Daily Tutorial Sheet-13	Level-3

147.(C) Let the moles of HCOOH be x and the moles $\begin{matrix} COOH \\ | \\ COOH \end{matrix}$ be y.

$$HCOOH \xrightarrow{H_2SO_4} CO + H_2O$$

$$\begin{matrix} COOH \\ | \\ COOH \end{matrix} \xrightarrow{H_2SO_4} CO_2 + CO + H_2O$$

$\therefore$ moles of $CO_2 = y$; moles of $CO = x + y$

Total gaseous moles $= x + 2y$

$$\frac{y}{x+2y} = \frac{1}{6} \Rightarrow 6y = x + 2y \Rightarrow x = 4y \Rightarrow \frac{x}{y} = \frac{4}{1}$$

148.(B) Let there be 'a' mole of CH_4 and b mol of C_2H_2

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

So 'a' mol of CH_4 will give 'a' mol of CO_2

$$C_2H_2 + \frac{5}{2}O_2 \longrightarrow 2CO_2 + H_2O$$

So, 'b' mol of C_2H_2 will give 2b mol of CO_2 under same temperature and volume,

$$\frac{P_1}{P_2} = \frac{n_1}{n_2}$$

$P_1 = 63\,mm$; $P_2 = 69\,mm$

$n_1 = a + b$ $n_2 = a + 2b$

$$\frac{63}{69} = \frac{a+b}{a+2b} \Rightarrow 19b = 2a$$

Fraction of methane $= \dfrac{a}{a+b} = \dfrac{a}{a + \frac{2a}{19}} = 0.90$

149.(B) $p_{H_2} = x_{H_2} \times P_T$

$$x_{H_2} = \frac{n_{H_2}}{n_{H_2} + n_{He} + n_{CH_4}} = \frac{\frac{1}{2}}{\frac{1}{2} + \frac{1}{4} + \frac{1}{16}} = 0.615$$

$p_{H_2} = 0.615 \times 2.6 = 1.6\,atm$

150.(B) $$\frac{\text{Rate of diffusion of } H_2}{\text{Rate of diffusion of He}} = \frac{n_{H_2}}{n_{He}}\sqrt{\frac{M_0(He)}{M_0(H_2)}} = \frac{\frac{1}{2}}{\frac{1}{4}}\sqrt{\frac{4}{2}}$$

$$\frac{\text{number of moles of } H_2 \text{ effused per second}}{\text{number of moles of He effused per second}} = 2\sqrt{2}$$

151.(C) $V \times n$ at constant P and T

152.(AC) K.E. remains constant at constant temperature and same number of molecules.