



E22

Physical Chemistry\_Chpt\_One\_Properties of Gases

35/100 Thirty Five

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Department of Chemistry

1<sup>st</sup> 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<sub>2</sub> gas (44 g mol<sup>-1</sup>) in a 0.5 x 10<sup>4</sup> mL cylinder at 20 x 10<sup>2</sup> kPa and 25 °C.  
Answer: a) 180 g mol<sup>-1</sup> b) 180 g c) 180 mol d) 180 kg

3: Calculate the density of CO<sub>2</sub> placed in a 22.4 x 10<sup>3</sup> mL cylinder at 20 x 10<sup>2</sup> kPa and 298 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 dm<sup>3</sup> at 90 °C and 760 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 x 10<sup>5</sup> Pa. The gas is transferred to another tank 20 dm<sup>3</sup> with pressure of 20 x 10<sup>5</sup> 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 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 mg of CO<sub>2</sub> gas at 273 K. Calculate the best value of the molar mass of CO<sub>2</sub>. (25 points)

p/10 <sup>2</sup> 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 dm<sup>3</sup>. The p<sub>i</sub> and V<sub>i</sub> of the gas are 2 x 10<sup>2</sup> kPa and 2.14 dm<sup>3</sup>, respectively. Calculate the p<sub>f</sub> of the gas in (i) bar, (ii) torr. (25 points)

Thur\_11/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

Q2/  $n = \frac{10000}{1000} = 10$ ,  $T = 273$  K,  $P = 1$ ,  $V_1 = 4$ ,  $V_2 = 7.5$   
 $V_3 = 11.75$

$P_1 = 1$        $P_2 = 2$        $P_3 = 3$

1)  $PV = nRT \Rightarrow n = \frac{4 \times 0.082 \times 273}{1} = 89.5$

2)  $n = \frac{7.5 \times 0.082 \times 273}{2} = 83.9$

3)  $n = \frac{11.75 \times 0.082 \times 273}{3} = 87.7$

Q

Q3/

Q3 25  
 NO ANSWER  
 Why?

mol mass of CO <sub>2</sub>	44	44	44
V/L	1.00	2.00	3.00
	1.25	1.50	1.75

Q3: A perfect gas undergoes isothermal expansion, which increases its volume by 3.00 L. The p and V of the gas are  $2 \times 10^5$  Pa and 3.00 L, respectively. Calculate the p of the gas in (i) bar, (ii) torr. (25 points)

Dr. Abdulghabar I. R. Rashid

Best wishes

Thurs 12/11/2021