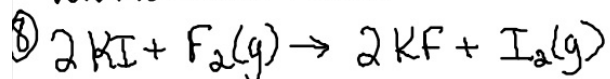


Volume Stoich. Homework:

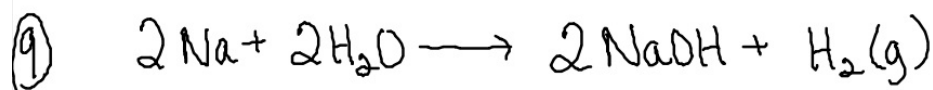


a) given: 0.72 mol F_2 need: ? L I_2 Type: mol \rightarrow vol

$$0.72 \text{ mol } \text{F}_2 \times \frac{1 \text{ mol } \text{I}_2}{1 \text{ mol } \text{F}_2} \times \frac{22.4 \text{ L } \text{I}_2}{1 \text{ mol } \text{I}_2} = \boxed{16 \text{ L } \text{I}_2}$$

b) given: 56.2 L I_2 need: ? mol KI Type: vol \rightarrow mol

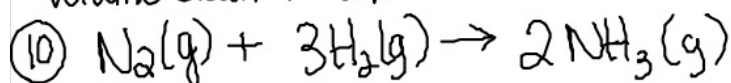
$$56.2 \text{ L } \text{I}_2 \times \frac{1 \text{ mol } \text{I}_2}{22.4 \text{ L } \text{I}_2} \times \frac{2 \text{ mol KI}}{1 \text{ mol } \text{I}_2} = \boxed{5.02 \text{ mol KI}}$$



a) given: 15.0 L H_2 need: ? mol Na Type: vol \rightarrow mol

$$15.0 \text{ L } \text{H}_2 \times \frac{1 \text{ mol } \text{H}_2}{22.4 \text{ L } \text{H}_2} \times \frac{2 \text{ mol Na}}{1 \text{ mol } \text{H}_2} = \boxed{1.34 \text{ mol Na}}$$

Volume Stoich. Homework:

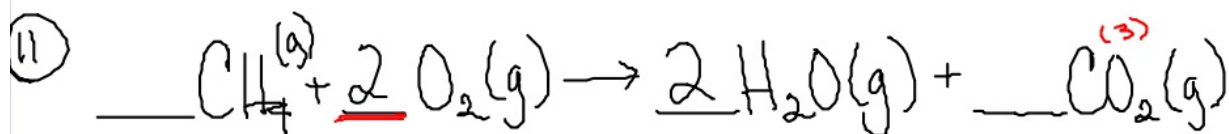


a) given: 31.8 L NH_3 need: ? L N_2 Type: Vol \rightarrow Vol

$$31.8 \text{ L NH}_3 \times \frac{1 \text{ mol NH}_3}{22.4 \text{ L NH}_3} \times \frac{1 \text{ mol N}_2}{2 \text{ mol NH}_3} \times \frac{22.4 \text{ L N}_2}{1 \text{ mol N}_2} = \boxed{15.9 \text{ L N}_2}$$

b) given: 562.7 L N_2 need: ? L H_2 Type: Vol \rightarrow Vol

$$562.7 \text{ L N}_2 \times \frac{1 \text{ mol N}_2}{22.4 \text{ L N}_2} \times \frac{3 \text{ mol H}_2}{1 \text{ mol N}_2} \times \frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} = \boxed{1688 \text{ L H}_2}$$



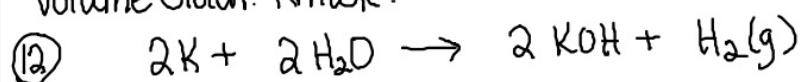
a) given: 10.0 L O_2 need: ? L CH_4 Type: Vol \rightarrow Vol

$$10.0 \text{ L O}_2 \times \frac{1 \text{ mol O}_2^{(2)}}{22.4 \text{ L O}_2} \times \frac{1 \text{ mol CH}_4^{(3)}}{2 \text{ mol O}_2} \times \frac{22.4 \text{ L CH}_4^{(2)}}{1 \text{ mol CH}_4} = \boxed{5.00 \text{ L CH}_4}$$

b) given: 70.5 L CH_4 need: ? L CO_2 Type: Vol \rightarrow Vol

$$70.5 \text{ L CH}_4 \times \frac{1 \text{ mol CH}_4}{22.4 \text{ L CH}_4} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} \times \frac{22.4 \text{ L CO}_2}{1 \text{ mol CO}_2} = \boxed{70.5 \text{ L CO}_2}$$

Volume Stoich. Homework:

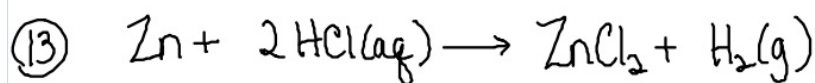


a) given: 20.0g K need: ? L H₂ Type: mass → vol

$$20.0g K \times \frac{1 \text{ mol K}}{39.10g K} \times \frac{1 \text{ mol H}_2}{2 \text{ mol K}} \times \frac{22.4L H_2}{1 \text{ mol H}_2} = \boxed{5.73 L H_2}$$

b) given: 23.0L H₂ need: ? g H₂O Type: vol → mass

$$23.0L H_2 \times \frac{1 \text{ mol H}_2}{22.4L H_2} \times \frac{2 \text{ mol H}_2O}{1 \text{ mol H}_2} \times \frac{18.02g H_2O}{1 \text{ mol}} = \boxed{37.0 g H_2O}$$



