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DEVELOPMENT OF A METHODOLOGY FOR TEACHING A COURSE IN ORGANIC CHEMISTRY ON THE BASIS OF A MODULAR CREDIT SYSTEM

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Abstract:

The article introduces students to the theory of structure of AM Butlerov, the basic knowledge for the course of organic chemistry, the application of biological knowledge in the teaching of organic chemistry. It also provides information on the study of the concepts of homologous series and isomers of organic compounds, high-molecular compounds and their importance.

Keywords: A.M. Butlerov structure theory, organic chemistry, organic compounds, isomer, gamological series, high molecular weight compound, First-Year Undergraduate/General; Graduate Education/Research; Second-Year Undergraduate; Upper-Division Undergraduate. Biochemistry; Organic Chemistry. Pedagogy: Computer-Based Learning; Distance Learning/Self Instruction; Internet/Web-Based Learning.

The students used during lectures appear to affect the participation levels of students across all sites. They exhibit a widespread range in the mastery of chemical concepts needed to understand the actions of drugs at the molecular level. In this context we sought to enhance the learning experience of the students by designing and implementing a Web-based interactive module relevant to the topic that they chose as the most difficult for them. Pre-pharmacy, pre-medicine, entry-level pharmacy students, as well as students in other health professions, would benefit from the "Acid–Base Properties of Drugs" online module by allowing them to explore, on their own time, how the concepts they have learned in general and organic chemistry relate to the actions and reactions of drugs in the body.

The basic sections of the module are:

- Lecture Material
- Key Concepts
- Online Exercises (with solutions)
- Learner's Resources

Self-Check The Lecture Materialsection includesthefollowing subheadings:

- Introduction to Acids, Bases and Salts
- Hydrolysis of Salts
- Conjugate Acids and Conjugate Bases
- Strength of Acids and Bases
- Inductive Effects
- Resonance Effects
- The Henderson–Hassel Bach Equation

The Online Exercise section includes ten problems displayed throughout the module as the concepts are discussed. The Self Check section is a randomly generated structure that requires the student to evaluate the effect of neighboring functional groups on the ionization and urinary excretion of the drug. Evaluation of the "Acid–Base Properties of Drugs" online module by first-year students at the College of Pharmacy indicates that it is a valuable learning resource. It is expected to be valuable to other health professions students and those returning to academia in a health related field after several years of full time employment. Educators in need of computer resources for life science applications of chemical concepts should find the online module an easy-to-use study aid.

In the modular credit system, lessons are taught interactively and will help students work independently throughout the week. At the end of the week, each teacher takes stock of the lesson and reviews the weekly student ratings. Thus, the student can see an increase or decrease in the success of their course. Once a student is well prepared and gets a low score, his or her average will drop. Students often come to a lecture, attend a seminar, memorize all the material before an exam, or ask a familiar question in an exam.

Credit Technology empowers students to choose courses in the curriculum and participate in the development of an individualized curriculum. Freedom of choice not only of science, but also of the faculty.

The theory of chemical structure created by A. M.Butlerov is one of the greatest achievements of modern chemistry.

Students will be introduced to the theory of chemical structure on the topic of "Saturated Hydrocarbons". Methane is being studied. The concept of "homologous series of methane" is explained. Students are reminded that the names and formulas of homologues do not conform to the usual valence rule. For example, in the ethane formula, according to the valence rule, carbon remains trivalent. But that is only the tip of the iceberg. Butlerov's theory of chemical structure completely explains this "contradiction."

The basic rules of Butlerov's theory are given. Each rule is not only described, but explained in concrete examples. Methane is represented by the valence lines of the elements in the formulas of substances in the homologous series (methane, ethane, propane and butane). "Chemical formulas that describe the order in which atoms combine in molecules are called structural formulas." Based only on the theory of chemical structure, Butlerov came to the conclusion that atoms in saturated hydrocarbon molecules have different combinations - he discovered isobutane, explained previously known cases of isomerism, predicted the number of possible isomers of organic matter, and students 'attention is drawn to the fact that the ideas are validated by relevant experiences and production practices.

In the process of studying the material after saturated hydrocarbons in organic chemistry, the basic principles of the theory of chemical structure are identified and refined during the acquaintance with the functional groups and the most important representatives of the main classes of organic compounds. As students become familiar with the characteristics of organic substances, they become convinced that the properties of substances really depend on the structure of their molecules, and that Butlerov's theory is the scientific basis of modern organic chemistry.

