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PA

Physical Chemistry_Chpt_One_Properties of Gases

75/100 Security only

24-11-21
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No.

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University of Mustansiriyah

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Department of Chemistry

1st Exam-paper C

Q1: Circle the right answer for all of the following:

(50 points)

1: If a gas has polar particles then the difference between the volume of this gas is:

Answer: a) $V_{Real} > V_{Perfect}$ b) $V_{Real} < V_{Perfect}$ c) $V_{Real} = V_{Perfect}$ d) $V_{Real} \neq V_{Perfect}$

2: A gas occupies 60×10^3 mL at 150°C and 760 mmHg pressure. What would be its volume at STP?

Answer: a) 38.7 mL b) 38.7 dm³ c) 38.7 L⁻¹ d) 38.7 dm⁻³

3: Calculate the weight of H₂O gas (18 g.mol⁻¹) in a 5 L cylinder at 10×10^2 kPa and 373 K.

Answer: a) 29.40 g mol⁻¹ b) 29.40 g c) 29.40 mol d) 29.40 kg

4: Calculate the density of H₂O placed in a 22400 mL cylinder at 10^5 Pa and 0°C .

Answer: a) 0.804 kg L⁻¹ b) 0.804 g L⁻¹ c) 0.804 g d) 0.804 L⁻¹

5: According to Graham's law the heaviest gas is?

Answer: a) H₂O b) CH₄ c) NH₃ d) Cl₂

6: A tank contains a certain amount of gas at 10^5 Pa. The gas is transferred to another tank 40 dm³ with pressure of 200×10^3 Pa. What should be its volume?

Answer: a) 80 L b) 80 Pa L c) 80 Pa dm³ d) 80 L⁻¹

7: According to Boyle's law the pressure of a gas is inversely proportional with?

Answer: a) p b) T c) R d) V e) n

8: The difference between real and ideal gas, that the real gas interested in?

Answer: a) V & p b) V & T c) p & n d) T & p

9: It can follow the direct proportional between temperature and pressure through the law of

Answer: a) Van der Waal b) Graham c) Charles d) Gay-Lussac

10: The behaviour of real gas is ideal when the value of Z is equal to

Answer: a) $V_m < V_m^0$ b) $V_m > V_m^0$ c) $V_m = V_m^0$ d) $V_m \neq V_m^0$

Q2: The following data have been observed for 800 mg of nitrogen gas at 273 K. Calculate the best value of the molar mass of N₂. (25 points)

p/10 ⁵ Pa	0.750	0.500	0.200
V/dm ³	3.0	4.5	7.0

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm³. The p_f and V_f of the gas are 2×10^2 kPa and 2.14 dm³, respectively. Calculate the p_{original} of the gas in (i) bar, (ii) torr. (25 points)

Wed_10/11/2021

Best wishes

Dr Abduljabbar I. R. Rusydi

Q2/

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

$$M = \frac{m * R * T}{P * V}$$

$$m = \frac{300 \text{ mg}}{1000}$$

$$m = 0.3 \text{ g}$$

$$M = \frac{0.3 \text{ g} \times 0.082 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \times 273 \text{ K}}{0.750 \text{ atm} \times 3 \text{ L}} = 7.95 \text{ g/mol}$$

$$M = \frac{8 \text{ g} \times 0.082 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \times 273 \text{ K}}{0.500 \text{ atm} \times 0.5 \text{ L}} = 79.59 \text{ g/mol}$$

$$M = \frac{8 \text{ g} \times 0.082 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \times 273 \text{ K}}{0.200 \text{ atm} \times 7 \text{ L}} = 127.92 \text{ g/mol}$$

Q2
20
25

Q3/ $P_1 V_1 = P_2 V_2$

$$P_1 \times 1.80 \text{ dm}^3 = 2 \times 10^2 \text{ kPa} \times 2.14 \text{ dm}^3$$

$$P_1 = \frac{2 \times 10^2 \text{ kPa} \times 2.14 \text{ dm}^3}{1.80 \text{ dm}^3}$$

$2 \times 10^2 \text{ kPa}$
 $2 \times 10^5 \text{ Pa} = 2 \text{ atm}$

$$P_1 = 237.77 \text{ kPa}$$

$$P_1 = 237.77 \text{ kPa} \times \frac{1 \text{ bar}}{101.325 \text{ kPa}} \Rightarrow 2.3466 \text{ bar}$$

1 bar = 1 atm

Q3
20
25

$$2.3466 \text{ bar} \times \frac{760 \text{ torr}}{1 \text{ bar}} \Rightarrow 1783.416 \text{ torr}$$