GMR Classes

Gaseous State Slip Test - Keys And Solutions

Total Marks : 40
Duration : 1:00 hrs

KEY

1. (A) **2.** (D) **3.** (B)

4. (A) **5.** (B) **6.** (B)

7. (A) **8.** (D) **9.** (A)

10. (B)

SOLUTIONS

1. Under different conditions of pressure and temperature

$$\text{rate } \alpha \frac{PA}{\sqrt{T.M.}} \quad \therefore \frac{r_1}{r_2} = \frac{P_1}{P_2}\frac{A_1}{A_2}\sqrt{\frac{T_2M_2}{T_1M_1}}$$

2.

$$n_T = n_1 + n_2 + n_3 + \ldots\ldots\ldots$$

$$\frac{P_T.V_T}{RT} = \frac{P_1V_1}{RT} + \frac{P_2V_2}{RT} + \ldots\ldots\ldots = \Sigma P_iV_i$$

$$P_TV_T = \Sigma P_iV_i$$

$$= 2PV + \frac{P.V}{2} + \frac{P}{2}.\frac{P}{4} + \frac{P}{4}.\frac{V}{8} + \ldots\ldots\ldots$$

$$= 2PV\,[\,1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \ldots\ldots\ldots$$

$$P_TV_T = 2PV\frac{1}{1-\frac{1}{4}} = 2PV.\frac{4}{3}$$

$$V_T = V_1 + V_2 + V_3 + \ldots\ldots\ldots$$

$$= V + \frac{V}{2} + \frac{V}{4} + \frac{V}{8}\ldots\ldots\ldots = V\left[1+\frac{1}{2}+\ldots\ldots\ldots\right] = V\frac{1}{1-\frac{1}{2}} = 2V$$

$$\therefore \quad P_T.\,2V = 2PV.\frac{4}{3} \quad ; \quad P_T = \frac{4}{3}P$$

3. PV = nRT

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

$$n_{N_2} > n_{O_2} \Rightarrow P_{N_2} > P_{O_2}$$

4.

$$\frac{r_1}{r_2} = \frac{p_1}{p_2}\sqrt{\frac{T_2 M_2}{T_1 M_1}} \quad \Rightarrow \quad \frac{n}{x} = \frac{1}{0.25}\sqrt{\frac{2 \times 273 \times 4}{273 \times 64}} \quad \Rightarrow \quad x = \frac{n}{\sqrt{2}}$$

5. At constant pressure
PV = nRT.

$V = \left(\frac{nR}{P}\right)T$. So, log V = log $\left(\frac{nR}{P}\right)$+ log T.

y = C + mx.]
So answer is (B)

6. $u_{av} = \frac{\sqrt{8RT}}{\pi m}$

7.

$m = 10^{-22}\, g$, $n = 10^{23}$, $V = 1\ litre = 1000 cm^3$,

$C = 10^5\, cm - s^{-1}$; $PV = \frac{1}{3} mnC^2$

$$\Rightarrow P = \frac{1}{3}\frac{mnC^2}{V} = \frac{1}{3} \times \frac{10^{-22} \times 10^{23} \times (10^5)^2}{1000}$$

$= 3.33 \times 10^7\, dyne - cm^{-2}$

8.

$P'_{N_2} + P'_{H_2O} = 1 atm$; $P'_{H_2O} = 0.3 atm$; $P'_{N_2} = 0.7 atm$

Now new pressure of N_2 in another vessel of volume V/3 at same temperature T is given by

$$P''_{N_2} \times \frac{V_1}{3} = 0.7V$$

$$\therefore P''_{N_2} = 2.1 \text{ atm}$$

since aqueous tension remains constant, and thus total pressure in new vessel

$$= P''_{N_2} + P'_{H_2O} = 2.1 + 0.3 = 2.4 \text{ atm}$$

9.

$$n = \frac{8.5}{17} = 0.5\ mol$$

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$$

$$P = \frac{nRT}{(V-nb)} - \frac{an^2}{V^2} = \frac{0.5 \times 0.082 \times 300}{(0.5 - 0.5 \times 0.036)} - \frac{4(0.5)^2}{(0.5)^2}$$

$$= 21.51\ atm$$

$$T = 24°\ C = 297\ K$$

$$P = 760\ mm\ of\ Hg = 1 atm$$

$$V = 128\ ml = 128 \times 10^{-3}$$

$$PV = nRT$$

$$\Rightarrow 1 \times 128 \times 10^{-3} = \frac{m}{32} \times 0.0821 \times 297$$

$$\Rightarrow m = \frac{32 \times 128 \times 10^{-3}}{0.0821 \times 297} = 0.167\ gm$$

10. $\cong 0.163\ gm$