <sub>3</sub>	white	insol.	
Fluosilicate	Al <sub>2</sub> (SiF <sub>6</sub> ) <sub>3</sub>		very sol.	
Hydroxide	Al(OH) <sub>3</sub>	white	insol.	acids, bases
Iodide	AlI <sub>3</sub> ·6H <sub>2</sub> O	white-yellow	very sol.	
Nitrate	Al(NO <sub>3</sub> ) <sub>3</sub> ·9H <sub>2</sub> O	white	113	
Oxalate	Al <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ·H <sub>2</sub> O	white	insol.	acids
Oxide	Al <sub>2</sub> O <sub>3</sub> ·H <sub>2</sub> O	white	insol.	HCl, H <sub>2</sub> SO <sub>4</sub> , NaOH
Oxide	Al <sub>2</sub> O <sub>3</sub>	white	insol.	insol.
Phosphate	AlPO <sub>4</sub>	white	insol.	acids, bases
Sulfate	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	white	36	
Sulfate	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> ·18H <sub>2</sub> O	white	107.4	
Sulfide	Al <sub>2</sub> S <sub>3</sub>	yellow	hydr.	acids, bases

CHROMIUM (-OUS)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Chromium	Cr	gray		HCl, H <sub>2</sub> SO <sub>4</sub>
Bromide	CrBr <sub>3</sub>	white	sol.	
Carbonate	CrCO <sub>3</sub>	gray-blue	slightly sol.	acids
Chloride	CrCl <sub>3</sub>	white	very sol.	
Fluoride	CrF <sub>3</sub>	green	slightly sol.	hot conc. HCl
Hydroxide	Cr(OH) <sub>3</sub>	yellow-brown	decomp.	acids
Iodide	CrI <sub>3</sub>	white	very sol.	
Oxalate	Cr <sub>2</sub> C <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	yellow	slightly sol.	acids
Oxide	Cr <sub>2</sub> O <sub>3</sub>	black	insol.	HCl, HNO <sub>3</sub>
Phosphate	Cr <sub>2</sub> (PO <sub>4</sub> ) <sub>3</sub>	green	insol.	acids
Sulfate	CrSO <sub>4</sub> ·7H <sub>2</sub> O	blue	12.35	
Sulfide	CrS	black	insol.	acids
Thiocyanate	Cr(SCN) <sub>3</sub>		very sol.	

CHROMIUM (-IC)

Acetate	Cr <sub>2</sub> (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>6</sub> ·2H <sub>2</sub> O	green	sol.	
Arsenite	CrAsO <sub>3</sub>		sol.	
Bromide	CrBr <sub>3</sub>	green	insol.	
Bromide	CrBr <sub>3</sub> ·6H <sub>2</sub> O	green	very sol.	
Chloride	CrCl <sub>3</sub>	pink	insol.	
Chloride	CrCl <sub>3</sub> ·6H <sub>2</sub> O	violet or green	very sol.	
Fluoride	CrF <sub>3</sub>	green	sol.	
Hydroxide	Cr(OH) <sub>3</sub>	green	insol.	acids, bases
Iodide	CrI <sub>3</sub> ·9H <sub>2</sub> O		sol.	
Nitrate	Cr(NO <sub>3</sub> ) <sub>3</sub> ·9H <sub>2</sub> O	purple	sol.	
Oxide	Cr <sub>2</sub> O <sub>3</sub>	dark green	insol.	
Oxide	CrO <sub>2</sub>	gray	insol.	acids
Oxide	CrO <sub>3</sub>	red	167	
Phosphate	CrPO <sub>4</sub> ·3H <sub>2</sub> O	green	insol.	acids, bases
Sulfate	Cr <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> ·18H <sub>2</sub> O	red-violet	120	
Sulfide	Cr <sub>2</sub> S <sub>3</sub>	br.-black	hydr.	HNO <sub>3</sub>

