Marks
5

- Calcium carbide, CaC_2, reacts with water to produce a gas and a solution containing OH^- ions. A sample of CaC_2 was treated with excess water and the resulting gas was collected in an evacuated 5.00 L glass bulb. At the completion of the reaction, the pressure inside the bulb was 1.00×10^5 Pa at a temperature of 26.8 °C. Calculate the amount (in mol) of the gas produced.

Answer:

Given that the mass of the gas collected was 5.21 g, show that the molar mass of the gas is 25.9 g mol^{-1}.

Suggest a molecular formula for the gas and write a balanced equation for the reaction that occurred.

Marks 3

- A sample of gas is found to exert a pressure of 7.00×10^4 Pa when it is in a 3.00 L flask at 10.00 °C. Calculate the new volume if the pressure becomes 1.01×10^5 Pa and the temperature is unchanged.

Answer:

Calculate the new pressure if the volume becomes 2.00 L and the temperature is unchanged.

Answer:

Calculate the new pressure if the temperature is raised to 50.0 °C and the volume is unchanged, *i.e.* still 3.00 L.

Answer:

	Marks
• A cylinder fitted with a piston contains 5.00 L of a gas at a pressure of 4.0×10^5 Pa. The entire apparatus is maintained at a constant temperature of 25 °C. The piston is released and the gas expands against a pressure of 1.0×10^5 Pa. Assuming ideal gas behaviour, calculate the final volume occupied by the gas.	**3**

Answer:

Calculate the amount of work done by the gas expansion.

Answer:

Page Total:

- The average speed of a gaseous neon atom at 300 K is 609 m s^{-1}. What is the average speed of a helium atom at the same temperature?

2

Answer:

- Why is helium instead of nitrogen mixed with oxygen in deep sea diving? Explain the origin of any differences in relevant properties. **2**

• A doctor recommends to a pregnant woman that she takes an iron supplement of 50 mg (as Fe^{2+}) daily. To achieve this, what mass (to the nearest mg) of iron(II) gluconate-2-water, $FeC_{12}H_{22}O_{14}\cdot 2H_2O$, would be required?	**Marks 3**
• What is the mass of each of the following at 298 K and 101 kPa pressure?	**4**
(i) argon (24.5 litre)	
(ii) water (24.5 litre)	
(iii) chlorine (12.25 litre)	
(iv) zinc (1.00 mole)	