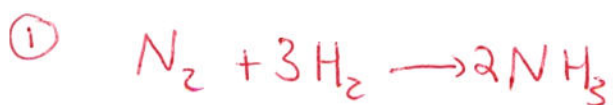


# Stoichiometry Practice Problems



$$3.45 \text{ moles } N_2 \times \frac{2 \text{ mol } NH_3}{1 \text{ mol } N_2} = \boxed{6.9 \text{ mol } NH_3} \quad N_2: \text{ Excess Reactant}$$

$$4.85 \text{ mol } H_2 \times \frac{2 \text{ mol } NH_3}{3 \text{ mol } H_2} = \boxed{3.23 \text{ mol } NH_3} \quad H_2: \text{ Limiting Reactant}$$



$$6.45 \text{ g } KClO_3 \times \frac{1 \text{ mol } KClO_3}{122.6 \text{ g } KClO_3} \times \frac{2 \text{ mol } KCl}{2 \text{ mol } KClO_3} \times \frac{74.6 \text{ g } KCl}{1 \text{ mol } KCl} = \boxed{3.92 \text{ g } KCl}$$



$$156 \text{ g } NaNO_3 \times \frac{1 \text{ mol } NaNO_3}{85 \text{ g } NaNO_3} \times \frac{2 \text{ mol } NaNO_2}{2 \text{ mol } NaNO_3} \times \frac{69.0 \text{ g } NaNO_2}{1 \text{ mol } NaNO_2} = \boxed{126.6 \text{ g } NaNO_2}$$

$$\% \text{ Yield} = \frac{\text{actual}}{\text{theoretical}} \times 100$$

$$\frac{112 \text{ g } NaNO_2}{126.6 \text{ g } NaNO_2} \times 100 = \boxed{88.5\%}$$

↑  
theoretical

↑  
% Yield



$$9.73\text{g Al}_2\text{O}_3 \times \frac{1\text{mol Al}_2\text{O}_3}{102.0\text{g Al}_2\text{O}_3} \times \frac{2\text{mol Al}}{1\text{mol Al}_2\text{O}_3} \times \frac{27.0\text{g Al}}{1\text{mol Al}} = \boxed{5.15\text{g Al}}$$

↑  
theoretical

$$\% \text{ Yield} = \frac{\text{actual}}{\text{theoretical}} \times 100$$

$$91\% = \frac{\text{actual}}{5.15\text{g Al}} \times 100 \quad 0.91 = \frac{\text{actual}}{5.15\text{g Al}} \quad \boxed{\text{actual} = 4.69\text{g Al}}$$



$$25.3\text{g Mg} \times \frac{1\text{mol Mg}}{24.3\text{g Mg}} \times \frac{1\text{mol Cu}}{1\text{mol Mg}} \times \frac{63.5\text{g Cu}}{1\text{mol Cu}} = \boxed{66.1\text{g Cu}}$$

Excess Reactant: Mg

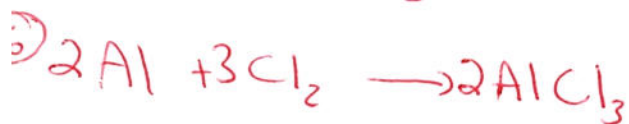
~~44.3g Cu~~

$$44.3\text{g Cu}(\text{NO}_3)_2 \times \frac{1\text{mol Cu}(\text{NO}_3)_2}{187.5\text{g Cu}(\text{NO}_3)_2} \times \frac{1\text{mol Cu}}{1\text{mol Cu}(\text{NO}_3)_2} \times \frac{63.5\text{g Cu}}{1\text{mol Cu}} = \boxed{15.0\text{g Cu}}$$

theoretical  
↓

$$\% \text{ Yield} = \frac{14.3\text{g Cu}}{15.0\text{g Cu}} \times 100 = \boxed{95.3\%}$$

Limiting Reactant =  $\text{Cu}(\text{NO}_3)_2$



$$34.0\text{g Al} \times \frac{1\text{mol Al}}{27.0\text{g Al}} \times \frac{2\text{mol AlCl}_3}{2\text{mol Al}} \times \frac{133.5\text{g AlCl}_3}{1\text{mol AlCl}_3} = \boxed{168.1\text{g AlCl}_3}$$

Excess = Al

$$39.0\text{g Cl}_2 \times \frac{1\text{mol Cl}_2}{71.0\text{g Cl}_2} \times \frac{2\text{mol AlCl}_3}{3\text{mol Cl}_2} \times \frac{133.5\text{g AlCl}_3}{1\text{mol AlCl}_3} = \boxed{48.9\text{g AlCl}_3}$$

Limiting  $\text{Cl}_2$

$$39.0\text{g Cl}_2 \times \frac{1\text{mol Cl}_2}{71.0\text{g Cl}_2} \times \frac{2\text{mol Al}}{3\text{mol Cl}_2} \times \frac{27.0\text{g Al}}{1\text{mol Al}} = 9.89\text{g Al used} \quad \boxed{\text{Left over } 34.0 - 9.89 = 24.1\text{g Al}}$$