

Corrosion

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Corrosion of metal occurs naturally when the metal is exposed to chemical or electrochemical attack. The atoms on the exposed surface of the metal come into contact with a substance, leading to deterioration of the metal through a chemical or electrochemical reaction. The corroding medium can be a liquid, gas or solid.

Although all metals are susceptible to corrosion, they corrode in different ways and at various speeds. Pure aluminum, bronze, brass, most stainless steels and zinc corrode relatively slowly, but some aluminum alloys, structural grades of iron and steel and the 400 series of stainless steels corrode quickly unless protected.

Various types of metal corrosion are categorized by its appearance or the method of acceleration:

- *Chemical corrosion* occurs through dissolution of the metal by reaction with a corrosive medium.
- *Electrochemical corrosion* involves chemical dissolution.
- *Galvanic corrosion* is accelerated by a difference in potential between metals that are in contact.
- *Pitting corrosion* is accelerated by a difference in the concentration of an ion or another dissolved substance.
- *Crevice corrosion* is accelerated by oxygen concentration or ion cell formation.
- *Erosion corrosion* is accelerated by a flow of liquid or gas.
- *Intergranular corrosion* occurs at grain (or crystal) boundaries.

Electrochemical Corrosion

Electrochemical corrosion is caused by an electrical current flow between two dissimilar metals, or if a difference of potential exists, between two areas of the same metal surface.

The energy flow occurs only in the presence of an electrolyte, a moist conductor that contains ions, which carry an electric charge. Solutions of acids, alkalies, and salts contain ions, making water—especially salt water—an excellent electrolyte.