

CHEMICAL CHANGES

If, $A + B \rightleftharpoons C$, E.C.(Equilibrium Constant) = k

and $C \rightleftharpoons A + B$ where E.C = k'

then $k' = \frac{1}{k}$

Relation between K_p and K_c :

$$K_p = K_c (RT)^{\Delta n}$$

R = Gas Constant

T = Kelvin Temperature

$$\Delta = \sum C_p - \sum C_r$$

= (Sum of Coefficient(s) of Product) – (Sum of Coefficient(s) Reactant)

if, $lA + mB \rightleftharpoons nC + oD$ where E.C = k

again, if, $2lA + 2mB \rightleftharpoons 2nC + 2oD$

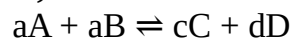
then $k' = K^2$

In other words if the Coefficients of a reaction is multiplied by **n**, then

$k' = k^n$

K_p and K_c :

If, a reaction is as follow -



$$K_p = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

$$K_c = \frac{P_C^c P_D^d}{P_A^a P_B^b}$$

P is the partial Pressure of their respected elements

$$\partial \text{ Pressure} = \text{Total Pressure} \times \text{Mole Fraction}$$

$$\text{Mole fraction of an element} = \frac{\text{Number of moles of that element}}{\text{Total number of Moles in the reaction}}$$

● **K_w of Water = $1 \times 10^{-14} \text{ mol}^2 \text{ L}^{-2}$ [If Temperature is 25C]**

$$pH = -\log[H^+]$$

$$POH = -\log[OH^-]$$

$$\text{Dissolution rate}, \alpha = \frac{\text{Dissolved moles of Acid or Base}}{\text{Total moles of Acid or Base}}$$

OSTWALD'S DILUTION LAW:

$$K_a = \frac{C \alpha^2}{(1-\alpha)} \quad \text{if acid is so weak, } \alpha \ll 1 \text{ so } (1-\alpha) \approx 1 \quad \text{hence, } K_a = C \alpha^2$$

$$K_b = \frac{C \alpha^2}{(1-\alpha)} \quad \text{if base is so weak, } \alpha \ll 1 \text{ so } (1-\alpha) \approx 1 \quad \text{hence, } K_b = C \alpha^2$$

$$pK_a = -\log [K_a]$$

$$pH + POH = 14; \text{ if Temperature is } 25^\circ \text{ Degree Celcius}$$

Buffer Solutions:

$$pH \text{ of buffer} = pK_a + \log_{10} \frac{[\text{Conjugate Base}]}{[\text{Weak Acid}]}$$

$$pH \text{ of Bases} = 14 - pK_b - \log_{10} \frac{[\text{Conjugate Acid of Weak Base}]}{[\text{Weak Base}]}$$

$$\text{Buffer Capacity}, \beta = \frac{\text{Gram molecular number of acide/base solute in 1 L solution}}{\text{Changes of pH}}$$