CHEM 115
Notes 2-14

Composition: Mass (what something is made of)
Formula: Ratio of particles (moles)

Quantity can be measured in two ways:

1. How many particles (moles)
2. How much the particles weigh (i.e. grams)

Chemical formula: ratio of how many particles

Composition of a Mixture

To figure out the composition of a mixture, put the part over the whole.

$$CaHCO_4 = \frac{\textbf{3.50g}}{\textbf{3.50 +1.50 + 1.00g}} \times 100\% = 58.3\%$$

$$\% = \frac{\textbf{(part)}}{\textbf{(whole)}} \textbf{ x 100\%}$$

Chemical Compounds by Mass

Empirical Formula: Ratio of elements in a compound (same ratio = same composition by mass). The lowest whole number ratio of elements in a compound.

Chemical Formula	Empirical Formula
C_2H_4	CH_2
C_4H_8	CH_2
C_6H_{12}	CH_2
$C_6H_{12}O_6$	CH_2O
$Na_2C_2O_4$	$NaCO_2$
CH_3COOH	CH_2O
H_2O_2	HO
H_2O	H_2O

Empirical Formula will give you the percent by mass, but you need the molecular formula to know the structure (C_2H_4 vs. C_6H_{12})

%Composition to Empirical Formula
Once you figure out the ratios of each element in the compound, turn the ratio to integers by dividing each part of the ratio by the smallest number.

How many empirical formulas?
Need two pieces of info to get the molecular formula:

1. percent composition
2. g/mol

Empirical Formula		**Molecular**
	x2 →	
CH_2		?
Empirical Mass = 14.03 g/mol		28.06 g/mol (this must be given)
	→ x2	

Balancing the Chemical Equation
In a chemical change, the same amount of elements go in as do come out, however the identity of the chemical changes.

1. Pick an element to balance first
2. Balance elements that appear twice in the products last

Combustion: A compound reacts with oxygen and all elements become oxidized

Nitrogen gas burned incompletely = nitrous oxide
Nitrogen gas burned completely is more stable as nitrogen gas

Ions will go into a chemical equation complete and come out complete.