



THE CREDIT-MODULE SYSTEM AND THE METHODOLOGY OF INDEPENDENT EDUCATION BY MODULE IN CHEMISTRY EDUCATION

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Abstract

In the credit-modular system, the main and auxiliary concepts of independent work of students were developed, as well as the deepening of their interest in independent knowledge of science.

Keywords: credit hour, credit module, independent study, abstract, essay, non-standard test.

In 1869, the president of Harvard University, Charles William Eliot, a well-known figure of American education, introduced the concept of "credit hour" [1.1].

The "credit hour" system first appeared and improved in the United States. To obtain a bachelor's degree in the USA, it is required to accumulate at least 120 credit-hours in 4 years, 30-60 credit-hours respectively in 1-2 years for a master's degree, and 60-90 credit-hours in 3-4 years respectively [2.8].

The ECTS system offers great advantages to students of Europe and, in general, the countries participating in the Bologna process. [2.12].

The credit-module system of educational process organization is a model of educational process organization based on the combination of modular educational technologies and credits or credits of educational units.

The organization and implementation of the educational process is a multifaceted and complex system of action and interaction.

In the credit-module system, attention is paid to its two features:

- On the independent work of students;
- To carry out the credit-module system of organizing the educational process and the rating system of evaluating the educational achievements of students [3. 1039-1043 b].

Vokhid Orinov, Ph.D., professor of the University of New Brunswick, in the handbook on the ECTS credit module system in higher education institutions of the Republic of Uzbekistan, comments on the credit education system, unit of measurement, study load, auditory and independent hours . In his opinion, "Student's study load is divided





into classroom and independent study hours in this way, improving the conditions in the libraries of higher education institutions, organizing large reading rooms, translating authoritative professional literature published in foreign languages in a public manner, i.e. quality education. it is necessary to further expand the scope of manuals".

Despite the fact that scientists and practitioners pay a lot of attention to the problem of organizing independent work of students of higher educational institutions, there are still important issues that need to be considered and solved. As noted by Yu. Miroshnichenko and O. Troyan, these are undisclosed connections and relationships between the goal of organizing independent work of students of higher education institutions and the ways of its implementation; comprehensive theoretical understanding and justification of the organization of students' independent work in the context of the credit-module system of education; issues of motivating students in terms of increasing the efficiency of their independent educational activities; mastering of reasonable methods of educational work by students; formation of independent study skills and abilities [4.105-115b].

The credit-module system is a process of educational organization and is an assessment model based on a set of module technologies and a credit measure.

A module is a part of the curriculum in which several subjects and courses are studied. It is a set of several subjects (courses) aimed at students' ability to acquire certain knowledge and skills, analytical and logical observation. In this, the teacher organizes the educational process, gives live, video and audio lectures, coordinates and monitors the student's activities. The student learns the subject independently and completes the assigned tasks.

According to foreign experience, the educational process in the credit-module system consists of 2-4 modules per semester. The subjects collected in the module are formed from easy to complex, from theoretical-methodical subjects to applied subjects and logically based on the principle of complementing each other. In order for a student to become a specialist, it is necessary not only to acquire information, but also to be able to process it and put it into practice.

Higher education institutions set a study load of 30 hours for 1 credit, of which 12 hours ($30 \cdot 40\% = 12$) are classroom hours, and 18 hours ($30 \cdot 60\% = 18$) correspond to the student's independent study hours. . If we determine the 6-credit course load based on this distribution, the student will have to spend 72 hours ($(30 \cdot 6) \cdot 40\% = 72$) classroom classes, 108 hours ($(30 \cdot 6) \cdot 60\% = 108$) will have to complete an independent study load at home and in the library.





Giving students the following types of assignments for self-study of topics allows them to work on themselves.

Essay (referat) Preparation

Information on the topic is presented in the form of an abstract. On the title page, the name of the higher education institution, group of the performer, surname, name, scarf, subject of the abstract and year are written. Of course, it is better if there is an abstract word in capital letters and a picture related to the topic. For example:

On the next page, the summary plan is given. In parentheses, it is indicated from which page it starts. For example:

INTRODUCTION (3).

Chapter I. Literature analysis on the topic (4).

Chapter II. Covering and comparing the topic in literature and electronic sources(21).

Conclusion (32).

Glossary.

Applications.

