STUDENT SUCCESS CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Stoichiometry

When we talk about stoichiometry, we're talking about how to convert between units and compounds in a chemical reaction using molecular weight and Avogadro's number.

Step 1:

- To begin, you need a balanced chemical equation.

Step 2:

- Next, convert known values to moles.
    - If given an amount of something in grams, use the molar weight to convert to moles.
        - Remember that molar weight is given in grams/mole so you would need to divide the mass by the molar mass to get moles.
    - If given an amount in liters, you should also be given either a concentration in g/L or molarity in mol/L.
        - If given the concentration, you will need to use both the concentration (g/L) and the molar mass (g/mol) to convert to moles.

Step 3:

- Use the molar ratio from the balanced chemical equation to convert from moles of one thing to another.
    - A balanced chemical equation is a lot like a recipe – if you use 2 cups of flour plus all the other ingredients, you get 12 cookies.

Step 4:

- Once you have moles of the desired product or reactant, convert to the desired units.
    - Use the methods given above to know what to use when converting.

Example:

- From the reaction: $B_2H_6 + O_2 \rightarrow HBO_2 + H_2O$
    - What mass of O_2 will be needed to burn 36.1 g of B_2H_6?
    - First balance the equation:
        - $B_2H_6 + 3O_2 \rightarrow 2HBO_2 + 2H_2O$
    - Using the molar mass convert from grams to moles:
        - 36.1 g B_2H_6 / 27.66 g/mol B_2H_6 = 1.305 mol B_2H_6
    - From the balanced equation we see that for every 1 B_2H_6 there are 3 O_2.
    - We use this mole ratio to convert from moles of B_2H_6 to moles of O_2:
        - 1.305 mol B_2H_6 * 3 mol O_2 /1 mol B_2H_6 = 3.92 mol O_2
    - Using molar mass to convert from moles to grams:
        - 3.92 mol O_2 *32 g O_2 / 1 mol O_2 = 125.3g O_2