Physical Chemistry_Chpt_One_Properties of Gases

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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/

$$PM = dRT$$

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

$$M = \frac{10000 \;\; 10}{28} \Rightarrow M = 357.14 \;\; (g/mol)$$

$n = 28 \; mol$

$m = 10000 \; g$

$T = 76 \overset{\circ}{C} + 273 K = 349 K$

$P = \frac{641}{760} \; toor = 0.84 \; bar$

$d = ?$

$$PM = dRT$$

$$d = \frac{PM}{RT} \Rightarrow d = \frac{0.84 \; bar \times 357.14 \; (g/mol)}{0.082 \times 349 k} \quad ? = units$$

$$d = 10.47 \quad ?$$

$$\frac{15}{25} \; Q_2$$

Q3/

$$C = 30 \overset{\circ}{C} + 273 = 303 k$$

$$P = \frac{730 \; toor}{760} = 0.96 \; bar$$

$$v = ?$$

$$PV = nRT \Rightarrow V = \frac{nRT}{P} \quad ? = units$$

$$V = \frac{1 \times 0.082 \times 303}{0.96} \Rightarrow V = \frac{24.846}{0.96}$$

$$V = 25.875 \, l$$

$$V = 25875 \, ml$$

$$\frac{20}{25} \; Q_3$$