PR6

60 Sixty only

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 ^oC.
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

9: A gas occupies 30×10^{-3} m^3 at 75 ^oC 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 ^oC. 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

Q/2/

wt = 5000 mg ⇒ wt = 5000×10^{-3} g

wt = 5 g

T = 0 c° ⇒ T = 0c° + 273 = 273 K

1 atm = 10^5 Pa

1 L = 1 dm^3

$n = \frac{PV}{RT}$

1- $n = \frac{0.75 atm \times 9.33 L}{0.082 L.atm/K.mol \times 273 K}$ ⇒ $M.wt = \frac{wt}{n} \Rightarrow \frac{5g}{0.312 mol}$

$n = 0.312$ mol

$M.wt = 16.02$ g/mol

2- $n = \frac{0.6 atm \times 11.6 L}{0.082 L.atm/K.mol \times 273 K}$ ⇒ $M.wt = \frac{wt}{n} \Rightarrow \frac{5g}{0.31 mol}$

$n = 0.31$ mol

$M.wt = 16.12$ g/mol

3- $n = \frac{0.25 atm \times 27.5 L}{0.082 L.atm/K.mol}$ ⇒ $M.wt = \frac{wt}{n} \Rightarrow \frac{5g}{0.307 mol}$

$n = 0.307$ mol

$M.wt = 16.28$ g/mol

The best Value

~~The name of the~~ gas

Q/2

$P_1 = 19.7$ atm

$V_1 =$

$V_2 = 2.14 dm^3 \Rightarrow 2.14$ L

$\Delta V = \frac{V_2}{V_1}$

$V_1 = \frac{V_2}{\Delta V} \Rightarrow \frac{19.7}{1.8}$

$V_1 = 109.4$ L

$\Delta V = V_2 - V_1$

$not = \frac{V_2}{V_1}$

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

a) ∵ 1 atm = 1 bar

∴ $P_2 = 3.85$ bar

$\frac{19.7 atm}{P_2} = \frac{L}{2.14 L}$

b) $P_2 = \frac{3.85}{760}$ torr

$P_2 = \frac{19.7 atm \times 2.14 L}{109.4 L}$

$P_2 = 5.06 \times 10^{-3}$ torr

$P_2 = 3.85$ atm