



Physical Chemistry-Properties of Gases



20-01-2021 Wed 79/100 Faculty Name
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1st Semester-2021

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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 05

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

Answer: a) $\frac{r_1}{r_2} = \left(\frac{M_2}{M_1}\right)^{\frac{1}{2}}$ 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) $\frac{r_1}{r_2} = \left(\frac{d_2}{M_1}\right)^{\frac{1}{2}}$ 05

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 05

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 05

5: Calculate the V_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 05

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

Answer: a) real b) noble c) perfect d) expands 05

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 05

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 05

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

Answer: a) Pascal b) mmHg c) Psi d) bar 05

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 05

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)

Sol/ $V = \frac{335 \text{ mL}}{1000} \text{ L}$ $M.W. = 0.4 \text{ g.mol}^{-1}$ $1 - 37^\circ \text{C} + 273 = 310 \text{ K}$ $P = \frac{745}{760} = 0.98 \text{ atm}$

Where is the result $w = ?$

$273 + 37 = 310 \text{ K}$

$PV = nRT$

$PV = \frac{w}{M.W.} RT$

$0.98 \times 0.335 = \frac{w}{0.4} \times 0.082 \times 310$

$Q_2 \frac{22}{25}$

~~0.335~~
 $0.328 = w$ 0.3778 $w = 0.82 \text{ g}$

Sol/ $V = ?$ $w = 25$ $T = 25 + 273$

$M.W. = 16 \times 2$

$P = \frac{742}{760} \text{ atm}$

$PV = nRT$
 $V = \frac{w}{M.W.} \cdot \frac{RT}{P}$

$Q_3 \frac{20}{25}$

$V = \frac{0.25 \times 0.082 \times 298}{0.97 \times 760}$ $\rightarrow V = \frac{0.0078}{0.77}$

$V = 1.96 \text{ L}$
 0.196 L