ZINC

Zinc	Zn	silvery	insol.	acids, bases
Acetate	Zn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·2H <sub>2</sub> O	white	30	
Arsenate	Zn <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·8H <sub>2</sub> O	white	insol.	HNO <sub>3</sub>
Bromide	ZnBr <sub>2</sub>	white	470	
Carbonate	ZnCO <sub>3</sub>	white	1 × 10 <sup>-4</sup>	acids, bases
Chlorate	Zn(ClO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	white	265	
Chloride	ZnCl <sub>2</sub>	white	431	
Chromate	ZnCrO <sub>4</sub>	yellow	insol.	acids
Cyanide	Zn(CN) <sub>2</sub>	white	insol.	KCN, bases
Dichromate	ZnCr <sub>2</sub> O <sub>7</sub>	yellow	insol.	acids
Ferrocyanide	Zn <sub>2</sub> Fe(CN) <sub>6</sub> ·3H <sub>2</sub> O	white	insol.	HCl, NH <sub>4</sub> OH
Fluoride	ZnF <sub>2</sub> ·4H <sub>2</sub> O	white	1.6	acids, bases
Fluosilicate	ZnSiF <sub>6</sub> ·6H <sub>2</sub> O		very sol.	
Hydroxide	Zn(OH) <sub>2</sub>	white	4.3 × 10 <sup>-4</sup>	acids, bases
Iodide	ZnI <sub>2</sub>	white	432	
Nitrate	Zn(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	white	185	
Nitrite	Zn(NO <sub>2</sub> ) <sub>2</sub> ·3H <sub>2</sub> O		very sol.	
Oxalate	ZnC <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	white	7.9 × 10 <sup>-4</sup>	acids, bases
Oxide	ZnO	white	4 × 10 <sup>-4</sup>	acids, bases
Phosphate	Zn <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	acids, NH <sub>4</sub> OH
Silicate	ZnSiO <sub>3</sub>	white	insol.	
Sulfate	ZnSO <sub>4</sub> ·6H <sub>2</sub> O	white	103.3	

ZINC (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Sulfide	ZnS	white	$6.9 \times 10^{-4}$	acids
Sulfite	ZnSO <sub>3</sub> ·2H <sub>2</sub> O	white	0.16	acids
Tartrate	ZnC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·H <sub>2</sub> O	white	slightly sol.	acids
Thiocyanate	Zn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	white	sol.	
Thiosulfate	ZnS <sub>2</sub> O <sub>3</sub> ·xH <sub>2</sub> O	white	very sol.	

TITANIUM

Titanium	Ti	gray	insol.	acids
Bromide	TiBr <sub>4</sub>	yellow	decomp.	
Chloride (di)	TiCl <sub>2</sub>	black	decomp.	
Chloride (tri)	TiCl <sub>3</sub>	violet	sol.	
Chloride (tetra)	TiCl <sub>4</sub>	colorless	sol.	
Fluoride	TiF <sub>4</sub>	white	sol.	
Iodide	TiI <sub>4</sub>	red	very sol.	
Oxalate	Ti <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ·10H <sub>2</sub> O	yellow	sol.	
Oxide (di)	TiO <sub>2</sub>	white	insol.	
Oxide (sesqui)	Ti <sub>2</sub> O <sub>3</sub>	black or red	insol.	
Sulfate	Ti <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	green	insol.	

BARIUM

Barium	Ba	yellowish	insol.	acids
Acetate	Ba(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·H <sub>2</sub> O	white	69.2	
Arsenate (ortho)	Ba <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub>	white	0.055	acids
Arsenite	Ba <sub>3</sub> (AsO <sub>3</sub> ) <sub>2</sub>	white	sol.	
Borate (meta)	Ba(BO <sub>2</sub> ) <sub>2</sub>	white	slightly sol.	acids
Bromide	BaBr <sub>2</sub>	white	104	
Carbonate	BaCO <sub>3</sub>	white	$2.2 \times 10^{-3}$	acids
Chlorate	Ba(ClO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O	white	35.7	
Chloride	BaCl <sub>2</sub> ·2H <sub>2</sub> O	white	42	
Chromate	BaCrO <sub>4</sub>	yellow	$3.4 \times 10^{-4}$	HCl, HNO <sub>3</sub>
Cyanide	Ba(CN) <sub>2</sub>	white	80	
Ferricyanide	Ba <sub>3</sub> Fe(CN) <sub>6</sub> ·20H <sub>2</sub> O		sol.	
Ferrocyanide	Ba <sub>2</sub> Fe(CN) <sub>6</sub> ·6H <sub>2</sub> O	yellow	0.17	
Fluoride	BaF <sub>2</sub>	white	0.16	
Fluosilicate	BaSiF <sub>6</sub>		0.03	HCl
Hydroxide	Ba(OH) <sub>2</sub> ·8H <sub>2</sub> O	white	8.1	
Iodide	BaI <sub>2</sub> ·2H <sub>2</sub> O	white	222	
Nitrate	Ba(NO <sub>3</sub> ) <sub>2</sub>	white	9.4	
Nitrate	Ba(NO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O	yel.-white	72	
Oxalate	BaC <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	white	$2.4 \times 10^{-3}$	HCl, HNO <sub>3</sub>
Oxide	BaO	white	3.5	
Oxide (per)	BaO <sub>2</sub>	white	insol.	HCl, HNO <sub>3</sub>
Phosphate	Ba <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	HCl, HNO <sub>3</sub>
Silicate	BaSiO <sub>3</sub>	white	insol.	HCl, HNO <sub>3</sub>
Sulfate	BaSO <sub>4</sub>	white	$2.5 \times 10^{-4}$	
Sulfide	BaS	yellow	hydr.	
Sulfite	BaSO <sub>3</sub>	white	0.02	HCl
Tartrate	BaC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	0.026	HCl
Thiocyanate	Ba(SCN) <sub>2</sub> ·2H <sub>2</sub> O	white	very sol.	
Thiosulfate	BaS <sub>2</sub> O <sub>3</sub> ·H <sub>2</sub> O	white	slightly sol.	HCl

STRONTIUM

Strontium	Sr	silvery	insol.	acids
Acetate	Sr(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	white	42.9	
Arsenate (ortho)	Sr <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub>	white	insol.	HCl, HNO <sub>3</sub>
Arsenite	Sr <sub>3</sub> (AsO <sub>3</sub> ) <sub>2</sub>	white	sol.	

