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IMPROVING METHODOLOGICAL PREPARATION OF FUTURE CHEMISTRY TEACHERS IN THE PRACTICE PROCESS

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Abstract:

In the article, the students of the 10-11th grade of general secondary schools, who are studying in the field of chemistry of the higher educational institutions of pedagogy, i.e., the future chemistry teachers, are taught chemical knowledge Methodological recommendations are given to increase students' interest in chemistry through interdisciplinary integration in teaching, chemical calculations, and competency-based knowledge.

Keywords: Integration, differentiated education, individualized education, 4+2 practice, "Brainstorming", "Magic bag", honey, methane, air, "wolf foam", hydrocarbons

Today, in general education institutions, paying attention to the following tasks for the formation and development of students' chemical knowledge there are some aspects that are needed. For example, taking into account the interests, inclinations and needs of students, building individual educational directions, creating a system of extracurricular activities and additional educational services, improving the material and technical base of general education institutions, and making this process scientific- Methodologically, providing the best literature and pedagogues serves to increase the quality of school lessons. For this purpose, today 4+2 practice occupies an important place in the teacher training system. It is a link that connects students' 4-day theoretical knowledge acquired in higher educational institutions with independent activities implemented in 2-day practice. Successful completion of 4+2 practice at school by students of higher educational institutions depends on a number of conditions. In this regard, the training they received during their studies at higher educational institutions is extremely important. However, most of the qualities of the teaching profession are formed in students only during the 4+2 internship period at school.

In our research, during the 4+2 practice of chemistry education students of the higher educational institution of pedagogy, the most problematic situations were the 10-11th grade chemistry classes. Because in this period, students are considered to have determined their specific goals and directions. But they have no idea that we need chemistry at every step. Therefore, in our research work, we recommend non-traditional approaches to teaching the 10-11th grade chemistry course.

In teaching the 10-11th grade chemistry course, we need to implement a differentiated and individualized approach in exactly 2 ways:

1. Dividing the educational materials into parts, the minimum and maximum volume of the educational material that students should master in each part, the knowledge and skills of the students must know the minimum and maximum requirements;
2. Compilation of educational tasks of different levels of difficulty on certain topics;
3. It is necessary to acquire the skills of organizing and managing the work of students in small groups of different levels.

Differentiated education takes into account the individual characteristics, abilities, interests, and needs of each student. Therefore, differentiation of teaching requires individualized education.

Individualized education is a form of education, a model of the organization of the educational process, which is characterized by the following features:

1. The teacher works with each student individually;
2. Each student performs educational tasks tailored to his personal characteristics, abilities, interests, and needs, that is, he works individually with teaching tools (textbook, visual and didactic materials, computer) .

We aimed to train competitive personnel in the future by effectively using the 4+2 practice in teaching the 10-11th grade chemistry course of a general secondary school, and developed and tested the following methodological recommendations for students:

Organization of lessons based on students' wishes:

When it comes to chemistry, first of all, all students imagine processes such as chemical reactions and explosions. However, schools do not have enough opportunities to carry out such experiments. In this case, the future teacher will have achieved his goal if he can fulfill the wishes of the students using local raw materials.

Enriching 10-11th grade chemistry lessons with interesting information about chemicals used in everyday life:

During the chemistry lessons, it is necessary to attract the attention of the students to the lesson by asking interesting chemical questions about the chemical compounds that are used the most in daily life and teach them to be interested in chemistry. It is possible to use chemical cases, problem-based questions, "Magic bag" and "Rolling snow pile" and other interactive methods or various interesting and problematic questions that often occur in our lives to make students think. In a chemical case, the sum of information can be given in the form of a sentence made up of words, or in a poetic way. In order to pass chemistry lessons in an interesting way, I would like to suggest methods such as case questions, problem-based questions, "Brainstorming", "Magic bag" and "Rolling snow pile" along with performing interesting experiments during the lessons.

Fun Food Inks

Necessary equipment and reagents: Optionally use the following liquids: milk, lemon juice, apple juice, concentrated sugar solution, onion juice, cotton Procedure: Write the word cotton on a piece of paper. After the writing is dry, heat this sheet with an iron for a few minutes. What happens to the record? Explain the observations

"Burning Foam"

Required equipment and reagents: crystallizer, liquid gel, propane, matches

How it works: The crystallizer is filled halfway with water, foam is created through dishwashing gel, and the propane gas used to fill the lighter is pressed into the water and the foam is carefully ignited.

