KEY

Stoichiometry Practice Problems

1. Determine the moles of LiOH produced when 1.38 moles of lithium nitride reacts with water according to the following equation: $Li_3N + 3H_2O \rightarrow NH_3 + 3LiOH$

$$\frac{1.38 \text{ mol } Li_3N}{1} \times \frac{3 \text{ mol } LiOH}{1 \text{ mol } Li_3N} = \boxed{4.14 \text{ mol } LiOH}$$

2. What mass of sodium chloride is produced when chlorine reacts with 0.29 g of sodium iodide?

$$Cl_2 + 2NaI \rightarrow 2NaCl + I_2$$

$$\frac{0.29 \text{ g NaI}}{1} \times \frac{1 \text{ mol NaI}}{149.89 \text{ g NaI}} \times \frac{2 \text{ mol NaCl}}{2 \text{ mol NaI}} \times \frac{58.44 \text{ g NaCl}}{1 \text{ mol NaCl}} = \boxed{0.11 \text{ g NaCl}}$$

3. Determine the mass of carbon dioxide produced when 0.85 g of butane reacts with oxygen according to the following equation: $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

$$\frac{0.85 \text{ g } C_4H_{10}}{1} \times \frac{1 \text{ mol } C_4H_{10}}{58.14 \text{ g } C_4H_{10}} \times \frac{8 \text{ mol } CO_2}{2 \text{ mol } C_4H_{10}} \times \frac{44.01 \text{ g } CO_2}{1 \text{ mol } CO_2} = \boxed{2.6 \text{ g } CO_2}$$

4. Determine the mass of antimony produced when 0.46 g of antimony(III) oxide reacts with carbon according to the following equation: $Sb_2O_3 + 3C \rightarrow 2Sb + 3CO$

$$\frac{0.46 \text{ g } Sb_2O_3}{1} \times \frac{1 \text{ mol } Sb_2O_3}{291.52 \text{ g } Sb_2O_3} \times \frac{2 \text{ mol Sb}}{1 \text{ mol } Sb_2O_3} \times \frac{121.76 \text{ g Sb}}{1 \text{ mol Sb}} = \boxed{0.38 \text{ g Sb}}$$

5. What mass of hydrogen peroxide (H_2O_2) must decompose to produce 0.77 mole of water? Hint: Remember it decomposes into water and a gas that causes a glowing splint to relight.

$$2H_2O_2 \rightarrow O_2 + 2H_2O$$

$$\frac{0.77 \text{ mol } H_2O}{1} \times \frac{2 \text{ mol } H_2O_2}{2 \text{ mol } H_2O} \times \frac{34.02 \text{ g } H_2O_2}{1 \text{ mol } H_2O_2} = \boxed{26 \text{ g } H_2O_2}$$

6. What mass of CO must react with oxygen to produce 0.69 g of CO_2? $2CO + O_2 \rightarrow 2CO_2$

$$\frac{0.69\ g\ CO_2}{1} \times \frac{1\ mol\ CO_2}{44.01\ g\ CO_2} \times \frac{2\ mol\ CO}{2\ mol\ CO_2} \times \frac{28.01\ g\ CO}{1\ mol\ CO} = \boxed{0.44\ g\ CO}$$

7. Determine the mass of sodium nitrate produced when 0.73 g of nickel(II) nitrate reacts with sodium hydroxide: $Ni(NO_3)_2 + 2NaOH \rightarrow Ni(OH)_2 + 2NaNO_3$

$$\frac{0.73\ g\ Ni(NO_3)_2}{1} \times \frac{1\ mol\ Ni(NO_3)_2}{182.71\ g\ Ni(NO_3)_2} \times \frac{2\ mol\ NaNO_3}{1\ mol\ Ni(NO_3)_2} \times \frac{85.00\ g\ NaNO_3}{1\ mol\ NaNO_3} =$$

$$\boxed{0.68\ g\ NaNO_3}$$

8. Determine the mass of $Ca(OH)_2$ produced when calcium carbide reacts with 0.64 g of water according to the following equation: $CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$

$$\frac{0.64\ g\ H_2O}{1} \times \frac{1\ mol\ H_2O}{18.016\ g\ H_2O} \times \frac{1\ mol\ Ca(OH)_2}{2\ mol\ H_2O} \times \frac{74.096\ g\ Ca(OH)_2}{1\ mol\ Ca(OH)_2} = \boxed{1.3\ g\ Ca(OH)_2}$$

9. How many grams of ozone (O_3) must decompose to produce 0.87 g of oxygen? $2O_3 \rightarrow 3O_2$

$$\frac{0.87\ g\ O_2}{1} \times \frac{1\ mol\ O_2}{32.00\ g\ O_2} \times \frac{2\ mol\ O_3}{3\ mol\ O_2} \times \frac{48.00\ g\ O_3}{1\ mol\ O_3} = \boxed{0.87\ g\ O_3}$$

X 10. Find the mass of sugar ($C_6H_{12}O_6$) required to produce 1.82 L of carbon dioxide gas at STP from the reaction described by the following equation: $C_6H_{12}O_6 \rightarrow 2C_2H_6O + 2CO_2$

$$\frac{1.82\ L\ CO_2}{1} \times \frac{1\ mol\ CO_2}{22.4\ L\ CO_2} \times \frac{1\ mol\ C_6H_{12}O_6}{2\ mol\ CO_2} \times \frac{180.15\ g\ C_6H_{12}O_6}{1\ mol\ C_6H_{12}O_6} = \boxed{7.32\ g\ C_6H_{12}O_6}$$