

## **EXTRA PRACTICE: Ch. 11 – The Mole & Chemical Quantities**

Name: \_\_\_\_\_

### **Molar Mass/2-Step MOLE Conversions:**

1. How many moles of water are there if you have  $2.52 \times 10^{25}$  molecules of water?
  
  
  
  
  
  
  
  
  
  
2. How many moles of aluminum sulfite are there in 25.5 grams of aluminum sulfite?
  
  
  
  
  
  
  
  
  
  
3. Calculate the mass in grams for 0.250 moles of sodium chloride.
  
  
  
  
  
  
  
  
  
  
4. Calculate the number of moles in 100. grams of sodium chloride.

### **3-Step MOLE Conversions:**

1. How many grams of calcium nitrate are in  $3.24 \times 10^{23}$  formula units (f.u.) of calcium nitrate?
  
  
  
  
  
  
  
  
  
  
2. How many grams of sulfur dioxide are in  $3.15 \times 10^{23}$  molecules of sulfur dioxide?

3. How many molecules of laughing gas (dinitrogen monoxide) are in  $1.78 \times 10^{23}$  grams of laughing gas?

4. How many grams of pure mercury are in  $2.54 \times 10^{23}$  atoms of mercury?

**Percent (%) Composition:**

1. Determine the percent composition for each of the elements in copper (II) sulfate.

2. What is the percent composition of calcium in the compound calcium phosphide?

3. Determine the percent composition for each of the elements in ammonium hydroxide.

4. Determine the percent composition for each of the elements in carbon tetrachloride.

### **Empirical Formulas (E.F.):**

1. Determine the empirical formula (E.F.) of a compound containing 24.7% potassium, 34.8% manganese, and 40.5% oxygen.
2. Quantitative analysis shows that a compound contains 32.4% Na, 22.7% S, and 45.0% O. Calculate the Empirical Formula (E.F.) of this compound.
3. Determine the empirical formula (E.F.) of a compound containing 67.6% mercury, 10.8% sulfur, and 21.6% oxygen.
4. A very flammable gas contains 60.0% Carbon and 40.0% Hydrogen. Calculate its Empirical Formula (E.F.).

### **Molecular Formulas (M.F.):**

1. The compound methyl butanoate smells like apples. Given its percent composition as 58.8% carbon, 9.80% hydrogen, and 31.4% oxygen and a M.F. molar mass of 102 g/mol, what is the molecular formula (M.F.) for methyl butanoate?

2. Calculate the Molecular Formula of a compound containing 43.6% P and 56.4% O, if the M.F. molar mass is 284 g/mol.
3. The empirical formula of a compound is  $C_3H_7$ , with a M.F. molar mass of 86.0 g/mol. Calculate the Molecular Formula (M.F.).
4. The empirical formula of a compound is CH, with a M.F. molar mass of 26.0 g/mol. Calculate the Molecular Formula (M.F.).

### **Calculating Hydrates:**

1. Hydrated sodium tetraborate, commonly called borax has the general formula  $Na_2B_4O_7 \cdot nH_2O$ . Chemical analysis indicates that this hydrate is 52.8% sodium tetraborate and 47.2% water. Determine the formula and name the hydrate.