Chemical Nomenclature

Naming cations and anions

Positive ions (cations)	Negative ions (anions)
1+	**1-**
ammonium (NH_4^+)	acetate ($C_2H_3O_2^-$)
copper(I) (Cu^+)	azide (N_3^-)
hydrogen (H^+)	chlorate (ClO_3^-)
silver (Ag^+)	cyanide (CN^-)
	dihydrogen phosphate ($H_2PO_4^-$)
2+	hydride (H^-)
cadmium (Cd^{2+})	bicarbonate (HCO_3^-)
cobalt(II) (Co^{2+})	hydroxide (OH^-)
copper(II) (Cu^{2+})	nitrate (NO_3^-)
iron (Fe^{2+})	nitrite (NO_2^-)
lead (Pb^{2+})	perchlorate (ClO_4^-)
manganese(II) (Mn^{2+})	permanganate (MnO_4^-)
mercury(I) (Hg_2^{2+})	thiocyanate(SCN^-)
mercury(II) (Hg^{2+})	
nickel (Ni^{2+})	**2-**
tin (Sn^{2+})	carbonate (CO_3^{2-})
zinc (Zn^{2+})	chromate (CrO_4^{2-})
	dichromate ($Cr_2O_7^{2-}$)
3+	hydrogen phosphate (HPO_4^{2-})
aluminum (Al^{3+})	oxide (O^{2-})
chromium(III) (Cr^{3+})	peroxide (O_2^{2-})
iron(III) (Fe^{3+})	sulfate (SO_4^{2-})
	sulfide (S^{2-})
	sulfite (SO_3^{2-})
	3-
	nitride (N^{3-})
	phosphate (PO_4^{3-})
	phosphide (P^{3-})

Monatomic anions (a single atom with a negative charge) change their ending to "-ide"

Examples:

- O^{2-} = oxide ion
- Cl^- = chloride ion

Oxoanions (negatively charged polyatomic ions which contain O) end in "-ate". However, if there is more than one oxyanion for a specific element then the endings are:

Two less oxygen than the most common starts with "hypo-" and ends with "-ite"	One less oxygen than the most common ends with "-ite"	**THE MOST COMMON OXOANION ENDS WITH "-ATE"**		One more oxygen than the most common starts with "per-" and ends with "-ate"
lO^- = hypochlorite	ClO_2^- = chlorite NO_2^- = nitrite SO_3^{2-} = sulfite	Most common oxyanions with four oxygens SO_4^{2-} = sulfate PO_4^{3-} = phosphate CrO_4^{2-} = chromate	Most common oxyanions with three oxygens NO_3^- = nitrate ClO_3^- = chlorate CO_3^{2-} = carbonate	ClO_4^- = perchlorate

Polyatomic anions (a negatively charged ion containing more than one type of element) often add a hydrogen atom; in this case, the anion's name either adds "hydrogen-" or "bi-" to the beginning

Example:

CO_3^{2-} becomes HCO_3^-

"Carbonate" becomes either "Hydrogen Carbonate" or "Bicarbonate"

Naming Binary Molecular Compounds

Molecular compounds are formed from the covalent bonding between non-metallic elements. The nomenclature for these compounds is described in the following set of rules.

1. The more positive atom is written first (the atom which is the furthest to the left and to the bottom of the periodic table)
2. The more negative second atom has an "-ide" ending.
3. Each prefix indicates the number of each atom present in the compound.

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

Examples:
CO_2 = carbon dioxide
P_4S_{10} = tetraphosphorus decasulfide

Naming Inorganic Acids

1. Binary acids (H plus a nonmetal element) are acids that dissociate into hydrogen atoms and anions in water. Acids that only release one hydrogen atom are known as*monoprotic*. Those acids that release more than one hydrogen atom are called *polyprotic*acids. When naming these binary acids, you merely add "hydro-" (denoting the presence of a hydrogen atom) to the beginning and "-ic acid" to the end of the anion name.

   Examples:
   HCl = hydrochloric acid
   HBr = hydrobromic acid
2. Ternary acids (also called oxoacids, are formed by hydrogen plus another element plus oxygen) are based on the name of the anion. In this case, the *-ate,* and *-ite*suffixes for the anion are replaced with *-ic* and *-ous* respectively. The new anion name is then followed by the word "acid." The chart below depicts the changes in nomenclature.

Anion name	Acid name
hypo___ite	hypo___ous acid
___ite	___ous acid
___ate	___ic acid
per___ate	per___ic acid

3. **Example:**
   ClO_4^- to $HClO_4$ => perchlorate to perchloric acid
   ClO^- to HClO => hypochlorite to hypochlorous acid