Name of a student _Aliaa Hissen Hammadi_ ----- Signature ----- ----- No. ----- 13 -----

60/100 Sixty only

University of Mustansiriyah	1st Semester-2021
Department of Chemistry	1st Exam-paper A

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

1: If a gas has a non-polar particles then the difference between the volume of this gas is:

Answer: a) $V_{Real} > V_{Perfect}$ b) $V_{Real} < V_{Perfect}$ c) $V_{Real} = V_{Perfect}$ d) $V_{Real} \neq V_{Perfect}$

2: A gas occupies 300000 mL at 130 °C and 760 mmHg pressure. What would be its volume at STP?

Answer: a) 203.22 mL   b) 203.22 dm³   c) 204 L   d) 204 dm³

3: Calculate the weight of CH_4 (16 g.mol⁻¹) in a 10 L cylinder at 15 x 10⁵ Pa and 307 K.

Answer: a) 95.33 g mol⁻¹   b) 95.33 g   c) 95.33 mol   d) 95.33 kg

4: Calculate the number of moles for CH_4 in a 10000 mL cylinder at 10⁶ Pa and 32 °C.

Answer: a) 4.5 mol   b) 4.0 mol   c) 4.0 mmol   d) 4.5 mmol

$P_1 \frac{10}{50}$

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

Answer: a) H_2O b) CH_4 c) NH_3 d) CO

6: A 20 L tank contains a certain amount of gas at 10⁵ Pa. The gas is transferred to another tank 40 dm³. What should be its pressure?

Answer: a) 0.50 atm   b) 50 dm³   c) 50 atm   d) 0.50 mmHg

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   e) n

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

Answer: a) law p & high T   b) high p & law T   c) high p & high T   d) law p & law T

9: It can know the density of a gas by applying one of the following?

Answer: a) Van der Waal'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 < 1

Q2: A (28 mol) gas sample has a mass of 10000 mg. The volume of a container is 22 dm³ at a temperature of 76 °C and a pressure of 641 Torr. What is the density of the gas? (25 points)

Q3: An Ar gas is placed in a container at 30 °C at a pressure of 730 torr. What is the volume of the container in ml? (25 points)

09/11/2021   Best wishes   Dr Abduljabbar I. R. Rushdi

Q2/ $n = 28$ mol , $m = 1000$ mg , $V = 22$ dm^3 , $T = 76$C

$P = 641$ torr , $d = ?$

$PV = nRT$

$PV = \dfrac{m}{M} RT$

$PM = \dfrac{m}{V} RT$

$PM = dRT$

$\boxed{d = \dfrac{PM}{RT}}$

$\dfrac{n}{1} = \dfrac{m}{M}$

$M = \dfrac{m}{n}$

$m = \dfrac{1000\,mg}{1000\,g} = 10\,g$

$= \dfrac{10\,g}{28\,mol}$

$M = 0.357\,g/mol$

$P = 641$ torr

$\dfrac{641\,torr}{760\,torr}$ atm

$= 0.84$ atm

$T = 76°C + 273K$

$= 349K$

$d = \dfrac{0.84\,atm \times 0.357\,g/mol}{0.082\,\frac{atm \cdot L}{mol \cdot K} \times 349K}$ ⟶ 0.299 ⟶ 28·4

0.0104

$= 1276.31\,g/L$

$R = 0.082 \dfrac{atm \cdot L}{mol \cdot K}$

(circled) Q$_2$ $\frac{25}{25}$

Q3/ $T = 30°C$, $P = 730$ torr , $V = ?$ mL

$T = 30°C + 273 = 303K$, $R = 0.082 \dfrac{atm \cdot L}{mol \cdot K}$

$n = 1$ mol

$PV = nRT$

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

$P = \dfrac{730\,torr}{760\,torr}$ atm

$= 0.96$

تقريب 1 atm   NO?

$= \dfrac{1\,mol \times 0.082 \frac{atm \cdot L}{mol \cdot K} \times 303K}{1\,atm}$

$= 24.846\,L$

(circled) Q$_3$ $\frac{25}{25}$

تحويل الـ L ⟶ mL تقريب في 1000

$= 24846\,mL$