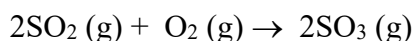


## Gas Volumes Q

- 1 3.0 dm<sup>3</sup> of sulfur dioxide are reacted with 2.0 dm<sup>3</sup> of oxygen according to the equation:



What volume of sulfur trioxide (in dm<sup>3</sup>) is formed? (Assume the reaction goes to completion and all gases are measured at the same temperature and pressure.)

- A 5.0                      B 4.0                      **C 3.0**                      D 2.0

- 2  $\text{H}_{2(\text{g})} + \text{Cl}_{2(\text{g})} \rightarrow 2\text{HCl}_{(\text{g})}$

Hydrogen and chlorine react according to the equation above. What will be the result of the reaction between 200 cm<sup>3</sup> of H<sub>2</sub> and 150 cm<sup>3</sup> of Cl<sub>2</sub>? (all gas volumes measured at the same temperature and pressure)

- A 350 cm<sup>3</sup> of HCl                      B 150 cm<sup>3</sup> of HCl and 50 cm<sup>3</sup> of H<sub>2</sub>  
 C 200 cm<sup>3</sup> of HCl and 50 cm<sup>3</sup> of Cl<sub>2</sub>                      **D 300 cm<sup>3</sup> of HCl and 50 cm<sup>3</sup> of H<sub>2</sub>**

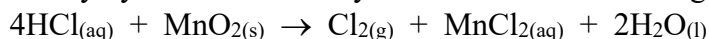
- 3 According to the equation:  $2\text{SO}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{SO}_{3(\text{g})}$   
 what volume of air (20 % O<sub>2</sub>) is required to react with 10 dm<sup>3</sup> of SO<sub>2</sub>?

- A 2 dm<sup>3</sup>                      B 5 dm<sup>3</sup>                      C 10 dm<sup>3</sup>                      **D 25 dm<sup>3</sup>**

- 4 Equal **volumes** of oxygen and hydrogen are reacted in a closed container. After the reaction is complete, the container will contain

- A water and oxygen only**                      B water and hydrogen only  
 C water only                      D water, hydrogen and oxygen

- 5 Chlorine was first prepared by by the reaction of hydrochloric acid with manganese(IV) oxide:



In a repetition of the original chlorine preparation, a solution of hydrochloric acid containing 14.6 g of hydrogen chloride reacted completely with manganese(IV) oxide.

- (a) Calculate how many moles of hydrogen chloride reacted. [1]

0.4

- (b) Calculate the volume of chlorine produced at 90KPa and 35<sup>o</sup>C. [2]

$$\text{Moles Cl}_2 = 0.1$$

$$V = 2.85\text{dm}^3$$

- 6 A 12.6 g sample of propene undergoes combustion:  $2\text{C}_3\text{H}_{6(\text{g})} + 9\text{O}_{2(\text{g})} \rightarrow 6\text{CO}_{2(\text{g})} + 6\text{H}_2\text{O}_{(\text{l})}$

Calculate the volume of carbon dioxide that would be produced from this combustion at 100KPa pressure and 20<sup>o</sup>C. [2]

$$\text{Moles propene} = 0.3$$

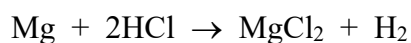
$$\text{Moles CO}_2 = n = 0.9$$

$$V = 21.92\text{dm}^3$$

## Gas Volumes Q

- 7 A 1.20 dm<sup>3</sup> sample of helium gas has a pressure of 4.67 x 10<sup>4</sup> Pa at 300 K. What pressure will the sample exert if the volume is changed to 1.60 dm<sup>3</sup> and the temperature is changed to 400 K?  
**A 4.67 x 10<sup>4</sup> Pa**    B 3.47 x 10<sup>4</sup> Pa    C 2.63 x 10<sup>4</sup> Pa    D 8.27 x 10<sup>4</sup> Pa
- 8 The temperature of 420 cm<sup>3</sup> hydrogen gas is changed from 20.0 °C to -20 °C at constant pressure. What is the final volume?  
**A 363 cm<sup>3</sup>**    B 392 cm<sup>3</sup>    C 406 cm<sup>3</sup>    D 486 cm<sup>3</sup>
- 9 2.00 mol of helium at a temperature of 27 °C and a pressure of 3.00 atm (304 kPa) may be contained in a vessel of what volume?  
 A 6.1 x 10<sup>-2</sup> dm<sup>3</sup>    B 1.48 dm<sup>3</sup>    C 4.48 dm<sup>3</sup>    **D 16.4 dm<sup>3</sup>**
- 10 A 0.365 g sample of a common anaesthetic has a volume of 225 cm<sup>3</sup> at 35 °C and 98.6 kPa. What is its molar mass?  
**A 42.1**    B 40.8    C 39.9    D 4.79
- 11 A certain gas has a density of 2.35 g dm<sup>-3</sup> at 30 °C and 96 kPa (0.95 atm). The molar mass of this gas will be closest to which of the following?  
 A 50    **B 60**    C 70    D 80

- 12 Magnesium metal reacts with hydrogen gas according to the following equation:



When excess hydrochloric acid is reacted with magnesium 100 cm<sup>3</sup> of hydrogen gas is collected at a temperature of 20 °C and a pressure of 1.08 x 10<sup>5</sup> Pa.

- (a) Calculate the number of moles of hydrogen gas produced. [2]

4.43x10<sup>-3</sup>

- (b) Calculate the mass of magnesium that reacted. [1]

0.106g

- 13 When manganese(IV) oxide (MnO<sub>2</sub>) is heated strongly it decomposes:



When 10.00 g of MnO<sub>2</sub> is heated what volume of oxygen (collected at 18 °C and 1.05 x 10<sup>5</sup> Pa) is produced? [3]

Moles MnO<sub>2</sub> = 0.115

Moles O<sub>2</sub> = 0.0383

Volume O<sub>2</sub> = 883cm<sup>3</sup>