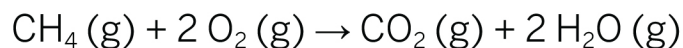


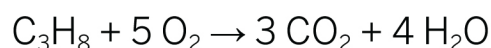
→ STOICHIOMETRY ← PROBLEMS

1. Methane burns in air by the following reaction:



What mass of water is produced by burning 500 g of methane?

2. Propene burns in excess oxygen according to the following reaction.



a. How many moles of each CO_2 and H_2O are formed from 3.85 mol of propane?

b. If 0.647 mol of oxygen is used to burn propane, how many moles of each CO_2 and H_2O are produced? How many moles of C_3H_8 are consumed?

3. Chlorine gas can be produced in the laboratory by adding concentrated hydrochloric acid to manganese (IV) oxide in the following reaction:



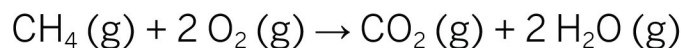
a. Calculate the mass of MnO_2 needed to produce 25 g of Cl_2 .

b. What mass of MnCl_2 is produced when 0.091 g of Cl_2 is generated?

→ STOICHIOMETRY ← PROBLEMS

Answers

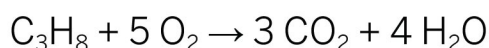
1. Methane burns in air by the following reaction:



What mass of water is produced by burning 500 g of methane?

$$500 \text{ g CH}_4 \times (1 \text{ mol CH}_4 / 16.01 \text{ g CH}_4) \times (2 \text{ mol H}_2\text{O} / 1 \text{ mol H}_2\text{O}) \\ \times (18.02 \text{ g H}_2\text{O} / 1 \text{ mol H}_2\text{O}) = 1126 \text{ g H}_2\text{O}$$

2. Propene burns in excess oxygen according to the following reaction.



a. How many moles of each CO_2 and H_2O are formed from 3.85 mol of propane?

$$3.85 \text{ mol C}_3\text{H}_8 \times (3 \text{ mol CO}_2 / 1 \text{ mol C}_3\text{H}_8) = 11.55 \text{ mol CO}_2$$

$$3.85 \text{ mol C}_3\text{H}_8 \times (4 \text{ mol H}_2\text{O} / 1 \text{ mol C}_3\text{H}_8) = 15.4 \text{ mol H}_2\text{O}$$

b. If 0.647 mol of oxygen is used to burn propane, how many moles of each CO_2 and H_2O are produced? How many moles of C_3H_8 are consumed?

$$0.647 \text{ mol O}_2 \times (3 \text{ mol CO}_2 / 5 \text{ mol O}_2) = 0.388 \text{ mol CO}_2$$

$$0.647 \text{ mol O}_2 \times (4 \text{ mol H}_2\text{O} / 5 \text{ mol O}_2) = 0.518 \text{ mol H}_2\text{O}$$

$$0.647 \text{ mol O}_2 \times (1 \text{ mol C}_3\text{H}_8 / 5 \text{ mol O}_2) = 0.129 \text{ mol C}_3\text{H}_8$$

3. Chlorine gas can be produced in the laboratory by adding concentrated hydrochloric acid to manganese (IV) oxide in the following reaction:



a. Calculate the mass of MnO_2 needed to produce 25 g of Cl_2 .

$$25 \text{ g Cl}_2 \times (1 \text{ mol Cl}_2 / 71 \text{ g Cl}_2) \times (1 \text{ mol MnO}_2 / 1 \text{ mol Cl}_2) \times (87 \text{ g MnO}_2 / 1 \text{ mol MnO}_2) = \\ 30.6 \text{ g MnO}_2$$

b. What mass of MnCl_2 is produced when 0.091 g of Cl_2 is generated?

$$0.091 \text{ g Cl}_2 \times (1 \text{ mol Cl}_2 / 71 \text{ g Cl}_2) \times (1 \text{ mol MnCl}_2 / 1 \text{ mol Cl}_2) \\ \times (125.84 \text{ g MnCl}_2 / 1 \text{ mol MnCl}_2) = 0.161 \text{ g MnCl}_2$$