

# MARK SCHEME

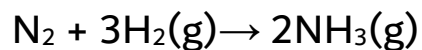
# GCSE

## CHEMISTRY

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## Gas Volumes

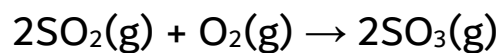
1. Find the volume of hydrogen gas that reacts with  $200 \text{ cm}^3$  of nitrogen gas measured at the same temperature and pressure.



volume of  $\text{H}_2 = 600 \text{ cm}^3$

Answer:  $600 \text{ cm}^3$

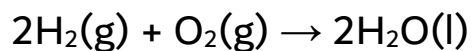
2. Find the volume of oxygen gas that reacts with  $10 \text{ dm}^3$  of sulfur dioxide gas measured at the same temperature and pressure.



volume of  $\text{O}_2 = 5 \text{ dm}^3$

Answer:  $5 \text{ dm}^3$

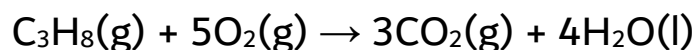
3. Find the volume of hydrogen gas that reacts with  $160 \text{ cm}^3$  of oxygen gas measured at the same temperature and pressure.



volume of  $\text{H}_2 = 320 \text{ cm}^3$

Answer:  $320 \text{ cm}^3$

4. Find the volume of  $\text{CO}_2$  gas formed (at room temperature and pressure) when  $10.0 \text{ g}$  of propane burns in oxygen.



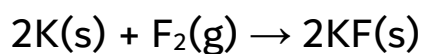
moles  $\text{C}_3\text{H}_8 = 10.0/44 = 0.227 \text{ mol}$

moles  $\text{CO}_2 = 3 \times 0.227 = 0.681 \text{ mol}$

volume  $\text{CO}_2 = 24 \times 0.681 = 16.4 \text{ dm}^3$

Answer:  $16.4 \text{ dm}^3$

5. Find the mass of potassium fluoride formed when 120 cm<sup>3</sup> of fluorine gas (at room temperature and pressure) reacts completely with potassium.



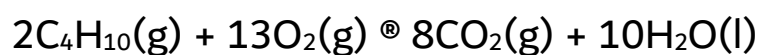
$$\text{moles F}_2 = 120/24000 = 0.00500 \text{ mol}$$

$$\text{moles KF} = 2 \times 0.00500 = 0.0100 \text{ mol}$$

$$\text{mass KF} = 58 \times 0.0100 = 0.580 \text{ g}$$

Answer: 0.580 g

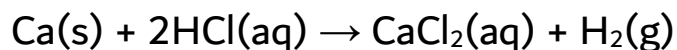
6. Find the volume of oxygen gas that reacts with 4.0 dm<sup>3</sup> of butane (C<sub>4</sub>H<sub>10</sub>) gas measured at the same temperature and pressure.



$$\text{volume of O}_2 = 26 \text{ dm}^3$$

Answer: 26 dm<sup>3</sup>

7. Find the volume of hydrogen gas (measured at room temperature and pressure) formed when 0.540 g of calcium reacts with hydrochloric acid.



$$\text{moles Mg} = 0.540/40 = 0.0135 \text{ mol}$$

$$\text{moles H}_2 = 0.0135 \text{ mol}$$

$$\text{volume H}_2 = 24 \times 0.0135 = 0.324 \text{ dm}^3$$

Answer:  $0.324 \text{ dm}^3$

8. Find the volume of carbon dioxide gas (measured at room temperature and pressure) formed when 1.50 g of calcium carbonate reacts with hydrochloric acid.



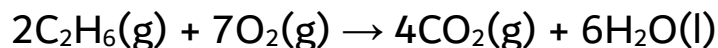
$$\text{moles CaCO}_3 = 1.50/100 = 0.0150 \text{ mol}$$

$$\text{moles CO}_2 = 0.0150 \text{ mol}$$

$$\text{volume CO}_2 = 24 \times 0.0150 = 0.360 \text{ dm}^3$$

Answer:  $0.360 \text{ dm}^3$

9. Find the volume of carbon dioxide gas (measured at room temperature and pressure) formed when 6.00 kg of ethane (C<sub>2</sub>H<sub>6</sub>) burns in oxygen.



$$\text{moles C}_2\text{H}_6 = 6000/30 = 200 \text{ mol}$$

$$\text{moles CO}_2 = 400 \text{ mol}$$

$$\text{volume CO}_2 = 24 \times 400 = 9600 \text{ dm}^3$$

Answer: 9600 dm<sup>3</sup>

10. Find the mass of the following gases (measured at room temperature and pressure).

a) 7.20 dm<sup>3</sup> of ammonia (NH<sub>3</sub>)

$$\text{moles NH}_3 = 7.20/24 = 0.300 \text{ mol}$$

$$\text{mass} = 17 \times 0.300 = 5.10 \text{ g}$$

Answer: 5.10 g

b) 480 cm<sup>3</sup> of nitrogen (N<sub>2</sub>)

$$\text{moles N}_2 = 480 / 24000 = 0.0200 \text{ mol}$$

$$\text{mass} = 28 \times 0.0200 = 0.560 \text{ g}$$

Answer: 0.560 g

c) 100 cm<sup>3</sup> of oxygen (O<sub>2</sub>)

$$\text{moles O}_2 = 100/24000 = 0.00417 \text{ mol}$$

$$\text{mass} = 32 \times 0.00417 = 0.133 \text{ g}$$

Answer: 0.133 g