HINTS & SOLUTION WORKBOOK-1

States of Matter

Daily Tutorial Sheet-12	Level-3

141.(A) For same density, pressure will be greater at higher temperature

142.(B) Number of moles of He initially in $A = \frac{PV}{RT} = \frac{2\times 3}{R\times 273}$

Number of moles of He initially in $B = \frac{1\times 4}{R\times 300}$

$\therefore$ Total number of moles of He $= \frac{6}{273R} + \frac{4}{300R}$

After connecting the vessels

Volume $= 3+4 = 7\,L$

Temperature $= 300\,K$

Number of moles = same as before i.e. $\frac{6}{273\,R} + \frac{4}{300\,R}$

$$\therefore \quad P = \frac{nRT}{V} = \frac{\left(\frac{6}{273\,R} + \frac{4}{300\,R}\right)R\times 300}{3+4} = 1.51\,atm$$

143.(D) $n_1 = \frac{1}{32}$

$P_1 = 10\,atm$; $T_1 = 47+273 = 320\,K$

$P_2 = \frac{5}{8}\times 10\,atm$; $T_2 = 27+237 = 300\,K$

$n_2 = ?$

$V_1 = V_2$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2} \Rightarrow \frac{10}{\frac{1}{32}\times 320} = \frac{\frac{5}{8}\times 10}{n_2\times 300} \Rightarrow n_2 = \frac{5}{8}\times\frac{1}{32}\times\frac{320}{300} = \frac{2}{3}\times\frac{1}{32}$$

Mass of O_2 left $= \frac{2}{3}\times\frac{1}{32}\times 32 = \frac{2}{3}g$

$\therefore$ Mass of O_2 leaked $= \left(1-\frac{2}{3}\right)g = \frac{1}{3}g = 0.33\,g$

144.(D) $\frac{1}{2}A_4 + \frac{x}{2}O_2 \longrightarrow A_2O_x$

$\frac{1}{2}$ mole of A_4 will required $\frac{x}{2}$ mol of O_2

$\therefore$ 0.75 mol of A_4 will require $\frac{x}{2}\times 2\times 0.75$ mol of O_2

i.e. $0.75\,x$ mol of O_2

$\therefore$ The formula is $A_2O_{8/3}$ or A_6O_8 or A_3O_4

145.(B) PV = Constant

146.(A) $$\frac{\text{Rate of diffusion of A}}{\text{Rate of diffusion of B}} = \sqrt{\frac{M_0(B)}{M_0(A)}}$$

$$\Rightarrow \quad \frac{50}{40} = \sqrt{\frac{M_0(B)}{64}} \quad \Rightarrow \quad M_0(B) = 100$$