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DEVELOPMENT AND PROSPECTS OF MODERN ORGANIC CHEMISTRY

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Abstract. This article explores the development and prospects of modern organic chemistry, highlighting key milestones and illuminating future directions. Organic chemistry plays a crucial role in our daily lives as it encompasses the study of compounds containing carbon. Over the years, modern organic chemistry has significantly evolved, leading to groundbreaking discoveries and advancements in various fields.

Key words: organic chemistry, organic synthesis, analysis of oxycompounds, chromatography techniques

Introduction. Modern organic chemistry continues to expand the boundaries of knowledge, with several exciting frontiers on the horizon. One such area is the development of sustainable and environmentally friendly organic methodologies. Green chemistry principles, including the use of renewable resources, catalysis, and waste reduction, are being integrated into organic synthesis, paving the way for more sustainable chemical processes. Moreover, the exploration of exotic new reaction concepts, such as organ cascade catalysis and transition metal-free coupling reactions, promises to extend the synthetic toolbox and open up new reaction pathways. Along with Oxygen-containing compounds, commonly referred to as oxycompounds, play a crucial role in various fields such as pharmaceuticals, agrochemicals, and materials science. The accurate analysis of these compounds is vital to understand their properties and potential applications. In this article, we will explore different methods used for the analysis of oxycompounds, their advantages, and their applications in various industries. Chromatography techniques are widely employed for the analysis of oxycompounds due to their excellent separation capabilities [1]. Gas chromatography (GC) and liquid chromatography (LC) are the most commonly used techniques. Gas chromatography separates volatile analytes by their affinity for the stationary phase and the mobile gas phase. It is particularly effective for the analysis of volatile oxycompounds such as alcohols, ethers, and ketones. Liquid chromatography utilizes liquid as the mobile phase, making it suitable for the analysis of non-volatile or semi-volatile oxycompounds, including organic acids, esters, and phenols. High-performance liquid chromatography (HPLC) and ultra-high-performance liquid chromatography (UHPLC) offer improved separation efficiency. Spectroscopy allows the identification and quantification of oxycompounds based on their interaction with light. Various spectroscopic techniques are utilized for the analysis of oxycompounds. UV-Vis spectroscopy measures the absorption or transmission of ultraviolet and visible light by oxycompounds. It provides valuable information about their electronic structure and can be used for quantitative analysis and identification. Infrared spectroscopy measures the absorption of infrared light by oxycompounds. It provides information about functional groups present in the compounds, aiding in their identification and structural analysis. NMR spectroscopy is a powerful technique for the elucidation of oxycompound structures. It provides detailed information about the connectivity and environment of atoms in a molecule, helping in the identification and characterization of complex oxycompounds [2]. Mass spectrometry (MS) is widely used for the identification and quantification of oxycompounds. It involves ionizing the compounds and separating the ions based on their mass-to-charge ratios. MS can provide information regarding molecular weight, fragmentation patterns, and structural characteristics, offering valuable insights into the composition of oxycompounds. The characterization and analysis of oxycompounds are crucial in drug discovery and development. It helps in assessing the purity, stability, and quality of pharmaceutical compounds, ensuring their safety and efficacy. Understanding the presence and concentration of oxycompounds in the environment is essential for assessing pollution levels and

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studying their impact on ecosystems. Analytical techniques enable the identification and quantification of these compounds in soil, water, and air samples. The analysis of oxycompounds is vital for ensuring food and beverage safety [3]. Methods such as chromatography and spectroscopy aid in identifying and quantifying additives, preservatives, and contaminants in food products. Analysis of oxycompounds plays a significant role in the development of new materials. Polymer research, for instance, involves the characterization and analysis of oxycompound monomers, oligomers, and polymers to understand their structure-property relationships. The accurate analysis of oxycompounds is of utmost importance in various scientific fields due to their widespread applications. Chromatographic techniques, spectroscopy, and mass spectrometry are powerful tools that enable the identification, quantification, and characterization of these compounds. The advancements in analytical methods continue to expand our understanding of oxycompounds and pave the way for their potential use in diverse industries.

