

ON THE PROBLEM OF INTRODUCING ECOLOGICAL CONCEPTS TO THE CONTENT OF THE CHEMISTRY COURSE OF ACADEMIC LYCEUMS

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Abstract. *In this article, didactic analysis of the relationship between the main concepts in the chemistry course of academic lyceums and environmental concepts is done. Based on the results of the analysis, the environmental content of the chemistry course was enriched. The application of ecological knowledge in the system of content, structure and properties is shown. The related arguments have been analyzed and discussed in the paragraphs below in the article.*

Keywords: *chemical element", "substance", "chemical reaction", "chemical production", "ecology", "living organism", "ecosystem", "ecological education - education".*

Introduction

The analysis of the content and structure of the chemistry course of academic lyceums showed that the most important concepts such as "chemical element", "substance", "chemical reaction" and "chemical production" are important in the selection of environmental content.

Taking into account that in the literature, the chemistry course answers the question about the exchange of substances in nature, and in ecology, the laws of nature occupy one of the central places, the exchange of substances is considered both a chemical concept (mass and energy exchange) and an ecological concept (biogeochemical exchange of substances) at the same time. It is indicated that it should be looked at [1-10].

The basis for the selection of ecological concepts is derived from the view of the levels of life emergence. From this point of view, the following concepts are distinguished: "living organism" (a set of characters describing living matter), "ecosystem" (an association of living organisms formed on the basis of the absorption of the inorganic environment and the interaction of organisms in nature), "biosphere" (on earth a biological system containing all living organisms, a global ecosystem), "biogeochemical exchange of substances" (processes of reversible exchange and mixing of circulating substances of one or another description in nature), "ecological factors" (environment affecting organisms abiotic, biotic and anthropogenic changes), "environment" (the natural and anthropogenic environment that can be considered as the environment of human development and the sphere of activity, which are interconnected and interdependent ``a whole system of objects and events).

In the field of technology, the system of concepts related to natural science can be distinguished as follows: "reasonable use of nature", "integrated use of industrial waste and raw materials", "environmentally safe technology", "low-waste and no-leakage technology", "methods of effective treatment of gaseous, liquid and solid waste", "use of secondary raw materials", "eco-friendly materials and products industry". These concepts reflect the problem of rational use of

natural resources, preservation of the natural environment, and the main directions of development of waste-free technology (such as the ideal model of industry).

In order to correctly assess the impact of the rapidly developing scientific and technical process and modern civilization on the natural environment, it is necessary to take into account the general laws of the interaction between man and nature, the results of the economic activity of the ruling generations and forms of society on the earth. assessment is necessary. It is necessary for students to understand that a person can destroy the harmony of nature without taking into account the laws of nature during his activities, and can cause great harm to himself and the environment as a result of alienation from nature.

The moral side of the problem is of great importance in educating students. At the basis of the return to harmony lies a careful, intellectually scientific approach of man to nature. Solving environmental problems should not be based on scientific or technical achievements, but the driving force should be the high moral and ecological culture of each person and the entire society. In the "social sphere" - the emergence of man and society (the concept of anthroposociogenesis), human-nature products and society (the concept of human biopsychosocial existence), the relationship of man to nature in various social forms (the concept of historical retrospectivity), the interaction of man and nature , unity and cooperation (the concept of preserving the social natural environment). In turn, concepts of chemical, ecological and natural sciences are closely related. For example, the concept of a chemical element reflects the quantitative and qualitative composition of living and dead (inorganic) nature, while the introduction of the concept of "biogenic element" means the introduction of the concept of interchangeability of elements in nature (in the case of severe environmental pollution), as well as macro- and microelements. (necessary for the existence of living organisms), serves to reveal their biological role. Analyzing the negative side of this process allows one of the main ecological concepts - "biogeochemical cycle of chemical elements in nature" to be considered at the atomic-molecular level and to determine the reasons for the disruption of biogeochemical cycle.

When considering the concept of "substance" together with the traditional chemical concepts of composition, structure and properties, there is an opportunity to focus students' attention on the biological functions of substances. Here, it is necessary to explain to the students that the double role of substances in nature depends on its concentration in the ecosystem (the excess or small amount of the same substance has different effects on the organism). Information about environmental pollution and sources of pollution leads to the introduction of new concepts, such as permissible regulatory concentration (RMK) and preferential environmental factor, which explain the process of bioaccumulation of hazardous compounds and substances.

It is possible to consider the knowledge about the formation of relatively less toxic or harmless substances (nitrites and nitrosamines from nitrates, nitrogen oxides as a result of photochemical smog) from new substances with strong toxic properties. Also, it is appropriate to discuss activities aimed at preserving the natural environment protecting nature and stabilizing natural circulation processes, warning against pollution of living organisms, neutralization and processing of harmful chemical compounds. The concept of "chemical reaction" serves to reveal the nature of chemical and biochemical processes in the biosphere. For example, the concepts of biocatalytic processes extend the concepts of catalytic reactions. An important moment in the formation of ideas about the processes that describe the main changes in the biogeochemical cycle of substances is the pollution of the biosphere due to these processes. The essence of these changes

is a change in the concentration of active substances or a violation of the direction of biocatalytic processes (speeding up or slowing down) at the expense of others. It is possible to consider measures aimed at maintaining the conditions of biochemical and chemical processes in the biosphere in balance.

Conclusion. In conclusion, from what has been analyzed and discussed above it can be inferred as a conclusion that during the study of the basics of chemical production, ideas about pollutants and sources of pollution deepen. By analyzing the participation of the products and wastes of the chemical industry in the cycle of natural substances, students learn the reasons for the disruption of the natural balance in the ecosystem and biosphere. The concept of "chemical industry" is inextricably linked with low-waste technology, ecologically safe technology, rational use of nature, circulating water system and other important concepts of nature protection. Here, it is necessary to consider actions to prevent environmental pollution. Introducing the concept of monitoring (observation system, assessment and forecasting of the state of the natural environment) is one of the goals of anthropogenic pollution.

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