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University of Mustansiriyah

Department of Chemistry

1st Semester-2021

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

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/10⁵ Pa	0.75	0.60	0.25
V/dm³	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

Q2 $PM = \dfrac{m}{V} Rt$

$0.75\,atm * M = \dfrac{5g}{9.33L} * 0.0825\,atm\cdot L/mol\cdot k * 273\,k$

$0.75\,atm * M = \dfrac{5g}{\cancel{11g}}\,\dfrac{,g}{,g} * 0.0825\,atm\cdot L\cdot *273k$

$0.75\,atm * M = 11.93 \Rightarrow M = 15.90\,g/mol$

2)

$0.60 * M = \dfrac{5g}{11.60L} * 0.0825 * 273$

$M = 16.09\,g/mol$

3) $0.25 * M = \dfrac{5g}{27.50} * 0.0825 * 273$

$M = 16.30$

Q2

$PV = nRt$

$197\,{}^{atm} * V = 1^{mol} * 0.0825\,atm\cdot L/mol\cdot k * 273\,k$

$197 * V = 0.0825 * 273$

$V = 0.113\,L$

$P_1V_1 = P_2V_2$

$P_1 * 0.113 = 197 * 2.14$

$P = 3.83\,atm$