CHEMICAL CHANGES

If, A + B ⇌ C , E.C.(Equilibrium Constant) = k
and C ⇌ A + B where E.C = k’
then $k' = \frac{1}{k}$

Relation between K_p and K_c :

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

R = Gas Constant
T = Kelvin Temperature
$\Delta = \sum C_p - \sum C_r$
= (Sum of Coefficiant(s) of Product) – (Sum of Coefficiant(s) Reactant)

if, lA + mB ⇌ nC + oD where E.C = k
again, if, 2lA + 2mB ⇌ 2nC + 2oD
then k’ = K^2
In other words if the Coefficients of a reaction is multiplied by **n** , then
k’ = k^n

Kp and Kc:

If, a reaction is as follow -
aA + aB ⇌ cC + dD

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

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

P is the partial Pressure of their respected elements

$$\partial\, Pressure = Totatl\ Pressure \times Mole\ Fraction$$

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

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

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

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

OSTWALD'S DILUTION LAW:

$K_a = \frac{C\,\alpha^2}{(1-\alpha)}$ if acid is so weak, α << 1 so $(1-\alpha)=1$ hence, $\boxed{K_a = C\,\alpha^2}$

$K_b = \frac{C\,\alpha^2}{(1-\alpha)}$ if base is so weak, α << 1 so $(1-\alpha)=1$ hence, $\boxed{K_b = C\,\alpha^2}$

$pK_a = -\log[K_a]$

$pH + POH = 14\,;\,if\;Temperature\;is\,25\;Degree\;Celcius$

Buffer Solutions:

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

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

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