## **Naming Binary and Ionic Inorganic Compounds**

1. When writing formulas for binary compounds, elements are arranged in group order, except for H, O, and F. The accepted order by groups and these elements is:

$$1A < 2A < 3A < 4A < 5A < H < 6A < 7A < O < F$$

- 2 Determine whether the compounds is *ionic* or *molecular*.
  - (a) Binary compounds of two nonmetals, two metalloids, or a metalloid and a nonmetal are usually *molecular*.
  - (b) Binary compounds of a metal and a nonmetal are usually ionic.
  - (c) A compound that contains a polyatomic cation or anion and any kind of counter ion (monatomic or polyatomic anion or cation) is *ionic*.
  - (d) Molecular compounds are named from their molecular formulas; ionic compounds are named from their empirical formulas.
- 3. For molecular compounds, name the first element followed by the stem of the second element plus "ide". Use Greek prefixes to indicate numbers of each atom in the molecular formula. (If there is only one of the first element, "mono" is not used.) Examples:
  - $\begin{array}{ll} NO_2 & \text{nitrogen dioxide ("mono" not needed)} \\ N_2O_4 & \text{dinitrogen tetroxide ("a" of "tetra" usually dropped)} \\ SCI_4 & \text{sulfur tetrachloride} \\ H_2S & \text{(di)hydrogen sulfide ("di" not needed, since no other HS compound exists)} \\ H_2O & \text{water (not systematically named)} \\ NH_3 & \text{ammonia (not systematically named)} \\ CH_4 & \text{methane (not systematically named)} \end{array}$
- 4. For ionic compounds, name the first element followed by the stem of the second element plus "ide", but do not use Greek prefixes to indicate numbers of atoms (unless a Greek prefix is a part of a complex ion's name). If a cation might have one of two or more possible charges, the charge is indicated by using a Roman numeral (Stock system). Examples:

LIF	lithium fluoride
BaBr <sub>2</sub>	barium bromide ("di" not used)
NaCN	sodium cyanide (must know CN <sup>-</sup> = cyanide)
$Hg_2Cl_2$	mercury(I) chloride ( $Hg_2^{2+} = mercury(I)$ ion, a diatomic ion)
$NH_4NO_3$	ammonium nitrate
$NH_4NO_2$	ammonium nitrite
FeCl <sub>2</sub>	iron(II) chloride (formerly, ferrous chloride)
FeCl <sub>3</sub>	iron(III) chloride (formerly, ferric chloride)