Enriching 10-11th grade chemistry lessons with interesting information about the experiences of chemical scientists:

Question: In two face-to-face contests of world-famous chemists, organic chemists won each time. Who are we talking about?

Answer: In 1882, D.I. Mendeleev, who became world famous for discovering the periodic law, ran for election to the Russian Academy of Sciences. His rival was ordinary organic chemist F. Beilstein. Due to the lack of one vote in the secret ballot, D. I. Mendeleev could not become an academician. in 1906 in chemistry D. I. Mendeleev and the French organic chemist A. Moissan, who was the first to obtain fluorine, and 20 years younger than him, claim the Nobel Prize. 5 people vote secretly for Moissan, 4 people vote for Mendeleev, and 1 person abstains. D. I. Mendeleev, known to the world for the discovery of the periodic law, lived without being awarded the most prestigious laureate either in his homeland or in the world.

Case 1

Case report: Bread is considered to be the most basic food item that a person consumes, and he eats an average of 15 tons of bread throughout his life. According to scientists' research, people started eating bread and flour products 15 thousand years ago. The Egyptians, Greeks and Romans learned to cook the first bread made from dough 5-6 thousand years ago. Bread satisfies the requirement of half of the carbohydrates, one third of protein, and B group vitamins. It contains a lot of phosphorus salts and iron.

Case question:

1. Why is bread so delicious?
2. What chemical processes occur during bread chewing?

Case solution: The process of kneading the dough is very important for the sweet taste of the bread. Yeasted dough is made in two ways.

1. Alcohol fermentation is observed more often in dough made from wheat flour.
2. Lactic acid fermentation is observed in the dough made from barley flour.

That is why the longer the bread is chewed, the sweeter it tastes.

Case 2

Case text: Cucumber is the most watery vegetable and is considered one of the most useful blessings for the human body. More than 90 percent of the composition of cucumber is water. Cucumber contains substances such as potassium, calcium, sodium, magnesium, iron, starch, sugar, protein, fiber, organic acids, essential oil, a number of drugs, phosphorus, iodine, sulfur, tin, copper, fluorine.

Also, cucumber normalizes the activity of the digestive glands and the secretion of saliva, and ensures better assimilation of protein. Therefore, juicy pieces of cucumber not only make food beautiful and tasty, but also improve digestion. Cucumber reduces blood cholesterol and strengthens kidney health. Regular consumption reduces the risk of cancer.

Case question: Why do some cucumbers grow crooked?

Case solution: Cucumbers grow crooked like peppers if there is a lack of nitrogen in the plant body. This usually happens at the end of summer, when the amount of elements necessary for the growth of plants in the soil decreases.

Assignment:

1. Write the formulas of salts known as mineral nitrogen fertilizers. 2. Tell about the biological role of nitrogen in plant life.

Case 3

Case text Air and its composition.

That air is a mixture, it contains: CO_2 --- Joseph Breck

That there is N_2 --- Rutherford

The presence of O_2 was discovered by --- Lavoisier. Volumetric composition of air: $ph(N_2)=78\%$, $ph(O_2)=21\%$, $ph(CO_2)=0.03\%$, $ph(Ar)=0.93\%$

Mass fraction composition of air: $\omega(N_2)=75\%$, $\omega(O_2) = 23\%$

Based on these, the air formula can be expressed as: Air = $0.21\%O_2 + 0.78\%N_2$.

$M(air)\ 0.21 \cdot 32 + 0.78 \cdot 28 = 28.8 = 29$ g/mol

Case questions

1. Knowing the composition of air, explain the importance of its nitrogen content in the metabolism of substances in nature.
2. Can the composition of the air change depending on the topography of the place?
3. Think about what chemical and biological processes occur in living organisms in the presence of oxygen in the air, and what accelerates or slows down these processes?

Case 4

Case text. When this metal was discovered in 1783, it was named after a word meaning "wolf's mouth or wolf's foam", and it was thought to be a harmful additive in ores, and for 100 years this metal was not used anywhere. Today, we often come across this metal in the process of lighting our homes.

Case assignment:

1. What metal is this metal?
2. Why was this metal thought to be a harmful additive in ores?
3. Why was this metal not used at all for 100 years after its discovery?
4. Why is there no light in our house without this metal?

