



Physical Chemistry-Properties of Gases

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1st Exam-paper B

Q1: Circle the right answer for all of the following:

(50 degree)

1: Carbon dioxide is classified as a .

Answer: a) toxic gas b) ideal gas c) real gas d) heavy gas

$$V = 2 \text{ dm}^3$$

$$P = 0.5 \text{ atm}$$

SIS

2: A 2 dm³ container contains a certain amount of gas at 0.5 atm pressure. The gas is transferred to another vessel of volume and the pressure is 0.25 bar. What should be its Volume?Answer: a) 0.40 atm b) 0.40 dm³ c) 0.4 bar d) 4 bar

$$V = 400 \text{ dm}^3$$

$$T = 273 + 130 = 403 \text{ K}$$

$$P = 0.5 \text{ atm}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$0.5 \times 2 = P_2 \times V_2$$

$$V_2 = \frac{0.5 \times 2}{0.25} = 4 \text{ dm}^3$$

3: A gas occupies 400 dm³ at 130 °C and 76 cmHg pressure. What would be its volume at STP?Answer: a) 270 L b) 207 dm³ c) 207 m³ d) 204 cm³4: Calculate the weight of H₂ (2.00 g.mol⁻¹) in a 2 L cylinder at 2.5 atm and 27 °C.Answer: a) 0.40 mol⁻¹ b) 0.40 g c) 0.40 mol g⁻¹ d) 0.4 g mol⁻¹5: Calculate the number of moles for CO₂ in a 10 L cylinder at 8 bar and 27 °C.Answer: a) 3.25 mmol b) 3.00 mol c) 3.00 L d) 2.99 mol

6: According to Graham's law the lightest gas is?

Answer: a) H₂ b) O₂ c) N₂ d) CO₂

7: According to the Boyle's law the pressure of a gas is inversely proportional with?

Answer: a) mol b) T c) R d) V8: If a gas has $V_m \neq V^0 m$ then this means one of the following?Answer: a) real b) noble c) ideal d) heavy

9: If RT > pV this means the forces dominated are?

Answer: a) attraction b) repulsion c) Van der Waal's d) no one of these

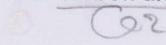
10: According to Gay-Lussac's law the volume of the gas is?

Answer: a) constant b) variable c) equal to zero

d) equal to 22.4 L

Q2: Under the same conditions of temperature and pressure, how many times faster will hydrogen effuse

compare to carbon dioxide.



top is diff. with air
S. E. S. H. oxygen
CO₂ in

(25 degree)

Q3: Calculate the density of carbon dioxide (44 g mol⁻¹) at STP.

$$d = \frac{wt}{V}$$

(25 degree)

$$\textcircled{2} \quad V = 2 \text{ dm}^3, P = 0.5 \text{ atm}, P_2 = 0.25 \text{ bar} \rightarrow 0.25 \text{ atm}$$

$$PV_1 = P_2 V_2 \rightarrow 0.5 \text{ atm} \times 2 \text{ dm}^3 = 0.25 \text{ atm} \times V_2 \rightarrow V_2 = \frac{0.5 \times 2 \text{ dm}^3}{0.25} = 4 \text{ dm}^3$$

$$\textcircled{3} \quad V = 400 \text{ dm}^3, T = 130 + 273 = 403 \text{ K}, P = 76 / 760 = 0.1 \text{ atm}$$

$$PV = nRT \rightarrow 0.1 \text{ atm} \times 400 \text{ L} = n \times 0.082 (\text{L.atm/mol.K}) \times 403 \text{ K}$$

$$n = \frac{0.1 \times 400}{0.082 \times 403} = 114 \text{ mol}$$

$$P = 1 \text{ atm} \quad \text{at } 25^\circ\text{C}$$

$$T = 25^\circ\text{C}, V = 22 \text{ L}, R = 0.082$$

$$PV_2 = nRT \rightarrow \frac{114 \text{ mol} \times 0.082 \text{ L.atm/mol.K} \times 288 \text{ K}}{1 \text{ atm}}$$

$$V_2 = 270 \text{ L}$$

$$\textcircled{4} - M.wt = 2.00 \text{ g/mol}, V = 2 \text{ L}, P = 2.5 \text{ atm}$$

$$T = 27^\circ\text{C} + 273 = 300 \text{ K}$$

$$PV = nRT \rightarrow 2.5 \text{ atm} \times 2 \text{ L} = \frac{wt}{M.wt} \times 0.082 (\text{L.atm/mol.K}) \times 300 \text{ K}$$

$$5 = \frac{wt}{2.00 \text{ g}} \times 246$$

$$wt = \frac{10}{246} =$$

$$\textcircled{5} - Q_2 - T_H / T_{CO_2} = (M_{H_2} / M_{CO_2}) \frac{12 + (16 \times 2)}{12 + 32} = 44$$

$$25 / 25 = (8 / 38)$$

$$+ 50.05 ?$$

$$Q_2 \frac{5}{25}$$

$$Q_3 - P = 1 \text{ atm}, V = 22 \text{ L}, T = 25^\circ\text{C}, R = 0.082, n = 1$$

$$PV = nRT \rightarrow PV = \frac{wt}{M} RT$$

$$PM = \frac{wt}{V} RT$$

STP means $T = 0^\circ\text{C}$
OR 273

~~$$1 \text{ atm} \times 44 \text{ g/mol} = \frac{wt}{V} 0.082 \text{ L.atm/mol.K} \times 288 \text{ K}$$~~

$$d = 1.8 \frac{\text{kg}}{\text{L}}$$

$$Q_3 \frac{15}{25}$$