40/100 Fourty

12-Oct 2021 Tues

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Physical Chemistry-Properties of Gases

Name of a student ---------- Signature ---------- No. 2

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

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

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

1: A vessel of 50 mL capacity contains a certain amount of gas at 40 °C and 2 bar pressure. The gas is transferred to another vessel of volume 100 mL at 40 °C. What should be it is pressure?

Answer: a) 1.0 atm b) 0.85 mmHg c) 0.9 cmHg d) 1 bar

2: What is the right formula of the Van der Waals equation?

Answer: a) $p = [nRT/(V-nb)] - n(a^2/V^2)$ b) $P = [nRT/(V-nb)] - V(n^2/a^2)$ c) $p = [nRT/(b-nV)] - a(n^2/V^2)$ d) $P = [nRT/(V-nb)] - a(n^2/V^2)$

3: Calculate the temperature of 4.0 mol of a gas occupying 5.0 dm^3 at 3.3 bar?

Answer: a) 50.3 °C b) 48 K c) 51 °C d) 50.3 K

4: Calculate the weight of O_2 (32 $g.mol^{-1}$) in a 4 L cylinder at 9 atm and 281 K.

Answer: a) 50 kg b) 50 g c) 50 K d) 50 °C

5: Calculate the p_C of He gas, if the p_r and p is 0.44 and 1 atm respectively

Answer: a) 2.26 K b) 2.26 atm c) 2.26 L d) 2.26 mol

6: If the repulsion forces are negligible, that means the gas is?

Answer: a) real b) noble c) perfect d) compressed

7: According to the Dalton's law total mole fraction is equal to?

Answer: a) 0.10 mol b) 1.0 mol c) 0.10 d) 1.0

8: What is the partial pressure of a gas in a mixture if the X_i is 0.5, and the conditions are at STP?

Answer: a) 1.5 Pa b) 0.49 bar c) 0.5 atm d) 0.5 bar

9: If the value of is 0.082 then the unit of temperature is?

Answer: a) Kelvin b) Celsius c) Fahrenheit d) no one of these

10: According to the Avogadro's law the amount of a gas at STP is?

Answer: a) 1.00 mol b) 2.00 mol c) 1.00 L d) 2.00 mol

Q. 30/50

Q2: The air inside a flexible 3.5 L container has a pressure of 115 kPa. What should the volume of the container be increased to in order to decrease the pressure to 625 torr?

Q3: A 3 dm^3 container holds 0.5 moles of N_2 gas at 42 °C. What is the pressure inside the container?

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

Q2

$V_1 = 3.5\,L$

$P_1 = 115\,KPa$?

عندما نقص الضغط $P_2 = 625$ torr

$V_1P_1 = V_2P_2 \Rightarrow \frac{P_1}{P_2} = \frac{V_2}{V_1}$

Q2 5/25

$\frac{V_1}{P_1} = \frac{V_2}{P_2}$

$= \frac{3.5}{115} = \frac{V_2}{625}$? ? ? ? ? ? ? ≡ units

$V_2(115) = 3.5 \times 625$

$V_2 = 19.02\,L$

Q3

$V = 3\,dm^3$

$n = 0.5$ moles

$T = 42\,^\circ C$ $\quad T = 42\,^\circ C + 273 = 315\,K$

Q2 10/25

$PV = nRT$

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

$P = \frac{0.5\,\text{moles} \times 0.082 \times 315\,K}{3 \times 10^{-3}\,L} = 43.05\,atm$

$P = 43.05\,atm$