This will facilitate the construction of complex molecules in a more efficient and sustainable manner. The foundation of modern organic chemistry was laid in the early 19th century. Friedrich Wöhler's synthesis of urea from ammonium cyanate in 1828 shattered the notion of vitalism and proved that organic compounds could be produced synthetically. This discovery marked a turning point and initiated the transformation of organic chemistry into a true scientific discipline. One of the most profound concepts in organic chemistry is the notion of structure and bonding, which forms the basis for understanding the behavior and reactivity of organic compounds. August Kekulé's proposal of a cyclic structure for benzene in 1865 exemplified the power of structure elucidation. Another significant development was the concept of functional groups, introduced by Emil Fischer in the late 19th century. This concept classified organic compounds into distinctive groups based on their characteristic chemical behavior [4]. It provided a systematic approach to understanding the vast diversity of organic compounds and their reactions. The integration of organic chemistry with other disciplines, such as materials science and biology, is another exciting prospect. Organic materials with tunable electronic and optical properties have immense potential in fields like organic electronics, photovoltaics, and sensors. Additionally, the merging of organic chemistry with synthetic biology and bioengineering has the potential to yield novel biologically active compounds and therapeutic agents. Synthetic Organic Chemistry.The 20th century witnessed remarkable advances in synthetic organic chemistry, driven by the need for new and efficient methodologies to develop novel compounds. Transition metal-catalyzed reactions, such as Heck, Suzuki, and Sonogashira couplings, opened up new vistas for the synthesis of complex organic molecules. Furthermore, the development of protecting-group strategies, stereoselective synthesis, and the use of organocatalysis revolutionized synthetic organic chemistry. These advancements enabled chemists to synthesize intricate natural products, pharmaceuticals, and functional materials with greater control over stereochemistry and efficiency. Computational Organic Chemistry.In recent decades, computational methods have played an integral role in organic chemistry. Molecular modeling, quantum mechanics, and molecular dynamics simulations aid in elucidating reaction mechanisms, predicting molecular properties, and designing new molecules with desirable attributes. Computer-aided drug design (CADD) is a prime example of the practical applications of computational organic chemistry. By virtually screening millions of compounds and predicting their binding affinities to target proteins, CADD accelerates the discovery and development of new drugs, ultimately benefiting society as a whole. In the formation of concepts of organic chemistry, the following should be taken into account: the course of organic chemistry is designed for students who can perform logical operations, especially consistency and generalization; studying organic chemistry is based on knowledge of the basic concepts of inorganic chemistry (structure of matter, periodic law, chemical bonds, laws of chemical reactions, electrolytic dissociation). The characteristics of the concepts of organic chemistry are derived from this. The system of exercises offered in the course of organic chemistry allows to reveal the diversity of organic compounds, their structure and properties, and the genetic connection between different classes of organic compounds. The improvement of the theoretical level of the course of organic chemistry and its logical structure determined the importance of problem-based teaching. It should be noted that students of academic-lyceum and vocational college who have a certain reserve of chemical knowledge are better able to determine the solution of complex problems than schoolchildren. In the course of organic chemistry, there are great opportunities to create a system of problem situations that allow the conscious assimilation of concepts or theories, to activate the cognitive activity of students. In the process of studying the educational material, it is possible to create situational tasks related to predicting the structure and properties of compounds and identifying some laws. Conflicts between evidence and theories can be partially or completely resolved by the student himself. All of the above-mentioned conditions for the formation of the basic concepts of organic chemistry should be considered as an interrelated whole process, and it should be remembered that these conditions can be expressed differently for certain concepts. In the formation of any concept, three parts or fields can be distinguished: the field of basic concepts, the field of the concept being formed, and the field of application of the concept. The field of the concept being formed is related to the field of basic concepts and determines the field of application of the concept. Nowadays, there are many electronic devices used in the educational process. Modern electronic devices are programmed, and its preparation requires at least two people, one is a science specialist, and the other is a programmer. In such a case, there will be a problem, because the specialist will need to explain his opinion to the programmer and achieve the intended goal. Theory in the formation of important concepts of chemistry education at school it is required to be implemented through organization depending on practice. Kaysik in the theories and scientific pedagogical studies of our late Methodist scientists The effect of passing the theory on the basis of experiential experiments is especially scientific for students it is brought to conduct research, conducting experiments for this they should have deep knowledge of techniques and methods. In many cases, one of the factors contradicting the theory is a chemical experiment. For example, the experiment proving that benzene does not oxidize contradicts the knowledge about unsaturated hydrocarbons. In the given example, the chemical experiment is considered to be the cause of the problematic situation. A chemical experiment is not only the cause of a problematic situation, but also a solution to this problem. More than the deductive approach, it has its application in vocational colleges or academic-lyceum education system, and this approach allows to save study time. For example, the study of the properties of unsaturated hydrocarbons based on their structure is carried out in two stages: first, the properties and the mechanism of the coupling reaction are studied and considered. Studying the reaction mechanism and their properties on the example of homologous series increases the ability of the teacher to analyze evidence and perform various analytical operations on the basis of this. Today, the process of studying foreign experiences is independent based on the experience of foreign countries in forming thinking students serving to form or develop the student in the qualities of creativity many methods and strategies are being introduced. This method and didactic value of strategies is that they teach students and students forces to think deeply about the materials. Continuously developing chemistry in line with modern development and it was shown that pedagogic education is a new approach to students' professional training, and it is necessary to direct teachers to pedagogical, cultural-educational, scientific-research activities, and to ensure the achievement of educational results by acquiring general cultural, general professional, scientific competences. It was shown that the integrative methodology of ensuring the quality of students' professional training based on the principles of chemistry education is implemented through theoretical and methodological integration. Based on the basics of chemistry, it was determined that the content of their professional methodical training should be organized based on innovative