Case solution:

1. The metal that gives these meanings is tungsten.
2. Because the tungsten compounds ate the tin in the tin ore like a wolf ate a sheep, that is, the amount of tin that should be released in the ore was sharply reduced.
3. In those years, people did not know the physical and chemical properties of tungsten, they thought it was unnecessary.
4. Currently, the incandescent coil of all electric lamps is made of tungsten. Tungsten is the light that illuminates our home.

Organization of chemistry classes using a number of new advanced pedagogical technologies

Brainstorming method

With the help of this method, it is possible to increase students' knowledge by asking interesting and thought-provoking questions, connecting chemistry with other subjects. In the process of finding answers to these questions, students think chemically, write the necessary chemical reaction equations and formulas, as a result, chemical knowledge is further strengthened.

1. Why does the egg yolk turn gray during long cooking?

Answer: The reason for this phenomenon is that the egg yolk contains a large amount of iron ions. Prolonged heat treatment causes some egg proteins to break down, resulting in the release of hydrogen sulfide. A small amount of hydrogen sulfide is sufficient to form gray-black iron sulfide compounds.

Task: Write the formulas and names of amino acids found in proteins.

2. It is known that when a person falls asleep, he yawns. But there is also an effect of the seasons on the yawning process of people. For example, people yawn more in cold winter than in summer. Why do people yawn a lot in winter?

Answer: Oxygen is scarce in cold winter air, blood thickens, blood flow slows down, and the load on the heart and blood vessels increases. Therefore, headaches and yawning processes due to fatigue, vasospasm are observed more often.

3. There is a gas that we use in our daily life, if it is mixed with water in a pipe, the water in this pipe freezes at +20 0C. This is because this gas lowers the internal pressure of water. As a result, the freezing temperature of water decreases. What gas could it be?

Answer: methane gas (CH_4)

4. Currently, many different containers, plastic bags and other different products are made from synthetic polymer materials. But after they are used, they do not decompose in the waste for more than 100 years and have a negative impact on the environment. Therefore, today, in several countries, synthetic polymer materials are being replaced by artificial ones, i.e. materials containing cellulose. What is the main reason for this?

Answer: The reason is that cellulose quickly rots and turns into fertilizer

5. A mausoleum was built 500 years ago in the north of the island of Sri Lanka. Not a single brick has been moved yet. As a result of the investigations, it became clear that the building of this brick was not made of ordinary clay or cement, but of an expensive product. What are the building bricks made of?

Answer: honey

Task: what are the organic compounds in the composition of honey, write their chemical formulas.

Problem situation method

Problem 1

Said and Aziz lived in the same village. They were dear friends. Saeed used to call Aziz to school every day, but Aziz poured water on his father's car and occupied Saeed's time, as a result of which he was late for school and was reprimanded by his teacher. Said did not like this situation. He did not want his friend to be upset when he said that he would leave without calling Aziz to school. But he did not understand the reason of his friend's actions, because Said's father had a car like Aziz's father, but Said did not remember that he ever poured water on it.

Questions:

1. What is the problem?
2. What is the chemical process here? How would you describe this process?
3. Explain this with complete chemical processes, write their chemical formulas.

2-Troublesome situation

One day, after a long conversation with his friends, Mendeleev said that he could easily collect tobacco smoke in an empty jar for a little fun. Then, while his friend Repin smokes a cigarette and blows tobacco smoke into the air, he covers the mouth of the empty jar on the table with a glass plate. After some time, a miracle happened and the empty closed jar was filled with white "tobacco smoke". Then Mendeleev suggested to his friend Repin to smell it. As soon as Repin smelled the smoke from the tank in disbelief, he quickly ran away from the tank and began to cough violently.

Questions:

1. What did Mendeleev mean by tobacco smoke?
2. Do you also try this experiment and draw a conclusion?

"Magic bag" method

Each group is given one bag. The names of various hydrocarbons are mixed in these bags. Each group will have to separate the carbohydrates belonging to the bags given to them into appropriate groups. The group that separates the names of the most combinations and puts them in separate bags during the given time will be the winner.

Group 1	Group 2	Group 3
Saturated hydrocarbons	Unsaturated hydrocarbons	Aromatic hydrocarbons

If the educational process is organized using the above-recommended methods in the practice of 4+2, it will lead to students' deep mastery of chemistry, and as a result, the quality and efficiency of education will increase.

In conclusion, the effective organization of 4+2 practice in general secondary education and higher education institutions will improve students' readiness for professional and pedagogical activities in the future, by performing experiments that can be performed using local raw materials, chemical laboratories organization causes the organization of an effective teaching process.

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