Physical Chemistry-Properties of Gases

Name of a student ---------- Signature ---------- No. ----------

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 .

Answer: a) toxic gas b) ideal gas c) real gas d) heavy gas

2: A 2 dm^3 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?

Answer: a) 0.40 atm b) 0.40 dm^3 c) 0.4 bar d) 4 bar

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

Answer: a) 270 L b) 207 dm^3 c) 207 m^3 d) 204 cm^3

4: Calculate the weight of H_2 (2.00 $g.mol^{-1}$) in a 2 L cylinder at 2.5 atm and 27 °C.

Answer: a) 0.40 mol^{-1} b) 0.40 g c) 0.40 mol g^{-1} d) 0.4 g mol^{-1}

5: Calculate the number of moles for CO_2 in a 10 L cylinder at 8 bar and 27 °C.

Answer: a) 3.25 mmol b) 3.00 mol c) 3.00 L d) 2.99 mol

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

Answer: a) H_2 b) O_2 c) N_2 d) CO_2

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

Answer: a) mol b) T c) R d) V

8: If a gas has $Vm \neq V^{o}m$ then this means one of the following?

Answer: a) real b) noble c) ideal d) heavy

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

Answer: a) attraction b) repulsion c) Van der Waal's d) no one of these

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

Answer: a) constant b) variable c) equal to zero 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**

$$\frac{v_{1(H)}}{v_{2(C)}} = \frac{t_{2(C)}}{t_{1(H)}}$$

$$v_1 t_1 = v_2 t_2$$

$$v_1 = \frac{v_2 t_2}{t_1}$$

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$$pV = nRt$$

$$pV_{(L)} = \frac{m_{(g)}}{M_{(g/mol)}} * R\left(\frac{L \cdot atm}{K \cdot mol}\right) * t_{(K)}$$

$$pM_{g/mol} = \frac{m_{(g)}}{V_{(L)}} * R\left(\frac{L \cdot atm}{K \cdot mol}\right) * t_{(K)}$$

$$pM = d\,RT$$

$$1 * 44\,(g/mol) = d * 0.0082 \frac{L \cdot atm}{K \cdot mol} * 273\,K$$

$$d = 1.9 \cdot 73 \frac{g}{L}$$

STP

$p = 1\,atm$

$T = 273\,K$

$n = 1\,mol$

$V = 22.4\,L$

Q_3 20/25