| Daily Tutorial Sheet-9 | Level-2 |
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**106.(A)** $\left(K_{P_1} = \frac{P_y^2}{P_x}\right)$ $\quad K_{P_2} = \frac{P_P \; P_Q}{P_Z}$

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

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

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

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

**108.(B)** $C_6H_{12}O_6 \rightleftharpoons 6HCHO$

$$\begin{array}{cc} 1 & 0 \\ 1-x & 6x \end{array}$$

$K_c = \frac{(6x)^6}{(1-x)} = \frac{1}{6\times10^{22}} \quad \Rightarrow \quad 6x = \left(\frac{1}{6\times10^{22}}\right)^{1/6} \quad \Rightarrow \quad$ 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

$N_2O_4(g) \rightleftharpoons 2NO_2(g)$

Degree of dissociation (x) = $\frac{D-d}{d(n-1)} = \frac{46-30}{30(2-1)} = \frac{16}{30\times1} = 0.535 \quad \Rightarrow \quad \% = 53.5\%$

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

$\Delta G^\circ = 2\Delta G_f^\circ(NO_2) - \Delta G_f^\circ(N_2O_4) = 2\times50 - 100 = 0$

$\Delta G = \Delta G^\circ - 2.303\,RT\log_{10} Q_p = 0 - 2.303\times8.314\times298\log_{10}10 = -5705.8\,J = -5.705\,kJ$

**111.(B)**

$$\begin{array}{llll} & PCl_5 \rightleftharpoons & PCl_3 \; + & Cl_2 \\ \text{at } t=0 & 1 & 0 & 0 \\ \text{at } t=eq & (1-0.5) & 0.5 & 0.5 \end{array}$$

$k_p = \frac{\left(\frac{0.5}{1.5}\right)p\left(\frac{0.5}{1.5}\right)p}{\left(\frac{0.5}{1.5}\right)p} \quad \Rightarrow \quad k_p = \left(\frac{0.5}{1.5}\right)p$

$2 = \frac{p}{3} \quad \Rightarrow \quad p = 2\times3 = 6\,atm$

**112.(B)** $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$

$CO_2(g) \quad + \quad C(s) \quad \longrightarrow \quad 2CO(g)$

$8 \times 10^{-2} \qquad\qquad\qquad\qquad 0$

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

$$K_p = \frac{p_{CO}^2}{p_{CO_2}} = \frac{(2x)^2}{0.08}$$

**113.(B)** $NH_4Cl(s) \rightleftharpoons NH_4^+(aq) + Cl^-(aq); \quad \Delta H = +ve$

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.