## STRONTIUM (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Borate	Sr(BO <sub>3</sub> ) <sub>2</sub> ·5H <sub>2</sub> O	white	0.23	HCl
Bromide	SrBr <sub>2</sub>	white	104	
Carbonate	SrCO <sub>3</sub>	white	1 × 10 <sup>-3</sup>	acids
Chlorate	Sr(ClO <sub>3</sub> ) <sub>2</sub> ·5H <sub>2</sub> O	white	234	
Chloride	SrCl <sub>2</sub> ·6H <sub>2</sub> O	white	89	
Chromate	SrCrO <sub>4</sub>	yellow	0.12	acids
Cyanide	Sr(CN) <sub>2</sub> ·4H <sub>2</sub> O	white	sol.	
Ferrocyanide	Sr <sub>2</sub> Fe(CN) <sub>6</sub> ·15H <sub>2</sub> O	yellow	50	
Fluoride	SrF <sub>2</sub>	white	0.012	HCl
Fluosilicate	SrSiF <sub>6</sub> ·2H <sub>2</sub> O		3.2	HCl
Hydroxide	Sr(OH) <sub>2</sub> ·8H <sub>2</sub> O	white	1.74	acids
Iodide	SrI <sub>2</sub> ·6H <sub>2</sub> O	white	238	
Nitrate	Sr(NO <sub>3</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	white	106	
Nitrate	Sr(NO <sub>3</sub> ) <sub>2</sub>	white	79.3	
Nitrite	Sr(NO <sub>2</sub> ) <sub>2</sub>	white	75.5	
Oxalate	SrC <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	white	5.6 × 10 <sup>-3</sup>	acids
Oxide	SrO	white	0.88	acids
Phosphate	Sr <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	insol.	acids
Silicate	SrSiO <sub>3</sub> ·H <sub>2</sub> O	white	insol.	
Sulfate	SrSO <sub>4</sub>	white	0.011	
Sulfide	SrS	gray	hydr.	acids
Sulfite	SrSO <sub>3</sub>	white	3.3 × 10 <sup>-3</sup>	acids
Tartrate	SrC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	white	slightly sol.	acids
Thiocyanate	Sr(SCN) <sub>2</sub> ·3H <sub>2</sub> O		very sol.	
Thiosulfate	SrS <sub>2</sub> O <sub>3</sub> ·5H <sub>2</sub> O	white	30	

## CALCIUM

Calcium	Ca	silvery	decomp.	acids
Acetate	Ca(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·2H <sub>2</sub> O	white	34.7	
Arsenate	Ca <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·3H <sub>2</sub> O	white	insol.	acids
Arsenite (meta)	Ca(AsO <sub>2</sub> ) <sub>2</sub>	white	slightly sol.	acids
Borate (meta)	Ca(BO <sub>3</sub> ) <sub>2</sub> ·2H <sub>2</sub> O	white	0.2	acids
Bromide	CaBr <sub>2</sub> ·6H <sub>2</sub> O	white	219	
Carbonate	CaCO <sub>3</sub>	white	1.2 × 10 <sup>-3</sup>	acids
Chlorate	Ca(ClO <sub>3</sub> ) <sub>2</sub>	white	178	
Chloride	CaCl <sub>2</sub>	white	82	
Chloride hexahydrate	CaCl <sub>2</sub> ·6H <sub>2</sub> O	white	165	
Chromate	CaCrO <sub>4</sub>	yellow	18.6	
Cyanide	Ca(CN) <sub>2</sub>	white	sol.	
Ferricyanide	Ca <sub>3</sub> [Fe(CN) <sub>6</sub> ] <sub>2</sub> ·12H <sub>2</sub> O	red	very sol.	
Ferrocyanide	Ca <sub>2</sub> Fe(CN) <sub>6</sub> ·12H <sub>2</sub> O	yellow	89	
Fluoride	CaF <sub>2</sub>	white	1.6 × 10 <sup>-3</sup>	
Fluosilicate	CaSiF <sub>6</sub> ·2H <sub>2</sub> O		slightly sol.	
Hydroxide	Ca(OH) <sub>2</sub>	white	0.17	acids
Iodide	CaI <sub>2</sub>	white	204	
Nitrate	Ca(NO <sub>3</sub> ) <sub>2</sub>	white	130	
Nitrite	Ca(NO <sub>2</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	white	119	
Oxalate	CaC <sub>2</sub> O <sub>4</sub>	white	7 × 10 <sup>-4</sup>	acids
Oxide	CaO	white	reacts	acids
Phosphate	Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	white	0.02	acids
Silicate	CaSiO <sub>3</sub>	white	1 × 10 <sup>-3</sup>	HCl
Sulfate	CaSO <sub>4</sub>	white	0.21	
Sulfide	CaS	white	hydr.	acids
Sulfite	CaSO <sub>3</sub> ·2H <sub>2</sub> O	white	4.3 × 10 <sup>-3</sup>	acids
Tartrate	CaC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	white	0.016	acids
Thiocyanate	Ca(SCN) <sub>2</sub> ·3H <sub>2</sub> O	white	very sol.	
Thiosulfate	CaS <sub>2</sub> O <sub>3</sub> ·6H <sub>2</sub> O	white	90	



