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USE OF INNOVATIVE METHODS IN SCHOOL CHEMISTRY LESSONS

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Abstract
The article presents the importance of innovative methods and their importance, as well as some examples of methods of explaining the topic by making students interested by using one of the innovative methods, Case study, Problem question, Magic bag method, PISA tests, and asking interesting problem questions.

Keywords: innovation, case, PISA, problematic questions, magic bag, magic, aggregate state, chemical bond, borazot.

INTRODUCTION

Innovative technologies are innovations and changes in the pedagogical process and the activities of teachers and students, and interactive methods are mainly used in its implementation. Today, if we observe the educational process of several developed countries, the experience of using new interactive educational methods that guarantee the effectiveness of the educational process has proven to be effective. When translated from the English language, the word "interactive" means "inter" and "act" - act, and combines the meanings of acting together.

Today, in the educational system, the teaching process using interactive educational methods helps to make the educational process interesting and effective, and to fully achieve the intended goal of the educational process. In the entire educational process, it is desirable to integrate natural sciences with other sciences, that is, to connect them with each other.

The complexity of various tasks and problem questions given to students during lessons should be appropriate to the level of students. The development of problem-oriented and personality-oriented tasks suitable for each topic requires a lot of work from the teacher. If the tasks to be executed are very large, they cannot receive and solve all the information. After failure, students' interest in this topic fades. That is why students should be able to find solutions to these tasks.

LITERATURE ANALYSIS AND METHODS

Today, several of our chemical scientists have worked in this regard, including S.A. Nizamova's book "Using innovative methods in teaching chemistry" contains a

number of innovative methods for use in chemistry classes. In order to increase the effectiveness of education, and for young people to learn independently, educational institutions need well-trained teachers who know interactive methods in their field of study and apply them in their lessons. For this, it is necessary to arm all subject teachers with new pedagogical technology and interactive methods. Every teacher should work independently in the field of his subject, therefore, in the conditions of innovative technologies, effective methods and tools for chemistry teacher's teaching should be updated, certain changes should be made to the structural parts of methodical preparation, practical training and finding ways to use tools and equipment efficiently and effectively in performing experiments, creating recommendations for them, developing ways to use innovative technologies in teaching chemistry is one of the urgent problems of today. [1.5.]

DISCUSSION AND RESULTS

Below are some examples of innovative methods that can be used in chemistry classes and PISA tasks:

Case study method

Case 1

Case Statement: Generally we use diamond to cut window panes in different shapes. Because diamond is a very hard substance. One day, a craftsman used a diamond to cut a window pane, but it broke the window panes. Then the master got angry and wanted to check the diamond in his hand and discovered something.

Case question:

1. Do you know the composition of the window glass?
2. Why did the glass in the master's hand break?
3. What condition did the master find?

Case solution:

1. $Na_2O \cdot Al_2O_3 \cdot SiO_2$ colored glass is a polymer.
2. The reason for this is BN, not diamond, because BN has a higher stability than diamond, and its hardness is 11 on the Mohs scale. Because of this, he breaks the glass.
3. When the master put the diamond in his hand in a mixture of different acids, it melted. Then the craftsman found out that the diamond in his hands was not a diamond, but a diamond resistant to acid, and this was artificial diamond borazot (BN).

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Case 2

Case text Air and its composition.

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

That there is N_2 --- Rutherford

The presence of O_2 was discovered by --- Lavoisier.

Volume composition of air: φ (N_2)=78%, φ (O_2)=21%, φ (CO_2)=0.03%, φ (Ar)= 0.93%

Mass fraction composition of air: ω(N_2)=75%, ω(O_2) = 23%

Based on these, the formula of air can be expressed as: 1 Air = $0.21O_2$ + $0.78N_2$.

M(air) 0.21·32 + 0.78·28 = 28.8 =29 g/mol

Case questions

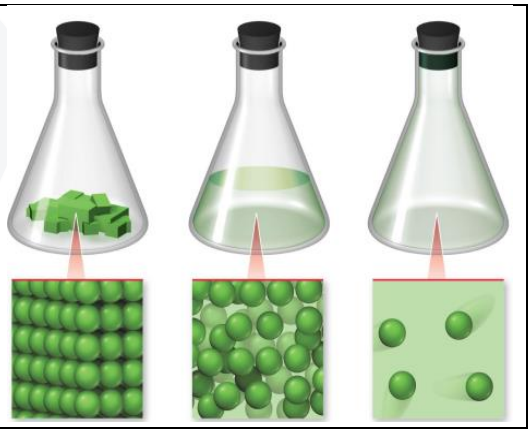
1. Knowing the composition of air, explain the importance of its nitrogen content in the metabolism of substances in nature.
2. Can the composition of the air change depending on the topography of the place?
3. What changes occur when we change the composition of the air?
4. What chemical and biological processes take place in living organisms in the presence of oxygen in the air?
5. What chemical and biological changes do you know that occur in nature with the presence of CO_2 in the air, and think about what accelerates or slows down these processes?