Based on the experience of teaching important concepts and theories of organic chemistry, the following recommendations have been developed for teachers:

- Determining the interdisciplinary relationship between the course of inorganic chemistry.
- The history of the theory of chemical structure.
- To reveal Butlerov's ideas about the structure of organic matter and to connect them with the theory of spatial structure.
- Demonstrate that the properties of substances depend on their structure.
- Extensive use of technical means (modeling, display tools).

The concepts of organic chemistry are divided into five groups based on modern structural theory: the concept of chemical structure, the concepts of electron and stereochemistry, the concepts of high molecular chemistry, and the laws of chemical reactions. In the course of inorganic chemistry, students did not see that the properties of substances are affected by their structure. However, in organic chemistry, the teacher must show that these concepts play a key role.

Modern structural theory has become the basis for the study of organic matter by individual classes. From saturated to unsaturated hydrocarbons, the elemental composition and chemical structure of organic matter are complicated. The electronic and spatial structure will also change. For example, for saturated hydrocarbon molecules (-bond and Sp3-hybridization, in ethylene series hydrocarbons - p-bond and Sp2-hybridization. - Sp-hybridization and two p-bonds appear. At the same time, the spatial structure is also complicated: valence angles change, spatial isomers appear, and so on.

In the study of organic chemistry, students are introduced to isomeric and homologous concepts for the first time. Although these two concepts are different, students often confuse them. Therefore, isomers and then homologues are considered first in concrete examples.

The concepts of homolog and isomer can be formed in three stages:

- Distinguish and clearly define the specific features of each concept.
- Show the relationship between a homologue and an isomer.
- Study of interclass isomers of different types and substances.
- Once students are familiar with isomeric and homologous concepts, they compare their similarities and differences.

Isomers have the same quality and quantity, different chemical structure and properties.

Homologues have the same qualitative composition, similar chemical structure and chemical properties, but different quantitative composition and physical properties.

In the course of teaching organic chemistry, generalizations are made for each section: the concept of isomers, the interaction of atoms in a molecule, the types of covalent chemical bonds. It is important to establish a genetic link between the organic substances.

The final topic of organic chemistry is "Summarizing students' knowledge of organic chemistry." In this topic, we will look in more detail at the basics of the structural theory of organic matter.

The main idea of Butlerov's theory is reflected in the school textbook:

- Atoms in molecules are bound in a specific sequence specific to their valence.

- The properties of a substance depend on the order in which the atoms in the molecule of the substance combine and how they interact.

Atoms and molecules are real; atoms in a molecule are bound in a certain sequence. Atoms are bound by valence.

In organic compounds, carbon is divalent. Its atoms can combine not only with the atoms of other elements, but also with each other to form a chain of atoms — straight, branched, and ring chains.

The properties of substances depend on the chemical structure of the molecule and its quality and quantity.

The chemical structure of a molecule can be represented by a structural formula. Each substance has only one structural formula. The chemical structure of a molecule can be determined by studying its properties and products.

The different chemical structures of substances of the same composition depend on the phenomenon of isomerization.

The methods and tools of teaching organic chemistry are similar to those of inorganic chemistry, but with fewer features.

In organic chemistry, great emphasis is placed on reaction conditions in chemical experiments. The main purpose of chemical experiments is to show that the properties of substances depend on their structure.

In addition, models are used to show the combination of atoms in a certain sequence, (-bond direction, valence angles.

Naming organic matter is a challenge for students. Tables should be used to eliminate them. To reduce the nomenclature of organic substances, it is recommended to prepare two tables: the first - to show the homologous sequence of saturated hydrocarbons from methane to decane and their radicals, and the second - to show the algorithm for naming substances.

The course of organic chemistry is greatly influenced by interdisciplinary links. The connection with the course of biology is especially evident in the teaching of "Proteins" and "Nucleic Acids". The relationship between physics, history, and other subjects also determines the place of organic chemistry in the school curriculum.

As students study organic chemistry, they will gain a general elementary understanding of high molecular weight compounds. The importance of polymers and materials based on them in the national economy, the introduction of new technologies, the development of chemistry and technology of these compounds should be shown to students.

First of all, cotton fiber and cotton products, wool, silk, gas, oil and other natural resources open up a wide range of opportunities for the development of polymer chemistry and technology. The development of polymer chemistry in Uzbekistan, in particular, has great prospects. Polymers play an important role in protecting human health and solving environmental problems associated with it.

Introducing students to the activities of Uzbek chemists in this field of science, giving them an idea of their scientific work, schools, discoveries will increase students' interest in scientific knowledge. In this regard, it is recommended to set up stands in school chemistry classrooms to promote the scientific activities of Uzbek scientists.

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