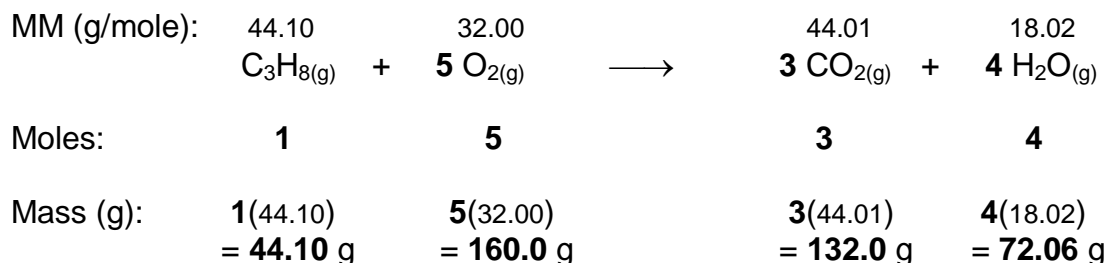


STOICHIOMETRY

- Stoichiometry refers to the calculations involving chemical reactions in which we have to determine the amounts of reactants and/or products.
- The balanced equation of the chemical reaction is a very powerful summary of conversion factors that can be used for these calculations.
- Note that the equation is written in mole units but the measurement of reactants and products is in mass units.

Example: Combustion of propane.



Note that the MM is a conversion factor; for example:

$$1 \text{ mole of C}_3\text{H}_8 = 44.10 \text{ g of C}_3\text{H}_8$$

Calculation examples:

a) How many moles of O_2 are necessary to consume 2.50 moles of C_3H_8 ?

$$\frac{2.50 \text{ moles C}_3\text{H}_8}{1 \text{ mole C}_3\text{H}_8} \times \frac{5 \text{ moles O}_2}{1 \text{ mole C}_3\text{H}_8} = 12.5 \text{ moles O}_2$$

b) If 1,000.0 kg of CO_2 have been produced, how many kg of C_3H_8 were consumed?

$$\frac{1,000.0 \text{ kg CO}_2}{132.0 \text{ kg CO}_2} \times \frac{44.10 \text{ kg C}_3\text{H}_8}{3 \text{ kg CO}_2} = 334.09 \text{ kg C}_3\text{H}_8$$

In real reactions, the reactants may be initially present in any amounts. In this case, the **limiting reactant** is the reactant that is present in the smallest stoichiometric amount (and the stoichiometric amount of a reactant is the ratio of the moles initially present to its stoichiometric coefficient).