MAGNESIUM

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Magnesium	Mg	silvery	insol.	acids
Acetate	Mg(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	white	very sol.	
Arsenate	Mg <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub>	white	insol.	acids
Arsenite	Mg <sub>3</sub> (AsO <sub>3</sub> ) <sub>2</sub>	white	sol.	
Borate (meta)	Mg(BO <sub>2</sub> ) <sub>2</sub> ·8H <sub>2</sub> O	white	insol.	acids
Bromide	MgBr <sub>2</sub> ·6H <sub>2</sub> O	white	357	
Carbonate	MgCO <sub>3</sub>	white	0.09	acids, NH <sub>4</sub> Cl
Chlorate	Mg(ClO <sub>3</sub> ) <sub>2</sub>		128	
Chromate	MgCrO <sub>4</sub> ·7H <sub>2</sub> O	yellow	211.5	
Ferrocyanide	Mg <sub>2</sub> Fe(CN) <sub>6</sub> ·6H <sub>2</sub> O	yellow	33	
Fluoride	MgF <sub>2</sub>	white	8.7 × 10 <sup>-2</sup>	HNO <sub>3</sub>
Fluorosilicate	MgSiF <sub>6</sub> ·6H <sub>2</sub> O		0.064	
Hydroxide	Mg(OH) <sub>2</sub>	white	9 × 10 <sup>-4</sup>	acids
Iodide	MgI <sub>2</sub> ·8H <sub>2</sub> O	white	212	
Nitrate	Mg(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	white	128	
Oxalate	MgC <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	white	0.07	acids
Oxide	MgO	white	6 × 10 <sup>-4</sup>	acids
Phosphate	Mg <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	white	0.02	acids
(Ammonium) phosphate	MgNH <sub>4</sub> PO <sub>4</sub>	white	insol.	acids
Silicate	MgSiO <sub>3</sub>	white	insol.	
Sulfate	MgSO <sub>4</sub> ·7H <sub>2</sub> O	white	71	
Sulfide	MgS	gray	hydr.	acids
Sulfite	MgSO <sub>3</sub> ·6H <sub>2</sub> O	white	1.25	acids
Tartrate	MgC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	white	0.8	acids
Thiocyanate	Mg(SCN) <sub>2</sub> ·4H <sub>2</sub> O	white	very sol.	
Thio sulfate	MgS <sub>2</sub> O <sub>3</sub> ·6H <sub>2</sub> O	white	very sol.	

SODIUM

Sodium	Na	silvery	reacts	
Acetate	NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	white	124	
Arsenate (ortho)	Na <sub>2</sub> AsO <sub>4</sub> ·12H <sub>2</sub> O	white	26.7	
Arsenate (acid)	Na <sub>2</sub> HAsO <sub>4</sub> ·12H <sub>2</sub> O	white	56	
Arsenite (acid)	Na <sub>2</sub> HAsO <sub>3</sub>	white	very so	
Borate (meta)	NaBO <sub>2</sub>	white	sol.	
Borate (tetra)	Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·10H <sub>2</sub> O	white	7.9	
Carbonate	Na <sub>2</sub> CO <sub>3</sub>	white	21.4	
Carbonate (bi)	NaHCO <sub>3</sub>	white	9.6	
Chlorate	NaClO <sub>3</sub>	white	99	
Chloride	NaCl	white	36	
Chromate	Na <sub>2</sub> CrO <sub>4</sub>	yellow	82	
Cyanide	NaCN	white	sol.	
Ferricyanide	Na <sub>3</sub> Fe(CN) <sub>6</sub> ·H <sub>2</sub> O	red	19	
Ferrocyanide	Na <sub>4</sub> Fe(CN) <sub>6</sub> ·10H <sub>2</sub> O	yellow	30	
Fluoride	NaF	white	4.2	
Fluorosilicate	Na <sub>2</sub> SiF <sub>6</sub>	white	0.65	
Hydroxide	NaOH	white	109	
Iodide	NaI	white	179	
Manganate	Na <sub>2</sub> MnO <sub>4</sub>	green	very sol.	
Nitrate	NaNO <sub>3</sub>	white	88	
Nitrite	NaNO <sub>2</sub>	yellow	84	
Oxalate	Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	white	3.7	
Permanganate	NaMnO <sub>4</sub> ·3H <sub>2</sub> O	purple	very sol.	
Phosphate (ortho)	Na <sub>3</sub> PO <sub>4</sub> ·12H <sub>2</sub> O	white	28.3	
Phosphate (acid)	Na <sub>2</sub> HPO <sub>4</sub> ·12H <sub>2</sub> O	white	19.7	
Phosphate (acid)	NaH <sub>2</sub> PO <sub>4</sub> ·12H <sub>2</sub> O	white	98	
Silicate	Na <sub>2</sub> SiO <sub>3</sub>	white	sol.	

