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**SPECIFIC APPROACH TO TEACHING ANALYTICAL CHEMISTRY
TO STUDENTS OF THE DIRECTION OF BIOLOGY**

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SPECIFIC APPROACH TO TEACHING ANALYTICAL CHEMISTRY TO STUDENTS OF THE DIRECTION OF BIOLOGY

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Abstract: *The organization of a system of orientation of your future biology teacher to independent work for the study of new material is the most important condition for the development of intellectual abilities in modern education. Creative independence in learning increases the chances of learning material, activates thinking, directs reading to be attentive and responsible. The introduction of elements in the description of creative and research, the study of natural objects in the development of chemical experience, analytical skills and abilities, carried out individually and in groups, contributes to the effective organization of independent work of students in audiences and the development of professional competence of a graduate of the Faculty of biology.*

Keywords: *biology, analytical chemistry, intellectuality, ability, Development, Opportunity, training, creative independence, biological processes, natural sciences, integration, audience.*

BIOLOGIYA YO 'NALISHI TALABALARIGA ANALITIK KIMYONI O'QITISHDA O 'ZIGA XOS YONDOSHISH

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Annotatsiya. *Bo'lg'usi biologiya o'qituvchising yangi materialni o'rganish uchun mustaqil ishlashga yo'naltirish tizimini tashkil etish zamonaviy ta'limda intellectual qobiliyatni rivojlantirishning eng muhim sharti hisoblanadi. O'qishdagi ijodiy mustaqillik materialni o'rganishda imkoniyatni oshiradi, fikrlashni faollashtiradi, o'qishga e'tiborli va mas'uliyatli bo'lishga yo'naltiradi. Ijodiy va ilmiy-tadqiqot tavsifidagi elementlarni kiritish, individual va guruhlarda amalga*

oshiriladigan kimyoviy tajriba, analitik ko'nikma va ko'nikmalarni rivojlantirishda tabiiy ob'ektlarni o'rganish talabalarning auditoriyalarda mustaqil ishlarini samarali tashkil etish va biologiya fakulteti bitiruvchisining kasbiy vakolatlarini rivojlantirishga yordam beradi.

Kalit soʻzlar: biologiya, analitik kimyo, intellektuallik, qobiliyat, rivojlanish, imkoniyat, mashgʻulot, ijodiy mustaqillak, biologik jarayonlar, tabiiy fanlar, integratsiya, auditoriya.

СПЕЦИФИЧЕСКИЙ ПОДХОД К ПРЕПОДАВАНИЮ АНАЛИТИЧЕСКОЙ ХИМИИ СТУДЕНТАМ - БИОЛОГАМ

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Аннотация. Для будущего учителя биологии организация системы ориентации на самостоятельную работу по изучению нового материала является важнейшим условием развития интеллектуальных способностей в современном образовании. Творческая самостоятельность в чтении увеличивает шансы на усвоение материала, активизирует мышление, направляет внимание и ответственность за чтение. Включение элементов в творческую и исследовательскую характеристику, химические опыты, проводимые в индивидуальном и групповом порядке, изучение природных объектов в развитие аналитических умений и навыков, способствуют эффективной организации самостоятельной работы студентов в аудиториях и развитию профессиональных компетенций выпускника биологического факультета.

Ключевые слова: биология, аналитическая химия, интеллектуальность, способности, развитие, возможности, обучение, творческая независимость, биологические процессы, естественные науки, интеграция, аудитория.

INTRODUCTION

Currently, the educational process requires continuous improvement. The main

characteristics of a graduate of any educational institution are his skills and mobility. Therefore, in the study of academic subjects, emphasis is placed on the cognitive process, the effectiveness of which depends entirely on the student's cognitive activity. For example, in the teaching of analytical chemistry to biological students, attention is paid to the following topics. The subject of analytical chemistry, its goals and tasks. The importance of analytical chemistry in the development of natural sciences and national economy. The place and role of analytical chemistry in biology [3,4,5]. Qualitative and quantitative analysis of inorganic and organic substances. Chemical, physical and biological analysis methods. Analytical signal. Modern requirements for analytical methods: accuracy, reproducibility, selectivity, expressiveness, automation ability. The relationship between the object and the method of analysis. Analytical control in the service of nature protection, biology and medicine [6]. Analytical chemistry teaching has been considered important in the system of training biological teachers in the family educational institution of pedagogy [7]. Today, the importance of problems arising in the modern world, especially in connection with the impact on biological processes and environmental protection, is the task of training highly qualified teachers who can actively participate in the formation and development of the ecological culture of schoolchildren. This, in turn, shows that it is necessary to pay attention to the methods of researching chemical and biological objects [8]. Today, in connection with changes in biology curricula and programs for pedagogical universities, there is a need for a new methodological approach to teaching analytical chemistry, in addition to mastering educational materials. organization, and in this process, the task of changing students' learning-understanding (knowing) activities is becoming urgent. The problems of improving the teaching of analytical chemistry have been reviewed several times by the leading teachers and scientists of our time and suggestions have been made [1].

