FR12

45/100 Fourty Five

Physical Chemistry_Chpt_One_Properties of Gases

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University of Mustansiriyah — 1st Semester-2021

Department of Chemistry — 1st Exam-Repeat_1

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

1: Calculate the weight of C_2H_4 gas (26 g mol^{-1}) in a 10000 Cm^3 cylinder at 1520 mmHg and 90 °C.
Answer: a) 17.47 g^{-1} mol^{-1} b) 17.47 g^{-1} c) 17.47 mol (d) 17.47 g e) 17.47 mg

2: When $V_{Real} > V_{Perfect}$, this means that the gas is:
Answer: a) perfect b) noble (c) real d) heavy

3: The difference between real and ideal gas equation, that the ideal gas equation is not interested in?
Answer: a) p_{gas} & n_{gas} b) $V_{container}$ & $p_{attraction}$ c) V_{gas} & $p_{attraction}$ d) T_{gas} & p_{gas}

4: Calculate the density of C_2H_4 is placed in a 50000 Cm^3 container at 760 torr and 273 K.
Answer: a) 1.16 g^{-1} L^{-1} b) 1.16 g^{-1} L (c) 1.16 g L^{-1} d) 1.16 mg L^{-1}

5: Graham's law studies the ---------- of the gas.
Answer: a) flow b) collision c) diffusion (d) effusion

6: The right formula of the Dalton's law is?
Answer: a) $p_i = \chi_i \sum p_i$ (b) $p_i = \chi_i \sum p_T$ c) $p_T = \chi_i \sum p_i$ d) $p_i = \chi_T p_T$

7: The law of Corresponding states is an evidence that the gas is?
Answer: a) real b) ideal (c) expanded d) compressed e) heavy

8: The total mol fractions of atmospheric pressure of air is equal to?
Answer: a) zero b) one c) two d) three — NO ANSWER Why?

9: A gas occupies 30 × 10^{-3} m^3 at 75 °C and 76 CmHg pressure. What would be its volume at STP?
Answer: a) 23.5 dm^3 b) 23.5 m^2 (c) 23.5 L^{-1} d) 23.5 m^{-3}

10: When the value of Z > 1 this means the dominated forces are:
Answer: a) attraction (b) van der Waal c) repulsion d) compression

Q2: The following data have been observed for 5000 mg of unknown gas at 0 °C. Calculate the best value of the molar mass of this gas, and what is it? (25 points)

$p/10^5$ Pa	0.75	0.60	0.25
V/dm^3	9.33	11.60	27.50

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 197 atm and 2.14 dm^3, respectively. Calculate the $p_{original}$ of the gas in (a) bar, (b) torr. (25 points)

Sun_28/11/2021 — With best my wishes — Dr Abduljabbar I. R. Rushdi

Q7

? ≡ units

Q2/ $PV = nRT$ → atm → L

① $0.75 \times 10^5\ Pa \times 9.33\ dm^3 = ? \times 0.082 \times 273$

$= 0.75 \times 10^5\ Pa \times 9.33\ dm^3 \Rightarrow 9.33 \times 10^{-9}\ m^3$

$= 6.9775 \times 10^{-4} = n \times 22.386$

$n = \frac{6.9775 \times 10^{-4}}{22.386} = 0.3116$

② $0.6 * 11.6 = ? \times 0.082 \times 273$

$6.96 = ? \times 22.386$

$n = \frac{6.96}{22.386} = 0.310$

③ $0.25 * 27.5 = n \times 0.082 \times 273$

$n = \frac{6.875}{22.386}$ 0.307

Q2 10/25

Q3/ $V_1P_1 = V_2P_2$

$V_1 = 1.8 + 2.14$

$= 3.94$

$3.94 * P_1 = 2.14 * 197$

$P_1 = \frac{2.14 * 197}{3.94}$

$P = \frac{421.5}{3.94}$

$= 106.9$

$= 106.9 \times 10^{-6}$ bar

$= 106.9 \times 10^{-9}$ torr

Q3 15/25

214 × 197

1498

19260

21400

42158