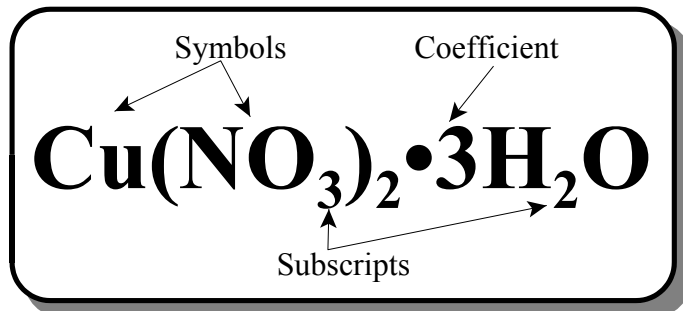


## Interpreting Chemical Formulas

A chemical formula consists of chemical symbols, subscripts, and, in some cases, a coefficient. The chemical symbols show which elements are present in the compound. Subscripts are small numbers written to the lower right of the symbol to which they refer. In the formula to the right, there are three atoms of oxygen in each nitrate ion ( $\text{NO}_3^-$ ) and two atoms of hydrogen in each molecule of water ( $\text{H}_2\text{O}$ ). There is only one atom of copper, but a subscript of one (1) is never written. It is understood. Nitrate is a polyatomic ion. When there is



more than one polyatomic ion, it is enclosed in parentheses, and the subscript is written outside to the lower right referring to everything inside. As a result,  $\text{Cu}(\text{NO}_3)_2$  has two nitrogen and six oxygen atoms. Some materials such as copper II nitrate crystallize in such a way that they are attached to a fixed number of water molecules. These are called hydrated crystals. The number of molecules or formula units is shown by a large number called a coefficient. The coefficient is written to the left of the formula, and multiplies everything to the right of it. This means the formula above has a total of 6 hydrogen atoms. The formulas for the copper II nitrate and the water are separated by a dot. The number of atoms in the formula above is 18, because it shows 1 atom of copper, 2 atoms of nitrogen, 9 atoms of oxygen (6 from the nitrate plus 3 from the water), and 6 atoms of hydrogen.

**For each of the formulas below, determine the number and type of each of the atoms shown, and the total number of atoms.**

### Example

$5(\text{NH}_4)_3\text{PO}_4$  ..... N = 15, H = 60, P = 5, O = 20, TOTAL = 100

1.  $4\text{NaHCO}_3$  .....
2.  $15\text{HCl}$  .....
3.  $3\text{Al}_2\text{O}_3$  .....
4.  $6\text{KNO}_3$  .....
5.  $2\text{N}_2\text{O}_5$  .....
6.  $7\text{Sn}(\text{NO}_2)_4$  .....
7.  $4\text{Mn}_2(\text{Cr}_2\text{O}_7)_7$  .....
8.  $9\text{Na}_2\text{SO}_3$  .....
9.  $8\text{Ba}_3(\text{PO}_4)_2$  .....
10.  $5\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  .....