



Physical Chemistry Chpt_One_Properties of Gases

50/100 Fifty only

P1

Name of a student _____ Signature _____ No. _____

University of Mustansiriyah

1st Semester-2021

Department of Chemistry

1st Exam-paper E

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 dm³

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 dm^3 with pressure of 200×10^3 Pa. What should be its volume?

Answer: a) 80 L b) 80 Pa L c) 80 Pa dm^3 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)

$p/10^5 \text{ Pa}$	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 dm^3 . The p_i and V_f of the gas are $2 \times 10^2 \text{ kPa}$ and 2.14 dm^3 , respectively. Calculate the p_{original} of the gas in (i) bar, (ii) torr. (25 points)

Thur_11/11/2021

Best wishes

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$$PV = \frac{m}{M} RT \Rightarrow 0.75 \times 3 = \frac{m}{1} 0.082 \times 273$$

? = units

$$m_1 = \frac{2.25}{22.38} \Rightarrow 0.1 \text{ g}$$

Mass is not unknown!

$$M_2 = \frac{2.25}{22.38} = 0.1 \text{ g}$$

$$M_3 = \frac{1.4}{22.38} = 0.062 \approx 0.1 \text{ g}$$

Q2 $\frac{5}{25}$

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

$$\Rightarrow \frac{0.1 \times 800}{0.082 \times 273} \Rightarrow \frac{80}{22.4} = 3.6$$

$$Q_2 / 1.80 + 2.14 = 3.94 \text{ dm}^3$$

$$P_1 V_1 = P_2 V_2$$

$$2 \times 10^2 \times 3.94 = P_2 \times 2.14$$

Q3 $\frac{15}{25}$

$$P_2 = \frac{788}{2.14}$$

$$\Rightarrow 368 \text{ kPa} \Rightarrow 368 \times 10^5 \text{ bar}$$

$$30.48 \text{ Torr}$$