



F40

Physical Chemistry\_Chpt\_One\_Properties of Gases

40/100 Faculty only

25-11-21

Thur. Jabbar



Name of a student Ahmad Mohammad Ali Signature [Signature] No. 18

University of Mustansiriyah

1st Semester-2021

Department of Chemistry

1st Exam-paper F

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  $25^\circ C$ .

Answer: a) 180 g mol<sup>-1</sup> b) 180 g c) 180 mol d) 180 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 kg L<sup>-1</sup> b) 36.06 g L<sup>-1</sup> c) 36.06 g d) 36.06 L<sup>-1</sup>

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  $90^\circ C$  and  $760 \text{ torr}$  pressure. What would be its volume at STP?

Answer: a) 15.04 mL b) 15.04 dm<sup>3</sup> c) 15.04 L<sup>-1</sup> d) 15.04 dm<sup>3</sup>

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 L b) 0.5 Pa L c) 0.5 Pa dm<sup>3</sup> d) 0.5 L<sup>-1</sup>

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

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 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	(25 points)
$V/L$	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)

Thur\_11/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

بالتوفيق والتأييد من الله

Q2  $PV = nRT$

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

$(1.00) \cdot (4.00) = \frac{m}{1} (0.0082) (273)$   
 $4 = m \cdot 2.2386$

$M = \frac{4}{2.2386} = 1.78683$

Q2 10/25

Q  $PV = nRT$

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

$(2.00) \cdot (7.50) = \frac{m}{1} (0.0082) (273)$   
 $1500 = m \cdot 1.78683$

$M = \frac{1.78683}{1500} = 0.0011912$

3

$PV = nRT$

$(3.00) \cdot (11.75) = \frac{m}{M} (0.0082) (273)$   
 $35.25 = M \cdot 2.2386$

$M = \frac{2.2386}{35.25} = 0.063$

$V_1 = 2.48 \quad P = 2 \times 10^2 \quad V_2 = 2.14$

$P_1 V_1 = P_2 V_2$

$(2 \times 10^2) (2.48) = P (2.14)$

$4.96 = P (2.14)$

$P = \frac{4.96}{2.14} = 2.32$

Q3 5/25