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) $V_m < V^0_m$ b) $V_m > V^0_m$ c) $V_m = V^0_m$ d) $V_m \neq V^0_m$

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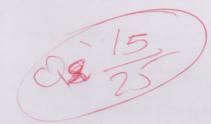
Wed_10/11/2021   Best wishes   Dr Abduljabbar I. R. Rushdi

Q $\boxed{2}$

① $Pv = nRT \Rightarrow Pv = \frac{m}{M} RT$

$M = \times \frac{Pv}{mRT} \Rightarrow \dfrac{0.750 \, atm \times 0.003 \, L}{0.8g \times 0.082 \, mol \cdot g/atm \cdot k \times 273 k}$

$M = 1.256 \times 10^4$ ~~mol~~ g/mol

② $M = \frac{Pv}{mRT} \Rightarrow \dfrac{0.5 \, atm \times 4.5 \, L}{0.8g \times 0.082 \, mol \cdot g/atm \cdot k \times 273 k}$ $\frac{g/mol}{mol} = 0.012 \, mol$

③ $M = \frac{Pv}{mRT} = \dfrac{0.2 \, atm \times 7 \, L}{0.8g \times 0.082 \, mol \cdot g /atm \cdot k \times 273 k}$ $= 0.0078 \, mol$

Q $\boxed{3}$

$Q_2 \quad \frac{15}{25}$

$Q_3 \quad \frac{0}{25}$ NO ANSWER why?