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METHODOLOGY FOR USING INDIVIDUAL AND DIFFERENTIAL METHODS OF TEACHING STUDENTS TO SOLVING CHEMICAL PROBLEMS

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Abstract: In the article, the method of using individual and differential methods of teaching students to solve chemical problems is given in order to improve the alacrity of future chemistry teachers for their practical activities under the 4+2 program.

Also, methodical recommendations have been developed for taking into account the level of knowledge of students when composing chemical problems, and developing non-standard tasks.

Keywords: differential (differentiated) approach, individual approach, skill, competence, issues.

The 21st century is recognized by the world community as the world of knowledge, and in particular, great work is being done in our country to train mature and well-rounded individuals.

The content and essence of education is determined by the level of material and cultural development of society. Depending on social relations, the need for general information, professional training of people, and pedagogical ideas about education, the nature, method, and organizational forms of education have changed at different stages of the development of human society [1].

Today, there are general education, separate (individual) education, organizational education, classroom education, course system education and other types of education organization. In the current conditions, education is being improved more and more in accordance with social requirements, opportunities and

needs of students, and new methods and forms are being developed. For this, a young teacher needs strong knowledge and methodical training [2].

However, when the teacher is simultaneously working with all the students of the class, he will focus on the student who has an average knowledge. In such a system of education, the growth of knowledge of some students slows down, and for other students, insurmountable difficulties will arise. Therefore, the onus of a teacher is knowing the potential of each student. During the lesson, the teacher learns the features of each student's inclination, capacity, interest, memory and thinking skills.

Differential (differentiated) approach is a system of managing students' cognitive activities that takes into consideration individual characteristics of students, as well as the main characteristics of certain groups.

Differential teaching is an educational process that involves managing the student's cognitive activity in this system. The individual approach to education means the system of managing the student's cognitive activity, taking into account the individual psychological characteristics of each student. Accordingly, the organization of training is called individualized training [3].

Considering the categories of singularity, particularity and generality of philosophy, the fact that dialectics has a spiral nature, the uniqueness of the growth and development aspects of each living individual, and the fact that the individuals who make up the group of students cannot be compared to chicks in an incubator. It becomes clear how important the differentiated approach is in teaching process . It is a natural process for a chemistry teacher to make his students being engrossed in different levels of independent work, taking into account the mental and physical capabilities of his students. The sole purpose and attention should be paid to the types and forms.

When the teacher makes the optimal choice of teaching methods in practice, he should not forget the characteristics of the reading and learning activities of students with different learning abilities of the same age group. They are underestimating the value of aspects such as the ability to distinguish and differentiate the most vital

features in the subject, thinking independently, planning, and self-control. After that, a glance to that situation is enough to make it clear that their reading, writing, and calculation pace will be extremely low. They often have a negative attitude towards studying, even though, sometimes, they do not have a distinct study discipline.

Such students are more interested in practical training than theoretical training. Experienced pedagogues use this opportunity to involve them in practical work. For this, it is necessary to actively manage their educational activities, provide them with comprehensive support in explaining new material, slow down the pace of explanation in difficult areas of the subject, and encourage students to ask questions when there are difficulties in mastering.

It is useful to differentiate the support given to free learners in completing the same task that is given to most students in the class. The types of such support can be very diverse. For example, when solving exercises, tests and problems, showing the way to solve problems by "dividing into parts", "dividing into proportions", etc. For self-monitoring, he should be relied upon to answer, ask thoughtful questions, point out mistakes, or encourage the correctness of the initial steps in solving the problem. It is necessary to show the rule, to give a plan of initial actions in the problem, to show similar ones, and to allow familiarization with the solution of a similar problem.

When it comes to working with well-prepared students, it is necessary to increase the amount of exercises in the lesson, give them a larger number of problems and exercises or more complex tasks to complete in a certain time, and widely use research methods and independent work methods.

Differentiated approach preparation requires simultaneous attention to the better group of students. Individual homework for the development of abilities in a certain area now has a different meaning in terms of content: for independent work on issues, these individual assignments involve independent reading of the materials given under the special entry "for additional reading" in the textbook. .

It is appropriate to recommend such students to read understandable scientific and popular literature news; Tasks of the type "Solve this problem in two ways",

"Structure the problem independently" are especially valuable for them.

It is also useful to entrust the student's classmate with additional training aimed at eliminating the lack of knowledge on a certain subject. This position of the student who is providing help is a very effective means of activating the study for both the lazy mastering student and the successful student.

Differential tasks are important for students to learn how to solve problems in chemistry. They are divided into three dynamic groups in teaching according to the differences in individual characteristics of students - students with low, average and high knowledge (respectively I, II and III groups).T. According to V. Cheremukhina, the composition of the group changes during the teaching process, but the only task before the teacher is to use each student's maximum potential at the same stage of education. is to encourage.

He describes the three dynamic groups as follows.

Group I unites students who do not have even the simplest analytical skills, who cannot think chemically, who cannot logically connect the internal structure of a substance with its chemical and physical properties. They cannot solve the problem given for the class, because its content and methods of execution seem incomprehensible to the students of this group.