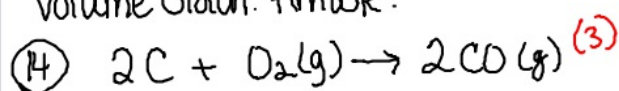
a) given: 60.70L H₂ need: ? g Zn Type: vol → mass

$$60.70L H_2 \times \frac{1 \text{ mol H}_2}{22.4L H_2} \times \frac{1 \text{ mol Zn}}{1 \text{ mol H}_2} \times \frac{65.39g Zn}{1 \text{ mol Zn}} = \boxed{177.2 g Zn}$$

b) given: 47.8g HCl need: ? L H₂ Type: mass → vol

$$47.8g HCl \times \frac{1 \text{ mol HCl}}{36.46g HCl} \times \frac{1 \text{ mol H}_2}{2 \text{ mol HCl}} \times \frac{22.4L H_2}{1 \text{ mol H}_2} = \boxed{14.7 L H_2}$$

Volume Stoich. Homework:

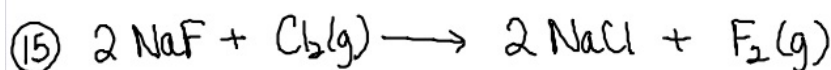


a) given: 34.2 L CO need: ? g C Type: Vol \rightarrow mass

$$34.2 \text{ L CO} \times \frac{1 \text{ mol CO}}{22.4 \text{ L CO}} \times \frac{2 \text{ mol C}}{2 \text{ mol CO}} \times \frac{12.01 \text{ g C}}{1 \text{ mol C}} = \boxed{18.3 \text{ g C}}$$

b) given: 21.9 g C need: ? L O₂(g) Type: mass \rightarrow vol

$$21.9 \text{ g C} \times \frac{1 \text{ mol C}}{12.01 \text{ g C}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol C}} \times \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} = \boxed{20.4 \text{ L O}_2}$$



a) given: 88.0 L Cl₂ need: ? g NaCl Type: Vol \rightarrow mass

$$88.0 \text{ L Cl}_2 \times \frac{1 \text{ mol Cl}_2}{22.4 \text{ L Cl}_2} \times \frac{2 \text{ mol NaCl}}{1 \text{ mol Cl}_2} \times \frac{58.45 \text{ g NaCl}}{1 \text{ mol NaCl}} = \boxed{459 \text{ g NaCl}}$$

b) given: 97.8 g NaF need: ? L F₂ Type: mass \rightarrow vol

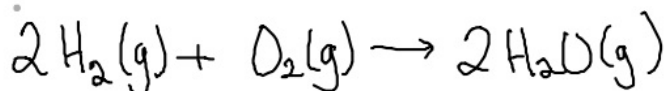
$$97.8 \text{ g NaF} \times \frac{1 \text{ mol NaF}}{42.00 \text{ g NaF}} \times \frac{1 \text{ mol F}_2}{2 \text{ mol NaF}} \times \frac{22.4 \text{ L F}_2}{1 \text{ mol F}_2} = \boxed{26.1 \text{ L F}_2}$$

$$\% \text{ yield} = \frac{\text{lab or actual value}}{\text{theoretical value}} \times 100$$

Compares the value obtained in lab to the mathematical value (theo.).

Limiting Factor

Compares the quantity of product created when the starting values of both reactants are known. Can be used to find "left over" or unused reactants.



given #1: 30.0L H₂
given #2: 40.0L O₂ } needed: ? L H₂O

$$\text{Limiting factor} \quad 30.0 \text{L H}_2 \times \frac{1 \text{ mol H}_2}{22.4 \text{ L H}_2} \times \frac{2 \text{ mol H}_2\text{O}}{2 \text{ mol H}_2} \times \frac{22.4 \text{ L H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = \boxed{30.0 \text{L H}_2\text{O}} \quad \text{Theo yield (the smaller value)}$$

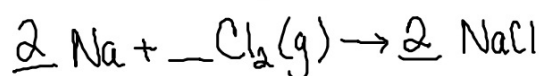
$$40.0 \text{L O}_2 \times \frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol O}_2} \times \frac{22.4 \text{ L H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = \boxed{80.0 \text{L H}_2\text{O}}$$

$$\boxed{30.0 \text{L H}_2\text{O}} \quad \text{Theo yield} \times \frac{1 \text{ mol H}_2\text{O}}{22.4 \text{ L H}_2\text{O}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \times \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} = 15.0 \text{L O}_2 \text{ used}$$

$$40.0 \text{L O}_2 - 15.0 \text{L O}_2 = \boxed{25.0 \text{L left over (remaining)}}$$

(given) (used)

if 10.0 g of Sodium reacts with 10.0 g of chlorine gas how many grams of Sodium chloride is produced? What is the limiting factor? How much reactant is left over?



$$10.0 \text{ g Na} \times \frac{1 \text{ mol Na}}{23.00 \text{ g Na}} \times \frac{2 \text{ mol NaCl}}{2 \text{ mol Na}} \times \frac{58.45 \text{ g NaCl}}{1 \text{ mol NaCl}} = 25.4 \text{ g NaCl}$$

L.F.

$$10.0 \text{ g Cl}_2 \times \frac{1 \text{ mol Cl}_2}{70.90 \text{ g Cl}_2} \times \frac{2 \text{ mol NaCl}}{1 \text{ mol Cl}_2} \times \frac{58.44 \text{ g NaCl}}{1 \text{ mol NaCl}} = \boxed{16.5 \text{ g NaCl}}$$

theo yield

$$16.5 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.45 \text{ g NaCl}} \times \frac{2 \text{ mol Na}}{2 \text{ mol NaCl}} \times \frac{23.00 \text{ g Na}}{1 \text{ mol Na}} = 6.49 \text{ g Na used}$$

$$10 \text{ g} - 6.49 \text{ g} = \boxed{3.51 \text{ g Na leftover}}$$

If the lab produced 12.8 g NaCl, what is the % yield?