

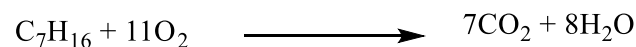
Scenario 5: mole-to-mole ratio



mole-to-mole ratio of: $\text{CO}_2/\text{C}_7\text{H}_{16} = 7 \text{ moles of CO}_2 / 1 \text{ moles of C}_7\text{H}_{16}$
 $\text{H}_2\text{O}/\text{O}_2 = 8 \text{ moles of H}_2\text{O} / 11 \text{ moles of O}_2$

mole-to-mole ratio is the ratio of the stoichiometric amounts of the species involved. (number in front of molecule)

Scenario 6: calculating limiting reactant = reactant that gives off the least amount of moles of the product



$$\begin{aligned} \text{moles of CO}_2 \text{ from X} &= \text{Scenario 1} * \text{Scenario 5} = \text{moles} \\ \text{from O}_2 &= 7000 \text{ g of O}_2 \times \frac{1 \text{ mol of O}_2}{32.00 \text{ g of O}_2} \times \frac{7 \text{ moles of CO}_2}{11 \text{ moles of O}_2} = 139.2 \text{ moles of CO}_2 \end{aligned}$$

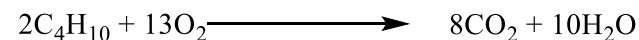
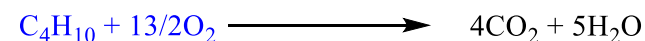
Scenario 1 Scenario 5

$$\begin{aligned} \text{From C}_7\text{H}_{16} &= 4000 \text{ g of C}_7\text{H}_{16} \times \frac{1 \text{ mol of C}_7\text{H}_{16}}{100.2 \text{ g of C}_7\text{H}_{16}} \times \frac{7 \text{ moles of CO}_2}{1 \text{ moles of C}_7\text{H}_{16}} = 279.4 \text{ moles of CO}_2 \end{aligned}$$

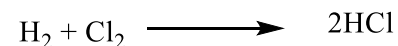
Scenario 1 Scenario 5



$$\text{moles of O}_2 = \frac{1 \text{ mol of O}_2}{2 \text{ mol of SO}_2} \quad 3.6 \text{ mol of SO}_2 = 1.8 \text{ moles of O}_2$$



$$\text{moles of CO}_2 = 1.25 \text{ moles of C}_4\text{H}_{10} \times \frac{8 \text{ mol of CO}_2}{2 \text{ mol of C}_4\text{H}_{10}} = 5 \text{ moles of CO}_2$$



$2.5 * 10^3$ (limiting reactant because Cl_2 is in excess)

$$\text{mass of HCl from H}_2 = 2.5 * 10^3 \text{ g H}_2 \times \frac{1 \text{ mol of H}_2}{2.016 \text{ g of H}_2} \times \frac{2 \text{ mol of HCl}}{1 \text{ mol of H}_2} \times \frac{36.46 \text{ g of HCl}}{1 \text{ mol of HCl}} = 90426 \text{ g of HCl}$$

Scientific Notation = $9.0 * 10^4$ g of HCl