

Daily Tutorial Sheet-9

Level-2

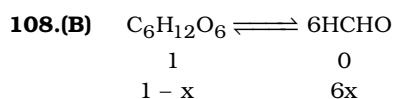
106.(A) $\left(K_{P_1} = \frac{P_y^2}{P_x} \right) \quad K_{P_2} = \frac{P_P \cdot P_Q}{P_Z}$

$$\begin{array}{lcl}
 & x & \rightleftharpoons 2y \\
 t = 0 & 1 & 0 \\
 \text{at } t = t_{eq} & 1-x & 2x
 \end{array}
 \quad \text{Let total pressure } P_1 \Rightarrow K_{P_1} = \frac{\left(\frac{2x}{1+x} \right)^2 P_1^2}{\left(\frac{1-x}{1+x} \right) P_1}$$

$$\begin{array}{lcl}
 & Z & \rightleftharpoons P + Q \\
 & 1 & 0 \quad 0 \\
 & 1-x & x \quad x
 \end{array}
 \quad \text{Let total pressure } P_2 \Rightarrow K_{P_2} = \frac{\left(\frac{x}{1+x} \right) P_2 \left(\frac{x}{1+x} \right) P_2}{\left(\frac{1-x}{1+x} \right) P_2}$$

Given: $K_{P_1} : K_{P_2} = 1 : 9$

107.(B) $Q_c = \frac{[P_2(g)]^2}{[P_4(g)]} = \frac{(1)^2}{(3/2)} = \frac{2}{3}$



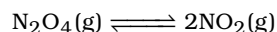
$$K_c = \frac{(6x)^6}{(1-x)} = \frac{1}{6 \times 10^{22}} \Rightarrow 6x = \left(\frac{1}{6 \times 10^{22}} \right)^{1/6} \Rightarrow \text{Calculate } 6x$$

109.(A) Normal molecular mass of $N_2O_4 = 28 + 64 = 92$

Normal vapour density (V.D before dissociation)

$$(D) = \frac{\text{Normal molecular mass}}{2} = \frac{92}{2} = 46$$

Vapour density after dissociation (d) = 30



$$\text{Degree of dissociation } (x) = \frac{D-d}{d(n-1)} = \frac{46-30}{30(2-1)} = \frac{16}{30 \times 1} = 0.535 \Rightarrow \% = 53.5\%$$

110.(C) Reaction quotient $= \frac{p[NO_2]^2}{p[N_2O_4]} = \frac{100}{10} = 10$

$$\Delta G^\circ = 2\Delta G_f^\circ(NO_2) - \Delta G_f^\circ(N_2O_4) = 2 \times 50 - 100 = 0$$

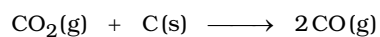
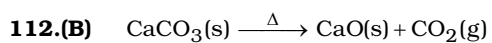
$$\Delta G = \Delta G^\circ - 2.303 RT \log_{10} Q_p = 0 - 2.303 \times 8.314 \times 298 \log_{10} 10 = -5705.8 \text{ J} = -5.705 \text{ kJ}$$



$$\begin{array}{cccc}
 \text{at } t = 0 & 1 & 0 & 0 \\
 \text{at } t = eq & (1-0.5) & 0.5 & 0.5
 \end{array}$$

$$K_p = \frac{\left(\frac{0.5}{1.5} \right) P \left(\frac{0.5}{1.5} \right) P}{\left(\frac{0.5}{1.5} \right) P} \Rightarrow K_p = \left(\frac{0.5}{1.5} \right) P$$

$$2 = \frac{P}{3} \Rightarrow P = 2 \times 3 = 6 \text{ atm}$$



8×10^{-2}

0

$(8 \times 10^{-2} - x)$

2x

$$K_p = \frac{p_{\text{CO}}^2}{p_{\text{CO}_2}} = \frac{(2x)^2}{0.08}$$



Increasing temperature will shift the reaction to the right

114.(A) On adding reactant at equilibrium, rate of forward reaction increases.

115.(D) For exothermic reaction decrease in temperature is favourable to condition, on increasing pressure equilibrium shift in the direction towards lesser number of moles.