F13

Physical Chemistry_Chpt_One_Properties of Gases

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

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 particle 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 dm^3 c) 204 L d) 204 dm^3

3: Calculate the weight of CH_4 (16 $g.mol^{-1}$) in a 10 L cylinder at 15 x 10^5 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 10^6 Pa and 32 °C.

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

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 10^5 Pa. The gas is transferred to another tank 40 dm^3. What should be its pressure?

Answer: a) 0.50 atm b) 50 dm^3 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 dm^3 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

$$\delta = \frac{MP}{RT}$$

How do you get this no.

$$\delta = \frac{0.35\ g.mol \times 10.3152\ atm}{0.082\ \frac{L.atm}{mol.K} \times 349\ K}$$

$$\delta = 0.12\ g/L$$

Q2 15/25

المعطيات

$n = 28\ mol$

$T = 76\ C^\circ$

$P = 641\ Torr$

$m = 10000\ mg$

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

$$28\ mol = \frac{10\ g}{M}$$

$$M = \frac{10?}{28?}$$

$$28\overline{)100}\ \ 0.35$$

84

160

140

20

$M = 0.35\ g.mol$

$$1g = \frac{10000\ mg}{1000\ mg}$$

$m = 10g$

$T_K = 76 + 273$

$T = 349\ K$

Q3

$$PU = RTn$$

$$U = \frac{RTn}{P}$$

Q3 15/25

$T = 30C^\circ$

$T_K = 30 + 273$

$T = 303\ K$

$$U = \frac{0.082\ \frac{L.atm}{mol.K} * 303\ K \times 1\ mol}{0.6106\ atm}$$

[redacted]

$P = 730\ torr$

$$U = \frac{248,4600}{0,6106}\ L$$

$$P = \frac{1\ atm \times 730\ torr}{760\ \ 10.3152\ torr}$$

$$U = \frac{2484600}{6106}\ L$$

$$P = \frac{730}{10.32}\ atm$$

$U = 3.21$

$P = 0.6106\ atm$