



Physical Chemistry Chpt\_One\_Properties of Gases

50 Fifty only  
100

P10

24 JAN-21

Abduljabbar



Name of a student

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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

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  $CO_2$ .

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

(25 points)

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

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/

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

$$PV = \frac{m}{M_1} RT$$

$$\text{atm} \times 4 \text{ L} = \frac{10 \text{ g}}{M_1 \text{ mol}} \times 0.082 (\text{atm} \cdot \text{L} / \text{mol} \cdot \text{K}) \times 273 \text{ K}$$

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

$$2) PV = \frac{m}{M_2} RT$$

$$0.500 \times 7.5 \text{ K} = \frac{10 \text{ g}}{M_2 \text{ mol}} \times 0.082 (\text{atm} \cdot \text{L} / \text{mol} \cdot \text{K}) \times 273 \text{ K}$$

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

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$$3) PV = \frac{m}{M_3} RT$$

$$\times 11.75 \text{ L} = \frac{10 \text{ g}}{M_3 \text{ mol}} \times 0.082 (\text{atm} \cdot \text{L} / \text{mol} \cdot \text{K}) \times 273 \text{ K}$$

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

$$Q3/1) \frac{P_1}{V_1} = \frac{P_2}{V_2} \Rightarrow \frac{P_1}{2.14 \text{ dm}^3} = \frac{P_2}{2.48 \text{ dm}^3}$$

$$P_2 = \frac{P_1 \times 2.48 \text{ dm}^3}{2.14 \text{ dm}^3} \quad P_2 = \text{bar}$$

$$2) \frac{P_1}{V_1} = \frac{P_2}{V_2} \Rightarrow \frac{P_1}{2.14 \text{ dm}^3} = \frac{P_2}{2.48 \text{ dm}^3}$$

$$P_2 = \text{torr}$$

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