

Section 7.4 Complete the following assignment in your class notebook

with the heading: Percent Composition and Empirical/Molecular Formula

KEY

1.) Find the percent composition of plumbic bromide.

$$PbBr_4 \quad 207.2 + 4(79.9) = 526.8g$$

$$\% Pb = \frac{207.2g}{526.8g} \times 100 = \boxed{39.33\%} \quad \% Br = \frac{4(79.9g)}{526.8g} \times 100 = \boxed{60.68\%}$$

2.) Determine the percent composition of calcium nitrate, ...

3.) A compound was analyzed and found to contain 9.8 g of nitrogen, 0.70 g of hydrogen, and 33.6 g of oxygen. What is the empirical formula of the compound?

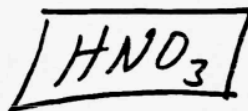
$$9.8g N \times \frac{1mol}{14.01g} = 0.70mol N$$

$$0.70g H \times \frac{1mol}{1.01g} = 0.69mol H$$

$$33.6g O \times \frac{1mol}{16.00g} = 2.10mol O$$

$$\frac{0.70mol N}{0.69mol H} \approx \frac{1mol N}{1mol H}$$

$$\frac{2.10mol O}{0.69mol O} \approx \frac{3mol O}{1mol H}$$



4.) Determine the empirical formula of a compound containing 3.6 g carbon, 0.90 g hydrogen, and 2.4 g oxygen.

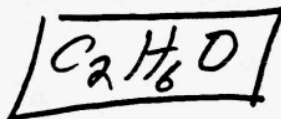
$$3.6g C \times \frac{1mol}{12.01g} = 0.30mol C$$

$$0.90g H \times \frac{1mol}{1.01g} = 0.89mol H$$

$$2.4g O \times \frac{1mol}{16.00g} = 0.15mol O$$

$$\frac{0.30mol C}{0.15mol O} \approx \frac{2mol C}{1mol O}$$

$$\frac{0.89mol H}{0.15mol O} \approx \frac{6mol H}{1mol O}$$



5.) Determine the empirical formula of a compound containing 1.37 g of barium, 0.32 g of sulfur, and 0.64 g oxygen.

6.) A certain sugar has a chemical composition of 40.0% carbon, 6.6% hydrogen, and 53.3% oxygen.

a.) Determine the empirical formula for this sugar.

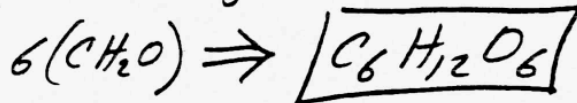
$$\begin{array}{l}
 40.0 \text{ g C} \times \frac{1 \text{ mol}}{12.01 \text{ g}} = 3.33 \text{ mol C} \\
 6.6 \text{ g H} \times \frac{1 \text{ mol}}{1.01 \text{ g}} = 6.5 \text{ mol H} \\
 53.3 \text{ g O} \times \frac{1 \text{ mol}}{16.00 \text{ g}} = 3.33 \text{ mol O}
 \end{array}
 \left. \begin{array}{l}
 \frac{6.5 \text{ mol H}}{3.33 \text{ mol C}} \approx \frac{2 \text{ mol H}}{1 \text{ mol C}} \\
 \frac{3.33 \text{ mol O}}{3.33 \text{ mol C}} \approx \frac{1 \text{ mol O}}{1 \text{ mol C}}
 \end{array} \right\}$$

$$\boxed{\text{CH}_2\text{O}}$$

b.) Determine the molecular formula if its molar mass is found to be 180.0 g.

$$\text{CH}_2\text{O} \quad 12.01 + 2(1.01) + 16.00 = 30.03 \text{ g}$$

$$n = \frac{180.0 \text{ g}}{30.03 \text{ g}} \approx 6$$



$$\begin{array}{r}
 \times \frac{1 \text{ mol H}_2\text{O}}{1} \\
 - 1
 \end{array}$$

7.) If the empirical formula for nicotine is $\text{C}_5\text{H}_7\text{N}$, what is its molecular formula if its molecular mass has been determined to be 162.1 grams?