F24

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 F**

Q1: Circle the right answer for all of the following: **(50 points)**

1: According to van der Waal's corrections if $V_{Real} < V_{Perfect}$ of any gas that means the gas has:

Answer: a) non-polar particles b) polar particles c) small particles d) big particles

2: Calculate the weight of CO_2 gas (44 g mol^{-1}) in a 0.5×10^4 mL cylinder at 20×10^2 kPa and 25 °C.

Answer: a) 180 g mol^{-1} b) 180 g c) 180 mol d) 180 kg

3: Calculate the density of CO_2 placed in a 22.4×10^3 mL cylinder at 20×10^2 kPa and 298 K.

Answer: a) 36.06 kg L^{-1} b) 36.06 g L^{-1} c) 36.06 g d) 36.06 L^{-1}

4: According to Graham's law the heaviest gas has?

Answer: a) low rate b) high rate c) middle rate d) low density

5: A gas occupies 20 dm^3 at 90 °C and 760 torr pressure. What would be its volume at STP?

Answer: a) 15.04 mL b) 15.04 dm^3 c) 15.04 L^{-1} d) 15.04 dm^{-3}

6: A vessel contains a certain amount of gas at 80×10^5 Pa. The gas is transferred to another tank 20 dm^3 with pressure of 20×10^5 Pa. What should be its volume?

Answer: a) 0.5 L b) 0.5 Pa L c) 0.5 Pa dm^3 d) 0.5 L^{-1}

7: According to Avogadro's law n is directly proportional with volume at constant?

Answer: a) p & V b) T & p c) T & V d) p & n e) R & P

8: Attractive and repulsive forces between particles are present in a?

Answer: a) perfect gas b) non-ideal gas c) ideal gas d) noble gas

9: It can follow the direct proportional between temperature and volume through the law of

Answer: a) Van der Waal b) Graham c) Charles d) Gay-Lussac

10: The mol fraction of atmospheric pressure is equal to?

Answer: a) zero b) one c) two d) three

Q2: The following data have been observed for 10000 mg of CO_2 gas at 273 K. Calculate the best value of the molar mass of CO_2. **(25 points)**

$p/10^2$ kPa	1.00	2.00	3.00
V/L	4.00	7.50	11.75

Q3: A perfect gas undergoes isothermal expansion, which increases its volume by 2.48 dm^3. The p_i and V_i of the gas are 2×10^2 kPa and 2.14 dm^3, respectively. Calculate the p_f of the gas in (i) bar, (ii) torr. (25 points)

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

Q/2

$P = 1 \quad 2 \quad 3 \rightarrow \frac{1}{101.325} \rightarrow 0.01\ atm,\ 0.02,\ 0.03\ atm$

$V = 4, 7.50, 11.75\ L, \quad T = 273\ K, \quad m = \frac{10000\ mg}{1000}$ ~~$m = 10\ g$~~

$PV = nRT \rightarrow 0.01 \times 4 = \frac{10}{M} \cdot 0.082 \cdot 273\ K$?

$0.04\ atm.L = \frac{10}{M} 22.386\ \frac{atm.L}{mol}$

$0.04 = \frac{223.86}{M}\ g.mol^{-1}$

$M_1 = \frac{223.86}{0.04} \rightarrow M = 5596.5\ Mol/g$ ~~g/mol~~ $g.mol^{-1}$

$M_2 = 1492.4\ Mol/g$

$M_3 = 0.0015\ Mol/g$

$Q_2\ \frac{10}{25}$

Q/3 $V = 2.48\ dm^3$

$P = 2 \times 10^2\ kPa \rightarrow 1.97\ atm$

$V = 2.14\ dm^3$

$L = dm^3 = 2.14\ L$

$V = 2.48 - 2.14$

$V = 0.34\ L$

$Q_3\ \frac{5}{25}$

$V_1 V_2 = P_1 P_2$ From Where This law !

$2.14 \times 0.34 = 1.97\ P_2$

$\frac{0.757}{1.97} = P_2 \rightarrow P_2 = 0.38\ atm = 0.38\ atm$