In the introduction, the relevance and importance of the topic, the purpose and tasks of the abstract are highlighted, in the 1st chapter, the information given in the main literature is given, and in the 2nd chapter, several literatures are compared and conflicting concepts are discussed. In the summary part, brief information about the abstract is given. The last page of the report contains a list of used literature. All sheets of the abstract are numbered.

Creating non-standard tests.

Fill in the blanks with the necessary words.

1. Write the discoveries of the great scientists who contributed to organic chemistry below?





I. Berzelius

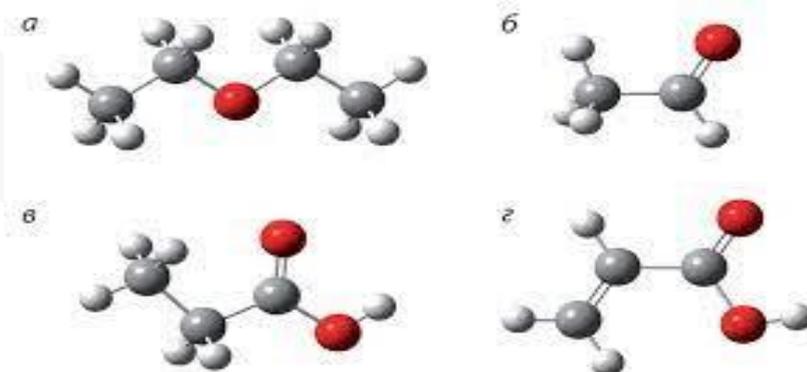


A.M. Butlerov

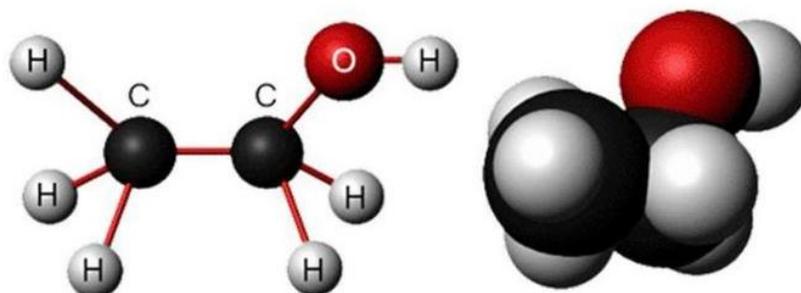


N.N. Zinin

3. Determine the formula of the substance by the electronic structure shown in the picture?



4. What is the electronic structure of an organic compound? _____



Decide which of the two statements is correct.



I Inorganic
substances

Organic substances

covalent bond

II stable

unstable

III the reaction is fast

slow

IV various products when burned the same product when burned

V not isomerized

isomerized

Based on the meaning of the sentence, choose the appropriate word from the brackets and underline it.

(In 1828) F. Vohler synthesized urea from an inorganic substance (ammonium cyanate);

(in 1842) the Russian chemist N. N. Zinin obtained aniline;

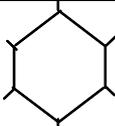
(in 1845) the German chemist A. Kolbe synthesized acetic acid;

(in 1854) French chemist M. Berthelot synthesized oils and finally.

(in 1861) A. M. Butlerov himself synthesized a substance similar to sugar.

According to the properties of the chemical concepts given below, put them in pairs in suitable groups.

After determining the composition of benzene, match the various structural formulas proposed for it with the suggested formulas.

No	Scientists who proposed the structure of benzene		Formulas suggested for benzene
1	Kekule	A	



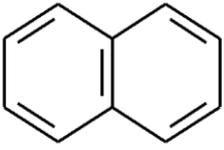
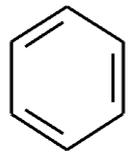
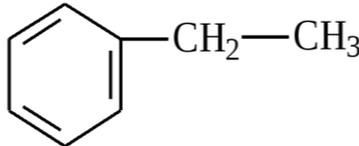
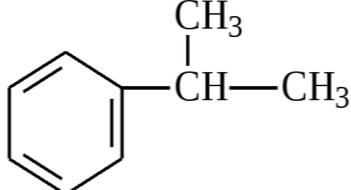
2	Claus	B	
3	Ladenburg	D	
4	Durar	E	
5	Armstrong-Bayer	F	
6	Tile	H	

Answers: 1–H; 2– F; 3– E; 4 – D; 5– B;6– A;

Match the structural formulas of cyclic organic substances with their names.

