



Physical Chemistry Chpt One Properties of Gases

Name of a student Peer Kadam Hashan Signature Peer Kadam Hashan

No. 23

University of Mustansiriyah

1<sup>st</sup> Semester-2021

Department of Chemistry

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

Q1: Circle the right answer for all of the following:

(50 points)

1: Calculate the weight of  $C_2H_4$  gas ( $26 \text{ g.mol}^{-1}$ ) in a  $10000 \text{ Cm}^3$  cylinder at  $1520 \text{ mmHg}$  and  $90^\circ \text{C}$ .

Answer: a)  $17.47 \text{ g}^{-1} \text{ mol}^{-1}$  b)  $17.47 \text{ g}^{-1}$  c)  $17.47 \text{ mol}$  d)  $17.47 \text{ g}$  e)  $17.47 \text{ mg}$

2: When  $V_{\text{Real}} > V_{\text{Perfect}}$ , 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)  $p_{\text{gas}}$  &  $n_{\text{gas}}$  b)  $V_{\text{container}}$  &  $p_{\text{attraction}}$  c)  $V_{\text{gas}}$  &  $p_{\text{attraction}}$  d)  $T_{\text{gas}}$  &  $p_{\text{gas}}$

4: Calculate the density of  $C_2H_4$  is placed in a  $50000 \text{ Cm}^3$  container at  $760 \text{ torr}$  and  $273 \text{ K}$ .

Answer: a)  $1.16 \text{ g}^{-1} \text{ L}^{-1}$  b)  $1.16 \text{ g}^{-1} \text{ L}$  c)  $1.16 \text{ g L}^{-1}$  d)  $1.16 \text{ mg L}^{-1}$

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  $30 \times 10^{-3} \text{ m}^3$  at  $75^\circ \text{C}$  and  $76 \text{ CmHg}$  pressure. What would be its volume at STP?

Answer: a)  $23.5 \text{ dm}^3$  b)  $23.5 \text{ m}^2$  c)  $23.5 \text{ L}^{-1}$  d)  $23.5 \text{ m}^{-3}$

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  $5000 \text{ mg}$  of unknown gas at  $0^\circ \text{C}$ . Calculate the best value of the molar mass of this gas, and what is it?

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

(25 points)

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by  $1.80 \text{ dm}^3$ . The  $p_f$  and  $V_f$  of the gas are  $197 \text{ atm}$  and  $2.14 \text{ dm}^3$ , respectively. Calculate the  $p_{\text{original}}$  of the gas in (a) bar, (b) torr. (25 points)

Sun\_28/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

50/100 Fifty only  
Abd Jabbar I. R. Rushdi  
Dr. Abduljabbar I. R. Rushdi

30  
Q. 150



Q 2/ U1 = ?

$$PV = nRT$$

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

$$n = \frac{7.49 \text{ atm} * 9.33 \text{ L}}{0.082 \text{ atm} \cdot \text{L} / \text{mol} \cdot \text{K} * 273 \text{ K}} = 3.09$$

$$n = 3.09 \text{ mol}$$

$$n = \frac{m}{M} \Rightarrow 3.09 = \frac{5}{M}$$

$$M = \frac{5}{3.09} = 1.62 \text{ g/mol}$$

$$m = 5 \text{ g} * \frac{1 \text{ g}}{1000 \text{ mg}} \Rightarrow \frac{5000}{1000} = m = 5$$

$$M = 5 \text{ g}$$

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

$$P_1 = 0.75 \text{ Pa} * \frac{1 \text{ atm}}{101325 \text{ Pa}}$$

$$P_1 = 0.75 \text{ atm} \Rightarrow 7.49 \text{ atm}$$

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

$$V = 11 \text{ L}$$

Q 2.25

Q 3/  $V_1 = 1.80 \text{ dm}^3$  /  $P_2 = 197 \text{ atm}$

$V_2 = 2.14 \text{ dm}^3$  /  $P_1 = ?$

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

not represent  $V_1$

$$P_1 * 1.80 \text{ dm}^3 = 197 \text{ atm} * 2.14 \text{ dm}^3$$

$$P_1 = \frac{197 \text{ atm} * 2.14 \text{ dm}^3}{1.80 \text{ dm}^3} = P_1 = 421 \text{ atm}$$

a)  $P_1 = 233 \text{ atm} \Rightarrow \text{atm} = \text{bar}$

b)  $P_1 = \frac{233 * 760}{760 \text{ torr}} \Rightarrow P_1 \text{ torr} = 0.306 \text{ torr}$

Q 3.10

الجزء الثاني  
كما في المثال B1

سؤال الثاني كنهها  $P = 0.60$  Pa  
والحجم  $V = 11.60$

$$n = \frac{PV}{RT} \Rightarrow \frac{5.92 \times 11.60}{0.082 \times 273}$$

$$n = \frac{68.6}{22.3} \Rightarrow n = 3.0 \text{ mol}$$

$$n = \frac{m}{M} \Rightarrow 3.0 = \frac{m}{5}$$

$$M = \frac{3.0}{5} \Rightarrow 0.6$$

التحويل  
 $P = 0.60 \text{ Pa} \times \frac{1 \text{ atm}}{101325}$

$$P = \frac{0.60}{101325}$$

$$P_{\text{atm}} = 5.92$$

كنها القدر يكون  $P = 0.25$

والحجم  $V = 27.50$  تحويل

$$PV = nRT$$

$$n = \frac{PV}{RT} \Rightarrow \frac{2.46 \text{ atm} \times 27.50}{0.082 \times 273} \quad P = 2.46$$

$$n = \frac{67.65}{22.386} \Rightarrow n = 3.0$$

$$3.0 = \frac{m}{5} \Rightarrow M = \frac{3.0}{5} \Rightarrow 0.6$$