

METALS AND ELECTROCHEMICAL CORROSION

Suyunova Yulduz
Karshi State Technical University, Uzbekistan

| ABSTRACT | KEYWORDS |
|--|----------|
| Metals are widely used in many fields due to their physicochemical properties and industrial importance. However, the long-term use and stability of metals are faced with problems associated with electrochemical corrosion. In this article, we will discuss the electrochemical corrosion processes of metals, their causes and methods of prevention. | |

Introduction

Electrochemical corrosion is a process that occurs as a result of chemical reactions between metals and a solid or liquid medium. This process usually occurs when the metal acts as an electrode and interacts with ions in the medium. The corrosion process consists of two main stages:

1. Anode reaction: Metal atoms lose electrons, which causes them to become ions.
2. Cathode reaction: Electrons combine with ions in the environment to form new chemical compounds.

Causes of Corrosion

1. Chemical Composition of the Environment: The presence of salts, acids, and other chemicals accelerates the corrosion process.
2. Temperature: High temperatures can accelerate the corrosion process of a metal.
3. Oxidation-reduction processes: The reaction of a metal with other substances.
4. Oxidation degree: The chemical properties of the metal, for example, materials such as stainless steel and aluminum are more resistant to corrosion.

Types of Corrosion

1. Galvanic Corrosion: Occurs when dissimilar metals react with each other. For example, galvanic corrosion can occur in a copper and iron bridge.
2. Surface Corrosion: Occurs on the surface of the metal, affecting only the surface.
3. Pitting Corrosion: The formation of holes in the interior of the metal, often caused by chemical exposure to the environment.

Anti-Corrosion Measures

Surface Coating: Coating metal surfaces is an effective way to protect them from corrosion. Paint, plastic, or other coatings are used for this purpose.

Corrosion Resistant Materials: Using stainless steel, aluminum, and other corrosion-resistant materials.

Corrosion Inhibitors: Slowing down the corrosion process by using chemicals that are added to the environment.

Mechanical Protection: Protecting the metal from mechanical damage, such as through coating or other protective methods.

Corrosion inhibitors are chemicals that slow down or stop the corrosion process of metals. They can form a protective coating on the metal surface or stimulate reactions in the environment that reduce the corrosion process. Corrosion inhibitors are important in industry and everyday life.

Types of Corrosion Inhibitors

1. Anodic Inhibitors:

Slow down anodic reactions.

Example: calcium nitrate, copper nitrate.

2. Cathodic Inhibitors:

Slow down cathodic reactions.

Example: calcium carbonate, some organic compounds.

3. Passivation Inhibitors:

Form a passivation coating on the surface of the metal.

Example: chromate and nitrite.

4. Organic Inhibitors:

Are organic compounds that form a coating on the surface of the metal.

Example: amines, carboxylic acid salts.

Mechanism of Action of Corrosion Inhibitors

Surface Coating: Inhibitors limit the passage of ions and electrons by coating the metal surface. This process increases the corrosion resistance of the metal.

Significantly Inhibit Reactions: Inhibitors slow down the important reactions in the corrosion process, reducing metal loss.

Application Areas

Industry: Chemical industry, oil and gas industry, building materials.

Daily Life: Automobiles, structures, electrical equipment.

Benefits of Use

Extends the service life of the metal.

Helps to effectively control technological processes.

Ensures compatibility and safety.

Corrosion inhibitors are important protective agents for metals. Their effectiveness and variety of types are used to protect metallic materials under various corrosion conditions. In the future, the development of new, more effective inhibitors will play an important role in solving corrosion problems.

Conclusion

The relationship between metals and electrochemical corrosion is an important aspect that determines their service life and stability. Understanding the corrosion process and taking measures to combat it will contribute to the effective and long-term use of metal materials. In the future, with the development of science and technology, it will be possible to solve corrosion problems more effectively. Corrosion inhibitors are important protective agents that affect metals. Their effectiveness and various types are used to protect metal materials under various corrosion conditions. In the future, the development of new, more effective inhibitors will play an important role in solving corrosion problems.

References

1. Эвенчик Э.Е. Методика преподавания физики в средней школе. Пособие для учителей/ Э.Е. Эвенчик. – М.: Просвещение, 1986. – 240 с.
2. Якиманская И. С. Планирование исследования метакогнитивных аспектов безопасности образовательной среды //Перспективы психологической науки и практики. сборник статей Международной научно-практической конференции. 2017. – С. 682-684.
3. Bazarbayev M.I. “Elektron pedagogika asoslari va pedagogning shaxsiy, kasbiy axborot maydonini takomillashtirish” modulli bo‘yicha: O‘quv-uslubiy majmua. – 2019. –В. 117 .
4. Гейхман Л.К. Межязыковая и межкультурная вариативность при переводе технических текстов: синергетический подход. / Л.В. Кушнина, Л.К. Гейхман, А.О. Неганова // Современные проблемы науки и образования. 2015. – № 1-1. – С. 12-17.
5. Грошева Е.П., Подготовка студентов технических вузов к инновационной деятельности при обучении инженерному творчеству и патентоведению. [Текст] : автореф. дис.. . кан. пед. наук /Е.П.Грошева. – Москва, 2010. – 28 с.
6. Ibragimova G.N. Interfaol o‘qitish metodlari va texnologiyalari asosida talabalarning kreativlik qobiliyatlarini rivojlantirish. Pedagogika fanlari bo‘yicha falsafa doktori (PhD) dissertatsiyasi avtoreferati. – Toshkent, 2017. – 38 b.
7. Kurganbekov M.M., Moydinov A. Mashina detallari: O‘quv qo‘llanma. I va II qismlar. – Toshkent: “O‘zbekiston ensiklopediyasi”, 2014. – 384 b.
8. Куклев, В.А. Поиск новых возможностей электронного обучения на основе сдо moodle. / А.Н. Афанасев, В.А. Куклев, Т.М. Егорова, Е.Й. Воеводин, С.И. Бочков // Дистансионное и виртуальное обучение. 2016. – № 7 (109). – С. 4- 12.
10. Khudainazarov S., Donayev B. Propagation of a spherical wave in elastoplastic medium with complex equations of state //Proceedings of FORM 2021: Construction The Formation of Living Environment. – Springer International Publishing, 2022. – С. 403-420.
11. Axmatovna S. Y. TALABALARDA TEXNIK MEXANIKA FANI BILAN BOG‘LIQ AMALIY BILIMLARNI RIVOJLANTIRISH MODELI //ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ. – 2023. – Т. 21. – №. 3. – С. 138-141.
12. Suyunova Y. A. THE ROLE OF INDEPENDENT EDUCATION IN PREPARING STUDENTS FOR INNOVATIVE ACTIVITIES AND THE METHOD OF CONDUCTING THEM //Educational Research in Universal Sciences. – 2023. – Т. 2. – №. 1. – С. 134-139.
13. Suyunova Y. MODEL OF FORMATION OF PRACTICAL KNOWLEDGE BASED ON

TEACHING TECHNICAL MECHANICS IN STUDENTS //Евразийский журнал академических исследований. – 2022. – Т. 2. – №. 6. – С. 411-415.

14. Suyunova Y. A. Specific aspects of the formation of practical knowledge in the teaching of the course of technical mechanics //ACADEMICIA: An International Multidisciplinary Research Journal. – 2021. – Т. 11. – №. 4. – С. 1911-1916.
15. Mars G. Fontana -Corrosion Engineering" William D. Callister "Materials Science and Engineering: An Introduction" Шукина Г.И. Рол деятельности в учебном процессе/ Г.И. Шукина. – М.: Просвещение, 1986. – 144 с.