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educational paradigms, the development trends of the theory and practice of chemical education, and the formation of their chemical-methodical competence related to the acquisition of scientific competencies [5]. The need for a teacher in chemical-methodical competence is innovative the fact that chemistry teachers need to acquire not only general cultural and general professional but also special (based on the specific characteristics of chemistry, related to science) competences in forming their abilities, through the creation of innovative activities in students, the development of chemical concepts directs to formation.

Conclusion. The development of modern organic chemistry has been a remarkable journey filled with significant achievements and groundbreaking discoveries. From the synthesis of urea to the emergence of sustainable organic methodologies, the field has continuously evolved, enabling the synthesis of complex molecules and contributing to various scientific and technological advancements. Looking ahead, the prospects of modern organic chemistry are even more promising. With the integration of computational methods, sustainable practices, and interdisciplinary collaborations, organic chemists are poised to expand the frontiers of knowledge and develop innovative solutions to the complex challenges of the future. The future of organic chemistry is bright, and it holds great potential for benefiting society and shaping the world we live in.

References

1. Albert Bandura, Richard Walters. Teenage aggression. Studying of influence of education and family relations. Publishing house: Eksmo-Press, Aprel-Press ISBN: 5-04-004214-0 Year of the edition:-2000
2. Abraham Harold Masloou. Motivation and Personality. Year of the edition: 2011
3. V A Smit, A D Dilman Osnovy Sovremennogo Organicheskogo Sinteza (Fundamentals of Modern Organic Synthesis) (3rd Ed.) (Moscow: Binom. Laboratoriya Znanii, 2014
4. H C Kolb, M G Finn, K B Sharpless Angew. Chem., Int. Ed. 40 2004 (2001)
5. Karl Rogers, Jerome Freyberg. Freedom to study. ISBN: 5-89357-099-5, 0-02- 403121-6. Year of the edition: 2002