

# NOMENCLATURE

## Rules for Naming Compounds and Writing Formulas

### I. Binary Compounds (end in -ide)

1. Compounds containing a metal and a nonmetal (ionic compounds)

a. Fixed charge metal - Group 1(IA), 2(IIA), Al, Zn, Ag

Name the metal + base of the nonmetal + -IDE.

Example: Sodium and Bromine - NaBr, Sodium bromide

b. Variable charge metal - Transition metals (B group)

Name the metal + Roman Numeral to indicate the charge  
+ base of the nonmetal + -IDE.

Iron and Chlorine -  $\text{FeCl}_2$ , Iron(II) chloride,  $\text{FeCl}_3$ ,  
Iron(III) chloride

Using the common names for the metal ions, the above examples would be ferrous chloride ( $\text{FeCl}_2$ ) because the iron is in the lower state of +2. The  $\text{FeCl}_3$  would be named ferric chloride because the iron is in the higher oxidation state of +3.

2. Compounds containing only nonmetals (molecular or covalent compounds)

a. Two nonmetals

(Prefix) - Name the first nonmetal + prefix + base of second nonmetal + -IDE. NOTE: Use prefixes to denote the number of atoms of each element. If only one atom of the **FIRST** element is present, do not use the prefix mono-. The order of the elements in the formula is determined by the location of the element on the periodic table.

Example: carbon and oxygen - CO, carbon monoxide; CO<sub>2</sub>, carbon dioxide; phosphorus and oxygen - P<sub>2</sub>O<sub>5</sub>, diphosphorus pentoxide.

## II. Compounds containing polyatomic ions

### 1. Compounds containing a metal and a polyatomic ion

- a. Fixed charge metal - Group 1 (IA), 2 (IIA), Al, Zn, Ag  
Name the metal + name the polyatomic anion.  
Example: calcium and phosphate -  $\text{Ca}_3(\text{PO}_4)_2$ , calcium phosphate
- b. Variable charge metal - Transition metals (B group)  
Name the metal + Roman numeral to indicate the charge + name of the polyatomic anion.  
Example: Copper and sulfate -  $\text{Cu}_2\text{SO}_4$ , copper(I) sulfate,  $\text{CuSO}_4$ , copper(II) sulfate. The common names for these two compounds would be cuprous sulfate ( $\text{Cu}^{+1}$ ) and cupric sulfate ( $\text{Cu}^{+2}$ ).

## 2. Compounds containing two polyatomic ions

NOTE: Ammonium and hydronium are the only positive polyatomic ions we will be using. Of these two, ammonium is the only one found in combination with the polyatomic anions.

a. Name the polyatomic cation ion + name the polyatomic anion

Example: ammonium and carbonate,  $(\text{NH}_4)_2\text{CO}_3$ , ammonium carbonate.

### III. Binary acids

Recognized by a formula starting with H and containing a nonmetal anion.

1. Name as hydro + base of the nonmetal anion + -IC acid.

Example: Hydrogen and bromine, HBr, hydrobromic acid.

NOTE: Water solutions of HF, HCl, HBr, HI, H<sub>2</sub>S, H<sub>2</sub>Te, and H<sub>2</sub>Se are named as acids.

#### IV. Oxy Acids (Acids containing a polyatomic ion)

Recognized by formula starting with H and containing a polyatomic ion.

1. Acid containing the -ITE form of a polyatomic ion.  
Change the -ITE to -OUS and add the word acid.  
Example: hydrogen and nitrite ion -  $\text{HNO}_2$ , nitrous acid.
2. Acid containing the -ATE form of a polyatomic ion.  
Change the -ATE to -IC and add the word acid.  
Example: hydrogen and sulfate ion -  $\text{H}_2\text{SO}_4$ , sulfuric acid.

When writing formulas from the names of compounds, work backwards through these rules for naming compounds.