Physical Chemistry_Chpt_One_Properties of Gases

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University of Mustansiriyah

1st Semester-2021

Department of Chemistry

1st Exam-paper

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 g.mol^{-1}) in a 0.5 × 10^4 mL cylinder at 20 x 10^2 kPa and 25 °C.

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

3: Calculate the density of CO_2 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 dm^3 at 90 °C and 760 torr pressure. What would be its volume at STP?

Answer: a) 15.04 mL **b) 15.04** dm^3 c) 15.04 L^{-1} 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 dm^3 with pressure of 20 × 10^3 Pa. What should be its volume?

Answer: **a) 0.5 L** b) 0.5 Pa L c) 0.5 Pa dm^3 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 CO_2 gas at 273 K. Calculate the best value of the molar mass of CO_2. (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 dm^3. The p_i and V_i of the gas are 2 × 10^2 kPa and 2.14 dm^3, respectively. Calculate the p_f of the gas in (i) bar, (ii) torr. (25 points)

Thur_10/11/2021 Best wishes Dr Abduljabbar I. R. Rushdi

Q/2 $T = 273\ K$

$P = 1 \times 10^3\ pa$

$V = 4L$

$PV = nRT$

$n = \frac{PV}{RT} \Rightarrow \frac{1 \times 10^3 \times 4}{0.082 \times 273} = \frac{4000}{22.38} = 178.7$

$m = 10000\ mg \Rightarrow = 10g$

$P = 1$ atm

$n = \frac{m}{M} \Rightarrow M = \frac{m}{n} \Rightarrow \frac{100}{178.7} = 0.5\ g.mol^{-1}$

$P = 2$ atm

$n = \frac{2 \times 10^3 \times 7.50}{22.38} = 670.2$

$M = \frac{100}{670.2} = 0.14\ g.mol^{-1}$

$P = 3$ atm

$n = 157.5\ mol$

$M = 0.6\ g.mol^{-1}$

Q3/

$P_1 = 2 \times 10^2 \Rightarrow 2 \times 10^2\ kPa$

$P_2 = ?\ kPa$

$V_1 = 2.14$

$V_2 = 2.14 + 2.48$

$= 4.62\ dm^3$

$P_1V_1 = P_2V_2$

$P_2 = \frac{P_1V_1}{V_2}$

$P_2 = \frac{2 \times 100 \times 2.14}{4.62} = 92.6\ kPa$

$2 \times 10^2 \times k\ Pa$

$2 \times 10^2 \times 10^3\ Pa$

$2 \times 10^5\ Pa$

$\equiv 2$ atm !

Pa کا kPa میں

$= 92.6 \times 10^3$

$10^5\ Pa \equiv 1 atm$

$1 atm = 1 pa \Rightarrow 92.6 \times 10^3\ atm$

$1 atm = 760\ torr = 92.6 \times 760 \times 10^3$