



Physical Chemistry Chpt\_One Properties of Gases

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1<sup>st</sup> Exam-Repeat\_1

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

1: Calculate the weight of C<sub>2</sub>H<sub>4</sub> gas (26 g mol<sup>-1</sup>) in a 10000 Cm<sup>3</sup> cylinder at 1520 mmHg and 90 °C.

Answer: a) 17.47 g<sup>-1</sup> mol<sup>-1</sup>    b) 17.47 g<sup>-1</sup>    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<sub>2</sub>H<sub>4</sub> is placed in a 50000 Cm<sup>3</sup> container at 760 torr and 273 K.

Answer: a) 1.16 g<sup>-1</sup> L<sup>-1</sup>    b) 1.16 g<sup>-1</sup> L    **c) 1.16 g L<sup>-1</sup>**    d) 1.16 mg L<sup>-1</sup>

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<sup>-3</sup> m<sup>3</sup> at 75 °C and 76 CmHg pressure. What would be its volume at STP?

Answer: a) 23.5 dm<sup>3</sup>    b) 23.5 m<sup>2</sup>    **c) 23.5 L<sup>-1</sup>**    d) 23.5 m<sup>3</sup>

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 <sup>3</sup>	9.33	11.60	27.50

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm<sup>3</sup>. The  $p_f$  and  $V_f$  of the gas are 197 atm and 2.14 dm<sup>3</sup>, 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

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$$Q2 / PV = nRT \Rightarrow n = \frac{PV}{RT}$$

$$n = \frac{0.00794 \text{ atm} * 9.33 \text{ L}}{0.0821 \text{ L} \cdot \text{atm} / \text{K} \cdot \text{mol} * 273 \text{ K}}$$

$$n = 0.002 \text{ mol}$$

$$n = \frac{m}{M} \Rightarrow m = nM = \frac{5 \text{ g}}{0.002 \text{ mol}} = 2500 \text{ g}$$

$$m = 2500 \text{ mol} \cdot \text{g} \quad \text{g/mol}$$

$$m_2 = \frac{m}{n} = 2500 \text{ mol} \cdot \text{g}$$

$$m_3 = \frac{m}{n} = 2500 \text{ mol} \cdot \text{g}$$

Q2  $\frac{15}{25}$

نحول الضغط من Pa الى atm

$$p + m = \frac{0.75 \text{ Pa}}{101.325 \text{ Pa}} = 0.007$$

$$\frac{0.6 \text{ Pa}}{101.325 \text{ Pa}} = 0.0059 \text{ atm}$$

$$\frac{0.25 \text{ Pa}}{101.325 \text{ Pa}} = 0.00247 \text{ atm}$$

نحول درجة الحرارة من °C الى K

$$T \text{ K} = T \text{ °C} + 273 = 0 + 273 = 273 \text{ K}$$

الحجم  $1 \text{ L} = 1 \text{ dm}^3$

$$m = \frac{5000 \text{ mg}}{100} = 50 \text{ g}$$

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

$$\frac{1.9794 \text{ atm}}{P} = \frac{1.18 \text{ L}}{2.14 \text{ L}}$$

$$P = \frac{1.9794 \text{ atm} * 2.14 \text{ L}}{1.18 \text{ L}} = 3.58 \text{ atm}$$

$$P = 3.58 \text{ atm}$$

$$1 \text{ L} = 1 \text{ dm}^3$$

$$V_1 = V_2$$

$$V_1 = V_2$$

$$1.18 \text{ L} = 1.18 \text{ L}$$

Q3  $\frac{5}{25}$