

CORROSION OF METALS AND NEW INNOVATIVE METHODS OF THEIR PREVENTION

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Abstract

In this article, the purpose of corrosion protection, the causes of metal corrosion, the advantages and disadvantages of various methods of protecting metal structures from electrochemical corrosion were considered. In order to make metal products last longer, the problem of corrosion from electrochemical corrosion is described in detail based on experiments.

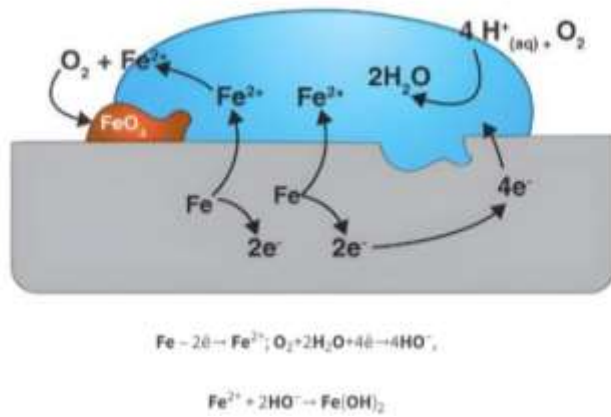
Keywords: Corrosion protection, corrosion, electrochemical corrosion, gas corrosion, metal corrosion.

Introduction

As there are changes in the environment, atmospheric factors are damaged and they have a negative effect on metal structures, causing the formation of corrosion in them. In this regard, many metal structures lose their original properties. This has a negative impact on their term of service. Metal deterioration due to corrosion accounts for 16% of annual production. The main goal of fighting and protecting against corrosion is to save the world's limited metal resources. This is of great economic importance. Corrosion causes heavy losses due to corrosion of metal parts of machines, hulls of ships and tankers, pipelines, reservoirs, offshore structures and other aggressive environments. Corrosion deprives the metal of its properties and turns it into a worthless powder or dust. Many metals are corroded by air, water, acid, dry gases, solutions of alkalis and salts, and other similar influences. Metal corrosion is a process that occurs spontaneously as a result of chemical and electrochemical interaction of metals with the external environment. Corrosion of iron and iron alloys is also called rusting.

Research materials and methodology

By metals, we mean common metals and their alloys, as well as metal products and their constructions. Usually, the environment in which metal corrosion occurs is in a liquid environment or a gas environment. Corrosion is a heterogeneous process that occurs at the boundary of two phases: metal-liquid or metal-gas. According to the mechanism of occurrence, metal corrosion is divided into two types: chemical (dry) and electrochemical (wet) corrosion.



Chemical corrosion is a process that occurs as a result of the interaction of metal atoms with the molecules of the substance that make up the environment, and at the same time, the oxidation-reduction process takes place. Chemical corrosion is manifested as a result of the interaction of non-aqueous liquids (mainly liquid metals) and atmospheric gases with the metal surface. There are 3 types of chemical corrosion: 1) Oxidation corrosion 2) Corrosion under the influence of gases 3) Corrosion under the influence of liquid metals.

Research results: Oxidative or oxygen-induced corrosion This type of chemical corrosion occurs as a result of the interaction of a metal surface with oxygen, and as a result, metal oxide is formed on this metal surface (in a non-moist environment). A stable and hardened oxide film acts as a protective layer on the metal surface and prevents metal corrosion. As a result, the metal becomes corrosion resistant.

2. If the oxide film formed on the metal surface is unstable and has a high tendency to disintegrate into metal and oxygen, then oxidation corrosion does not occur on the metal surface.
3. If the film on the surface of the metal is volatile, the surface of the metal comes into contact with air and oxidation continues. Corrosion under the influence of metals This type of chemical corrosion is formed as a result of the flow of liquid metal with a high temperature over the surface of solid metals and alloys. Corrosion under the influence of other gases. The occurrence of this type of corrosion depends on the oxide film formed on the metal surface, like corrosion under the influence of O₂. For example, if copper is resistant to SO₂ environment, nickel is corroded in such an environment.

Discussion: There are several methods of protecting metals from chemical corrosion, among which the following are of special importance: 1. Refractory alloying process with the addition of components that increase the durability of the alloy. For example, chromium is considered the main component that increases the fire resistance of steel, and silchromes (6-31% Cr, 5% Tempering steel alloys) are considered very common refractory alloys. 2. Providing protective layers of metal and non-metal layers on the surface of metal products. For example, hot chroming, hot siliconization, painting, lacquering of metals. 3. Artificial creation of gas atmosphere - method of protective or control atmospheres. 4. Reducing the oxidation of metals in different ways. A vivid example of this is the introduction of inhibitors into the corrosion mixture, and today, the use of inhibitors is considered one of the most appropriate ways to slow down corrosion processes. For example, volatile inhibitors, i.e. nitrides, are mainly used to protect Al and Fe. FeSO₄ microadditives are periodically used to protect heat exchange

condenser tubes made of Cu alloys. It is impossible to completely get rid of metal corrosion, we can only slow down these processes.

Conclusion: It is very important to take measures to prevent the deterioration of metals by corrosion and measures to stop corrosion in corroding parts, because all natural resources on earth are limited, especially metal ore mining mines, so it is necessary to use them wisely to prevent them from corroding. we must not allow it to disappear. today, anti-corrosion works are carried out by the above methods and several other methods. nowadays, the corrosion of metals greatly affects the surface cleanliness of details.

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