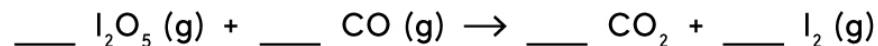


Name : _____ Date : _____

Limiting & Excess Reagents

1 Given the following reaction:



Balance the reaction.

(a) Suppose 80 grams of I_2O_5 reacts with 28 grams of CO. Determine the limiting reagent and the mass of I_2 produced.

(b) Suppose only 0.15 moles of I_2 were produced. What is the mass of I_2 ?

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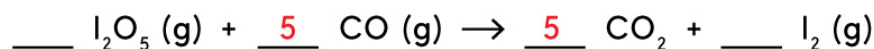
Consider the following reaction: $\text{CO} + 2 \text{H}_2 \rightarrow \text{CH}_3\text{OH}$

2.5 g of H_2 reacts with 30 L of CO at STP. What is the limiting reagent? What is the mass of CH_3OH produced? How much excess reagent is left over?

Limiting & Excess Reagents

Answers

- 1) Given the following reaction:



Balance the reaction.

- a) Suppose 80 grams of I_2O_5 reacts with 28 grams of CO. Determine the limiting reagent and the mass of I_2 produced.

$$80 \text{ g I}_2\text{O}_5 \times \frac{1 \text{ mol I}_2\text{O}_5}{333.8 \text{ g I}_2\text{O}_5} \times \frac{1 \text{ mol I}_2}{1 \text{ mol I}_2\text{O}_5} \times \frac{253.8 \text{ g I}_2}{1 \text{ mol I}_2} = 60.8 \text{ g I}_2$$

$$28 \text{ g CO} \times \frac{1 \text{ mol CO}}{28.01 \text{ g CO}} \times \frac{1 \text{ mol I}_2}{5 \text{ mol CO}} \times \frac{253.8 \text{ g I}_2}{1 \text{ mol I}_2} = 50.7 \text{ g I}_2$$

Since CO produces the least amount of I_2 , it is the limiting reagent. The mass of I_2 is 50.7 g.

- b) Suppose only 0.15 moles of I_2 were produced. What is the mass of I_2 ?

$$0.15 \text{ mol I}_2 \times \frac{253.8 \text{ g I}_2}{1 \text{ mol I}_2} = 38.7 \text{ g I}_2$$

2)

Consider the following reaction: $\text{CO} + 2 \text{H}_2 \rightarrow \text{CH}_3\text{OH}$

2.5 g of H_2 reacts with 30 L of CO at STP. What is the limiting reagent? What is the mass of CH_3OH produced? How much excess reagent is left over?

$$2.5 \text{ g H}_2 \times \frac{1 \text{ mol H}_2}{2 \text{ g H}_2} \times \frac{1 \text{ mol CH}_3\text{OH}}{2 \text{ mol H}_2} \times \frac{32 \text{ g CH}_3\text{OH}}{1 \text{ mol CH}_3\text{OH}} = 20 \text{ g CH}_3\text{OH}$$

$$30 \text{ L CO} \times \frac{1 \text{ mol CO}}{22.4 \text{ L CO}} \times \frac{1 \text{ mol CH}_3\text{OH}}{1 \text{ mol CO}} \times \frac{32 \text{ g CH}_3\text{OH}}{1 \text{ mol CH}_3\text{OH}} = 42.9 \text{ g CH}_3\text{OH}$$

H_2 is the limiting reagent. 20 g of CH_3OH is produced. Let us calculate the remaining amount of CO.

$$2.5 \text{ g H}_2 \times \frac{1 \text{ mol H}_2}{2 \text{ g H}_2} \times \frac{1 \text{ mol CO}}{2 \text{ mol H}_2} \times \frac{22.4 \text{ L CO}}{1 \text{ mol CO}} = 14 \text{ L CO used}$$

$$30 \text{ L CO} - 14 \text{ L CO} = 16 \text{ L CO remains.}$$