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

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

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

1: Helium represents a.

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

2: A 0.2 L container contains a certain amount of gas at 1.0 bar pressure. The gas is transferred to another vessel of volume $0.5 \, dm^3$. What should be it is pressure?

Answer: a) 0.60 atm   b) 0.40 dm^3 **c) 0.4 atm**   d) 0.4 mmHg

3: A gas occupies $299 \, dm^3$ at 127 °C and 760 mm pressure. What would be it is volume at STP?

Answer: a) 199.8 L   **b) 199 dm^3**   c) 200 L   d) 204 dm^3

4: Calculate the weight of CH_4 (16 $g.mol^{-1}$) in a 10 L cylinder at 15 atm and 34 °C.

Answer: a) 95.33 $g \, mol^{-1}$ **b) 95.33 g**   c) 85.80 mol   d) 86.65 g

5: Calculate the number of moles for CH_4 in a 12 L cylinder at 14 bar and 28 °C.

Answer: **a) 6.8 mol**   b) 6.9 mol   c) 6.5 mol   d) 6.7 mol

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

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

7: According to the Avogadro's law the amount of a substance is directly proportional with?

Answer: a) p   b) T   c) R   **d) V**

8: The difference between real and ideal gas is one of the following?

Answer: a) p & V   b) T & n   c)   **d) attraction forces & volume of a gas**

9: It can know the molecular mass of un known gas by applying one of the following?

Answer: a) Boyle's law   **b) Graham's law**   c) Charles's law   d) Gay-Lussac's law

10: If V_m is bigger than V^o_m then this means the behaviour of a gas is?

Answer: **a) Real**   b) Ideal   c) Real & ideal   d) Z = 0

Q2: A gas sample has a mass of 9.98 g. Its volume is 21.6 L at a temperature of 75.46 °C and a pressure of 641 Torr. Calculate its molar mass.

Q3: A 1.3 mole of Ar gas is placed in a container at 27 °C at a pressure of 725 torr. What is the volume of the container in ml?

Q1 45/50

12/01/2021   **Best wishes**   **Dr Abduljabbar I. R. Rushdi**

Q2/Sol:-

$m = 9.98g$, $V = 21.6 L$, $75.46°C$, $P = 641 Torr$, $n = ?$

$T = 75.46 + 273 \implies T = 348.46 K$

$PV = nRT \implies PV = \dfrac{m}{M.wt} RT \implies P_{M.wt} = \dfrac{m}{V} RT$

$641 Torr * M.wt = \dfrac{9.98g}{21.6L} * 0.082 \, atm.L/mol.K * 348.46 K$

$641 Torr * M.wt = 0.462 \, g/K * 28.57372 \, atm.L/mol$

$641 \, M.wt = 13.20105 \, g/mol$

$M.wt = \dfrac{13.20105 \, g/mol}{641} \implies M.wt = 0.0209 \, g/mol$

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Q3/Sol:- $n = 1.3 mol$, $T = 27°C$, $P = 725 Torr$, $V = ?$

$T = 27 + 273 \implies T = 300 K$

$PV = nRT \implies V = \dfrac{nRT}{P}$

$V = \dfrac{1.3 \, mol * 0.082 \, atm.L/mol.K * 300 K}{725 \, Torr}$

$V = \dfrac{31.98 L}{725} \implies V = 0.0414 L$