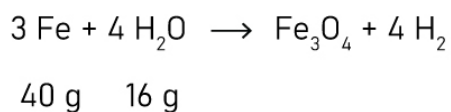


# Limiting and Excess Reactants

- ① For the following equation, determine which reactant is limiting and which reactant is in excess. The amount of reagents used is shown.



- ② 35.5 g of silver nitrate is reacted with 35.5 grams of sodium sulfide, producing silver sulfide and sodium nitrite.
- (a) Write and balance the equation.
- (b) Calculate the number of grams of silver sulfide produced in grams.

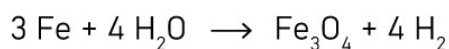
- ③ For the following reaction:  $\text{C}_3\text{H}_8 + 5 \text{ O}_2 \longrightarrow 3 \text{ CO}_2 + 4 \text{ H}_2\text{O}$

- (a) Write and balance the equation.
- (b) How many grams of propane is this.

# Limiting and Excess Reactants

## Answers

- ① For the following equation, determine which reactant is limiting and which reactant is in excess. The amount of reagents used is shown.



40 g    16 g

$$40 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.8 \text{ g Fe}} \times \frac{1 \text{ mol Fe}_3\text{O}_4}{3 \text{ mol Fe}} = 0.239 \text{ mol Fe}_3\text{O}_4$$

$$16 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol Fe}_3\text{O}_4}{4 \text{ mol H}_2\text{O}} = 0.222 \text{ mol Fe}_3\text{O}_4$$

0.222 mol is less than 0.239 mol. Therefore, the limiting reactant is  $\text{H}_2\text{O}$ , and the excess reactant is Fe.

- ② 35.5 g of silver nitrate is reacted with 35.5 grams of sodium sulfide, producing silver sulfide and sodium nitrite.

- (a) Write and balance the equation.



- (b) Calculate the number of grams of silver sulfide produced in grams.

$$35.5 \text{ g AgNO}_2 \times \frac{1 \text{ mol AgNO}_2}{153.9 \text{ g AgNO}_2} \times \frac{1 \text{ mol Ag}_2\text{S}}{2 \text{ mol AgNO}_2} = 0.115 \text{ mol Ag}_2\text{S}$$

$$35.5 \text{ g Na}_2\text{S} \times \frac{1 \text{ mol Na}_2\text{S}}{78 \text{ g Na}_2\text{S}} \times \frac{1 \text{ mol Ag}_2\text{S}}{2 \text{ mol Na}_2\text{S}} = 0.455 \text{ mol Ag}_2\text{S}$$

The amount of silver sulfide produced is 0.115 mol. Let us convert this into grams.

$$0.115 \text{ mol Ag}_2\text{S} \times \frac{247.8 \text{ g Ag}_2\text{S}}{1 \text{ mol Ag}_2\text{S}} = 28.5 \text{ g Ag}_2\text{S}$$

- ③ For the following reaction:  $\text{C}_3\text{H}_8 + 5 \text{ O}_2 \rightarrow 3 \text{ CO}_2 + 4 \text{ H}_2\text{O}$

- (a) Write and balance the equation.

$$0.37 \text{ g CO}_2 \times \frac{1 \text{ mol of CO}_2}{44.01 \text{ g CO}_2} \times \frac{1 \text{ mol C}_3\text{H}_8}{3 \text{ mol CO}_2} = 0.00280 \text{ mol C}_3\text{H}_8$$

- (b) How many grams of propane is this.

$$0.00280 \text{ mol C}_3\text{H}_8 \times \frac{44.1 \text{ g C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} = 0.12348 \text{ g C}_3\text{H}_8$$