B.Sc. II (H) – Paper – IIIA

Ostwald dilution law.

According to Arrhenius, when an electrolyte is dissolved in solvent i.e water, it dissociates in ions and there is an equalibrium between undissociated electrolytes and ions as

$$AB \rightleftharpoons A^+ + B^-$$

Ostwald pointed out that law of chemical equilibrium can be applied to the ionic equilibrium.

Let us consider the above ionic equilibrium

$$AB \rightleftharpoons A^+ + B^-$$

Initial conc^n C 0 0

At equilibrium C − Cα Cα Cα.

where α = dissociation's degree.

Applying law of equilibrium

$$K = \frac{[A^+][B^-]}{[AB]}$$

or

$$K = \frac{C\alpha \cdot C\alpha}{C(1-\alpha)}$$

$$\boxed{K = \frac{C\alpha^2}{1-\alpha}} \quad \text{---------- (1)}$$

The equilibrium constant K is called dissociation constant and the equation is called ostwald dilution law.

K is constant at constant temperature and its unit is the unit of concentration i.e moles/litre.

For weak electrolyte the value of degree of dissociation is very small and hence it is negligible w.r. to 1 in equation (1)

i.e $\alpha << 1$

$$\therefore K = \frac{C\alpha^2}{1}$$

or $$\boxed{K = C\alpha^2}$$

or $$\boxed{\alpha = \sqrt{\frac{K}{C}}} \quad \text{---------- (ii)}$$

This is outcome of ostwald dilution law and explain as fallows.

For ~~bcde~~ weak binary electrolyte the degree of dissociation is inversely proportional to ~~the~~ ~~concen~~ square root of molar concentration of solution.

Ostwald dilution law is valid for ~~bcde~~ weak electrolyte dilute solution only and it does not hold good for strong electrolytes.