Case 3

Case text. It is known that all substances occur in nature in 3 different aggregate states: These are solid, liquid and gas states.

Case assignment:

1. Look at the picture and think about what kind of bonds can be between chemical compounds in these cases.
2. Describe the chemical and physical properties of each of them.



Case solution:

This picture shows substances in which metallic bonds, atomic bonds, molecular bonds, ionic bonds, and hydrogen bonds occur.

Case 4

Case report: Bread is considered the most basic food item that a person eats, and he eats an average of 15 tons of bread throughout his life. According to scientists' research, people started eating bread and flour products 15,000 years ago. The Egyptians, Greeks and Romans learned to bake the first dough bread 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, iron and starch.

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.

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

This liquid contains an antimicrobial protein called lysocin. Therefore, the women of Byzantium and Iran mix it with rose water and prepare an ointment. What kind of liquid is this?

Answer: tears

There is such a gas that, if it is mixed with water in a pipe, the water in the pipe freezes at $+20^{0}$ C. The reason is that this gas lowers the internal pressure of the water. As a result, the freezing temperature of water decreases. What gas could it be?

Answer: methane.[2.155]

“Magic bag” method

Each group is given one bag. These bags contain a mixture of well-soluble solutions, slightly soluble solutions, and virtually insoluble solutions. Each group will have to separate the groups of solutions given to them. The group that names the most compounds in the given time is the winner.

Group 1	Group 2	Group 3
Water-soluble solutions	Poorly soluble solutions	Practically insoluble solutions

In addition, PISA tests are the main way to improve natural literacy, and are effective methods when combined with modern innovative principles. Most importantly, PISA tasks are one of the most effective ways to teach science in schools, in secondary education, and in higher education. PISA tasks differ from other methods in that they can produce simple but complex results.[3.111]

PISA assignment

The photo below shows the sculptures called Caryatids, erected 2,500 years ago at the Acro in Athens. On the floor, these sculptures are made of marble rock. Marble is composed of calcium carbonate. In 1980, the original statues were replaced by copies and moved to the Acropolis Museum. The original statues were destroyed by acid rain.

Question. Normal rain is slightly acidic because it absorbs a certain amount of carbon dioxide from the air. Acid rain is more acidic than normal rain because it absorbs sulfur and nitrogen oxides in addition to carbon dioxide. Where do sulfur and nitrogen oxides come into the air?

Assessment criterion. To complete this task, students should know the physical properties of carbon dioxide, nitrogen and sulfur oxides from chemistry, including their solubility in water, and the release of such oxides into the atmosphere as transport and industrial emissions.

Emissions from cars, plants and factories, combustion of fossil fuels such as oil and coal, volcanic gases and other similar answers are fully acceptable (1 point). The correct answers may be:

- from the burning of coal and gas;
- oxides in the air in the environment of factories and other industrial enterprises occurs due to pollution;

- from volcanoes;
- from the smoke of power plants;
-If there is no answer or other answers are given, the answer is not accepted (0 points).
-they separate from plastic;
- they are naturally part of the air;
-coal and oil (the answer is incomplete, it does not mention "burning");
- nuclear power plants;
- industrial waste.

This question is aimed at evaluating the competence of students to scientifically explain phenomena.[4.65]

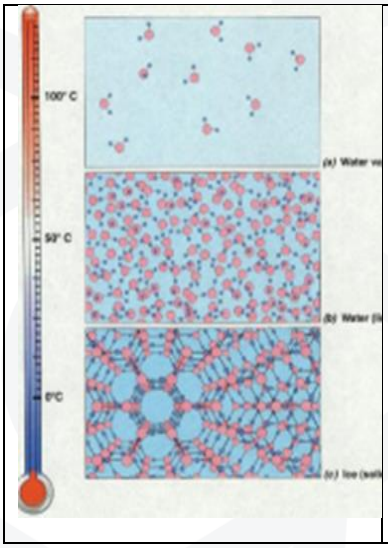
Problem question method

A tricky question

1. What salts do you know, can living organisms live without salt?
2. What are the effects of salts on living organisms (plants, animals, humans)?

Evaluation criterion: 0.9% solution of sodium chloride is considered a physiological solution in medicine and is used for washing blood, compensates for sodium deficiency in various pathological conditions of the body and temporarily increases the volume of fluid circulating in the veins. 0.9% sodium chloride solution is used as a base solution (solvent) for other drugs.

Problematic questions



Question 1 Look at the picture and think about what is depicted in it?

Question 2: What interactions can occur between molecules in these 3 different states?

Question 3 Think about what properties substances found in these 3 different states might have.

Question 4. Tell us about this characteristic of the chemical compound that occurs in these 3 different states in the cycle of substances in nature.

CONCLUSION

These problematic questions and methods are aimed at evaluating students' competence in scientific interpretation of information and evidence, and every student can easily start discussing these real-life examples when questions are asked using real-life examples from chemistry. Brainstorming and problem-solving methods used in chemistry classes not only make students interested in learning, but also form chemical knowledge, skills and abilities, and strengthen the knowledge acquired by students, as well as the ability to remember develops.

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