## SODIUM (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Sulfate.....	Na <sub>2</sub> SO <sub>4</sub>	white	19.5	
Sulfate (bi).....	NaHSO <sub>4</sub>	white	sol.	
Sulfide.....	Na <sub>2</sub> S·9H <sub>2</sub> O	white	56	
Sulfite.....	Na <sub>2</sub> SO <sub>3</sub>	white	25.3	
Tartrate.....	Na <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·2H <sub>2</sub> O	white	50	
Thiocyanate.....	NaSCN	white	very sol.	
Thiosulfate.....	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ·5H <sub>2</sub> O	white	110	

## POTASSIUM

Potassium.....	K	silvery	reacts	
Acetate.....	KC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	white	256	
Arsenate (ortho).....	K <sub>2</sub> AsO <sub>4</sub>	white	19	
Arsenate (acid).....	K <sub>2</sub> HAsO <sub>4</sub>	white	sol.	
Arsenate (acid).....	KH <sub>2</sub> AsO <sub>4</sub>	white	sol.	
Arsenite (meta).....	KAsO <sub>3</sub>	white	sol.	
Borate (tetra).....	K <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·5H <sub>2</sub> O	white	26.7	
Bromide.....	KBr	white	64.5	
Carbonate.....	K <sub>2</sub> CO <sub>3</sub>	white	112	
Chlorate.....	KClO <sub>3</sub>	white	7.3	
Chloride.....	KCl	white	34.7	
Chromate.....	K <sub>2</sub> CrO <sub>4</sub>	yellow	62.9	
Cyanide.....	KCN	white	72	
Dichromate.....	K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	red-orange	11.5	
Ferricyanide.....	K <sub>3</sub> Fe(CN) <sub>6</sub>	red	44	
Ferrocyanide.....	K <sub>4</sub> Fe(CN) <sub>6</sub> ·3H <sub>2</sub> O	yellow	31	
Fluoride.....	KF	white	92.3	
Fluosalicate.....	K <sub>2</sub> SrF <sub>6</sub>	white	0.12	
Hydroxide.....	KOH	white	112	
Iodide.....	KI	white	144	
Nitrate.....	KNO <sub>3</sub>	white	81.2	
Nitrite.....	KNO <sub>2</sub>	yellow	302	
Oxalate.....	K <sub>2</sub> C <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	white	33	
Permanganate.....	KMnO <sub>4</sub>	purple	6.4	
Phosphate (ortho).....	K <sub>3</sub> PO <sub>4</sub>	white	sol.	
Phosphate (acid).....	K <sub>2</sub> HPO <sub>4</sub>	white	very sol.	
Phosphate (acid).....	KH <sub>2</sub> PO <sub>4</sub>	white	30	
Silicate.....	K <sub>2</sub> SiO <sub>3</sub>	white	sol.	
Sulfate.....	K <sub>2</sub> SO <sub>4</sub>	white	10.9	
Sulfide.....	K <sub>2</sub> S	yellow-brown	sol.	
Sulfite.....	K <sub>2</sub> SO <sub>3</sub> ·2H <sub>2</sub> O	white	100	
Tartrate.....	2K <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·H <sub>2</sub> O	white	133	
Tartrate (bi).....	KHC <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	0.57	
Thiocyanate.....	KSCN	white	216	
Thiosulfate.....	K <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ·2H <sub>2</sub> O	white	184	

## AMMONIUM

Ammonia.....	NH <sub>3</sub>	colorless gas	very sol.	
Acetate.....	NH <sub>4</sub> C <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	white	very sol.	
Arsenate (ortho).....	(NH <sub>4</sub> ) <sub>2</sub> AsO <sub>4</sub> ·3H <sub>2</sub> O	white	sol.	
Arsenate (acid).....	(NH <sub>4</sub> ) <sub>2</sub> HAsO <sub>4</sub>	white	sol.	
Arsenite (meta).....	NH <sub>4</sub> AsO <sub>3</sub>	white	very sol.	
Borate (tetra).....	(NH <sub>4</sub> ) <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·4H <sub>2</sub> O	white	8.3	
Bromide.....	NH <sub>4</sub> Br	white	76	
Carbonate.....	(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> ·H <sub>2</sub> O	white	100	
Chloride.....	NH <sub>4</sub> Cl	white	37.3	
Chromate.....	(NH <sub>4</sub> ) <sub>2</sub> CrO <sub>4</sub>	yellow	40	
Cyanide.....	NH <sub>4</sub> CN	white	very sol.	

