Physical Chemistry-Properties of Gases

20-01-2021 (wed) *72/100 Seventy two* *Dr. Abduljabbar Rushdi*

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University of Mustansiriyah   **1st Semester-2021**

Department of Chemistry   **1st Exam-paper B**

Q1: Circle the right answer for all of the following: (50 degree)

1: Carbon dioxide is classified as a .

<u>Answer:</u>   a) toxic gas   b) ideal gas   **c) real gas**   d) heavy gas   (0/5)

2: A 2 dm³ container contains a certain amount of gas at 0.5 atm pressure. The gas is transferred to another vessel of volume and the pressure is 0.25 bar. What should be it is Volume?

<u>Answer:</u>   a) 0.40 atm   **b) 0.40 dm³**   c) 0.4 bar   d) 4 bar   (5/5)

3: A gas occupies 400 dm³ at 130 °C and 76 cmHg pressure. What would be it is volume at STP?

<u>Answer:</u>   **a) 270 L**   b) 207 dm³   c) 207 m³   d) 204 cm³   (5/5)

4: Calculate the weight of H₂ (2.00 g.mol⁻¹) in a 2 L cylinder at 2.5 atm and 27 °C.

<u>Answer:</u>   a) 0.40 mol⁻¹   **b) 0.40 g**   c) 0.40 mol g⁻¹   d) 0.4 g mol⁻¹   (5/5)

5: Calculate the number of moles for CO₂ in a 10 L cylinder at 8 bar and 27 °C.

<u>Answer:</u>   **a) 3.25 mmol**   b) 3.00 mol   c) 3.00 L   d) 2.99 mol   (0/5)

6: According to Graham's law the lightest gas is?

<u>Answer:</u>   **a) H₂**   b) O₂   c) N₂   d) CO₂   (5/5)

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

<u>Answer:</u>   a) mol   b) T   c) R   **d) V**   (5/5)

8: If a gas has Vm ≠ Vᵒm then this means one of the following?

<u>Answer:</u>   **a) real**   b) noble   c) ideal   d) heavy   (5/5)

9: If RT > pV this means the forces dominated are?

<u>Answer:</u>   a) attraction   **b) repulsion**   c) Van der Waal's   d) no one of these   (0/5)

10: According to Gay-Lussac's law the volume of the gas is?

<u>Answer:</u>   a) constant   b) variable   c) equal to zero   (0/5)   d) equal to 22.4 L

Q2: Under the same conditions of temperature and pressure, how many times faster will hydrogen effuse compare to carbon dioxide.   (25 degree)

Q3: Calculate the density of carbon dioxide (44 g mol⁻¹) at STP.   (25 degree)

Wed_20/01/2021   **Best wishes**   **Dr Abduljabbar I. R. Rushdi**

Q₂ 30/50

Q2/

$$\frac{r_{1H}}{r_{2CO_2}} = \frac{t_{2CO_2}}{t_{1H}} = \left(\frac{M_2}{M_1}\right)^{\frac{1}{2}}$$

$$\frac{t_{2CO_2}}{t_{1H}} = \left(\frac{M_{2(O_2)}}{M_{1H}}\right)^{\frac{1}{2}}$$

? ≡ Units

$$\frac{t_{2CO_2}}{X \; t_{2CO_2}} = \left(\frac{44 \; ?}{2 \; ?}\right)^{\frac{1}{2}}$$

$Q_2 \; \dfrac{20}{25}$

$$X = (22)^{\frac{1}{2}}$$

$$X = 4.6$$

Q3/ $PM = dRT$

$$d = \frac{P M}{R T}$$

$$d = \frac{1 \; atm \times 44 \; g/mol}{0.082 \; Latm/Kmol \times 273 \; K}$$

$$d = \frac{44}{22.386} = 1.965 \; g/L$$

$Q_3 \; \dfrac{22}{25}$

$$\frac{g}{\frac{L}{K}}$$