



Physical Chemistry_Chpt_One_Properties of Gases



Name of a student Amr Yehya Signature [Signature] No. 14

University of Mustansiriyah

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Department of Chemistry

1st 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 CO₂ gas (44 g.mol⁻¹) in a 0.5×10^4 mL cylinder at 20×10^2 kPa and 25 °C.

Answer: a) 180 g b) 180 g c) 180 mol d) 180 kg

3: Calculate the density of CO₂ placed in a 22.4×10^3 mL cylinder at 20×10^2 kPa and 298 K.

Answer: a) 36.06 kg L⁻¹ b) 36.06 g L⁻¹ c) 36.06 g d) 36.06 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 dm³ at 90 °C and 760 torr pressure. What would be its volume at STP?

Answer: a) 15.04 mL b) 15.04 dm³ c) 15.04 L¹ d) 15.04 dm⁻³

6: A vessel contains a certain amount of gas at 80×10^5 Pa. The gas is transferred to another tank 20 dm³ with pressure of 20×10^5 Pa. What should be its volume?

Answer: a) 0.5 L b) 0.5 Pa L c) 0.5 Pa dm³ d) 0.5 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 mg of CO₂ gas at 273 K. Calculate the best value of the molar mass of CO₂. (25 points)

p/10 ² 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 dm³. The p_i and V_i of the gas are 2×10^2 kPa and 2.14 dm³, 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

Molecular weight

$PV = nRT$
(1) (4) : $n(0.082)(273)$? ? ? \equiv units

$\frac{10000}{1000} g$
 $10 g$

$n = 0,594$ 22.386

$n_s \frac{0,594}{4} = 106 mol$

$n_s \frac{m}{M} = M_s \frac{10 g}{106 mol} = M_s \frac{0,094 g/mol}{106 mol}$

Q2 10/25

$PV = nRT$

(2) (7.5) : $n(0.082)(273)$? ?

15,0 : $n(0,594)$

$n_s \frac{15,0}{0,594} = 0,12 mol \Rightarrow n_s \frac{m}{M} = M_s \frac{m}{n} = \frac{10 g}{0,12 mol} = 0,66 g/mol$

$PV = nRT$

(3) (11,75) : $n(0,082)(273)$? (273) ?

$35,25 : n(0,594) \Rightarrow n_s \frac{35,25}{0,594} = 6,92 mol \Rightarrow n_s \frac{m}{M} = M_s \frac{m}{n}$
 $M = \frac{10}{6,92} = 1,44 g/mol$

Q3

$2 \times 10^2 \times 100 = Pa$
 2×10^5

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

Q3 10/25

$\frac{2.48 \times 10^{-3} L}{2.14 \times 10^2 L} = \frac{P_2}{2 \times 10^5 Pa}$

$P_2 \times 2.14 = 5,06 \times 10^5 Pa$

$P_2 = \frac{5,06}{2,14} = 2,11 \times 10^5 Pa$ \rightarrow For converting to mmHg OR Torr

$P_2 = 2,11 \times 760 = 1,26 \times 10^5$ bear

$= 2,11 \times 722 = 2,81 \times 10^5 Torr$