

Corrosion is irreversible damage of a metal surface due to chemical reactions which result in the conversion of a pure metal to its chemically more stable form such as sulphides, oxides, hydroxides, etc. in a corrosive environment. The corrosive environment may be of any type i.e. may be solid, liquid or gas. Corrosion is generally viewed as a universal phenomenon. These environments are generally known as electrolytes. These electrolytes allow the transfer of ions (cations and anions) and form two reactions (anodic and cathodic). If suppose, we have two different types of metals in a given electrolyte, then the less noble metal acts as anode and gets corroded whereas the more noble metal acts as cathode and gets protected. The electron flow is from anodic metal to cathodic metal. Among the two different metals present in a given environment, the metal with higher reduction potential (having higher position in electrochemical series) or less noble metal gets corroded. For example: Cu and Zn in a conducting solution. Zn has higher reduction potential than Cu so Zn acts as anode and gets corroded, whereas Cu acts as cathode and is protected. The electron flow is from Zn (less noble) to Cu (more noble). Loss of electrons takes place at the anode (it is known as oxidation) while the gain of electrons takes place at cathode (it is known as reduction). Corrosion damages the entire surface when most or all the metal particles on its surface get oxidized. The rusting of iron is the most common example of corrosion. Rust is hydrated ferric oxide $[\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}]$. Corrosion is a surface phenomenon i.e. it occurs at the surface of the materials. Corrosion takes place in several forms. First, an overall surface attack slowly reduces the thickness of the metal. Secondly, instead of an overall surface attack, only isolated areas are affected. Third, it also occurs along the grain boundaries or other lines of weakness because of a difference in resistance to corrosive environment. It is a slow process that damages industrial machines, metallic equipment, and reduces the overall value of that product. On an annual basis, total economic loss due to various types of corrosions in India is nearly US\$6500 million. In the US, total direct wastage is estimated at about 3.2% of domestic product. The key to control the corrosion is its proper awareness and by adopting suitable and timely measures. Rate of corrosion is directly proportional to the difference in the position of the two metals i.e. more the difference, faster is the rate of corrosion. The corrosion susceptibility of metals is shown in (Fig. 1) [2].