

Lecture notes from 2/14/08

To find the composition of elements in a compound:

- determine the mass of each element in the compound
- then find the percentages of those elements in the compound
- usually composition is given in mass percent

To find the composition of compounds in a mixture that has two or more compounds

- determine the mass of each compound in the mixture
- then find the percentages of those compounds in the mixture

Composition: percentage by mass

Chemical formula: ratio of moles

$$1 \text{ mole} = 6.022 \times 10^{23} \text{ particles}$$

NH_3 = 1 Nitrogen 3 Hydrogen so ratio of 1 to 3

We can only determine mass in a lab, then use a formula to find how many moles

- mass is another word for composition
- formula is the ratio of particles

Note fraction can be written as a decimal

Fraction 0.7585 is the same as 75.85%

2 Things needed to calculate percentages: a part and a whole

Proportional reasoning: comparing one ratio to another ratio

Example: 2 is to 3 as 4 is to 6

C_2H_4 C_4H_8 C_6H_{12} ratio of CH_2 is the same in all

Empirical formula: Ratio of elements the same in compounds, every compound with the same ratio having the same %.

Chemical formula	Empirical formula
C_2H_4	CH_2
C_4H_8	CH_2
C_6H_{12}	CH_2
$\text{C}_6\text{H}_{12}\text{O}_6$	CH_2O
$\text{Na}_2\text{C}_2\text{O}_4$	NaCO_2
CH_3COOH	CH_2O
H_2O_2	HO
H_2O	H_2O

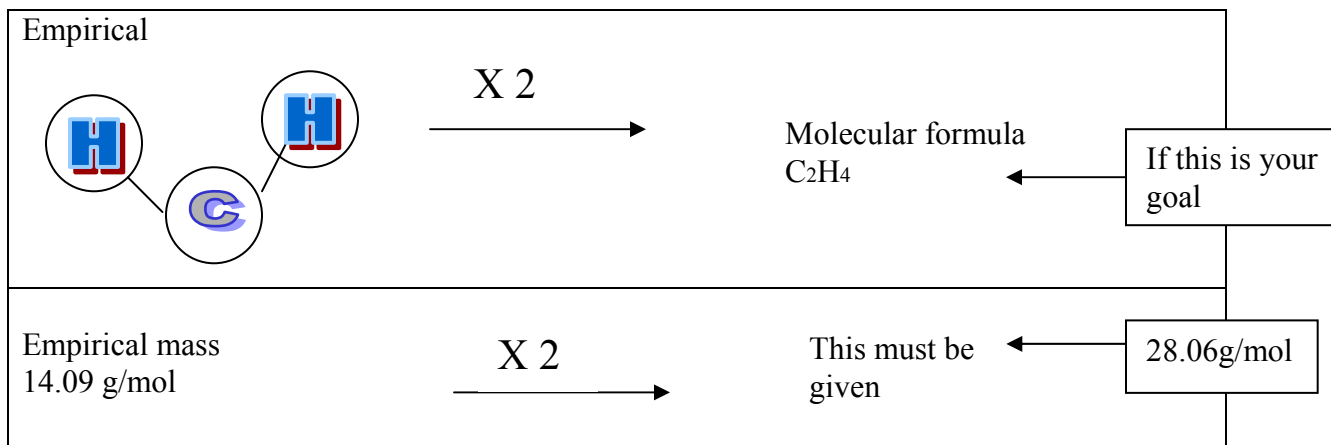
If you want to find the molecular formula, then you have to know (1) the empirical formula (then you can get the empirical mass from it) and (2) the molecular mass (then you can figure out how many empirical formulas fit in the molecular formula)

When you have specific whole number ratio of moles, you can turn them into integers by dividing everything by the smallest number.

Ex. If you have a ratio of 6.089: 7.31:1.218

Divide everything by 1.218

Ratio integers is now 5:6:1



Chemical Equations: reactants → products

-Whatever goes in has to come out, have to balance the equation!

Stoichiometry: measurement of structure

-species refers to stuff that goes in and out of the equation

Stoichiometric coefficients: balancing numbers in front of the equations

In ionic equations, if you want to add one species to the equation, you have to add the whole compound.

Ex. If you want to add one mole of Cu into CuSO₄, you add one entire unit of CuSO₄. So put a 2 in front of the whole compound