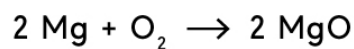


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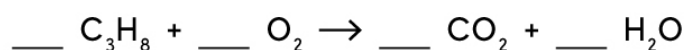
Stoichiometry Limiting Reagent

- 1) Consider the reaction between magnesium and oxygen.



- a) Suppose 2.2 g of Mg reacts with 4.5 L of O_2 . What is the limiting reactant? How much MgO is produced?
- b) How much excess reagent remains?

- 2) Given the following reaction:



Balance the reaction.

- a) Suppose 14.8 g of C_3H_8 reacts with 3.44 g of O_2 . Determine the limiting reagent.
- b) What is the amount of CO_2 produced in grams?

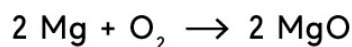
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Stoichiometry Limiting Reagent

Answers

- ① Consider the reaction between magnesium and oxygen.



- ① (a) Suppose 2.2 g of Mg reacts with 4.5 L of O_2 . What is the limiting reactant? How much MgO is produced?

$$2.2 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{2 \text{ mol MgO}}{2 \text{ mol Mg}} \times \frac{40.31 \text{ g MgO}}{1 \text{ mol MgO}} = 3.65 \text{ g MgO}$$

$$4.5 \text{ L O}_2 \times \frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} \times \frac{2 \text{ mol MgO}}{1 \text{ mol O}_2} \times \frac{40.31 \text{ g MgO}}{1 \text{ mol MgO}} = 16.19 \text{ g MgO}$$

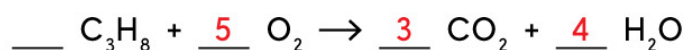
Mg is the limiting reactant. 3.65 g of MgO is produced.

- ① (b) How much excess reagent remains?

$$2.2 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol Mg}} \times \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} = 1.01 \text{ L O}_2 \text{ used}$$

$$4.5 \text{ L O}_2 - 1.01 \text{ L O}_2 = 3.49 \text{ L O}_2 \text{ remains}$$

- ② Given the following reaction:



Balance the reaction.

- ② (a) Suppose 14.8 g of C_3H_8 reacts with 3.44 g of O_2 . Determine the limiting reagent.

$$14.8 \text{ g C}_3\text{H}_8 \times \frac{1 \text{ mol C}_3\text{H}_8}{44.09 \text{ g C}_3\text{H}_8} \times \frac{4 \text{ mol H}_2\text{O}}{1 \text{ mol C}_3\text{H}_8} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 24.2 \text{ g H}_2\text{O}$$

$$3.44 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \times \frac{4 \text{ mol H}_2\text{O}}{5 \text{ mol O}_2} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 1.55 \text{ g H}_2\text{O}$$

O_2 is the limiting reagent.

- ② (b) What is the amount of CO_2 produced in grams?

$$3.44 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \times \frac{3 \text{ mol CO}_2}{5 \text{ mol O}_2} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = 2.84 \text{ g CO}_2$$