\[ G = \frac{1}{R}, \text{ units ohm}^{-1} \text{ mhos or } \Omega^{-1} \]

**Specific Conductivity (K)**

It is the reciprocal of specific resistance.

\[
\kappa = \frac{1}{R} = G \times \kappa = G \times \text{cell constant (} G^* \text{)}
\]

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

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

Unit of cell constant is \( \text{cm}^{-1} \text{ or m}^{-1} \).

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

**Molar Conductivity (} \Lambda_m \text{)}**

The conductivity of all the ions produced when 1 mole of an electrolyte is dissolved in \( V \text{ mL of solution} \) is known as molar conductivity.

It is related to specific conductance as

\[ \Lambda_m = (k \times 1000/M) \]

where. \( M = \text{molarity} \).

It units are \( \Omega^{-1} \text{ cm}^2 \text{ mol}^{-1} \) or \( S \text{ cm}^2 \text{ mol}^{-1} \).

**Equivalent conductivity (} \Lambda_m \text{)}**

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

\[ \Lambda_m = (k \times 1000/N) \]

where. \( N = \text{normality} \).

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

\[ \text{CO}_2 + \text{H}_2 \text{O} \rightarrow \text{H}_2 \text{CO}_3 \rightleftharpoons 2\text{H}^+ + \text{CO}_3^{2-} \]

*Anode reaction,*

\[ 2\text{Fe}(s) \rightarrow 2\text{Fe}^{2+}(aq) + 4e^- \]

*Cathode reaction,*

\[ \text{O}_2(g) + 4\text{H}^+(aq) + 4e^- (l) \rightarrow 2\text{H}_2\text{O}(l) \]

*Net reaction,*

\[ 2\text{Fe}(s) + 4\text{H}^+(aq) + \text{O}_2(g) \rightarrow 2\text{Fe}^{2+}(aq) + 2\text{H}_2\text{O}(l) \]

*At surface,*

\[ 4\text{Fe}^{2+}(aq) + \text{O}_2(g) + 4\text{H}_2\text{O}(l) \rightarrow 2\text{Fe}_2\text{O}_3(s) + 2\text{H}_2\text{O}(aq) \]

\[ \text{Fe}_2\text{O}_3(s) + x\text{H}_2\text{O}(l) \rightarrow \text{Fe}_2\text{O}_3\cdot x\text{H}_2\text{O} \] (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.