Group II unites students who have the ability to think and act reproductively in solving a given chemical problem. The main method in their work is to rely on previous experience: there is a desire to use it as a template in a new situation.

Group III includes students who are distinguished by their creative approach to the given problem of knowledge. They are characterized by a high level of activity and versatility in acquiring and performing problem options, showing a high level of activity in finding the most effective way to solve given chemical problems.

The students of this group have the ability to perceive the material in a wide and deep way compared to the students of the I and II groups.

To approach the given issue as much as possible - in order to impart new knowledge in the lesson, it is necessary to know what kind of group the class is, what

is the level of intellectual development of some groups of students, and how their levels of knowledge, learning, skills and qualifications are formed.

It is advisable to combine mass, group and individual work in all organizational forms of the chemical education process.

The use of specially developed didactic materials in the process of chemistry education and during the independent work of students is of great importance. This complex is aimed at differentiating education depending on the individual and psychological characteristics of students, and the ability of students to learn is different. It was developed taking into account the different levels of development and readiness to understand and explain knowledge.

In the first stage of training, students of the independent working group I are given simplified assignments to apply only vaguely generalized knowledge. Pupils of the II group are given tasks of average complexity on the analysis of the knowledge gained in the previous lesson and new material.

Group III is given complicated tasks to generalize and distinguish the main nes. For students of level I: Problem: Calculate the number of molecules in 25 g of Bertolle's salt. Solving. Method 1. According to the formula, the number of molecules in

Bertolle salt is as follows;

Method 2. Using the molar mass of Bertolle's salt as 122.5 g/mol, we make the following proportion:

There are $6.02 \cdot 10^{23}$ molecules in 122.5 g of $KClO_3$ There are x molecules in 25 g of $KClO_3$

$122.5 : 6.02 \cdot 10^{23} = 25 : X$

For II level students

Find the concentration (%) of the solution formed by dissolving 50 g of copper sulfate in 275 g of water.

Solution: we find the total mass of the solution $m(solution)=m(H_2O)+m(CuSO_4 \cdot 5H_2O)=275+50=325$

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we find the mass of the pure salt contained in the cup of copper

50 gr --------x gr

$CuSO_4 \cdot 5H_2O \rightarrow CuSO_4 + 5H_2O$

250 g ----------160 g

x=32 g

we find the percentage concentration of the pure salt in the solution $\omega(CuSO_4)$= =0.0985 or 9.85%

For students of level III: Problem: When 500 g of 8% $CuSO_4$ solution was electrolyzed, 25.2 l of gas was released at the anode (inert electrode). Determine the mass fraction (%) of the substance in the solution after electrolysis.

Solution:

1) Determine the mass of $CuSO_4$ in the solution; $m(CuSO_4)=500\times8\%=40$ g

2) Using the electrolysis process, we determine the volume of gas formed when 40 g of $CuSO_4$ undergoes electrolysis;

$2CuSO_4+2H_2O+ 2Cu+2H_2SO4+O_2\uparrow$

320 g 22.4 l 40 g x l x=2.8 l It is also appropriate to use questions that guide students to competence:

Problem 1: Find the mass of one molecule of ozone and 2 atoms of argon.

Problem 2: If the mass of a molecule is 44 m.a.b. If it is equal to, find the mass of its molecules in the amount of 1 mole.

Problem 3: How many moles are 22 g of CO_2 and how many molecules are there?

Problem 4: Calculate the density of toluene (g/ml) if $25.3\cdot10^{22}$ toluene and $15.05\cdot10^{23}$ water molecules are used to fill two flasks of equal volume, one with toluene and the other with water.

Problem 5: If the ratio of salt molecules to water molecules is 1:7 in magnesium sulfate crystalline hydrate with a mass of 615 g, find the number of oxygen atoms in it.

Problem 6: How many moles is an aluminum teaspoon weighing 13.5 g?

Problem 7: If the mass fraction of copper in 70 g of an alloy consisting of copper and gold is 80%, how many grams of gold will turn into an alloy containing Cu_3Au when added to it?

Problem 8: After the water of crystallization contained in 2.5 g of crystal hydrate of soda is removed, 0.926 g of dehydrated soda remains. Calculate the mass fraction (%) of the water of crystallization in the soda and find the crystal hydrate formula.

In conclusion, it is very necessary to organize the process of independent learning of students and use it appropriately to serve as a strong factor in improving the educational process. The inorganic and organic chemistry section of the chemistry subject is distinguished by the volume and content of the educational materials, didactic variety, and complexity in terms of mastering. Problems of organizing independent educational activities, its methodological and general pedagogical aspects has been sufficiently studied as an object and subject of many studies. But the part of this issue related to the study of inorganic and organic chemistry is almost not worked out. In order to eliminate the deficiency in this regard, the role of student problem-solving in the processes related to the formation of theoretical knowledge, practical skills and competences in chemistry education and its importance in educational practice was determined. In class and at home the form and content of solving the problems, essence and pedagogical coverage were scientifically and methodically determined, evaluated and recommended for implementation in educational practice in the example of teaching inorganic and organic chemistry for general secondary schools and academic lyceums. General- pedagogical and special-chemical aspects of students' individual and differential approaches to solving chemistry problems were studied and the necessary recommendations were given in this regard.

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