F18

25-11-2021 *30 Thirty only* *100*

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

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

Q1: Circle the right answer for all of the following: (50 points)

اذا كان الغاز يمتلك دقائق قطبية

1: If a gas has polar particles 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) $V_{Real} \neq V_{Perfect}$

جو الوني يشغل غاز

2: A gas occupies 60×10^3 mL at 150 °C and 760 mmHg pressure. What would be its volume at STP?

Answer: a) 38.7 mL — b) 38.7 dm^3 — c) 38.7 L^{-1} — d) 38.7 dm^{-3}

3: Calculate the weight of H_2O gas (18 g.mol^{-1}) in a 5 L cylinder at 10×10^2 kPa and 373 K.

Answer: a) 29.40 g mol^{-1} — b) 29.40 g — c) 29.40 mol — d) 29.40 kg

NO ANSWER Why?

4: Calculate the density of H_2O placed in a 22400 mL cylinder at 10^5 Pa and 0 °C.

Answer: a) 0.804 kg L^{-1} — b) 0.804 g L^{-1} — c) 0.804 g — d) 0.804 L^{-1}

5: According to Graham's law the heaviest gas is?

Answer: a) H_2O — b) CH_4 — c) NH_3 — d) Cl_2

6: A tank contains a certain amount of gas at 10^5 Pa. The gas is transferred to another tank 40 dm^3 with pressure of 200×10^3 Pa. What should be its volume?

Answer: a) 80 L — b) 80 Pa L — c) 80 Pa dm^3 — d) 80 L^{-1}

Q_1 $\frac{20}{50}$

7: According to Boyle's law the pressure of a gas is inversly proportional with?

Answer: a) p — b) T — c) R — d) V — e) n — $\frac{5}{5}$

8: The difference between real and ideal gas, that the real gas interested in?

Answer: a) V & p — b) V & T — c) p & n — d) T & p

9: It can follow the direct proportional between temperature and pressure through the law of

Answer: a) Van der Waal — b) Graham — c) Charles — d) Gay-Lussac — $\frac{5}{5}$

10: The behaviour of real gas is ideal when the value of Z is equal to

Answer: a) $V_m < V^O_m$ — b) $V_m > V^O_m$ — c) $V_m = V^O_m$ — d) $V_m \neq V^O_m$ — $\frac{5}{5}$

Q2: The following data have been observed for 800 mg of nitrogen gas at 273 K. Calculate the best value of the molar mass of N_2. (25 points)

p/10^5 Pa	0.750	0.500	0.200
V/dm^3	3.0	4.5	7.0

$P_2 V_2$

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm^3. The p_f and V_f of the gas are 2×10^2 kPa and 2.14 dm^3, respectively. Calculate the $p_{original}$ of the gas in (i) bar, (ii) torr. (25 points)

P_2 V_2

Thur_11/11/2021 — Best wishes $P_1 = ?$ — Dr Abduljabbar I. R. Rushdi

Q 2// V

$$M_1 = \frac{RT}{PV}$$

$$P = 0.750/10^5 = 7.500$$

Pa → atm

$$\frac{M_1}{m_1} = \frac{(0.082)(273)}{(7.500)(3\times10^{-9})}$$

dm³ → L

$$V = 3.0 \times 10^{-9} = 3\times10^{-9}$$

$$= 994.43 \ g/mol$$

? = units

$Q_2 \ \frac{5}{25}$

$$\frac{M_2}{m_2} = \frac{RT}{PV} = \frac{(0.082)(273)}{(5\times10^{-6})(4.5\times10^{-9})}$$

$$P = 0.500/10^5 = 5\times10^{-6}$$

$$V = 4.5 \times 10^{-9} = 4.5\times10^{-9}$$

$$= 9.95 \ g/mol$$

$$\frac{M_3}{m_3} = \frac{RT}{PV} = \frac{(0.082)(273)}{(2.2\times10^{-6})(7\times10^{-9})}$$

$$P = 0.22/10^5 = 2.2\times10^{-6}$$

$$V = 7.0 \times 10^{-9} = 7\times10^{-9}$$

$$= 1.45 \times 10^{13}$$

$$M = \frac{m}{n} = \frac{0.8}{1} = 0.8 \ g/mol$$

800 mg → g

800/1000

= 0.8

Q3// $P_2 = 2\times10^2 \ kPa$, $V_2 = 2.14 \ dm^3$

$$V_1 = 22.4 - 1.80 = 20.6 \ dm^3$$

$$P_1 V_1 = P_2 V_2$$

$Q_3 \ \frac{5}{25}$

$$P_1(20.6) = (2\times10^2)(2.14)$$

$$P_1 = \frac{(2\times10^2)(2.14)}{20.6} = 20.78 \ kPa$$

قوانين تحويل Pka الى atm (نفس التحويل لقياس atm الى mbar) نحوّل Pka الى gas atm قانون تحويل torr

2.105.5 atm $\xrightarrow{torr}$ $\frac{2.105.5}{760} = 2.77$ torr   2.105.5 atm = 2.105.5 bar barالى