## C11 - 3.4 - % Composition/Empirical/Molecular Formula Notes

Find the Percent Compsotion: Percent by mass of the element in the compound.

$$CH_4 \qquad C = 12 \ g \qquad H = 1 \ g \qquad 12g \\ H_4 = 4 \ g \qquad \frac{+4 \ g}{16g} \qquad 16g \qquad Molar \ Mass = 16 \ g$$

$$\% \ C = \frac{12g}{16g} \qquad \% \ H = \frac{4g}{16g} \qquad \% \ H = \frac{4g}{16g} \qquad \% \ H = 0.25 \qquad \frac{Part}{Total} \times 100\%$$

$$\% \ C = 75\% \qquad \% \ H = 25\% \qquad 75\% + 25\% = 100\%$$

Empirical Formula: The simplest formula of the compound.

Assume 100g

What is the Empirical Formula of a compound with 80% Carbon and 20% Hydrogen?

$$moles \ C = 80 \ g \ C \times \frac{1mol}{12g} = \underbrace{6.67 \ moles \ C}$$

$$moles \ C : moles \ H$$

$$6.67 \ C : 20 \ H$$

$$1 \ C : 3 \ H$$

$$CH_3$$

$$Possibly Double Everything!$$

Molecular Formula: formula of the compound

Empirical Mass: Molar Mass of the Empirical Formula

A molecule has an Empirical Formula of NO and a Molar Mass of 90 g. What is the Molecular Formula?

$$Empirical\ Mass\ NO = \frac{30g}{mol} \qquad 14\ g + 16\ g = 30g \qquad \qquad N = \frac{Molar\ Mass}{Empirical\ Mass}$$
 
$$N = \frac{90}{30}$$
 
$$molecular\ Formula = N \times Empirical\ Formula$$
 
$$= 3 \times (NO)$$
 
$$N = \frac{N}{30}$$

$$= N_3 O_3$$
 Molecular Formula