HINTS & SOLUTION TO WORKBOOK - 2

Chemical Equilibrium

Daily Tutorial Sheet - 12	Level-3

141.(C)

$$\underset{\text{Moles at Equil.}}{\underset{2-x}{A_2(g)} + \underset{4-x}{B_2(g)} \rightleftharpoons \underset{2x}{2AB(g)}}$$

$$K_c = \frac{4x^2}{(2-x)(4-x)} \quad \Rightarrow \quad x = \frac{32}{24} = 1.33\,\text{mole}$$

$$[AB(g)] = \frac{2\times 1.33}{4} = 0.66\,M$$

142.(C) $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$

Let partial pressure at equilibrium of CO_2 be P, then $P_{NH_3} = 2P$ and total pressure at equilibrium $= 3P$

$$K_P = (2P)^2 \times P = 4P^3 \qquad \text{.....(i)}$$

If NH_3 is added and the pressure of NH_3 after addition at equilibrium is 3P.

$$K_p = 4P^3 = \left(P'_{NH_3}\right)^2 \times P'_{CO_2}$$

$$\Rightarrow \quad P'_{CO_2} = \frac{4}{9}P \quad \therefore \quad \text{Ratio of } \frac{P'_{CO_2}}{P_{CO_2}} = \frac{4}{9}$$

143.(B)

$$\underset{\text{moles at equil.}}{\underset{a(1-\alpha)}{3Se_2(g)} \rightleftharpoons \underset{\frac{a\alpha}{3}}{Se_6(g)}}$$

$$\frac{\text{observed no. of moles at equilibrium}}{\text{Initial no. of moles of reactant}} = \frac{M_T}{M_O} \quad \Rightarrow \quad \frac{a(1-\alpha)+\frac{a\alpha}{3}}{a} = \frac{M_T}{M_O} = \alpha = 0.315$$

Where molar mass of Se_2, $(M_T) = 79\times 2 = 158$

and molar mass of mixture $(M_O) = \frac{wRT}{PV} = \frac{0.02\times 24.63}{1\times 2.463\times 10^{-3}} = 200$

144.(D)

$$\underset{\text{Conc. at eqm.}}{\underset{C(1-\alpha)}{6HCHO} \rightleftharpoons \underset{\frac{C\alpha}{6}}{C_6H_{12}O_6}}$$

$$\frac{\text{observed moles concentration}}{\text{Initial moles concentration}} = \frac{M_T}{M_O}$$

M_T = Theoretical molar mass of HCHO

$$\frac{C(1-\alpha)+\frac{C\alpha}{6}}{C} = \frac{M_T}{M_O} = \frac{30}{150}$$

145.(A) $\underset{0.01-x}{Sb_2S_3(s)} + \underset{0.01-3x}{3H_2(g)} \longrightarrow \underset{2x}{2Sb(s)} + \underset{3x}{3H_2S(g)}$

Where $3x = 0.005$

$H_2S + Pb^{2+} \longrightarrow PbS + 2H^+$

number of moles of PbS formed $= \dfrac{1.19}{238} = 0.005$ mole

At equil. $[H_2] = \left(\dfrac{0.01-0.005}{250}\right)$; $K_c = \left(\dfrac{0.005}{0.005}\right)^3 = 1$

146.(C) $\dfrac{r_{mix}}{r_{O_2}} = \sqrt{\dfrac{32}{M_{mix}}} = 0.4\sqrt{5} \quad \Rightarrow \quad M_{mix} = 40\,g/mol$

$$O_2(g) \rightleftharpoons \frac{2}{3}O_2(g)$$

Initial moles	1	0
at equilibrium	$1-\alpha$	$\frac{2}{3}\alpha$

$$\frac{32}{40} = \frac{1-\alpha+\frac{2}{3}\alpha}{1} \quad \Rightarrow \quad \alpha = 0.6 \quad \therefore \quad \%\alpha = 60$$