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METHODOLOGY OF USING THE VENN DIAGRAM AND THE INTEGRATION OF NATURAL SCIENCES IN TEACHING STUDENTS NITROGEN-CONTAINING ORGANIC COMPOUNDS

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Abstract:
This article focuses on developing a methodology for using the Venn diagram and integrating natural sciences in teaching nitrogen-containing organic compounds. Today, an interdisciplinary integration approach is becoming important for enriching students' theoretical knowledge with practical skills, for an exciting and effective educational process. The article presents a developed method used in a generalized lesson plan so that students can better understand the structure, properties, and biological significance of nitrogen-containing organic compounds in an organic chemistry course, combining biology, physics, and ecology with the Venn diagram in teaching nitrogen-containing organic compounds.

Keywords: Containing nitrogen-containing organic compounds, integration of natural sciences, teaching methodology, integration of biology and chemistry, interdisciplinary approach in education, integration of theoretical and practical knowledge, integrated lesson plans, interactive teaching methods.

Introduction

The formation of competencies in lessons organized on the basis of the integration of chemistry with other disciplines demonstrates the relationship between academic subjects. Students develop interdisciplinary competence and develop

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logical thinking. In the process of understanding science by students, the interrelation of social – humanitarian, natural – scientific, and technical methods of cognition is visible. It is on the basis of integration that natural sciences appear in the guiding principles of the biofield, in the study of human activity, and in solving urgent problems of our time. Well, this manifests itself in differences and changes in relationships, in the general cultural knowledge of all students. This interconnectedness creates a regular basis for the development of students' intellectual abilities and their active positive attitude towards the learning process. The integration of chemistry with natural sciences is important for a deeper understanding of natural processes, the enrichment of scientific approaches and the development of innovative technologies. Below we will consider its integration with chemistry and biology, ecology and geology [1].

1. Integration of chemistry and biology

Chemistry and biology are interconnected, and their integration makes it possible to understand and analyze biological processes at the molecular level.

Biochemistry is the chemical reactions occurring in living organisms (metabolism, enzymatic reactions).

Genetic engineering is the analysis of the structure of DNA and proteins, the creation of new organisms.

Medicinal chemistry is the use of chemical compounds in pharmacology and biomedicine.

Food chemistry is the study of the composition, storage and processing technology of food products [2].

2. Integration of chemistry and ecology

Chemistry is closely related to ecology and helps to understand the chemical processes occurring in nature and protect the environment.

Environmental chemistry-analysis of the composition of water, air and soil, identification of sources of pollution.

Ecotoxicology is the study of the effects of chemicals on living organisms and ecosystems.

Green chemistry is the development of environmentally friendly chemical technologies.

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Atmospheric chemistry – chemical bases of the ozone layer, greenhouse effect and air pollution [3].

3. Integration of chemistry and geology

Together, chemistry and geology play an important role in studying the composition of minerals and substances in the Earth's crust.

Geochemistry is the study of the chemical composition of the Earth's crust and minerals.

Oil and gas chemistry-technologies for the formation and production of hydrocarbons.

Mineralogy is the determination of the composition of minerals and the study of their chemical properties.

Hydrogeochemistry is the study and assessment of the chemical composition of groundwater.

This integration of chemistry and natural sciences greatly contributes to the development of modern science, medicine, ecology and technology.

The methodology involves the application of skills in practice, linking students' theoretical knowledge of organic chemistry with biological and environmental problems. In addition, the integration of natural sciences enhances students' opportunities to develop logical thinking skills, complex problem analysis, and apply scientific research methods in the learning process [4].

The main approaches to this methodology include interactive laboratory work, the development of environmental projects, and the widespread use of practical experiments. As a result, students develop the skills necessary to apply their knowledge in practice and achieve success in further scientific activities. Modern pedagogical technologies are used in the teaching of nitrogen-containing organic compounds in higher educational institutions along with the integration of a number of disciplines.

Organic compounds containing nitrogen are called organic substances, the molecule of which contains the element nitrogen. Nitrogenous organic compounds are vital substances such as amino acids, proteins, and nucleic acids. Nitrogen-containing organic compounds include such nitrogen-containing compounds as amines, nitro compounds, amino acids, proteins, and nucleic acids. Amines are compounds formed by the exchange of ammonia hydrogens for

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hydrocarbon radicals. Amines are divided into saturated, unsaturated and aromatic amines depending on the hydrocarbon part.

The integration of natural sciences is becoming increasingly important in modern education, as it forms multifaceted knowledge by teaching subjects as a single system. The nitrogen-containing organic compounds contained in it play an important role in biological processes and the environment, therefore, their teaching requires an integrated approach from various disciplines [5].

Containing nitrogen-fixing organic compounds and their significance:

The nitrogen-fixing organic compounds contained in it play an important role in biological and chemical processes. They are part of amino acids, proteins, nucleic acids, and many other important molecules. Providing students with knowledge about the molecular structure, properties, and biological functions of nitrogen-containing organic compounds in the composition will increase their interest in natural sciences.

