F33

Physical Chemistry_Chpt_One_Properties of Gases

Name of a student Sozan mahmood kareem Signature ---------- No. ----------

University of Mustansiriyah — **1st Semester-2021**

Department of Chemistry — **1st Exam-paper F**

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

1: According to van der Waal's corrections if $V_{Real} < V_{Perfect}$ of any gas that means the gas has:

Answer: a) non-polar particles b) polar particles **c) small particles** d) big particles

2: Calculate the weight of CO_2 gas (44 g mol^{-1}) in a 0.5 × 10^4 mL cylinder at 20 x 10^2 kPa and 25 °C.

Answer: a) 180 g mol^{-1} b) 180 g **c) 180 mol** d) 180 kg

3: Calculate the density of CO_2 placed in a 22.4 × 10^3 mL cylinder at 20 × 10^2 kPa and 298 K.

Answer: a) 36.06 kg L^{-1} b) 36.06 g L^{-1} c) 36.06 g **d) 36.06 L^{-1}**

4: According to Graham's law the heaviest gas has?

Answer: **a) low rate** b) high rate c) middle rate d) low density

5: A gas occupies 20 dm^3 at 90 °C and 760 torr pressure. What would be its volume at STP?

Answer: **a) 15.04 mL** b) 15.04 dm^3 c) 15.04 L^{-1} d) 15.04 dm^{-3}

6: A vessel contains a certain amount of gas at 80 × 10^5 Pa. The gas is transferred to another tank 20 dm^3 with pressure of 20 × 10^5 Pa. What should be its volume?

Answer: **a) 0.5 L** b) 0.5 Pa L c) 0.5 Pa dm^3 d) 0.5 L^{-1}

7: According to Avogadro's law n is directly proportional with volume at constant?

Answer: a) p & V **b) T & p** c) T & V d) p & n e) R & P

8: Attractive and repulsive forces between particles are present in a?

Answer: a) perfect gas b) non-ideal gas **c) ideal gas** d) noble gas

9: It can follow the direct proportional between temperature and volume through the law of

Answer: a) Van der Waal b) Graham c) Charles **d) Gay-Lussac**

10: The mol fraction of atmospheric pressure is equal to?

Answer: a) zero **b) one** c) two d) three

Q2: The following data have been observed for 10000 mg of CO_2 gas at 273 K. Calculate the best value of the molar mass of CO_2. **(25 points)**

$p/10^2$ kPa	1.00	2.00	3.00
V/L	4.00	7.50	11.75

Q3: A perfect gas undergoes isothermal expansion, which increases its volume by 2.48 dm^3. The p_i and V_i of the gas are 2 × 10^2 kPa and 2.14 dm^3, respectively. Calculate the p_f of the gas in (i) bar, (ii) torr. **(25 points)**

Thur_11/11/2021 — Best wishes — Dr Abduljabbar I. R. Rushdi

T = 273 K

Q2:-

molar mass = ?

? = units

$PV = nRT$

$1.00 \times 4.00 = n \times 0.082 \times 273$?

$n_1 = \frac{1.00 \times 4.00}{0.082 \times 273} \Rightarrow n = \frac{4}{22.386} = 0.1786 \text{ mole}$

$PV = nRT$

$2.00 \times 7.50 = n \times 0.082 \times 273$

$n_2 = \frac{2.00 \times 7.50}{0.082 \times 273} = \frac{15}{22.386} \Rightarrow n_2 = 0.67006 \text{ mole}$

$PV = nRT$

$3.00 \times 11.75 = n \times 0.082 \times 273$

$n_3 = \frac{3.00 \times 11.75}{0.082 \times 273} \Rightarrow n_3 = \frac{35.25}{22.386} \Rightarrow n_3 = 1.5764 \text{ mole}$

Next step is to find the best molar mass?

Q2 $\frac{15}{25}$

Q3 $V = 2.48 \text{ dm}^3$

$P_i = 2 \times 10^2 \text{ kPa}$

$V_i = 2.14 \text{ dm}^3$

P_F = الضغط النهائي = ?

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

$\frac{2 \times 10^2}{2.48} = \frac{P_2}{2.14}$ → is not V_f

Q3 $\frac{5}{25}$

$P_F = \frac{2 \times 10^2 \times 2.14}{2.48} \rightarrow P_F = 1.725 \times 10^2 \text{ atm}$

① 1 bar $P_F = 1.725 \times 10^5 \text{ bar}$

② torr $\Rightarrow P_F = \frac{1.725 \times 10^2}{760} \rightarrow P_F = 0.00226 \text{ torr}$