**Chemical Formulas of Compounds**

* **Formulas give the relative \_\_\_\_\_\_\_\_\_\_\_\_of \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ of each element in a formula unit - always a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio (the law of definite proportions).**

**NO2 2 atoms of O for every 1 atom**

**1 mole of NO2 : 2 moles of O atoms to every 1 mole of N atoms**

* **If we know or can determine the relative number of\_\_\_\_\_\_\_\_\_\_ of each element in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_, we can determine a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the compound.**

**Types of Formulas**

* **Empirical Formula: The formula of a compound that expresses the *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the atoms present.**

**Ionic formulas are always\_\_\_\_\_\_\_\_\_\_\_\_ formulas**

* **Molecular Formula**

**The formula that states the *\_\_\_\_\_\_\_\_* number of each kind of atom found in *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the compound.**

**To obtain an *Empirical Formula***

**1. Determine the \_\_\_\_\_\_ in grams of each \_\_\_\_\_\_\_\_\_\_\_ present, if necessary.**

**2. Calculate the number of *\_\_\_\_\_\_\_* of each element.**

**3. \_\_\_\_\_\_\_\_\_ each by the smallest number of moles to obtain the *\_\_\_\_\_\_\_\_\_\_\_\_ whole number ratio.***

1. **If whole numbers are not obtained\* in step 3), \_\_\_\_\_\_\_\_\_\_\_\_ through by the \_\_\_\_\_\_\_\_\_\_\_\_\_ number that will give all whole numbers**

**Writing an Empirical Formula**

**A sample of a brown gas, a major air pollutant, is found to contain 2.34 g N and 5.34g O. Determine a formula for this substance.**

**Requires *mole* ratios so convert grams to moles**

**moles of N = 2.34g of N = \_\_\_\_\_\_\_\_\_\_moles of N**

**14.01 g/mole**

**moles of O = 5.34 g = \_\_\_\_\_\_\_\_\_\_\_moles of O**

**16.00 g/mole**

**To obtain the simplest ratio, divide both numbers of moles by the smaller number of moles (0.167 mol).**



Formula:

**Molecular Formula**

* **Definition: a chemical formula based on analysis and molecular weight**
* ***What is the molecular formula of a substance that has an empirical formula of AgCO2and a formula mass of 304?***
* **The formula mass of the empirical unit,\_\_\_\_\_\_\_\_\_\_\_\_, is \_\_\_\_\_\_\_\_\_\_. If we divide the formula mass \_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_, we get 2. Therefore, the molecular formula must be \_\_\_\_\_\_\_\_\_\_\_\_ times the empirical formula, or Ag2C2O4.**

**Empirical Formula from % Composition**

**A substance has the following composition by mass: 60.80 % Na; 28.60 % B ;10.60 % H**

**What is the empirical formula of the substance?**

**Consider a sample size of 100 grams. This will contain 28.60 grams of B and 10.60 grams H. Determine the number of moles of each**

**Determine the simplest whole number ratio**