The importance of integrating natural sciences:

The integration of chemistry, biology, and ecology helps students understand nitrogen-containing organic compounds in the composition in a broader context. For example:

Chemistry: the study of the molecular structure, reactions, and properties of the hip joint.

Biology: intracellular functions of nitrogen-containing organic compounds in the composition, protein synthesis, and role in the structure of genetic material.

Ecology: natural cycle, nitrogen cycle and environmental impact.

Methodological approach:

Integrative Lesson Plans: Joint study of biological and chemical aspects of nitrogen-containing organic compounds in the composition by combining chemistry and biological sciences topics in lessons.

Practical exercises: Providing students with the opportunity to conduct nitrogen-containing organic compounds in the composition -related experiments in a laboratory setting.

Interactive teaching methods: explaining complex processes using multimedia, simulations, and other interactive technologies.

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Project activity: to develop independent research and creative approaches through students' work on projects related to nitrogen-containing organic compounds in the composition.

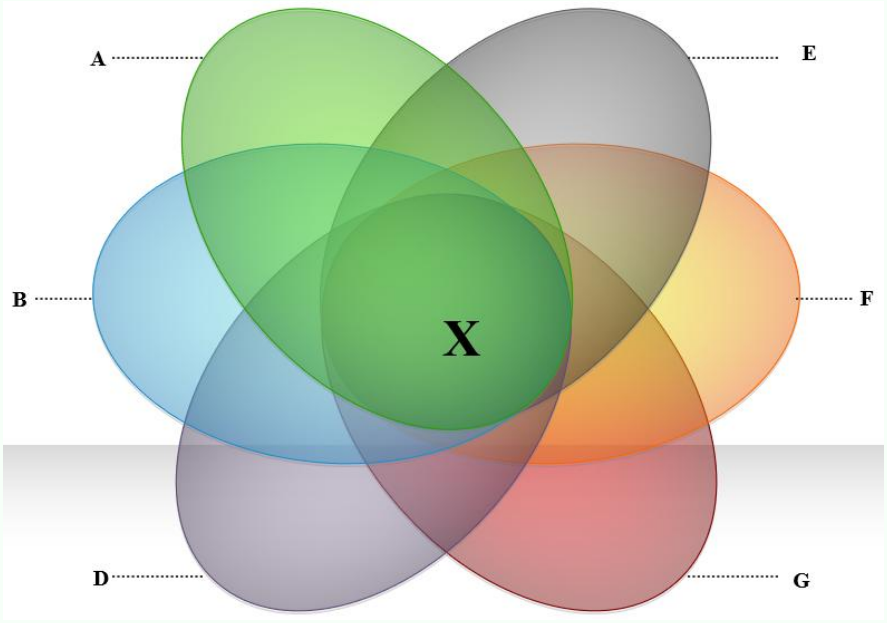
Developing students' competencies:

Through the integration of natural sciences, students' analytical thinking skills, research skills, and the ability to understand interdisciplinary connections are developed. This allows them to further engage in R&D or put their knowledge into practice.

Using the integration of natural sciences allows students to study nitrogen-containing organic compounds contained in them in depth and systematically. This approach not only expands their theoretical knowledge, but also develops their practical skills. The success of this approach depends on the active participation of the teacher and students, as well as on the effective organization of interdisciplinary connections.

When teaching subjects on nitrogen-containing organic compounds using modern pedagogical technologies, the following methods can be used [6].

As an example, consider using the Venn diagram graphic organizer. At the same time, the graphic organizer is focused on developing students' skills of an analytical approach to the subject, assimilation (synthesis) of the general essence of the subject on the basis of individual parts.



Complex view of the Venn diagram

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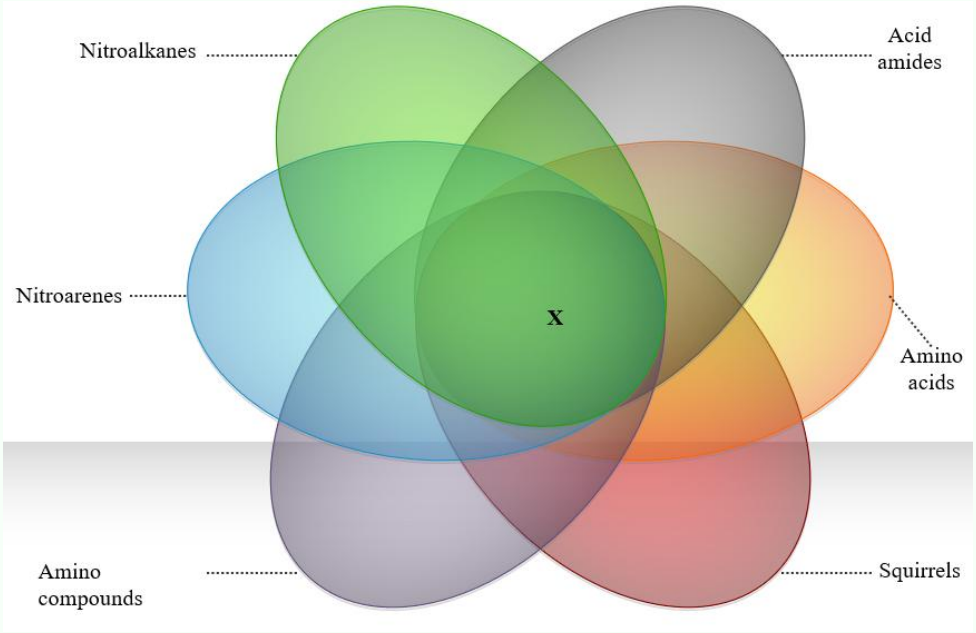
The graphic organizer helps to conduct a comparative analysis of interrelated theoretical knowledge, information or facts learned by students. Its use in organizing final classes in certain sections or chapters has a good effect. For example: if we place the organic compounds containing nitrogen section in the center of the Venn diagram, we will place classes such as nitroalkanes, nitroarenes, amino compounds, acid amides, amino acids, and proteins around it. Then you can write down their similarities and differences [7].



