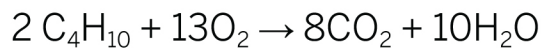


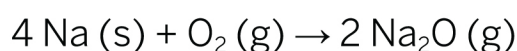
STOICHIOMETRY PROBLEMS

1. The combustion of a sample of butane, C_4H_{10} (lighter fluid), produced 2.46 grams of water.



- (a) How many moles of water formed?
- (b) How many moles of butane burned?
- (c) How many grams of butane burned?
- (d) How much oxygen was used up in moles?
- (e) How much oxygen was used up in grams?

2. Sodium metal burns in air according to the balanced reaction below.



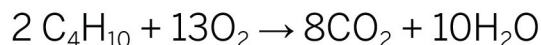
- (a) How many moles of oxygen are needed to react with 9.5 g of sodium completely?
- (b) How many grams of sodium are needed to produce 12.5 g of sodium oxide?

3. In the combustion of 54.5 g of butane (C_4H_{10}), how many grams of CO_2 are produced? Write and balance the equation before solving.

STOICHIOMETRY PROBLEMS

Answers

1. The combustion of a sample of butane, C_4H_{10} (lighter fluid), produced 2.46 grams of water.



(a) How many moles of water formed?

$$2.46 \text{ g } H_2O \times (1 \text{ mol } H_2O / 18 \text{ g } H_2O) = 0.137 \text{ mol } H_2O$$

(b) How many moles of butane burned?

$$0.137 \text{ mol } H_2O \times (2 \text{ mol } C_4H_{10} / 10 \text{ mol } H_2O) = 0.027 \text{ mol } C_4H_{10}$$

(c) How many grams of butane burned?

$$0.027 \text{ mol } C_4H_{10} \times (58.12 \text{ g } C_4H_{10} / 1 \text{ mol } C_4H_{10}) = 7.94 \text{ g } C_4H_{10}$$

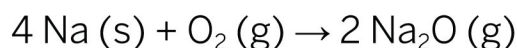
(d) How much oxygen was used up in moles?

$$0.137 \text{ mol } H_2O \times (13 \text{ mol } O_2 / 10 \text{ mol } H_2O) = 0.1781 \text{ mol } O_2$$

(e) How much oxygen was used up in grams?

$$0.1781 \text{ mol } O_2 \times (16 \text{ g } O_2 / 1 \text{ mol } O_2) = 2.85 \text{ g } O_2$$

2. Sodium metal burns in air according to the balanced reaction below.



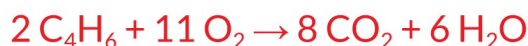
(a) How many moles of oxygen are needed to react with 9.5 g of sodium completely?

$$9.5 \text{ g Na} \times (1 \text{ mol Na} / 23 \text{ g Na}) \times (1 \text{ mol } O_2 / 4 \text{ mol Na}) = 0.103 \text{ mol } O_2$$

(b) How many grams of sodium are needed to produce 12.5 g of sodium oxide?

$$12.5 \text{ g Na}_2O \times (1 \text{ mol Na}_2O / 62 \text{ g Na}_2O) \times (4 \text{ mol Na} / 2 \text{ mol Na}_2O) \times (23 \text{ g Na} / 1 \text{ mol Na}) = 9.27 \text{ g Na}$$

3. In the combustion of 54.5 g of butane (C_4H_{10}), how many grams of CO_2 are produced? Write and balance the equation before solving.



$$54.5 \text{ g } C_4H_{10} \times (1 \text{ mol } C_4H_{10} / 58 \text{ g } C_4H_{10}) \times (8 \text{ mol } CO_2 / 2 \text{ mol } C_4H_{10}) \times (44 \text{ g } CO_2 / 1 \text{ mol } CO_2) = 178 \text{ g } CO_2$$