MATERIALS AND METHODS

The system of teaching analytical chemistry has been established for a long

time and has not changed much recently [2,3]. At present, there is a significant difference between the scientific level of analytical chemistry and the level of industrial chemical-analytical control and the nature of teaching analytical chemistry in higher educational institutions. The traditional teaching of analytical chemistry involves teaching the theoretical foundations of this science. It is based on learning, understanding the mechanisms of physical and physico-chemical processes, and mastering the general methodology of working with literature. Therefore, the training programs for teaching analytical chemistry should be adapted to the level of development of analytical science and the needs of modern society. It is necessary to try to ride [4,5]. All this allows us to master new analysis methods and tools for various objects during our further activities. However, over time, the objects of chemical analysis change, biological, medical, food and environmental objects come to the fore [9,10]. Analytical chemistry textbooks should include the analysis of not only bioinorganic, but also bioorganic objects and even more so biological processes. General and Inorganic Chemistry will help biologists to study this subject in depth, the knowledge obtained in the study of "Organic" academic subjects will be needed. Chemistry, physical chemistry, content of the academic subject "Analytical chemistry" for the further study of the academic subjects of the chemical block - "Methodology of teaching chemistry", "Biological chemistry", as well as the subjects of the biological block by establishing interdisciplinary connections serves as a basis [11,12].

At Chirchik State Pedagogical University 60110900, a total of 150 hours are allocated to study the subject of "Analytical Chemistry" for the "Biology" specialty, of which 60 hours are classroom hours (30 hours are lectures, 30 hours are laboratory classes). The recommended form of current attestation is an exam.

RESULTS AND DISCUSSION

In order to study and better understand the specifics of analytical chemistry for the specialty "Biology" of pedagogic universities, it can be shown that the time allocated for the study of this subject is too small, it does not give the expected result,

because biological processes are covered by other subjects This time is not enough to learn in integration with [13]. Because it is appropriate to mention that in the universities of the world more time is allocated for this. Analytical chemistry study for all majors is designed for 322 hours, of which 190 hours are classroom: 40 hours of lectures, 30 hours of seminars, 20 hours of practical and 100 hours of laboratory training. There are also planned coursework, and this is the time devoted only to the study of chemical analysis methods (titration and gravimetric) and basic topics devoted to chemical and electrochemical equilibria in homogeneous and heterogeneous systems [14]. Also, half an academic year has been allocated to study the methods of physical and chemical analysis!

Differences between the main curricula, in addition to their size, the ratio of laboratory work, seminars and practical training to lectures in a classical university has increased dramatically [15]. After all, the time allocated for lectures in the teacher training university program is more than in the classical university. This once again confirms our opinion about the need for new methodological approaches in the teaching of analytical chemistry, in which seminars and practical exercises, as well as increasing the role of laboratory work [16]. The topics of practical and seminar training must necessarily include a detailed review of the most important theoretical rules, solving computational problems and summarizing the results of laboratory work, in which more attention should be paid to the student's creative activity [17].

Many teachers have traditionally believed that as a result of studying science, students should master general analytical methods, and have not paid attention to the methods that play the biggest role now [18]. Therefore, the study of analytical chemistry should be done according to the profile of the university. For example, I believe that students of higher educational institutions of pedagogy majoring in "Biology" should, in our opinion, pay more attention to biological processes occurring in living organisms [19]. In addition, in the process of studying analytical chemistry, competences such as the ability to apply special knowledge in the fundamental sections of chemistry, biochemistry, bioorganic chemistry and mathematics to master physical, hydrochemical, biochemical, microbiological

processes begin to form [20].

