GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 11, Issue 10, Oct. (2023)

CORROSION OF METALS AND ITS IMPACT ON THE ENVIRONMENT

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ABSTRACT

This article provides information on the adverse effects of metal corrosion control, and its metallurgical effects, environmental and metallurgical effects, environmental and activators and inhibitors.

АННОТАЦИЯ

В данной статье представлена информация о негативных последствиях коррозии металлов, наиболлее эффективных методах борьбы с коррозией и ее влиянии на окружающую среду и металлургию, активаторах и ингибиторах коррозии.

Ключевые слова: Коррозия, защита от коррозии, химическая и електрохимическая коррозия, агрессивные газы, легирование металлов, оксидирование поверхности металлов, фосфатирование, придотвращение повреждения защитного слоя.

Keywords: Corrosion, corrosion protection, chemical and electrochemical corrosion aggressive gases, alloying of metals, oxidation of the metal surface, phosphating, prevention of damage to the protective layer.

INTODUCTION

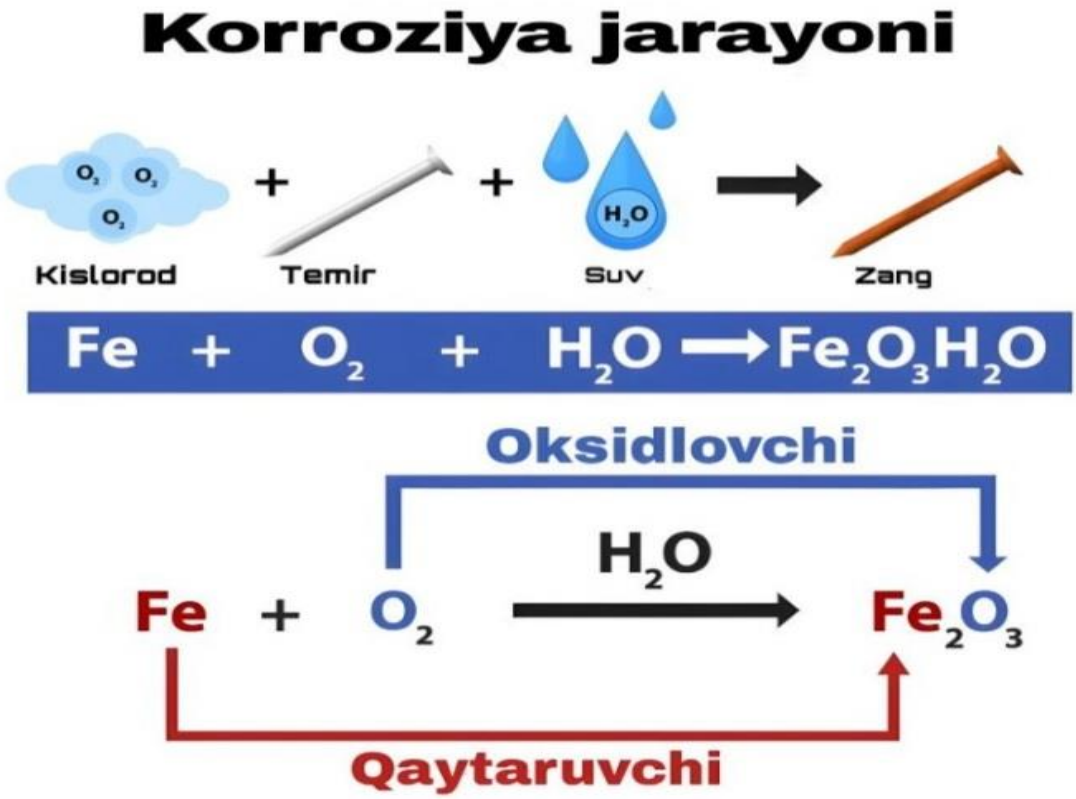
Most metals are corroded under the influence of air, water, solutions of acids, alkalis and salts. This phenomenon is called corrosion lorrosion (originating from the latin “corrodere” word for desay). Causes of metal corrosion: moist H_2O, in the air, oxygen O_2, aggressive gases CO_2, SO_2, H_2 S, C_{l2} enters. Metals are corroded in two different ways.Chemical (gas) corrosion, electrochemical corrosion. In chemical corrosion, metal gases interact with O_2, CO_2, SO_2, H_2S, C_{12} form oxides and other compounds on their surface and begin to decay. In most eases metal oxides are formed since they are very stable substances, they form corrosion. For example: the surface Cr_2O_3. In some cases, these oxides "curtain" will not be. For example, FeO and Fe_2O_3 oxides can be formed on the surface of iron. However, the corrosion of iron continues due to the splitting and cracking of these oxide films. These oxides are mixed oxides of Me^{+2} and Me^{+3}, forming a "spinel" compound, and this alloy is very resistant to corrosion. Gas corrosion is pacticulary damaging in metallurgy. To protect iron and steel produets from gas corrosion their surface is coated with Al. Electrochemical corrosion occurs when different metals are in contact with each other under the influence of an aggressive environment. The main cause of this corrosion is moisture and water. Because the normal electrode potential of water at PH=7 is

