



Physical Chemistry-Properties of Gases



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Jabb
Dr. Abduljabbar Rusydi

عبد عادل عبد الستار

Name of a student Signature No. 11

University of Mustansiriyah

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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^o_m 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

$V = 335 \text{ mL}$

64 g mol^{-1}

$T = 37^\circ\text{C}$

$P = 745 \text{ mmHg}$

$T_K = t(^{\circ}\text{C}) + 273$

$= 37 + 273$

$= 310 \text{ K}$

$PV = nRT$

$745 \text{ } \overset{?}{\times} 335 \text{ mL} = 64 \text{ g/mol} \times 0.082 \times \overset{?}{\frac{2}{310}}$

$\text{Q2 } \frac{\text{g}}{\text{mL}}$

? = units

Q3

$V = ?$

$m = 0.25 \text{ g}$

$T = 25^\circ\text{C}$

$P = 742 \text{ mmHg}$

$n = \frac{m}{M}$
 $PV = nRT$

$\text{Q3 } \frac{\text{g}}{\text{L}}$

$V = \frac{mRT}{P \times M}$

$T_K = t^{\circ}\text{C} + 273$

$= 25^{\circ}\text{C} + 273$

$= 298 \text{ K}$

$V = \frac{0.25 \text{ g} \times 0.082 \text{ mol}\cdot\text{L}\cdot\text{K}^{-1}\cdot\text{atm} \times 298 \text{ K}}{742 \text{ mmHg} \times M}$

$V = \frac{6.109}{742} = 0.0082 \text{ L}$