



OPPORTUNITIES AND WAYS TO IMPLEMENT THE HISTORICAL MATERIAL IN TEACHING ORGANIC CHEMISTRY

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Abstract

This article describes the lives of great chemical scientists in teaching organic chemistry, their contributions to chemistry, their research work, their chemical experiments and their achievements in this field.

Keywords: organic chemistry, historical material, theory of the structure of organic compounds, history of chemistry, chemical laboratory, extracurricular activities.

"In the transition from the study of inorganic substances to the study of organic substances, the chemist enters an entirely new field," he wrote in 1808. the famous Swedish chemist J.J. Berzelius, "since organic chemistry is a sharply different branch of science." He was the first to single out a special chapter "Organic Chemistry" in his five-volume Chemistry Textbook. Organic chemistry was originally called the chemistry of substances found in living organisms-plants and animals. For a long time it was believed that in order to produce complex carbon-containing compounds, some kind of "life force" is required, acting only in living matter. This opinion persisted until the German scientist F. Wehler synthesized urea from an inorganic salt (1828). This led to the need to change the definition of organic chemistry. Today, the term "organic chemistry" refers to the chemistry of over 18 million carbon compounds. Some of them have been isolated from plant and animal sources, but an immeasurably large number of them have been synthesized by organic chemists in laboratories [1, p. 112]. Organic chemistry is currently undergoing a period of rapid development. Whole classes of new substances, unusual in structure and properties, are being discovered; new and new compounds are being created for practical use in a wide variety of fields; the latest research methods based on the achievements of physics are being increasingly used; theoretical concepts are being deepened. All this leads to certain difficulties in the study of organic chemistry, when a huge amount of material needs to be placed within the framework of the curriculum, textbook pages.



The historical material on organic chemistry is particularly voluminous. The achievements of modern organic chemistry did not appear by themselves. This is the result of a long historical path of scientific development, scientific research, and the efforts of a huge number of researchers. Students should be introduced to the current state of scientific theories by using historical information in order to show how and when the relevant discoveries appeared. However, the correct use of historical material in the learning process does not consist in starting each stage of learning a new thing with the history, or even more so the prehistory of a particular discovery. In the course of the development of scientific theories, there were many mistakes, incorrect hypotheses and even theories from the point of view of modern science.

Butlerov's theory of the structure of organic compounds was preceded first by the theory of radicals (Gay-Lussac, 1815; Wehler and Liebig, 1832), and then by the theory of types (Gerard, 1848) and many other opinions and ideas. According to the theory of types, the various radicals forming a molecule do not possess two opposite charges; in this regard, the Gerard system was called a "unitary system" in contrast to the dualistic ideas of Berzelius, reflected in the theory of radicals. Gerard justified the fundamentally new doctrine of the molecule as a single integral system of atoms, thereby preparing good ground for Butlerov's theory. This is one of the many examples of the struggle to establish the truth, the priority of the discoverer, scientific success and dedication to your favorite cause. The history of organic chemistry includes a large number of facts, discoveries, exploits and numerous sacrifices. Here you can also add about 3,000 named reactions (like the reactions of Zinin, Kucherov, Wurtz, Konovalov, etc.), numerous laboratory utensils (like the flasks of Erlenmeyer, Wurtz, Soxlet apparatus, Tishchenko flask, etc.), names preserved in laws, theories, rules and methods (like the rules of Markovnikov, Popov, Eltekov, Zaitsev, Butlerov's theory of structure, Bayer stress theory, Zelinsky and Andrushev methods, the Meerwein-Ponidorff-Wehrlei reduction method, etc.), names preserved in formulas (such as the Heuorzs, Fischer, Kekule, Kolli formulas, etc.), names, fixed on substances (like Michler's ketone, "oil of Dutch chemists", etc.), names preserved on reagents (like Fehling liquid, Grignard reagent, etc.), names associated with individual things and phenomena (like Beckman rearrangement, Beilstein test, Schlenk equilibrium, Schiff bases, essential "pistol", "cooling finger", Dikman condensation, Wursterova /or Wursterova/ "red", etc.), names preserved on laboratory instruments and



accessories (such as the Buchner funnel, the Teclu burner, the Bunsen valve, etc.), names, related to chemical elements (such as Curium, Mendeleevium, Nobelium, etc.), etc. [3.18].

The life and scientific research work of dedicated scientists, inventors, innovators, researchers, naturalists and ordinary people devoted to science also provides considerable historical food. Local materials related to the history of science should also be added here.

The introduction of historical information and materials on organic chemistry is associated with certain difficulties: a) the limited educational process in time; b) the presence of a certain minimum content and volume of educational material in accordance with the requirements of state educational standards; c) poor awareness of the student with such information, i.e. poor professional training of the teacher; d) lack of scientific, popular science, scientific and methodological and educational literature, serving as a source such information; e) a strong manifestation of the processes of integration and differentiation in organic chemistry with related sciences; f) the multiplicity and diversity of properties of organic compounds, the excess of factual material and the breadth of the theoretical basis (excess information); g) insufficient study of the principles of historicism by the didactics of higher education; h) insufficient research into the history of the emergence and development of organic chemistry in the local region (Movarounnakher, Turkestan region, Central or Central Asia), etc.

In order to positively solve such problems, the following works must be carried out in stages: 1. Systematic introduction of historical materials into the content of general secondary, secondary vocational, vocational and higher education. 2. When creating curricula, textbooks, teaching aids and other components of the educational and methodological complex, significantly increase the share of historical material on organic chemistry. 3. To include a special course "History of Chemistry" in the curriculum of higher educational institutions training chemistry teachers, to create a curriculum and a textbook for this course. 4. To select, analyze and distribute historical materials for use during the lesson and for extracurricular activities.

Compared with lessons (lectures, practical classes, laboratory workshops, seminars, electives), extracurricular activities have great opportunities to use historical materials. Such jobs are divided into 2 groups: extracurricular and extracurricular activities. Special courses, educational (industrial or pedagogical) practice, term paper (course project), diploma (final qualification)



work, excursions, chemical clubs, theme evenings, scientific-theoretical or scientific-practical conferences, book readers' conference, Olympiads, chemical weeks and decades, chemical games, quizzes, club funny and resourceful, chemical societies, cinema demonstration- and videos, radio lectures, TV propaganda of chemical knowledge in the television center of an educational institution, oral journals, home experiments, theoretical and practical classes in student palaces and in flight camps -this is an incomplete list of individual, group and mass events where there is a huge potential for using, testing and discussing a large volume of historical materials on organic chemistry. If we consider that extracurricular activities are a direct continuation of the educational process, then they can be used with great effect to expand, deepen and strengthen knowledge of organic chemistry in all links of standardized types of education and for educational purposes[2,45].

The content of the modern organic chemistry course is very large in volume and quite complex. The basis for the successful assimilation of descriptive and additional, modern and historical materials is the correct and purposeful use of the opportunities of the lesson and extracurricular activities.

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