G = (1/R), units ohm^{-1} mhos or Ω^{-1}

Specific Conductivity (K)

It is the reciprocal of specific resistance.

$$\kappa = \frac{1}{\rho} = \frac{l}{R.a} = G \times \frac{l}{a} = G \times \text{cell constant } (G^*)$$

$$\left(\frac{l}{a} = \text{cell constant}\right)$$

Units of $\kappa = \Omega^{-1}\text{cm}^{-1}$

$= \text{S cm}^{-1} (\Omega^{-1} = \text{S i.e., Siemens})$

Unit of cell constant is cm^{-1} or m^{-1}.

Specific conductivity decreases on dilution. This is because concentration of ions per cc decreases upon dilution.

Molar Conductivity (Λ_m)

The conductivity of all the ions produced when 1 mole of an electrolyte is dissolved in V mL of solution is known as molar conductivity.

It is related to specific conductance as

Λ_m = (k x 1000/M)

where. M = molarity.

It units are Ω^{-1} cm^2 mol^{-1} or S cm^2 mol^{-1}.

Equivalent conductivity (Λ_m)

The conducting power of all the ions produced when 1 g-equivalent of an electrolyte is dissolved in V mL of solution, is called equivalent conductivity. It is related to specific conductance as

Λ_m = (k x 1000/N)

where. N = normality.

Its units are ohm^{-1} cm^2 (equiv^{-1}) or mho cm^2 (equiv^{-1}) or S cm^2 (g-equiv^{-1}).

5. Presence of electrolyte

Rusting of Iron-Electrochemical Theory

An electrochemical cell, also known as corrosion cell, is developed at the surface of iron.

Anode- Pure iron

Cathode-Impure surface

Electrolyte,

$$CO_2 + H_2O \longrightarrow H_2CO_3 \rightleftharpoons 2H^+ + CO_3^{2-}$$

Anode reaction,

$$2Fe(s) \longrightarrow 2Fe^{2+}(aq) + 4e^-$$

Cathode reaction,

$$O_2(g) + 4H^+(aq) + 4e^-(l) \longrightarrow 2H_2O(l)$$

Net reaction,

$$2Fe(s) + 4H^+(aq) + O_2(g) \longrightarrow 2Fe^{2+}(aq) + 2H_2O(l)$$

At surface,

$$4Fe^{2+}(aq) + O_2(g) + 4H_2O(l) \longrightarrow 2Fe_2O_3(s) + 8H^+(aq)$$

$$Fe_2O_3(s) + xH_2O(l) \longrightarrow Fe_2O_3 \cdot xH_2O \text{ (Rust)}$$

Rusting of iron can be prevented by the following methods :

1. Barrier protection through coating of paints or electroplating.
2. Through galvanisation or coating of surface with tin metal.
3. By the use of antirust solutions (bis phenol).
4. By cathodic protection in which a metal is protected from corrosion by connecting it to another metal that is more easily oxidised.