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University of Mustansiriyah

Department of Chemistry

1st Semester-2021

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   5/5

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

Answer: a) $\frac{r_1}{t_2} = \left(\frac{r_2}{M_1}\right)^{\frac{1}{2}}$ 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) $\frac{r_1}{r_2} = \left(\frac{d_2}{M_1}\right)^{\frac{1}{2}}$ 5/5

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   5/5

4: Calculate the molar mass of O_2 (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   0/5

45/50
Q1 = 50

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   5/5

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

Answer: a) real   b) noble   c) perfect   d) expands   5/5

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   5/5

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   5/5

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

Answer: a) Pascal   b) mmHg   c) Psi   d) bar   5/5

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

Answer: a) $p_r p_c = p$ 5/5   b) $p_r p = p_c$ c) $p_r / p_c = p$ d) $p_r = p_c p$

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)

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Best wishes

Dr Abduljabbar I. R. Rushdi

Q2/

V = 335 mL   M = 64 g/mol   T = 37°C   P = 745 mmHg

T = 37 + 273 = 310 K $\frac{335 \, mL}{1000}$ = 0.335

P = $\frac{745}{760}$ = 0.98 atm

PV = nRT

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

You should convent (mL) to (L)

0.98 atm × 335 mL [0.335] = $\frac{m}{64 \, g/mol}$ × (0.1082 (L·mol/atm·K)) × 310 K

328.3 mL = $\frac{m}{64 \, g}$ × (0.082 L) × 310

21011.2 mL·g = m · 25.42 L

$Q_2 \frac{25}{25}$

m = $\frac{21011.2 \, mL/g}{25.42 L}$ → $\frac{2101.2 \, mL}{1000 L}$ = 21.0112 L·g   not L/g

m/M = $\frac{21.0112 L/g}{25.42 L}$ = 0.826 g

Q3 NO ANSWER $Q_3 \frac{0}{25}$

Q3

$P = 742\, mmHg \quad T = 25°c \qquad m = 0.25g$

$P = \dfrac{742?}{760?} = 0.97\, atm$

? ≡ units

$T = 25? + 273 = 298\, k$

?

$PV = nRT$

$0.97/V = \dfrac{m}{M}\; 0.082(L.mol/atm.K) \times 298K$ ~atm~

?

$0.97 \cdot V = 0.25\; 0.082(L.mol) \cdot 298$

Where is molar mass of O_2?!

$V = \dfrac{0.25 \times 23.698\,(L.mol)}{0.97}$

$O_3 \; \dfrac{10}{25}$

$V = 6.10\, 2\, L$