UNIT II

CORROSION :

Definition :

Any process of deterioration and consequent loss of a solid metallic material, through an unwanted chemical or electrochemical attack by its environment, starting at its surface, is called corrosion.

Mechanism of Corrosion

i) Direct Chemical Corrosion :

DRY OR CHEMICAL CORROSION

This type of corrosion occurs mainly through the *direct chemical action of environment/atmospheric gases such as oxygen, halogen, hydrogen sulphide, sulphur dioxide, nitrogen or anhydrous inorganic liquid with metal surfaces in immediate proximity*. There are *three* main types of chemical corrosion :

1. **Oxidation corrosion** *is brought about by the direct action of* ***oxygen*** *at low or high temperatures on metals, usually, in the absence of moisture*. At ordinary temperatures, metals, in general, are very slightly attacked. However, alkali metals (Li, Na, K, Rb, etc.) and alkaline-earths (Be, Ca, Sr, etc.) are even rapidly oxidised at low temperatures. At high temperatures, almost all metals (except Ag, Au, and Pt) are oxidised.

The reactions in the oxidation corrosion are :

$$2\,M \longrightarrow \underbrace{2\,M^{n+}}_{\text{Metal ions}} + 2n\,e^- \qquad \textit{(Loss of electrons)}$$

$$n\,O_2 + 2n\,e^- \longrightarrow \underbrace{2n\,O^{2-}}_{\text{Oxide ions}} \qquad \textit{(Gain of electrons)}$$

or

$$2\,M + n\,O_2 \longrightarrow \underbrace{\underbrace{2\,M^{n+}}_{\text{Metal ions}} + \underbrace{2n\,O^{2-}}_{\text{Oxide ions}}}_{\text{Metal oxide}}$$