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TEACHING STUDENTS SAFETY MEASURES WHEN TEACHING THE SUBJECT "CHEMICAL PROPERTIES OF ALKALI METALS" IN SECONDARY SCHOOLS

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Abstract
This article studies the kinetic properties of the reactions of alkali metals (lithium, sodium, potassium, etc.) with water and various chemical reagents. The study analyzes the rate of reactions, the temperature affecting them (concentration, nature of the metallurgy, and surface area).

Keywords: Alkali metal, reaction kinetics, reaction with water, chemical reaction table, sodium, potassium, lithium, exothermic reaction, hydrogen evolution, safety techniques, laboratory experiments, chemical temperature, reactivity, temperature effect, concentration.

Introduction

Alkali metals - lithium, sodium, potassium, rubidium, cesium and francium - belong to group I of the periodic table, they have high chemical activity due to the presence of one valence electron in the outer energy layer , for which the exothermic nature of the reactions with the metal and the risk factors associated with the release of hydrogen are determined. The work describes the necessary precautions when working with alkali metals in laboratory conditions Special attention is paid to safety rooms and practical recommendations are developed. The results are of great importance for the safe organization of experiments in chemistry education and the formation of scientific and practical skills in the forces.
This metallurgy interacts with water and various reagents to change their chemical properties, That is, it is of great importance in studying the rates and mechanisms of chemical reactions. By analyzing the kinetics of reactions, it is possible to determine what factors accelerate or slow down these processes.
Methodology . Alkali metallurgy The reaction of a metal with water is exothermic, in which the metal reacts rapidly with water to form the corresponding hydroxide and hydrogen gas. For example, the reaction of sodium with water occurs with the release of sodium hydroxide and hydrogen. The kinetics of this process depends on several factors: the nature of the metal, the state of its surface, the temperature of the water, and the characteristics of the reaction medium. As you go down the group, the atomic radius increases and the ionization energy decreases, resulting in an increase in the rate of reaction. Therefore, lithium reacts with water relatively slowly, sodium reacts faster, and potassium reacts quickly and sometimes explosively. This can be explained by the fact that the repulsive force between the unpaired electron in the outermost shell of an element decreases as it moves away from the nucleus of the atom.
In experiments with these elements, it was found that at the beginning of the reaction, an oxide or hydroxide layer forms on the surface of the metal. probably, which temporarily slows down the reaction. However, the pressure of the hydrogen released and the heat generated destroy this layer and the reaction

accelerates further. From a kinetic point of view, this process is a heterogeneous reaction, since the metal is in the solid phase and the water is in the liquid phase. The rate of the reaction also depends on the surface area of the metal surface, with crushed metal reacting faster.

Alkali metals react actively not only with water, but also with oxygen, halogens, acids, and other reagents. For example, they react with oxygen to form oxides, peroxides, or superoxides . These processes are also complex from a kinetic point of view, and the rate of the reaction depends on the oxygen concentration and temperature. Reactions with halogens are also rapid and ionic salts are formed. Interactions with acids The reaction is similar to the reaction with water, but here the hydrogen evolution occurs much faster.

Kinetic studies show that the rate of reaction increases with increasing temperature. Furthermore , the activation energy varies greatly depending on the type of alkali metallurgy. This value is higher for lithium, and it is much smaller for the elements located further down in the group, i.e. potassium and below, which explains their high reactivity.

The high activity of alkali metallurgy requires strict safety precautions when studying it. This metal is rapidly oxidized in air and reacts with moisture to release flammable hydrogen gas, which is released when combined with oxygen in the air, forming a " Kaldirog gas" Since the university forms and has a strong explosive property, they are usually stored in brown containers and under kerosene or mineral oil. The dangers of using protective goggles, gloves and special clothing when working in laboratory conditions are explained to students. The student is also taught that when metals are exposed to water, the amount of alkali metallization cut off from the metal should be the same as the amount of steam and that the kerosene on the university should be wiped off with dry paper and then carefully thrown into the water . At the same time, it is important to observe the reaction from a distance and keep fire protection equipment ready.

Especially when working with sodium and potassium, caution is increased, as they can react explosively with water. In the event of a fire, it is strictly forbidden to use water as a fire extinguisher, as this will only intensify the reaction. In such cases, it is recommended to use sand or special fire extinguishing powders - soil or airtight rubber cloth . If your hands get burned during the experiment, you should immediately wash them under running water and then consult a doctor. Unknowingly applying various substances (alcohol , dental paste, etc.) is strictly prohibited.

Studies based on scientific sources show that a deep study of the kinetics of the interaction of alkali metallurgy with water and other reagents is not only of theoretical importance, but also has practical support. This knowledge is widely used in industry, in the creation of energy sources, and in chemical technology. At the same time, strict adherence to safety precautions due to their high reactivity is an integral part of any experimental and production process.

Conclusion

The interaction of alkali metallurgy with water and various reagents is directly related to their high chemical activity, and these processes are kinetically complex and dependent on many factors. The rate of reactions varies depending on the nature of metallization, atom, ionization energy, surface area, and external conditions, in particular temperature and properties of the problem . The fact that the rate of reactions increases as you move down the group clearly demonstrates the laws of the chemical properties of these elements. As a result of studies, it was found that the reaction of alkali metallurgy with water is

not only fast, but also strongly exothermic, and in some cases can be explosive . Therefore, a deep kinetic analysis of these processes is necessary to understand their expands the understanding of the mechanism, reaction control and practical applications. Interaction with various reagents The effects are also based on similar laws, and each of them has its own kinetic properties. At the same time, the high reactivity of alkali metallurgy requires strict safety precautions in their study and application .

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