More Limiting Reactant Practice

1. Calculate the theoretical yield of Fe in **grams**, and identify the limiting reactant using the reactant amounts and equation given.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Given:
167g Fe_2O_3
85.8g CO

Find:
Theoretical Yield: 114.05 g Fe
Limiting Reactant: CO

$$\frac{167\text{g } Fe_2O_3}{1}\left(\frac{1\text{mol } Fe_2O_3}{159.7\text{g } Fe_2O_3}\right)\left(\frac{2\text{mol Fe}}{1\text{mol } Fe_2O_3}\right)\left(\frac{55.85\text{g Fe}}{1\text{mol Fe}}\right) = 116.81\text{g Fe}$$

$$\frac{85.8\text{g CO}}{1}\left(\frac{1\text{mol CO}}{28.01\text{g CO}}\right)\left(\frac{2\text{mol Fe}}{3\text{mol CO}}\right)\left(\frac{55.85\text{g Fe}}{1\text{mol Fe}}\right) = 114.05\text{g Fe}$$

2. Calculate the theoretical yield of CO_2 in **grams**, and identify the limiting reactant using the reactant amounts and equation given.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Given:
167g Fe_2O_3
85.8g CO

Find:
Theoretical Yield: 134.81 g CO_2
Limiting Reactant: CO

$$\frac{85.8\text{g CO}}{1}\left(\frac{1\text{mol CO}}{28.01\text{g CO}}\right)\left(\frac{3\text{mol } CO_2}{3\text{mol CO}}\right)\left(\frac{44.01\text{g } CO_2}{1\text{mol } CO_2}\right) = 134.81\text{g } CO_2$$

3. Calculate the theoretical yield of NaBr in **moles**, and identify the limiting reactant using the reactant amounts and equation given.

$$2Na + Br_2 \rightarrow NaBr$$

Given:
1.8mol Na
1.4mol Br_2

Find:
Theoretical Yield: 0.9 mol NaBr
Limiting Reactant: Na

$$\frac{1.8\text{mol Na}}{1}\left(\frac{1\text{mol NaBr}}{2\text{mol Na}}\right) = 0.9\text{mol NaBr}$$

$$\frac{1.4\text{mol } Br_2}{1}\left(\frac{1\text{mol NaBr}}{1\text{mol } Br_2}\right) = 1.4\text{mol NaBr}$$