76.(A) $n_{Total} = \dfrac{PV}{RT} = \dfrac{6\times 3}{0.082\times 300} = 0.73$

$n_X = n_{Total} - 0.7 = 0.03$

Using Graham's law of Diffusion : $\dfrac{n_{H_2/t}}{n_X/t} = \dfrac{0.7}{n_X} = \sqrt{\dfrac{M_X}{M_{H_2}}} = \sqrt{\dfrac{M_X}{2}} \quad \Rightarrow \quad M_X = 2\left(\dfrac{0.7}{n_X}\right)^2 = 1088$

77.(B) $C_xH_yO_z(g) + \left(x + \dfrac{y}{4} - \dfrac{z}{2}\right)O_2(g) \longrightarrow x\,CO_2(g) + \dfrac{y}{2}H_2O(\ell)$

$1\,ml \qquad \left(x + \frac{y}{4} - \frac{z}{2}\right)ml \qquad x\,ml$

Contraction in volume due to combustion $= 10\left[\left(1 + x + \dfrac{y}{4} - \dfrac{z}{2}\right) - x\right] = 10 + 100 - 90 = 20$

$\Rightarrow \quad 1 + \dfrac{y}{4} - \dfrac{z}{2} = 2 \quad \Rightarrow \quad y - 2z = 4 \qquad \ldots\ldots$ (i)

and Contraction in volume due to absorption of CO_2 by NaOH : $10x = 20 \quad \Rightarrow \quad x = 2$

Also, $M_0 = 2\,V.D. = 46 = 12x + y\times 1 + 16z$

$\Rightarrow \quad y + 16z = 22 \qquad \ldots\ldots$ (i)

$\Rightarrow \quad z = 1$ and $y = 6 \Rightarrow$ Molecular formula $= C_2H_6O$

78.(C) $C_xH_y(g) + \left(x + \dfrac{y}{4}\right)O_2(g) \longrightarrow x\,CO_2(g) + \dfrac{y}{2}H_2O(\ell)$

$1\,ml \qquad \left(x + \frac{y}{4}\right)ml \qquad x\,ml$

Contraction in volume due to combustion $= 5\left(1 + x + \dfrac{y}{4} - x\right) = 5 + 30 - 25 = 10 \quad \Rightarrow \quad y = 4$

Contraction due to KOH $= 25 - 15 = 10 = 5x \quad \Rightarrow \quad x = 2 \quad \Rightarrow$ Molecular formula $= C_2H_4$

79.(D) Check yourself that all are correct.

- Decreases with increase in concentration – means increase in the number of molecules
- Increases with decrease in pressure at constant temperature – means increase in the volume available for gas molecules
- Decreases with increase in molecular size – means decrease in the volume available for gas molecules

80.(A) $\dfrac{r_{N_2}}{r_{XeF_y}} = \dfrac{1/38}{1/57} = \dfrac{0.8}{1.6}\sqrt{\dfrac{M_{XeF_y}}{28}}$

$\Rightarrow \quad M_{XeF_y} = 252 = 131 + 19y \quad \Rightarrow \quad y \approx 6 \quad \Rightarrow$ Molecular formula $= XeF_6$

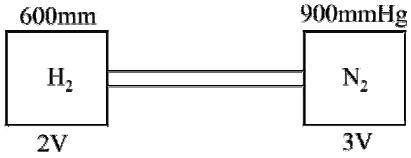
81.(A) $\left.\begin{aligned} c_{avg} &= \sqrt{\dfrac{8RT}{\pi M_o}} \\ c_{rms} &= \sqrt{\dfrac{3RT}{M_o}} \end{aligned}\right\} \Rightarrow \dfrac{400}{c_{rms}} = \sqrt{\dfrac{8}{3\pi}} \quad \Rightarrow \quad c_{rms} = 400\times\sqrt{\dfrac{3\pi}{8}} = 434.16\,ms^{-1}$

82.(B) For intercept, $P \to 0 \quad \Rightarrow \quad Z \to 1$

$\Rightarrow \quad PV_m \to RT \quad \Rightarrow \quad$ Intercept $= RT$

83.(A) $$\frac{g_{N_2}}{g_{O_2}} = \frac{1 \times 28}{\left(\frac{7}{8}\right) \times 32} = 1$$

84.(A)



$$3H_2(g) + N_2(g) \longrightarrow 2NH_3(g)$$

$$n_{H_2} = \frac{600 \times 2V}{RT}; \qquad n_{H_2} = \frac{900 \times 3V}{RT}$$

Clearly, H_2 is the limiting agent.

$$\Rightarrow \quad N_2 \text{ left} = \frac{2700\,V}{RT} - \frac{400\,V}{RT} = \frac{2300\,V}{RT} \text{ and } NH_3 \text{ formed} = \frac{800\,V}{RT}$$

$$\Rightarrow \quad P_{new} = \frac{\left(\frac{3100\,V}{RT}\right)RT}{5V} = 620\,mm$$

85.(C) $$\frac{r_A}{r_B} = \frac{2}{1} = \sqrt{\frac{M_B}{M_A}}$$

$$\frac{c_{rms\,A}}{c_{rms\,B}} = \sqrt{\frac{T_A}{M_A} \cdot \frac{M_B}{T_B}} = \sqrt{\frac{2}{1}} \times 2 = \frac{2\sqrt{2}}{1} \quad [\text{Rate} \propto c_{rms}]$$