



Physical Chemistry-Properties of Gases



20-01-2021
Wed
4/5
100
Forty five
Dr. Abduljabbar I. R. Rushdi
18

Name of a student د. ل. ع. س. علوان Signature _____ No. 18

University of Mustansiriyah

1st Semester-2021

Department of Chemistry

1st Exam-paper A

Q1: Circle the right answer for all of the following: (50 degrees)

1: A vessel of 100 L capacity contains a certain amount of gas at 50 °C and 0.5 bar pressure. The gas is transferred to another vessel has a pressure of 5 bar at 50 °C. What should be the volume of the vessel?

Answer: a) 10 bar b) 10 dm³ c) 0.1 dm³ d) 0.1 bar

2: What is the right formula of the Graham's law of effusion?

Answer: a) $\frac{r_1}{r_2} = \left(\frac{r_2}{M_1}\right)^{\frac{1}{2}}$ b) $\frac{r_1}{r_2} = \left(\frac{M_1}{M_2}\right)^{\frac{1}{2}}$ c) $\frac{d_1}{d_2} = \left(\frac{M_2}{M_1}\right)^{\frac{1}{2}}$ d) $\frac{r_1}{r_2} = \left(\frac{d_2}{M_1}\right)^{\frac{1}{2}}$

3: Calculate Z for a gas if T is 22 °C, V_m is 5 dm³ mol⁻¹ and p is 3 bar.

Answer: a) 0.62 °C b) 6.2 K c) 0.62 d) 6.2

4: Calculate the molar mass of O₂ (16 g.mol⁻¹) in a 4 L cylinder at 9 atm and 281 K.

Answer: a) 32 g.mol⁻¹ b) 32 g c) 50 g.mol⁻¹ d) 50 g

5: Calculate the V^om of a gas, if p is 1 atm and temperature is 32 °C.

Answer: a) 25 K b) 25 atm c) 25 L mol⁻¹ d) 25 mol

6: If the attraction forces are negligible, that means the gas is?

Answer: a) real b) noble c) perfect d) expands

7: According to the Dalton's law the unit of the mole fraction is?

Answer: a) mol b) dm³ c) psi d) free of units

8: What is the partial pressure of a gas in a mixture if the X_i is 0.1, and under atmospheric pressure?

Answer: a) 760 mmHg b) 10 bar c) 0.1 atm d) 1 bar

9: If the value of R is 0.082 then the unit of pressure is?

Answer: a) Pascal b) mmHg c) Psi d) bar

10: What is the right equation of one of the following?

Answer: a) p_rp_c = p b) p_rp = p_c c) p_r/ p_c = p d) p_r = p_cp

Q2: Calculate the mass of 335 mL of sulfur dioxide (64 g mol⁻¹) measured at 37 °C and 745 mm Hg pressure. (25 degrees)

Q3: Calculate the volume of 0.25 g of oxygen at 25 °C and 742 mm Hg pressure. (25 degrees)

$$Q2 / PV = nRT$$

$$\underline{Q2} \quad PV = \frac{m}{M} RT$$

$$m = \frac{PV}{RT} M$$

$$m = \cancel{1 \text{ atm}} \times \cancel{335 \text{ mL}}$$

$$64 \text{ g/mol} \times 0.082 \text{ L} \cdot \text{atm/mol} \cdot \text{K} \times 310 \text{ K}$$

$$m = \cancel{0.27 \text{ g}}$$

$Q2 \frac{10}{25}$

$$P = 745 \text{ mm Hg}$$

$$= \frac{760}{745} \Rightarrow \cancel{1 \text{ atm}}$$

? = units

$$Q3 / PV = nRT$$

$$PV = \frac{m}{M} RT$$

$$\cancel{1 \text{ atm}} V = \frac{0.25}{16} \times 0.082 \text{ L} \cdot \text{atm/mol} \cdot \text{K} \times 298 \text{ K}$$

$$\cancel{1 \text{ atm}} V = 0.015 \text{ mol} \times 0.082 \text{ L} \cdot \text{atm/mol} \cdot \text{K} \times 298 \text{ K}$$

$$1 \text{ atm} V = 0.36 \text{ L} \cdot \text{atm}$$

$$V = \cancel{0.36} \text{ L}$$

$Q3 \frac{10}{25}$