Physical Chemistry_Chpt_One_Properties of Gases

Name of a student Jouns Mohammed Khalifa Signature ---------- No. ----

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

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

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)

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

Q-2-

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

$M = \frac{mRT}{P*V}$? ≡ units

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

$= \frac{800}{28}$

$= 28.5$

① $= \frac{28.5 * 0.082 * 273}{0.750 * 3} = \frac{638.0}{2.25} = 283.5$

② $M = \frac{nRT}{P \times V} = \frac{28.5 \times 0.082 \times 273}{0.500 \times 4.5} = \frac{638.0}{2.25} = 283.5$

③ $M = \frac{nRT}{P \times V} = \frac{28.5 \times 0.082 \times 273}{0.200 \times 7} = \frac{638.0}{1.4} = 455.7$

10/25 Q2

Q-3

$P_1 * V_1 = P_2 * V_2$

$2 * 10^3 * 1.80 = P_2 * 2.14$

$P_2 = \frac{200 \times 1.80}{2.14} = \frac{360}{2.14} = 168.2$ KPa

10/25 Q3

168.2 KPa ÷ 1000 = 0.1682 bar

168.2 KPa ÷ 760 = 0.221 Torr