## AMMONIUM (Continued)

Name	Formula	Color	Solubility in H <sub>2</sub> O (g per 100 ml H <sub>2</sub> O)	Soluble in
Ferricyanide	(NH <sub>4</sub> ) <sub>3</sub> Fe(CN) <sub>6</sub>	red	very sol.	
Ferrocyanide	(NH <sub>4</sub> ) <sub>2</sub> Fe(CN) <sub>6</sub>	yellow	very sol.	
Fluoride	NH <sub>4</sub> F	white	very sol.	
Fluorilicate	(NH <sub>4</sub> ) <sub>2</sub> SiF <sub>6</sub>	white	19	
Iodide	NH <sub>4</sub> I	white	170	
Nitrate	NH <sub>4</sub> NO <sub>3</sub>	white	188	
Nitrite	NH <sub>4</sub> NO <sub>2</sub>	white	very sol.	
Oxalate	(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub> ·H <sub>2</sub> O	white	5.1	
Phosphate (acid)	(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub>	white	59	
Phosphate (acid)	NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>	white	37	
Sulfate	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	white	75.4	
Sulfite	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>3</sub> ·H <sub>2</sub> O	white	sol.	
Tartrate	(NH <sub>4</sub> ) <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	white	sol.	
Thiocyanate	NH <sub>4</sub> SCN	white	162	
Thiosulfate	(NH <sub>4</sub> ) <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	white	very sol.	

## ภาคผนวกที่ 5 แสดงสีของสารประกอบอนินทรีย์ชนิดต่าง ๆ

**Black:** CuO, NiO, SnO, MnO<sub>2</sub>, FeO, Fe<sub>3</sub>O<sub>4</sub>, FeS, CuS, Cu<sub>2</sub>S, HgS, Hg<sub>2</sub>S, Ag<sub>2</sub>S, PbS, NiS, CoS, finely divided metals, CuBr<sub>2</sub>, Co(OH)<sub>2</sub>, NiI<sub>2</sub>, BiI<sub>3</sub>, Cu(SCN)<sub>2</sub>

**Brown:** CdO, PbO<sub>2</sub>, Bi<sub>2</sub>O<sub>3</sub>, SnS, Bi<sub>2</sub>S<sub>3</sub>, ferric ion, Fe<sub>2</sub>(CrO<sub>4</sub>)<sub>3</sub>, CuCrO<sub>4</sub>, SnCrO<sub>4</sub>, Al<sub>4</sub>[Fe(CN)<sub>6</sub>]<sub>3</sub>, Hg<sub>2</sub>Fe(CN)<sub>6</sub>, MnCO<sub>3</sub>, Mn<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>, TiFe(CN)<sub>6</sub>

**Blue:** Some anhydrous cobaltous salts, some hydrated cupric salts, Fe<sub>4</sub>[Fe(CN)<sub>6</sub>]<sub>3</sub>, Fe<sub>3</sub>[Fe(CN)<sub>6</sub>]<sub>2</sub>, [Cu(NH<sub>3</sub>)<sub>4</sub>]<sup>2+</sup>, [Ni(NH<sub>3</sub>)<sub>6</sub>]<sup>2+</sup>, [Co(SCN)<sub>4</sub>]<sup>2-</sup>

**Green:** Some hydrated nickel salts, hydrated ferrous salts, Cr<sup>3+</sup>, MnO<sub>4</sub><sup>2-</sup>, Cu(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>2</sub>, Cu<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>, CuCl<sub>2</sub>, MnO

**Yellow:** Bi<sub>2</sub>O<sub>3</sub>, HgO, PbO, CdS, SnS<sub>2</sub>, As<sub>2</sub>S<sub>3</sub>, As<sub>2</sub>S<sub>5</sub>, CrO<sub>4</sub><sup>2-</sup>, [Fe(CN)<sub>6</sub>]<sup>4-</sup>, Fe<sup>3+</sup>, S, AgI, AlI<sub>3</sub>, K<sub>2</sub>Co(NO<sub>2</sub>)<sub>6</sub>, PbI<sub>2</sub>, Hg<sub>2</sub>(AsO<sub>4</sub>)<sub>2</sub>, Hg<sub>2</sub>F<sub>2</sub>, Hg<sub>2</sub>I<sub>2</sub>, Hg(NO<sub>2</sub>)<sub>2</sub>, Ag<sub>2</sub>AsO<sub>4</sub>, AgBr, Ag<sub>2</sub>CO<sub>3</sub>, AgF, Ag<sub>3</sub>PO<sub>4</sub>

