F22

Physical Chemistry_Chpt_One_Properties of Gases

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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/

① $PV = \frac{wt}{mwt} RT$

$0.750 \times 3.0 = \frac{wt}{800} \times 0.082 \times 273$

$wt = 2.25\ gm$

Q2 10/25

② $PV = \frac{wt}{mwt} RT$

$wt = \frac{2.25 \times 800}{0.82 \times 273} = 8.4\ gm$

③ $PV = \frac{wt}{mwt} RT$

$wt = \frac{1.4 \times 800}{0.082 \times 273} = 5.1\ gm$

Q3/ $\frac{P_1}{V_2} = \frac{P_2}{V_1}$

$\frac{P_1}{1.30} = \frac{2 \times 10^2}{2.14}$

Q3 10/25

$2 \times 10^2 kPa \times 1.30 dm^3 = 2.14 dm^3 \times P_1$

$P_1 = \frac{2 \times 10^2 kPa \times 1.30 dm^3}{2.14 dm^3} = 168\ kPa$

$torr = \frac{168 kPa \times 760 torr}{1 kPa} = 127\ Torr$

$bar = \frac{168 kPa \times 1 bar}{1 kPa} = 168\ bar$