Physical Chemistry-Properties of Gases

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

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

Department of Chemistry — **1st Exam-paper A**

(50 degrees)

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

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

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

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

$T = 37 + 273 = 310\,K$

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

$V = \frac{335}{1000} = 0.335\,L$

? ≡ units

$0.98 \times 0.335 = \frac{m}{64} \times 0.082 \times 310$

$0.328 = \frac{m}{64} \times 25.42$

$m = \frac{20.992}{25.42}$

$m = 0.825\,g$

Q2 18/25

Q3 $PV = nRT \Rightarrow n = \frac{m}{M} \Rightarrow \frac{0.25}{32} = n = 0.0078\,mol$

$0.97 \times V = 0.0078 \times 0.082 \times 298$

$V = \frac{1.906}{0.97}$

$V = 1.964\,L$

$T = 25 + 273 = 298\,K$

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

Q3 17/25