Molecular Formulas

- To determine the Molecular Formula:
  - Divide the **Molecular Formula mass** by the **Empirical Formula mass**
  - $$\frac{\textbf{Mass: Molecular Formula}}{\textbf{Mass: Empirical Formula}} = \textbf{Molecular Formula Integer}$$
  - Multiply the subscripts in the empirical formula by the integer to get the new subscripts for the molecular formula

end

Unit 8: Stoichiometry

The word stoichiometry derives from two Greek words: stoicheion (meaning "element") and metron (meaning "measure")

Stoichiometry

- Stoichiometry
  - Involves the mass relationships between reactants and products in a chemical reaction
  - Using a new conversion factor: <u>Mole Ratio</u>

end

Mole Ratio

- Mole Ratio
  - A conversion factor that relates the amount of moles in a chemical reaction, using the coefficients in a balanced equation
  - Example of what a mole ratio looks like $\longrightarrow$ $\dfrac{2mol\ Al_2O_3}{3mol\ O_2}$
  - Lets find mole ratios using the following equation:

$$2\ Al_2O_3 \rightarrow 4\ Al + 3\ O_2$$

1. Al_2O_3 and Al
2. Al and O_2
3. O_2 and Al_2O_3

end

Stoichiometry

- To solve:
  1. Balance equation
  2. Start dimensional analysis with the number that is given to you in the problem.
  3. Use the mole ratio conversion factor to convert from one substance to another. (**get this from the balanced equation**)
  4. Convert to the units that the question is asking for. (molar mass, 22.4L/mol, or Avogadro's number)

end

Limiting Reactant

- 1 reactant gets used up before the others
- <u>Limiting Reactant</u>
  - Limits the amount of product formed
  - Completely used up in a reaction
- <u>Excess Reactant</u>
  - Leftovers after the reaction

end

Limiting Reactant

- To Solve:

You will do 2 stoichiometry problems, one for each reactant

1. Do 2 dimensional analysis fences.
   1. Use the molar ratio for the reactant to the product
2. The dimensional analysis that produces the smallest amount of product is the limiting reactant.
   1. It is also the maximum amount of product you can create.

end

Percent Yield

Results from an Experiment

$$Percent\ Yield = \frac{Actual\ Yield}{Theoretical\ Yield} \times 100$$

Calculated from Stoichiometry

end