**Red:** Fe<sub>2</sub>O<sub>3</sub>, Cu<sub>2</sub>O, HgO, Pb<sub>3</sub>O<sub>4</sub>, Sb<sub>2</sub>S<sub>3</sub>, HgI<sub>2</sub>, AsI<sub>3</sub>, BiOI, SbI<sub>3</sub>, SnI<sub>2</sub>, [Fe(CN)<sub>6</sub>]<sup>3-</sup>, [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>, Ag<sub>2</sub>CrO<sub>4</sub>, (Hg<sub>2</sub>)<sub>2</sub>(AsO<sub>4</sub>)<sub>2</sub>, Ag<sub>2</sub>AsO<sub>4</sub>, Fe(SCN)<sub>3</sub>, Hg<sub>2</sub>CrO<sub>4</sub>, Cu<sub>2</sub>F<sub>2</sub>, Ni(ClO<sub>3</sub>)<sub>2</sub>, Ni dimethylglyoximate

**Orange:** Sb<sub>2</sub>S<sub>5</sub>, Ag<sub>2</sub>Fe(CN)<sub>6</sub>, Bi<sub>2</sub>(CrO<sub>4</sub>)<sub>3</sub>, SnI<sub>4</sub>, Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup>

**Pink:** Mn<sup>2+</sup>, hydrated cobaltous salts, Cu<sub>2</sub>Fe(CN)<sub>6</sub>

**Purple:** Cr<sup>6+</sup>, MnO<sub>4</sub><sup>-</sup>

## ภาคผนวกที่ 6

## LOGARITHMS

Logarithms	Exponent
$\log 1 = 0$	$10^0 = 1$
$\log 10 = 1$	$10^1 = 10$
$\log 100 = 2$	$10^2 = 100$
$\log 10^{-1} = -1$	$10^{-1} = 0.1$
$\log 10^{-2} = -2$	$10^{-2} = 0.01$
$\log AB = \log A + \log B$	$10^A \times 10^B = 10^{A+B}$
$\log (A/B) = \log A - \log B$	$10^A / 10^B = 10^{A-B}$

ถ้า  $x = 10^y$  จะได้  $\log x = y$

$$\log A^n = n \log A$$

$$\ln x = 2.303 \log x$$

ภาคผนวกที่ 7 Logarithms of Numbers

N	0	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0775
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4606
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396

ภาคผนวก

N	0	1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9690
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996