In our opinion, even in the universities of natural sciences, the main law of analytical chemistry, the characteristics of the processes in the organism, should pay attention to the buffer systems of the pH value.

At the same time, compulsory focus on the study of physical, hydro chemical, biochemical, microbiological processes at the university is not in accordance with the plan, because their study is intended at the next stages. Also, there is no need to study some issues of mathematics and physics (statistics, optics, structure of matter) at the university to the extent that they were previously studied in separate courses.

In the study of analytical chemistry in all higher educational institutions, students should be given a special place in their educational and research work, and they should be given a specific creative task - to identify an unknown substance and determine the amount of one or another component in it, participation in biological processes. task should be set. Such determinations are carried out involving not only chemical, but also physico-chemical methods of analysis. Perhaps, in order to more fully demonstrate the practical value of all the methods of analysis studied, students are allowed to conduct research with soil samples, ready-made food products (bread, juices, flour, meat, etc.) to study the essence of biological processes. should be created. Such definitions are carried out involving not only chemical, but also physico-chemical methods of analysis. While doing such work, students learn to master the culture of thinking, have the ability to generalize, analyze, perceive information, set a goal and choose ways to achieve it, logically and logically build oral and written speech, y develop their intellectual abilities, which is very important for the future teacher. For example, when performing any analytical task, the student must give a detailed description of the biological object under analysis, choose the right solvent, choose the dissolution conditions, study the properties of the resulting solution and, on this basis, determine the possible composition of the sample and its it is necessary to choose the method of analysis.

The education standards of the next generation give universities a great deal of freedom in formulating their academic plans. The choice of directions and methods

included in analytical chemistry should be determined mainly according to the profile of the university. Nevertheless, in all cases it is necessary to review sampling methods, processing of analysis results, use of mathematical statistics and computerization of analysis [4].

The study of analytical chemistry by students of natural sciences represents an important stage of their preparation in chemistry. Because students understand topics such as the theory of solutions, chemical equilibrium, chemical kinetics, the chemical basis of life, the role of solutions in biological processes by mastering analytical chemistry, preparing solutions of given concentrations in laboratory sessions, choosing the conditions of analysis and constructing titration curves. They will enrich their knowledge that the final results of the analysis are influenced by the form of finding the analyzed substance in the studied object, the methods of transferring it to the solution, the processes in the solution and other factors.

Therefore, the detailed study of such issues as the progress of ion exchange and hydrolysis processes, the conditions for the formation and dissolution of precipitates, the effect of one or another organic reagent, is of crucial importance for students of biology majors in the study of analytical chemistry. Future biology teachers can better explain these issues to their students by relating them to biological processes. In this case, the use of educational cases in analytical chemistry will make training more effective.

When teaching analytical chemistry to students, it should be noted that analytical chemistry has been the foundation of all chemical sciences for a long time, in fact, until the beginning of the 19th century. His methods (gravimetric, titrimetric, qualitative analysis) became the basis for the discovery of the law of existing masses, the constancy of composition and the law of multiple relations. Undoubtedly, at the current stage, analytical chemistry itself already uses the laws and principles of other sciences, it is closely related to mathematics, physics, biology, but on the basis of this knowledge, new methods of analysis, methods of signal registration are being created, many substances composition and structure are being studied. On the other hand, analytical chemistry provides many sciences with tools and methods, which

have a significant impact on the progress of these sciences [5]. In addition, it plays a key role in the study and analysis of biological processes.

CONCLUSION

Based on the analysis of the problems and development trends of higher chemical pedagogical education, the importance of analytical chemistry in the training of future teachers, a conclusion was drawn on the need to use new scientific and methodological approaches in teaching analytical chemistry. At the same time, there is a conflict between the level of development of these issues in pedagogy and methodology and the need to modernize analytical chemistry teaching, which requires the development of a qualitatively new concept of modernizing analytical chemistry teaching at a pedagogical university.

Based on the analysis of the results of the pedagogical experience, it is shown that it implements the main ideas and regulations of the analytical-methodological foundations, provides for the effective achievement of the integrative goals carried out by strengthening the interaction of students on creative mastery, allocates the specified hours Analytical chemistry provided in the composition of the second generation. The system not only creates conditions for the formation of values-knowledge related to chemical analysis (knowledge, skills, powers), but also values-tools, values-attitudes, values-qualities. makes a significant contribution to the formation of the information culture of the teacher, in particular, formed.

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