Physical Chemistry_Chpt_One_Properties of Gases

Name of a student Aya Abd Ali Signature ---------- No. 27

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

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

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 $M_{N_2} = 2x$

$m = 800mg \times \frac{800}{1000} \Rightarrow m = 8g$ (0.8)

$T = 273K$

$V =$

$P =$

$n = \frac{8g}{M}$? = units

$10 = \frac{8g}{M}$ for N_2 28 g/mol

$M = \frac{8}{10}$

① $M = 0.8$?

① $PV = nRT$

$0.75 \times 3.0 = n \times 0.082 \times 273$

$n = \frac{0.75 \times 3.0}{0.082 \times 273}$ $n = \frac{2.25}{22.3}$ $n = 10.0$

$M = 0.8$?

② $P_2 V_2 = nRT$

$0.500 \times 4.5 = n \times 0.082 \times 273$

$n = \frac{0.500 \times 4.5}{0.082 \times 273}$ $\frac{2.25}{22.3}$ $n = 10$ $m = 0.8$?

③ $PV = nRT$

$n = \frac{0.200 \times 7.0}{0.082 \times 273}$ $\frac{1.4}{22.3}$ $n = 0.06$ $m = 133$

Q3

$P_1 = ?$

$V_1 = 2.14\ dm^3 \Rightarrow 2.14\ dm^3 \times 10^{-3} L \Rightarrow 2.14 \times 10^{-3} L$

$P_2 = 2 \times 10^2\ kPa \Rightarrow 2 \times 10^2\ kPa = \frac{2 \times 10^2}{100}\ Pa \Rightarrow 2\ Pa$

$V_2 = 1.80\ dm^3 \Rightarrow 1.80\ dm^3 \times 10^{-3} \Rightarrow 1.80 \times 10^{-3} L$

$V_1 = 2.14 - 1.8$

$V_1 = 0.34$

$P_1 V_1 = P_2 V_2$

$P_1\ 2.14 \times 10^{-3} = 2 \times 0.34 \times 10^{-3}$

$P_1 = \frac{2 \times 0.34}{2.14}$

$P_1 = \frac{0.68 \times 10^{-3}}{2.14}$ 10^{-3}

$P_1 = 0.46\ Pa$ $0 = 0.46 Pa \Rightarrow 0.46 Pa\ 760 for$

Q2 15/25

Q3 10/25