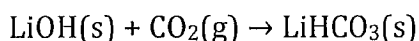


Worksheet: Percent Yield, Limiting Reactant

1. What is the percent yield of the following reaction if 50.0 g LiOH gives 72.8 g of

LiHCO₃?

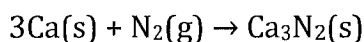


$$50.0 \text{ g LiOH} \times \frac{1 \text{ mol LiOH}}{23.95 \text{ g LiOH}} \times \frac{1 \text{ mol LiHCO}_3}{1 \text{ mol LiOH}} \times \frac{67.96 \text{ g LiHCO}_3}{1 \text{ mol LiHCO}_3} = 141.9 \text{ g LiHCO}_3$$

↑ use to get theoretical
actual yield

$$\% \text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{72.8}{141.9} \times 100 = \boxed{51.3\%}$$

2. If 56.6 g of calcium are mixed with nitrogen gas and 32.4 g of calcium nitride are produced, what is the percent yield of the following reaction?

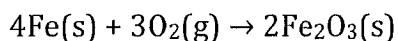


$$56.6 \text{ g Ca} \times \frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}} \times \frac{1 \text{ mol Ca}_3\text{N}_2}{3 \text{ mol Ca}} \times \frac{148.24 \text{ g Ca}_3\text{N}_2}{1 \text{ mol Ca}_3\text{N}_2} = 69.8 \text{ g Ca}_3\text{N}_2$$

actual yield ← theoretical yield

$$\% \text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{32.4}{69.8} \times 100 = \boxed{46.4\%}$$

3. Given the following reaction, determine the limiting reactant in each of the following mixtures of reactants:



a. 2.0 moles of Fe and 6.0 moles O₂

$$2.0 \text{ mol Fe} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{4 \text{ mol Fe}} \Rightarrow \boxed{1 \text{ mol Fe}_2\text{O}_3} \text{ lower } \therefore \text{Fe}$$

$$6.0 \text{ mol O}_2 \times \frac{2 \text{ mol Fe}_2\text{O}_3}{3 \text{ mol O}_2} = 4 \text{ mol Fe}_2\text{O}_3$$

b. 5.0 moles of Fe and 40 g O₂

$$5.0 \text{ mol Fe} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{4 \text{ mol Fe}} = 2.5 \text{ mol Fe}_2\text{O}_3$$

$$40 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{3 \text{ mol O}_2} = \boxed{0.83 \text{ mol Fe}_2\text{O}_3} \text{ lower } \therefore \text{O}_2$$

c. 16.0 g Fe and 20.0 moles O₂

$$16.0 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{4 \text{ mol Fe}} = \boxed{0.143 \text{ mol Fe}_2\text{O}_3} \text{ lower } \therefore \text{Fe}$$

$$20 \text{ mol O}_2 \times \frac{2 \text{ mol Fe}_2\text{O}_3}{3 \text{ mol O}_2} = 13.3 \text{ mol Fe}_2\text{O}_3$$