Physical Chemistry-Properties of Gases

Name of a student _____ Signature _____ No. _____

University of Mustansiriyah

Department of Chemistry

1st Semester-2021

1st Exam-paper B

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

حيز الهليوم
1: Helium represents a.
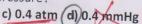Answer: a) real gas   b) ideal gas   c) noble gas   d) heavy gas   0/5

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 dm³. What should be it is pressure?
Answer: a) 0.60 atm   b) 0.40 dm³   c) 0.4 atm   d) 0.4 mmHg   0/5

3: A gas occupies 299 dm³ at 127 °C and 760 mm pressure. What would be it is volume at STP?
Answer: a) 199.8 L   b) 199 dm³   c) 200 L   d) 204 dm³   0/5

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   0/5

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   5/5

Q1 20/50

6: According to Graham's law the heaviest gas is?
Answer: a) H_2 b) O_2 c) N_2 d) CO_2 0/5

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   0/5

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   5/5

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   5/5

10: If V_m is bigger than V^0_m then this means the behaviour of a gas is?
Answer: a) Real   b) Ideal   c) Real & ideal   d) Z = 0   0/5

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?

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

Q2–

$m = 9.98 g$

$V = 21.6 L$

$T = 75.46 + 273$

$\quad = 348.46 K$

$P = 641 Torr$

$$d = \frac{m\,(g)}{V\,(L)}$$

$$= \frac{9.98\,(g)}{21.6\,(L)}$$

$$= 0.46 \overset{?}{_{o}} = unit$$

$$M = \frac{dRT}{P}$$

$$M = \frac{0.46 \overset{?}{_{o}} \times 0.082 \frac{L\cdot atm}{mol\cdot K} \times 348.46 K}{0.84\ atm}$$

→ You do not write how to convert torr to atm

$$M = 15.6\ \frac{g}{mol}$$

Q3–

$n = 1.3\ mol$

$T = 27 + 273$

$\quad = 300 K$

$P = 725\ Torr \Rightarrow atm?$

$V = ?$

$$PV = nRT$$

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

$$V = \frac{1.3\ mol \times 0.082 \frac{L\cdot atm}{mol\cdot K} \times 300 K}{0.95\ atm}$$

$$V = 33.66 L \implies V = 33663\ mL.$$