P13

63/100 Sixty three

23-11-2021 Tuesday

Physical Chemistry_Chpt_One_Properties of Gases

Name of a student ---------- Signature ---------- No. 11

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 ^{O}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 ^{O}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 $n = 28\ mol$ $m = 10000\ mg$ $V = 22\ dm^3$ $T = 76\ c^\circ$

$P = 641\ torr$ $d = ?$

$T = 76 c^\circ + 273 = 349\ K$

$P = (1\ atm \times 641\ torr) / 760\ torr = 0.043\ atm$ (0.843)

$m = \frac{10000}{1000} = 10\ g$

$M = \frac{m}{n} = \frac{10\ g}{28\ mol} = 0.357\ g/mol^{-1}$

Q2 23/25

$PM = dRT \Rightarrow d = \frac{PM}{RT}$

$d = \frac{0.043\ atm \times 0.357\ g/mol^{-1}}{0.082\ L.atm/mol.K \times 349\ K} = 4.25 \times 10^{-3}\ g/L$

Q3 / $T = 30 c^\circ$, $P = 730\ torr$, $V = ?$, $n = 1\ mol$

$T = 30 c^\circ + 273 = 303\ K$

$P = (1\ atm \times 730\ torr) / 760\ torr = 0.96\ atm$

$PV = nRT \Rightarrow V = \frac{nRT}{P}$ (0.082)

$V = \frac{1\ mol \times 0.028\ L.atm/mol.K \times 303\ K}{0.96\ atm} = 8.84\ L$

Q3 20/25

$V = 8.84\ L \times 1000 = 8840\ mL$