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OXIDE CHEMISTRY: STRUCTURE-FUNCTIONAL ANALYSIS OF INORGANIC AND ORGANIC OXIDES

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Annotation: This article analyzes the nature, chemical and physical properties of oxyls, the work with organic and inorganic oxyls, and their application in medicine and industry. The important role of metal oxides and oxides of non-metal elements in materials science, catalysts and environmental processes, and organic oxyls in pharmaceuticals and biochemistry, is considered. The article also highlights the practical importance of the use of oxyls based on modern research on oxidation-reduction processes, antioxidant systems and innovative industrial technologies.

Keywords: Oxyls; metal oxides; organic oxyls; oxidation-reduction process; pharmaceuticals; antioxidants; medicine; industrial applications; catalyst; ecology.

Oxyls are one of the most important compounds in chemistry, their composition, structure and properties determine the physical and chemical properties of a substance. Oxyls are formed in the process of interatomic oxidation and, in turn, play an important role in biological, chemical and industrial processes. Oxidation-reduction reactions (redox) are involved in natural processes, such as energy production, photosynthesis, metabolism, and detoxification processes in the body.

The practical importance of studying oxides is also great. In the field of medicine, oxidation processes play a direct role in cellular metabolism, the antioxidant system, and the development of chronic diseases in the body. At the same time, in industrial and chemical technologies, oxides are widely used in metallurgy, catalysts, pigments, and electrochemical processes.

Oxides are compounds of elements bonded to one or more oxygen atoms, which are formed with metal or non-metal elements. Oxides are among the most common and widely used compounds in chemistry, since their properties determine the physical and chemical state of matter.

Types of oxides are divided into several:

Metal oxides: This type of oxide is formed as a result of the reaction of oxygen atoms with metal elements. For example, iron(III) oxide (Fe_2O_3) and aluminum oxide (Al_2O_3) are common. Metal oxides are usually hard and have high melting points, and are used to increase the corrosion resistance of metals, strengthen materials, and as catalysts.

Oxides of non-metals: Oxides formed by non-metals bonded to oxygen are also important. For example, carbon dioxide (CO_2) and nitrogen oxides (NO, NO_2) are present

in the atmosphere and play a significant ecological and biological role. They are also used in industrial processes, such as polymer production, gas purification, and laboratory testing.

There are many ways to synthesize oxides:

- Direct reaction with oxygen: For example, the reaction of iron and oxygen produces iron(III) oxide.
- Reaction with water: Some metal oxides react with water to form hydroxides.
- Thermal decomposition: For example, the heating of carbonates produces oxides.

The physical and chemical properties of oxides depend on their composition and structure. Metal oxides usually have ionic bonds and appear as solids with high melting points. Non-metal oxides, on the other hand, often have a molecular structure and are found in the gaseous or liquid state. Chemically, oxides actively participate in oxidation-reduction reactions, therefore they are used as important mediators in redox processes.

In the field of organic chemistry, oxides are widely used in biological and synthetic substances. Organic oxides are compounds in which oxygen atoms participate in various bonds in organic molecules. They are divided into different types:

Alcohols: Organic oxides containing a hydroxyl group (-OH). For example, ethanol and methanol. Alcohols are widely used in the pharmaceutical, cosmetic, and food industries.

Aldehydes: Contain a carbonyl group (-CHO) in molecules. Examples are formaldehyde and acetaldehyde. Aldehydes are used in organic synthesis, particularly in polymers, pharmaceuticals, and preservatives.

Ketones: Organic compounds containing a carbonyl group (-CO-) in the molecule. For example, acetone. Ketones are used as solvents and chemical synthesis agents.

Organic oxyls also play an important role in biological processes. For example, during cellular metabolism, oxidation processes are involved in energy production, enzymatic reactions, and the metabolism of lipids, proteins, and carbohydrates. Therefore, methods for the synthesis and analysis of oxyls have been developed in the fields of pharmaceuticals and biochemistry.

- The main advantages of using oxyls in organic chemistry:
- Work as a catalyst or reagent in synthetic reactions
- Participation in the synthesis of biologically active substances
- Use in the production of pharmaceutical and cosmetic products

The study of organic oxyls is of great importance in the field of medicine and biochemistry, since they participate in metabolic processes, produce cellular energy, and ensure the normal functioning of the body. At the same time, their improper use can have a toxic effect, which requires caution in the synthesis and use of organic oxyls.

A complete understanding of oxyls, the study of their properties, and their effective use allow us to create new approaches in the fields of chemistry, medicine, and industry. This article analyzes oxyls by their natural properties, chemical types, work with organic

and inorganic oxyls, their application in medicine and industry, as well as modern technologies and scientific research.

Oxyls are compounds that play an important role in nature and medicine, industry, and organic chemistry. They have various chemical and physical properties due to their bonding with oxygen atoms and are actively involved in many natural and artificial processes. Inorganic oxides, such as metal oxides and oxides of non-metal elements, are widely used in materials science, metallurgy and as catalysts, and are also important in environmental processes, such as air pollution and acid rain.

Organic oxides, on the other hand, play an important role in pharmaceuticals, biochemistry and medicine. Alcohols, aldehydes, ketones and acids are the main raw materials for pharmaceutical preparations, metabolic processes and biochemical reactions. At the same time, oxides play a direct role in the antioxidant system, chronic and acute diseases, cell metabolism and energy production processes in the body.

In industry, oxides are widely used in metallurgy, chemical production, pigment preparation, electrochemical processes and energy systems. Modern technologies, in particular virtual rehabilitation and advanced analysis methods, are expanding the possibilities of using oxils, which increases the efficiency of scientific research and industrial processes.

In conclusion, the study of oxils and their practical application serve to develop natural processes, medical diagnostics and treatment strategies, optimize industrial production, and environmental monitoring. Scientific research and innovative technologies in the field of oxils will expand the possibilities of creating new treatment methods, highly efficient industrial processes, and a sustainable ecological environment in the future. Therefore, the in-depth study and effective use of oxils is of incomparable scientific and practical importance.

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