SYMBOLS AND CHARGES

CATIONS

Aluminum	Al^{+3}	Iron	Fe^{+2}, Fe^{+3}
Ammonium	NH_4^{+1}	Lead	Pb^{+2}, Pb^{+4}
Antimony	Sb^{+3}, Sb^{+5}	Lithium	Li^{+1}
Arsenic	As^{+3}, As^{+5}	Magnesium	Mg^{+2}
Barium	Ba^{+2}	Manganese	Mn^{+2}, Mn^{+4}
Bismuth	Bi^{+3}	Mercury	Hg_2^{+2}, Hg^{+2}
Cadmium	Cd^{+2}	Nickel	Ni^{+2}
Calcium	Ca^{+2}	Potassium	K^{+1}
Chromium	Cr^{+3}	Silver	Ag^{+1}
Cobalt	Co^{+2}, Co^{+3}	Sodium	Na^{+1}
Copper	Cu^{+1}, Cu^{+2}	Strontium	Sr^{+2}
Gold	Au^{+3}	Tin	Sn^{+2}, Sn^{+4}
Hydrogen	H^{+1}	Zinc	Zn^{+2}

ANIONS

Acetate	$C_2H_3O_2^{-1}$, CH_3COO^{-1}	Fluoride	F^{-1}
Amide	NH_2^{-1}	Hydroxide	OH^{-1}
Arsenate	AsO_4^{-3}	Iodide	I^{-1}
Arsenite	AsO_3^{-3}	Molybdate	MoO_4^{-2}
Bismuthate	BiO_3^{-1}	Nitrate	NO_3^{-1}
Borate	BO_2^{-1}, BO_3^{-3}	Oxalate	$C_2O_4^{-2}$
Bromide	Br^{-1}	Oxide	O^{-2}
Carbonate	CO_3^{-2}	Permanganate	MnO_4^{-1}
Chlorate	ClO_3^{-1}	Peroxide	O_2^{-2}
Chloride	Cl^{-1}	Peroxydisulfate	$S_2O_8^{-2}$
Chromate	CrO_4^{-2}	Phosphate	PO_4^{-3}
Cyanate	CNO^{-1}	Sulfate	SO_4^{-2}
Cyanide	CN^{-1}	Sulfide	S^{-2}
Dichromate	$Cr_2O_7^{-2}$	Thiocyanate	SCN^{-1}
Ferricyanide	$[Fe(CN)_6]^{-3}$	Thiosulfate	$S_2O_3^{-2}$
Ferrocyanide	$[Fe(CN)_6]^{-4}$		

Latin Names of Elements and Their Symbols

antimony	stibium	copper (Cu)	cuprum	gold	aurum
iron (Fe)	ferrum	lead (Pb)	plumbum	mercury (Hg)	hydrargyrum
potassium (K)	kalium	silver (Ag)	argentum	sodium (Na)	naturium
tin (Sn)	stannum				

NOMENCLATURE

Suffixes and Prefixes

-ide single element with a negative charge (exception hydroxide OH^{-1} and cyanide CN^{-1}).

-ate normal number of oxygens in the oxyanion (memorize for each radical. e.g. ClO_3^{-1} chlorate).

-ite one less oxygen than normal with same charge as normal (e.g. ClO_2^{-1} chlorite).

hypo--ite 2 less oxygens than normal with same charge as normal (e.g. ClO^{-1} hypochlorite).

per--ate one more oxygen than normal with same charge as normal (e.g. ClO_4^{-1} perchlorate).

thio- sulfur has replaced an oxygen (e.g. SO_4^{-2} sulfate $S_2O_3^{-2}$ thiosulfate).

Families or groups tend to exhibit the same chemistry so there will be similarities for formulas and names (e.g. ClO_3^{-1} is chlorate, BrO_3^{-1} is bromate).

Naming Rules

1. Name the positive ions first.

2. Include enough information to make the name unique for the given compound.

3. Write oxidation states in Roman numerals in parentheses after the ion it goes with or use prefixes to denote number of atoms (e.g. SnO_2 is tin dioxide or tin (IV) oxide but not simply tin oxide because SnO also exists).

Prefixes Used in Naming

1	mono	6	hexa
2	di	7	hepta
3	tri	8	octa
4	tetra	9	nona
5	penta	10	deca

Naming Acids

Acid names are derived from the name of the anion (negatively charged ion) according to the rules given below. The name thus derived is followed by the word "acid".

1. Binary acids (hydrogen plus one other element) - change the **-ide** suffix to **-ic**, add the prefix **hydro-**. HCl is **hydro**chloric **acid** (based on chlor**ide**).

2. Acids of oxyanions:

   a. Change **-ate** to **-ic**, retain any prefixes. HNO_3 is nitr**ic acid** (based on nitr**ate**). $HClO_4$ is **per**chlor**ic acid** (based on **per**chlor**ate**).

   b. Change **-ite** to **-ous**, retain any prefixes. H_2SO_3 is sulfur**ous acid** (based on sulf**ite**). HClO is **hypo**chlor**ous** acid (based on **hypo**chlor**ite**).

Naming Complex Ions

1. Change anion ligand names to end in -o (e.g. Cl^{-1} = chloro, CN^{-1} = cyano). Neutral ligands have their usual name - exceptions NH_3 = ammine (note spelling), CO = carbonyl, H_2O = aqua.

2. Use standard prefixes to denote number ligands present, except when the ligand name contains a number prefix (ethylenediamine) where you use parentheses around the ligand and modified prefixes: bis (2), tris (3), tetrakis (4), etc.

3. For compounds involving complex ions, still name the cation first then the anion. Use brackets to denote inner sphere (the complex and ligands, the counter ions are outside the brackets.

4. Names for the complex are one word - ligands first in alphabetical order ignoring the prefix, then the metal - no spaces.

   a. positive ions use the English name for the metal followed by the charge *on the metal* denoted as Roman numerals, e.g. $[Ag(NH_3)_2]^{+1}$ = diammine**silver** (I).

   b. negative ions add **-ate** ending to the metal name, using the Latin derived name when appropriate, followed by the charge *on the metal* denoted as Roman numerals, e.g. $[Fe(CN)_6]^{-3}$ = hexacyano**ferrate** (III).

Examples:

$[Pt(NH_3)_2Cl_2]$	diamminedichloroplatinum(II)	$[Sn(OH)_6]^{-2}$	hexahydroxostannate(IV)
$K_4[Fe(CN)_6]$	potassium hexacyanoferrate(II)	$[Cu(en)_2]Br_2$	bis(ethylenediamine)copper(II) bromide