F25

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 €**

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**

$V = 1.80\ dm^3$, $P = 2 \times 10^2\ kPa$, $V_2 = 2.14\ dm^3$ Q3

① يريدها بوحدة bar احول $P = 2 \times 10^2\ kPa$ الى bar

$$P\ 2\times10^2\ kPa \times \frac{1.01325\ Par}{101325\ kPa} \qquad P = 2\ bar$$

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

$$\frac{2}{1.80} = \frac{P_2}{2.14}$$

$$P_2 \times 1.80 = 4.28 \Rightarrow P_2 = \frac{4.28}{1.80} = 2.37\ \boxed{bar}$$

① يريدها بوحدة torr

$$P_2 = 2\times10^2 \times 760 = 1520\ tor$$

$M = 800\ mg \Rightarrow$ نحولها لـ g $M = 800 \times 1000$ $M = 8\times10^5$, $T = 273K$ ① / Q2

$P_1 = 0.75$, $V = 3.0$

$$n = \frac{M}{w.t} \Rightarrow \frac{8\times10^5}{17} = 0.47\times10^5$$

$$PV = nRT \Rightarrow PM = nRT$$

$0.75 \times 3 =$

$$M = \frac{nRT}{P}$$

① $$M = \frac{0.47\times10^5 \times 0.082 \times 273}{0.75} = 14.02856\ mol/g$$

② $$M = \frac{0.47\times10^5 \times 4.5 \times 273}{0.500} = 577.395\ mol/g$$

② $$M = \frac{0.47\times10^5 \times 7.0 \times 273}{0.200} = 4490\ mol/g$$

g/mol

The right unit