



Physical Chemistry\_Chpt\_One\_Properties of Gases

P3

50/100 Fifty only  
 Hina  
 Alwan  
 Abduljabbar I. R. Rushdi



Name of a student Mawla Rafid Rasul Signature Mawla Rafid Rasul No. 7

University of Mustansiriyah

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

Department of Chemistry

1<sup>st</sup> Exam-paper D

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

(50 points)

1: According to van der Waal's corrections if  $V_{Real} < V_{Perfect}$  of any gas that means the gas has:

Answer: a) non-polar particles b) polar particles c) small particles d) big particles

2: Calculate the weight of  $CO_2$  gas ( $44 \text{ g.mol}^{-1}$ ) in a  $0.5 \times 10^4 \text{ mL}$  cylinder at  $20 \times 10^2 \text{ kPa}$  and  $25^\circ\text{C}$ .

Answer: a)  $180 \text{ g mol}^{-1}$  b)  $180 \text{ g}$  c)  $180 \text{ mol}$  d)  $180 \text{ kg}$

3: Calculate the density of  $CO_2$  placed in a  $22.4 \times 10^3 \text{ mL}$  cylinder at  $20 \times 10^2 \text{ kPa}$  and  $298 \text{ K}$ .

Answer: a)  $36.06 \text{ kg L}^{-1}$  b)  $36.06 \text{ g L}^{-1}$  c)  $36.06 \text{ g}$  d)  $36.06 \text{ L}^{-1}$

4: According to Graham's law the heaviest gas has?

Answer: a) low rate b) high rate c) middle rate d) low density

Q1 35/50

5: A gas occupies  $20 \text{ dm}^3$  at  $90^\circ\text{C}$  and  $760 \text{ torr}$  pressure. What would be its volume at STP?

Answer: a)  $15.04 \text{ mL}$  b)  $15.04 \text{ dm}^3$  c)  $15.04 \text{ L}^{-1}$  d)  $15.04 \text{ dm}^{-3}$

6: A vessel contains a certain amount of gas at  $80 \times 10^5 \text{ Pa}$ . The gas is transferred to another tank  $20 \text{ dm}^3$  with pressure of  $20 \times 10^5 \text{ Pa}$ . What should be its volume?

Answer: a)  $0.5 \text{ L}$  b)  $0.5 \text{ Pa L}$  c)  $0.5 \text{ Pa dm}^3$  d)  $0.5 \text{ L}^{-1}$

7: According to Avogadro's law n is directly proportional with volume at constant?

Answer: a) p & V b) T & p c) T & V d) p & n e) R & P

8: Attractive and repulsive forces between particles are present in a?

Answer: a) perfect gas b) non-ideal gas c) ideal gas d) noble gas

9: It can follow the direct proportional between temperature and volume through the law of

Answer: a) Van der Waal b) Graham c) Charles d) Gay-Lussac

10: The mol fraction of atmospheric pressure is equal to?

Answer: a) zero b) one c) two d) three

Q2: The following data have been observed for  $10000 \text{ mg}$  of  $CO_2$  gas at  $273 \text{ K}$ . Calculate the best value of the molar mass of  $CO_2$ . (25 points)

p/ $10^2 \text{ kPa}$	1.00	2.00	3.00
V/L	4.00	7.50	11.75

Q3: A perfect gas undergoes isothermal expansion, which increases its volume by  $2.48 \text{ dm}^3$ . The  $p_i$  and  $V_i$  of the gas are  $2 \times 10^2 \text{ kPa}$  and  $2.14 \text{ dm}^3$ , respectively. Calculate the  $p_f$  of the gas in (i) bar, (ii) torr. (25 points)

Wed\_10/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

Q2/

$$PV = nRT$$

$$PV = \frac{m}{M} RT$$

$$4 \text{ L} = \frac{100 \text{ g}}{M} \cdot 0.082 \frac{\text{L}\cdot\text{atm}}{\text{K}\cdot\text{mol}} \cdot 273 \text{ K}$$

$$4 = \frac{100}{M} \cdot 272.9$$

$$4 = \frac{27290}{M}$$

$$4M = 27290$$
$$M = 6822.5 \text{ g/mol}$$

15

$$T = 273 \text{ K}$$

$$m = 10000 \text{ g}$$

$$M = 100 \text{ g}$$

$$V = 4 \text{ L}$$

$$R = 0.082 \text{ L}\cdot\text{atm}/\text{K}\cdot\text{mol}$$

15  
Q2/25

$mg \equiv 10^3 \text{ g}$   
 $10,000 = 10 \times 10^3 \times 10^3 \text{ g}$   
 $= 10 \text{ g}$

$$PV = nRT$$

$$PV = \frac{m}{M} RT$$

$$7.5 \text{ L} = \frac{10 \text{ g}}{M} \cdot 0.082 \cdot 273 \text{ K}$$

$$15 = \frac{27290}{M}$$

$$M = 1819.3 \text{ g/mol}$$

$$PV = nRT$$

$$PV = \frac{m}{M} RT \Rightarrow 3 \times 11.75 = \frac{10 \text{ g}}{M} \cdot 0.082 \cdot 273 \text{ K}$$

$$35.25 = \frac{27290}{M}$$

$$M = \frac{27290}{35.25} = 774.18 \text{ g/mol}$$

Q3/

NO ANSWER

Q3/0

$$V = 2.48 \text{ dm}^3$$

$$P_i = 9 \times 10^2 \text{ kPa}$$

$$V_i = 2.14 \text{ dm}^3$$