The placement of objects on the Venn diagram

The stages of its application are as follows in this case, students participate in the lesson in small groups: A diagram is drawn on the board, reflecting the essence of the task. Each group is given separate tasks on the topic being studied (section, chapter). After completing the tasks, leaders are selected from among the group members. The leaders fill out a diagram displayed on the board, summarizing the opinions expressed by the group members [8]. In the process of using the graphic organizer, each group performs tasks on a specific topic. After the thematic resources on the Venn diagram (the morphological series, isomerism and nomenclature of nitrogen-containing organic compounds contained therein, their preparation and properties, as well as their biological significance and use) are ready, the similarities and differences between the thematic sources will be presented at the junction of the circles on the Venn diagram.

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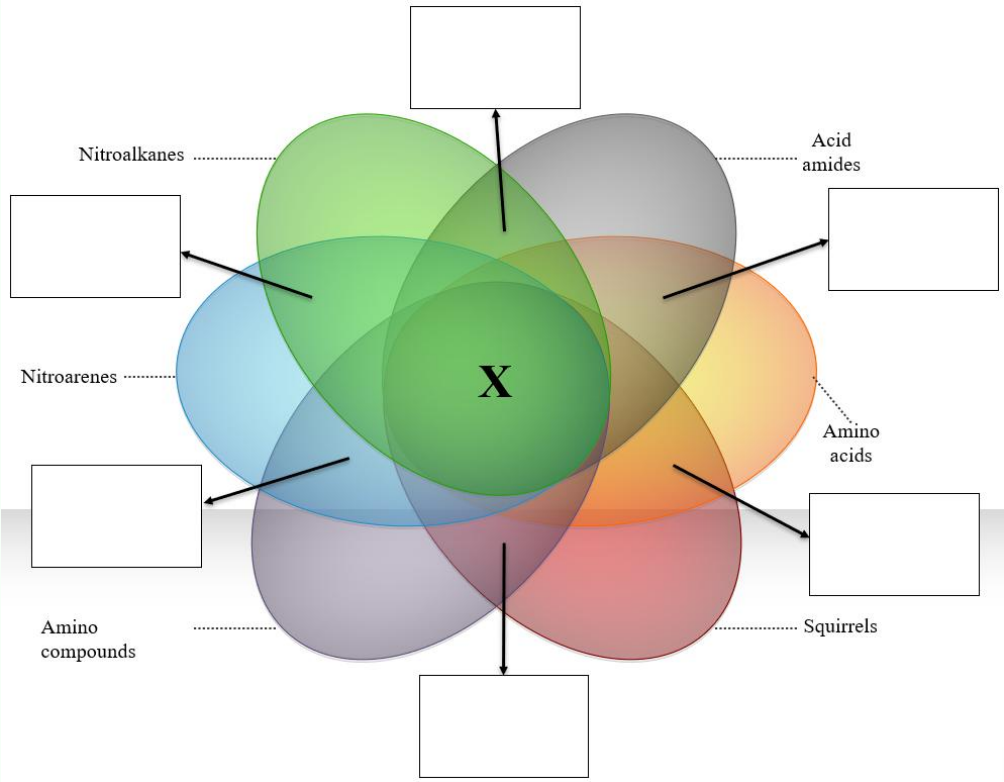

The placement of sources related to the nitrogen-containing organic compounds contained in it on the Venn diagram.

After forming a comprehensive representation of the Venn diagram, the final part expresses the similarities and differences common to all nitrogen-containing organic compounds contained in it at the junction of the circles (X). This means that with this method, which we have reviewed in our study, we can use the nitrogen-containing organic substances contained in it in generalizing lessons to explain to students, as well as use them to assess the extent to which they have internalized their knowledge of the subject. In conclusion, the use of modern pedagogical technologies and the integration of disciplines in chemistry teaching allows students to better assimilate subject-related resources, creating the basis for studying the biological importance of each chemical and its importance in living organisms, as well as in plants. Based on the resources received, students can develop several concepts related to the subject, natural phenomena, properties of substances, areas of their use, and competencies necessary for students.

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