Volume 2, Issue 11, November - 2024 **ISSN (E):** 2938-379X

CORROSION OF METALS AND METHODS OF PRESERVATION

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Abstract
Corrosion is a natural process that transforms a refined metal into a chemically stable oxide. This is the gradual deterioration of materials (usually metal) as a result of a chemical or electrochemical reaction with the environment. Corrosion engineering is a field devoted to corrosion control and prevention.

Keywords: Alloying, painting, anti-corrosion, Corrosion of metal parts.

Introduction

Riveted connection of elements of a power plant cooling tower from 1904. The increase in the volume of a material caused by corrosion. In its most common use, it refers to the electrochemical oxidation of a metal by reaction with an oxidant such as oxygen, hydrogen, or hydroxide. Rusting, the formation of red-orange iron oxides, is a well-known example of electrochemical corrosion. This type of corrosion usually produces oxides or salts of the original metal, resulting in a characteristic color. Rusting of iron can be prevented by coating, painting, galvanizing, anodizing, or oiling the surface. These methods can be divided into the following categories: Galvanizing: Galvanized metal is coated with a thin layer of zinc to protect it from corrosion. When exposed to air, the zinc oxidizes and forms a protective coating on the metal surface.

Alloying: This is a method of improving the properties of a metal by mixing it with another metal or non-metal. When iron is alloyed with chromium, nickel is obtained from stainless steel. Stainless steel does not rust at all.

Painting: Iron can be prevented from rusting by coating the surface with paint that protects the iron from air and moisture. Oiling/Lubrication: When a small amount of oil is applied to the surface of iron objects, air and moisture cannot come into contact with it and therefore, rusting is prevented. Corrosion is defined as the irreversible damage to a metal that causes the surface to change from pure metal to chemically more stable forms, such as sulfides, oxides, hydroxides, etc. Here, chemical and electrochemical reactions occur on the surface of the metal

in a corrosive medium that can be solid, liquid or gaseous. This can be corrosion by this corrosive medium. It is classified as dry or wet. Metal corrosion is the reverse of the removal of metals from their ores. This is a result of the tendency of materials to transition to their lowest energy states. Most metals occur in nature in the form of ores. Thus, ores, energy is required to extract metals. However, during the life cycle of metals, they tend to oxidize and return to their original states. The more energy it takes to extract metals, the greater their susceptibility to corrosion. In general, metal corrosion involves an electrochemical process.

The process typically involves an electrolyte that allows the transfer of ions (cations and anions) within and produces anodic and cathodic reactions. When two different metals are present in such an electrolyte, the less noble metal becomes the anode and is corroded, while the more noble metal becomes the cathode and is protected. The flow of electrons moves from the anodic metal to the cathode.

Between two metals, the metal with the higher reduction potential, or higher position in the electrochemical series, is more susceptible to corrosion.

Corrosion occurs when a metal reacts with oxidizing agents in its environment. This chemical reaction can degrade the metal over time, ruining its appearance and compromising its structural integrity. Each type of metal has different electrochemical properties. These properties determine the types of corrosion a part is susceptible to. For example, iron tools are prone to rusting when exposed to moisture for long periods of time, while a copper roof tarnishes when exposed to weather. While some metals are better at resisting corrosion than others (depending on the environment), none are immune to all forms of corrosion.

There is no one-size-fits-all solution to preventing corrosion of metal parts. With so many types of metals and thousands of possible applications, manufacturers must use a variety of methods to prevent and control corrosion on different metals.

Combating corrosion begins at the engineering stage. If a part is to be used in an environment that is prone to corrosion, manufacturers should design the part with this in mind.

For example, parts exposed to the elements should allow water and debris to drain away rather than collect on the surface. To reduce crevice corrosion, designers should eliminate narrow gaps that allow air or fluid to enter and stagnate. For corrosive environments, such as saltwater, it may be wise to engineer for a level of corrosion resistance.

Protective Coating: Coatings can provide a physical barrier between metal parts and oxidizing elements in the environment, providing a protective layer against corrosion. One common method is galvanizing, in which manufacturers coat the part with a thin layer of zinc. Powder coatings are another effective way to prevent corrosion on metal parts. When applied properly, a powder coating can isolate the surface of the part from the environment to protect it from corrosion.

Environmental Control: Many environmental factors affect the likelihood of corrosion. It helps to keep metal parts clean and dry when not in use. If you plan to store them for a long time, consider using methods to control the levels of sulfur, chloride, or oxygen in the surrounding environment.

Galvanic corrosion occurs when metal parts with two different electrode potentials come into contact with an electrolyte, such as salt water. This causes corrosion at the point of contact of

the metal with the higher electrode activity. Galvanic corrosion can be prevented by keeping these parts separate. This effect can also work as an anti-corrosion measure, as explained below

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