Physical Chemistry-Properties of Gases

Name of a student _____ Signature _____ No. 19

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

Department of Chemistry   **1ST Exam-paper A**

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

1: A vessel of 100 L capacity contains a certain amount of gas at 50 °C and 0.5 bar pressure. The gas is transferred to another vessel has a pressure of 5 bar at 50 °C. What should be the volume of the vessel?

Answer: a) 10 bar   b) 10 dm^3 c) 0.1 dm^3 d) 0.1 bar

2: What is the right formula of the Graham's law of effusion?

Answer: a) $\frac{r_1}{t_2} = (\frac{r_2}{M_1})^{\frac{1}{2}}$ b) $\frac{r_1}{r_2} = (\frac{M_1}{M_2})^{\frac{1}{2}}$ c) $\frac{d_1}{d_2} = (\frac{M_2}{M_1})^{\frac{1}{2}}$ d) $\frac{r_1}{r_2} = (\frac{d_2}{M_1})^{\frac{1}{2}}$

3: Calculate Z for a gas if T is 22 °C, V_m is 5 dm^3 mol^{-1} and p is 3 bar.

Answer: a) 0.62 °C   b) 6.2 K   c) 0.62   d) 6.2   NO ANSWER

4: Calculate the molar mass of O_2 (16 g.mol^{-1}) in a 4 L cylinder at 9 atm and 281 K.

Answer: a) 32 g.mol^{-1} b) 32 g   c) 50 g.mol^{-1} d) 50 g

5: Calculate the V^o_m of a gas, if p is 1 atm and temperature is 32 °C.

Answer: a) 25 K   b) 25 atm   c) 25 L mol^{-1} d) 25 mol

6: If the attraction forces are negligible, that means the gas is?

Answer: a) real   b) noble   c) perfect   d) expands

7: According to the Dalton's law the unit of the mole fraction is?

Answer: a) mol   b) dm^3 c) psi   d) free of units

8: What is the partial pressure of a gas in a mixture if the X_i is 0.1, and under atmospheric pressure?

Answer: a) 760 mmHg   b) 10 bar   c) 0.1 atm   d) 1 bar

9: If the value of R is 0.082 then the unit of pressure is?

Answer: a) Pascal   b) mmHg   c) Psi   d) bar

10: What is the right equation of one of the following?

Answer: a) $p_r p_c = p$ b) $p_r p = p_c$ c) $p_r / p_c = p$ d) $p_r = p_c p$

Q2: Calculate the mass of 335 mL of sulfur dioxide (64 g mol^{-1}) measured at 37 °C and 745 mm Hg pressure.?   (25 degrees)

Q3: Calculate the volume of 0.25 g of oxygen at 25 °C and 742 mm Hg pressure.   (25 degrees)

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

Q2/ PV = nRT

$? =$ units

$PV = nRT$

$PV - $ 0.98 × 335 = n × 0.082 × 310

$t = 273 + 37$
$t = 310 K$

$n = \dfrac{328.3}{25.42} = 12.9$

$P = \dfrac{745}{760} = 0.98 \, atm$

$n = ?$

$V = 335 L$

$n = \dfrac{wt}{mwt} \Rightarrow 12.9 = \dfrac{wt}{64}$

Q2 $\dfrac{10}{25}$

$wt = 825.6 \, g$

Q2/

$PV = nRT$

$m = 0.25$

$P = \dfrac{742}{760} = 0.97 \, atm$

$n = \dfrac{0.25}{32} = 0.078$ 0.0078

$t = 273 + 25$
$= 298$

$0.97 × V = 0.078 × 0.082 × 298$ 0.0078

$0.97 × V = 1.9$

$V = \dfrac{1.9}{0.97} = 1.958 \, mL$

Q3 $\dfrac{10}{25}$