E°=-0,41v, is equal to. The oxidation potential of water is less than -0,41v and oxidizes all metals. Corrosion of Fe products E° of Fe is lower than Sn E°Fe°/Fe_2+=0,44; E°Sn°/Sn_2+=0,14v, there fore, in such an article with a cracked protective layer, a galvanic element is formed due to the potential difference of the metal in a wet environment, and Fe acts as an anode, and Sn acts as a cathode. A result, it starts to rust.

$Fe+2H_2O=Fe(OH)_2+H_2$

$Fe(OH)_2+H_2O+O_2=Fe(OH)_3$

$Fe(OH)3=Fe_2O_3+3H_2O$.



Electrochemical corrosion also occurs when different parts of the metal surface are exposed to an electrolyte solution with different concentrations of oxidizing O_2. The most effective methods of combating corrosion are: metal surfase alloying methods, plating, oxidation, phosphating, metal surface painting, changing the solution environment, metal surface coating with other metal, and metal, coating with non-metallic substances. The method of alloying the metal surface. It is to turn the corrosion-resistant metal into an alloy under high vacuum or with the help of plasma spraying and thermal processing on the metal surface to be protected.In general, the passive metal for alloying is Cu, Au, Ag, or the metal that forms a corrosion resistant oxide film Al, Zn, Sn, Cr, Pb, Ni, V are used.

Plating method. This is the formation of a protective metal layer on the surface of rolled metal.This method covers the surface of stell, cast iron with Al, Zn, or Sn.

Oxidation method. The protective metal surface is chemically or electrochemically coated with a thin but very dense film. Is a method of covering with.The method of phosphating. It is a method of processing the protected metal with solutions of acidic salts of phosphoric acid so that

the metal surface is resistant to chemical effects and easy ti paint. It is mainly used in products made of Fe. When changing the solution environment: adding various inhibitors to the electrolyte solution that is, to prevent metal corrosion by adding corrosion inhibitors. Inhibitors are various organic substances, alcohols and nitrites, chromates phosphates, silicates. Painting the metal surface to protect metals from corrosion: first, the metal surface to protect metals from corrosion: first, the metal surface is phosphating with $Fe(H_2PO_4)_2$ or $Mn(H_2PO_4)_2$ to form a porous solid film $FePO_4$. Then it is covered with varnish, paint or enamel. During the corrosion process. The speed is greatly influenced by the concentration of H^+ and OH^- ions present in the solution, and the PH value of the solution.For example, if the concentration of H^+ ions in the solution increases, corrosion increases. The increase in concentration of OH^- ions slows down the corrosion of metals with amphoteric hydroxides Al, Zn, Pb accelerates.

Corrosion-accelerating substances are called corrosion activators.These include fluorides, chlorides, sulfates, nitrates, bromided, and iodides. Because there are more chlorides in seawater metals corrode faster in this water than in lake water. Corrosion inhibitors are substances that slow

down the corrosion of metals when added to a corrosive environment. For example if 0,3-0,4% Na_2CrO_4 is added to water containing iron or steel, the rate of corrosion is significantly reduced. When hexametaphosphate ($NaPO_3$), $NaNO_2$ and Na_2SiO_3 are added to water, the corrosion rate of iron and steel decreases. If Na_2SiO_3 and $Na[SiF_6]$ are added to water, the corrosion rate of aluminum decreases significantly. Inhibitors are great for protecting metal from corrosion especially in acidic environments is important. The reason for protecting metals from corrosion in the presence of inhibitors in such an environment is that the inhibitor in such an environment is that the inhibitor is abrorbed into the metal surface. Acids cannot affect the

metal surface covered with a thin layer of inhibitors. Therefore, corrosion inhibitors are widely used.

CONCLUSION

Corrosion Causes corrosion of any metak profucts and parts that are in constant use. As a result of eorrosion, equipment, devices, items and parts are destroyed and become unusable. The national economy suffers a lot from corrosion. That is why the science of chemistry one of the most important tasks is to solve corrosion problems. One of the most popular metal from corrosion is the use of non-metallic compounds. It can be plastic, ceramics, rubber, bitumen, polyurethane, paints and varnishes, etc. In addition, the second represents the widest range and the product can be used depending on the environmental conditions in which it is used. Thus, paint and varnish coatings are resistant to the effects of water atmosphere, chemical solutions, etc.

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