No	Names		Formulas
1	Benzene	A	
2	Ethylbenzene	B	
3	Kumol	C	
4	Vinylbenzene	D	



5	Diphenyl	E	
6	Phenanthrene	F	
7	Naphthalene	H	
8	Diphenylmethane	G	
9	Cyclopentylbenzene	I	

Continue the sentence according to the concept and interpretation of the terms related to the topic

Russian chemist, academician of St. Petersburg Academy of Sciences (since 1874). Graduated from Kazan University (1849). He worked here (from 1857 - professor, in 1860 and 1863 - rector). The creator of the chemical theory of the structure of organic compounds, which is the basis of modern chemistry. He based the idea about the interaction of atoms in a molecule. He predicted and explained the isomerism of many organic compounds. Wrote "Introduction to the Complete Study of Organic Chemistry" (1864) - the first manual in the history of science based on the theory of chemical structure. Chairman of the Chemistry Department of the Russian Physico-Chemical Society (1878-1882).

Spatial isomerism, in which molecules of substances differ not in the order of bonding of atoms, but in their position in space: cis-trans-isomerism (geometric). This isomerism is characteristic of substances whose molecules have a planar structure: alkenes, cycloalkanes, etc.





Optical (mirror) isomerism also belongs to spatial isomerism. As you know, the four single bonds around the carbon atom are arranged tetrahedrally. If a carbon atom is attached to four different atoms or groups, then these groups can be arranged differently in space, that is, two spatially isomeric forms.

The induction effect is the transfer of electron-atom gamma bonds from one atom to another due to different electromagnetism. It is denoted by (->).

Modern organic chemistry distinguishes two main types of isomerism: structural (chain isomerism, isomerism of the position of multiple bonds, isomerism of the homologous series, isomerism of the position of functional groups) and stereoisomerism (geometric or cis-trans isomerism, optical), or mirror, isomerism).

You have seen the incompleteness of the second thesis of the theory of chemical structure, clearly formulated by A.M. Butlerov. From modern positions, this rule requires additions: properties of substances depend not only on their qualitative and quantitative composition, but also on the following.

chemical,

Electronic,

Space structure.

Writing an essay. The topic is read in full, the material is absorbed as much as possible, and the gist of the topic is written based on one's own words. Both the manuscript and the electronic version are taken into account.

Preparing a multimedia presentation. In this case, electronic presentations on the topic will be created on the basis of the PowerPoint program. A simple presentation is enhanced with audio, video and animation. Texts are explained through audio format.

Creating a Case Assignment

Case report. Students are conducting experiments on obtaining complex compounds. In order to obtain a complex compound, the task was to perform the interaction of $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$ substance with quinazoline substance (ligand). But Nadira dissolved the ligand in water, and Gulnoza did the experiment by dissolving it in alcohol. As a result, in Nodira's experiment, a sediment-like residue was formed, and in Gulnoza's experiment, a crystalline substance was formed.

Case Question: Explain chemical processes?

Case Study: Guidance for Students:





1. Carefully read the information provided in the sources.
2. Differentiate the concepts.
3. Based on the acquired information, create your answer to the case questions.
4. Discuss your answer option with other representatives of the small group and form a common answer option.

Case resolution process. Carefully reads the information provided in the sources, differentiates the concepts, creates your answer option to the case questions based on the acquired information, discusses your answer option with other representatives of the small group and forms a general answer option

Case solution: (Student options). Teacher's solution: In the process of complex formation, attention should be paid to the nature of the ligand and the solubility in the solvent. Quinazoline is more soluble in alcohol than in water, which indicates the formation of a complex compound. Complex compounds are composed of complex substances consisting of a central atom (Co^{2+}) and surrounding ligands (quinazoline, chlorine and water molecules).

The implementation of independent work according to the type given by the independent work of the student under the guidance of the teacher is given in the syllabus of each subject, and students are given the task of completing this independent educational task.

In the credit-module system, 50-60% is allocated to independent work of students, which requires them to work more on themselves.

The purpose of independent work of students is not only to enrich their knowledge independently and develop the ability to think freely in the flow of scientific information, but also to act as a necessary condition for self-learning and self-realization in the future. and development of independence.

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