## ภาคผนวกที่ 8 หน้าหนักอะตอมของธาตุชนิดต่าง ๆ

Element	Symbol	Atomic number	Atomic mass	Element	Symbol	Atomic number	Atomic mass
Actinium	Ac	89	227.027 8*	Neon	Ne	10	20.179 7
Aluminum	Al	13	26.981 539	Neptunium	Np	93	237.048 2
Americium	Am	95	243.061 4*	Nickel	Ni	28	58.6934
Antimony	Sb	51	121.757	Niobium	Nb	41	92.906 38
Argon	Ar	18	39.948	Nitrogen	N	7	14.006 74
Arsenic	As	33	74.921 59	Nobelium	No	102	259.100 9*
Astatine	At	85	209.987 1*	Osmium	Os	76	190.2
Barium	Ba	56	137.327	Oxygen	O	8	15.999 4
Berkelium	Bk	97	247.070 3*	Palladium	Pd	46	106.42
Beryllium	Be	4	9.012 182	Phosphorus	P	15	30.973 762
Bismuth	Bi	83	208.980 37	Platinum	Pt	78	195.08
Boron	B	5	10.811	Plutonium	Pu	94	244.064 2*
Bromine	Br	35	79.904	Polonium	Po	84	209.982 4*
Cadmium	Cd	48	112.411	Potassium	K	19	39.098 3
Calcium	Ca	20	40.078	Praseodymium	Pr	59	140.907 65
Californium	Cf	98	251.079 6*	Promethium	Pm	61	144.912 8*
Carbon	C	6	12.011	Protactinium	Pa	91	231.036 88
Cerium	Ce	58	140.115	Radium	Ra	88	226.025 4
Cesium	Cs	55	132.905 43	Radon	Rn	86	222.017 6*
Chlorine	Cl	17	35.452 7	Rhenium	Re	75	186.207
Chromium	Cr	24	51.996 1	Rhodium	Rh	45	102.905 50
Cobalt	Co	27	58.933 20	Rubidium	Rb	37	85.467 8
Copper	Cu	29	63.546	Ruthenium	Ru	44	101.07
Curium	Cm	96	247.070 3*	Samarium	Sm	62	150.36
Dysprosium	Dy	66	162.50	Scandium	Sc	21	44.955 910
Einsteinium	Es	99	252.082 8*	Selenium	Se	34	78.96
Erbium	Er	68	167.26	Silicon	Si	14	28.085 5
Europium	Eu	63	151.965	Silver	Ag	47	107.868 2
Fermium	Fm	100	257.085 1*	Sodium	Na	11	22.989 768
Fluorine	F	9	18.998 403 2	Strontium	Sr	38	87.62
Francium	Fr	87	223.019 7*	Sulfur	S	16	32.066
Gadolinium	Gd	64	157.25	Tantalum	Ta	73	180.947 9
Gallium	Ga	31	69.723	Technetium	Tc	43	97.907 2*
Germanium	Ge	32	72.61	Tellurium	Te	52	127.60
Gold	Au	79	196.966 54	Terbium	Tb	65	158.925 34
Hafnium	Hf	72	178.49	Thallium	Tl	81	204.383 3
Helium	He	2	4.002 602	Thorium	Th	90	232.038 1
Holmium	Ho	67	164.930 32	Thulium	Tm	69	168.934 21
Hydrogen	H	1	1.007 94	Tin	Sn	50	118.710
Indium	In	49	114.82	Titanium	Ti	22	47.88
Iodine	I	53	126.904 47	Tungsten	W	74	183.85
Iridium	Ir	77	192.22	Unilennium†	Ule	109	266*
Iron	Fe	26	55.847	Unilhexium†	Ulh	106	263*
Krypton	Kr	36	83.80	Uniloctium†	Ulo	108	265*
Lanthanum	La	57	138.905 5	Unilpentium†	Unp	105	262*
Lawrencium	Lr	103	260.105 4*	Unilquadium†	Unq	104	261*
Lead	Pb	82	207.2	Unilseptium†	Uls	107	263*
Lithium	Li	3	6.941	Uranium	U	92	238.028 9
Lutetium	Lu	71	174.967	Vanadium	V	23	50.941 5
Magnesium	Mg	12	24.305 0	Xenon	Xe	54	131.29
Manganese	Mn	25	54.938 05	Ytterbium	Yb	70	173.04
Mendelevium	Md	101	258.098 6*	Yttrium	Y	39	88.906 85
Mercury	Hg	80	200.59	Zinc	Zn	30	65.39
Molybdenum	Mo	42	95.94	Zirconium	Zr	40	91.224
Neodymium	Nd	60	144.24				

\*The mass of the isotope with the longest known half-life.

†Names for elements 104-109 have been approved for temporary use by the IUPAC. The USSR has proposed Kurchatovium (Ku) for element 104, and Bohrium (Bh) for element 106. The United States has proposed Rutherfordium (Rf) for element 104, and Hahnium (Ha) for element 106.

ภาคผนวก

ภาคผนวกที่ 9 ความดันไอน้ำที่อุณหภูมิต่าง ๆ (mm Hg)											
T °C	P	T °C	P	T °C	P	T °C	P	T °C	P	T °C	P
-10	2.1	11	9.8	32	35.7	53	107.2	74	277.2	95	633.9
-9	2.3	12	10.5	33	37.7	54	112.5	75	289.1	96	657.6
-8	2.5	13	11.2	34	39.9	55	118.0	76	301.4	97	682.1
-7	2.7	14	12.0	35	42.2	56	123.8	77	314.1	98	707.3
-6	2.9	15	12.8	36	44.6	57	129.8	78	327.3	99	733.2
-5	3.2	16	13.6	37	47.1	58	136.1	79	341.0	100	760.0
-4	3.4	17	14.5	38	49.7	59	142.6	80	355.1		
-3	3.7	18	15.5	39	52.4	60	149.4	81	369.7	102	815.9
-2	4.0	19	16.5	40	55.3	61	156.4	82	384.9		
-1	4.3	20	17.5	41	58.3	62	163.8	83	400.6	104	875.1
0	4.6	21	18.7	42	61.5	63	171.4	84	416.8		
1	4.9	22	19.8	43	64.8	64	179.3	85	433.6	106	937.9
2	5.3	23	21.1	44	68.3	65	187.5	86	450.9		
3	5.7	24	22.4	45	71.9	66	196.1	87	468.7	108	1004
4	6.1	25	23.8	46	75.7	67	205.0	88	487.1		
5	6.5	26	25.2	47	79.6	68	214.2	89	506.1	110	1075
6	7.0	27	26.7	48	83.7	69	223.7	90	525.8		
7	7.5	28	28.3	49	88.0	70	233.7	91	546.1	112	1149
8	8.0	29	30.0	50	92.5	71	243.9	92	567.0		
9	8.6	30	31.8	51	97.2	72	254.6	93	588.6	114	1227
10	9.2	31	33.7	52	102.1	73	265.7	94	610.9		