Physical Chemistry_Chpt_One_Properties of Gases

Name of a student ---------- Signature ---------- No. ----------

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

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

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

1: If a gas has polar particles then the difference between the volume of this gas is:

Answer: a) $V_{Real} > V_{Perfect}$ b) $V_{Real} < V_{Perfect}$ c) $V_{Real} = V_{Perfect}$ d) $V_{Real} \neq V_{Perfect}$

2: A gas occupies 60×10^3 mL at 150 °C and 760 mmHg pressure. What would be its volume at STP?

Answer: a) **38.7 mL** b) **38.7** dm^3 c) **38.7** L^{-1} d) **38.7** dm^{-3}

3: Calculate the weight of H_2O gas (18 $g.mol^{-1}$) in a 5 L cylinder at 10×10^2 kPa and 373 K.

Answer: a) **29.40 g** mol^{-1} b) **29.40 g** c) **29.40 mol** d) **29.40 kg**

4: Calculate the density of H_2O placed in a 22400 mL cylinder at 10^5 Pa and 0 °C.

Answer: a) **0.804 kg** L^{-1} b) **0.804 g** L^{-1} c) **0.804 g** d) **0.804** L^{-1}

5: According to Graham's law the heaviest gas is?

Answer: a) H_2O b) CH_4 c) NH_3 d) Cl_2

6: A tank contains a certain amount of gas at 10^5 Pa. The gas is transferred to another tank 40 dm^3 with pressure of 200×10^3 Pa. What should be its volume?

Answer: a) **80 L** b) **80 Pa L** c) **80 Pa** dm^3 d) **80** L^{-1}

7: According to Boyle's law the pressure of a gas is inversly proportional with?

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

8: The difference between real and ideal gas, that the real gas interested in?

Answer: a) V & p b) V & T c) p & n d) T & p

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

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

10: The behaviour of real gas is ideal when the value of Z is equal to

Answer: a) $V_m < V^O_m$ b) $V_m > V^O_m$ c) $V_m = V^O_m$ d) $V_m \neq V^O_m$

Q2: The following data have been observed for 800 mg of nitrogen gas at 273 K. Calculate the best value of the molar mass of N_2. **(25 points)**

$p/10^5$ Pa	0.750	0.500	0.200
V/dm^3	3.0	4.5	7.0

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm^3. The p_f and V_f of the gas are 2×10^2 kPa and 2.14 dm^3, respectively. Calculate the $p_{original}$ of the gas in (i) bar, (ii) torr. **(25 points)**

Wed_10/11/2021 **Best wishes** **Dr Abduljabbar I. R. Rushdi**

Q2/ m = 800 mg = 0.8 g , t = 273 K , M ?

1- P = 0.750 , V = 3.0

$PV = nRT \Rightarrow n = \frac{RT}{PV} = \frac{0.082 * 273}{0.750 * 3} = \frac{19.434}{2.25} = 8.63 \text{ mol}$

$M = \frac{m}{n} = \frac{80}{8.63} = 9.26 \text{ g/mol}$

2- P = 0.500 , V = 4.5

$n = \frac{RT}{PV} = \frac{0.082 * 273}{0.500 * 4.5} = \frac{19.434}{2.25} = 8.63 \text{ mol}$

$M = \frac{m}{n} = \frac{80}{8.63} = 9.26 \text{ g/mol}$

3- $n = \frac{RT}{PV} = \frac{0.082 * 273}{0.200 * 7} = 13.8 \text{ mol}$

$M = \frac{80}{13.8} = 5.79 \text{ g/mol}$

Q3/ $P_1V_1 = P_2V_2 \Rightarrow P_1 = \frac{P_2V_2}{V_1}$

$\frac{P_1}{P_2} = \frac{V_2}{V_1} = \frac{P_1}{2 \times 10^2} = \frac{1.80}{2.14}$

$P_1 = \frac{428}{1.80} = 237.7 \text{ atm}$

$= 0.5$