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CASE-STUDY METHOD FOR TEACHING GENERAL AND INORGANIC CHEMISTRY

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ABSTRACT

In recent years, active learning technologies and their elements have been widely introduced in the higher education system, such as design, information and communication technologies (ICT), technologies that develop critical thinking, and case-study methods. The following article discusses the methods used in chemistry lessons.

Keywords: design, ICT, critical thinking technologies, case study.

INTRODUCTION

Today, active learning technologies are used in higher education, including design, information and communication technologies, and critical thinking technologies. In this article, we will look at the use of case technology in detail. The word case is derived from the Latin word "spy", which means confused, similar (different phenomenon). In addition, the folder in which the study materials are collected is sometimes called a case technology.

A case is a collection of learning materials that formulate practical problems that require a collective or individual search for answers, which is to explain the problem situation on the basis of real facts. It is necessary to turn it into a situational task and then go with reflection and solution resources to go.

Any text (newspaper, magazine, internet and other materials.) Can be used as cases. Cases can be practical, educational (solving educational and pedagogical problems), research (to conduct research activities and to develop research competence). Case-method is designed to acquire knowledge on sciences and topics.

Requirements for cases: first, to raise a topical issue, discuss it and not have a single solution; second, the relevance of the text to the task at hand and the topic, because it is included in the topic; third, the availability of sufficient information to

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conduct analysis and find solutions to problem research; fourth, the lack of an author's assessment of the problem.

The purpose is to teach: - information analysis; - Divide them into varieties to perform the given task; - find more important problems; - selection and evaluation of alternative solutions; - selection of the optimal solution and formation of the program of action, etc.

In addition to these goals, there are additional effects in the application of situation analysis, in which the listener achieves: - acquires communicative skills; - develops the ability to work together effectively and interactively, which allows to make a team decision; - have the ability to act as an expert; - learn to read, to work independently on various problems; - analyze the situation; - Evaluate alternatives; - choose the optimal answer; - development of a plan to achieve a solution; - learns to work with information.

Stages of using cases.

1. Preparatory stage - questions for creating a case and its analysis; Preparation of methodical support for the planned training.

2. Introductory stage (the teacher organizes the work in the classroom, students get acquainted with the situation and its peculiarities);

3. Analytical phase. The purpose of the phase is to analyze the case in a group and develop a solution. Types of activities: - Separation of the main problem; - any proposal for its solution; - Analysis of the situation after the acceptance of this or that proposal.

4. The final stage (the teacher evaluates the students' contribution to the analysis of the situation, draws a general conclusion).

METHODS AND MATERIALS

1. Contradictions. Incident (from the Latin word insidens) - a situation, an unexpected event, a collision. It is an in-depth and detailed study of a real or imagined situation. The purpose of the method is to train the listeners to search for information in order to make a decision, to teach them to work with information, that is, to analyze it in a systematic way. As an example, consider the following situation.

2. Rol bajaraish metodi. To‘g‘ri sahna ko‘rinishida vaziyat tashkil etiladi, u keyin talabalar tomonidan baholanadi. “Vaziyat o‘ynalganda” qatnashchilar o‘z holat strategiyasini aniqlab, rejalashtirilgan natijani mustaqil rol o‘ynashadi. Bunday mashg‘ulotga misol qilib, «Metallarning umumiy xossalari. Qotishmalar. Metallar korroziyasi. Konstruksion materiallar» mavzusini misol keltirish mumkin. Bunda

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o‘qituvchi gazeta va jurnal bosh muharriri, talabalar esa muxbirlar sifatida ishtirok etadi.

3. The method of "group conversation". A simple conversation is moderated by a moderator. In group discussions, the general rules of communication are expressed by group participants in the following requirements: - avoid common words; - target; - Learn to listen; - Be active in conversation; - speak briefly; - only constructive criticism.

4. Game design method. The purpose of the method is the process of creating or improving objects.

When this technology is introduced, small groups are formed, with each group developing its own project. Game design can include different types of projects, for example: research, exploratory, creative, predictive, analytical.

RESULTS

Problematic situation ??? “Separation of mixtures of substances. Determination of mass fraction (%) ». In the course of modern human life, a large amount of household waste is generated. Waste from big cities stores a lot of valuable waste: aluminum (bottles of milk jars, tea foil, candy wrapping paper), tin (cans) and gold (invalid radio parts, lids of jars with gold water)). But in order to separate useful materials and substances, the city is generally not engaged in agriculture. This is because waste is a mixture of a large number of components. Extracting substances from it is very difficult and labor-intensive.

So far no simple and efficient way to recycle waste has been found. This is a work in progress, but some progress has already been made and some components are being identified. In our example, salt is given as sand, iron powder, polyethylene granules as waste, and the components of this mixture are given in pure form. Find a simple and effective method of separating this mixture. Calculate the mass fraction (%) of each substance in the mixture.

1. You are given a mixture of salt, sand, iron powder, wood shavings, waste modeling, as well as the components that make up this mixture. Find a simple and effective method of separating the mixture. Determine the mass fraction (%) of each component in the mixture. 2. Do you think it is possible to separate the mixture by other methods, if instead of wood chips, the mixture contains copper particles …

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Table 1

"Problem situation"

The type of problem in the situation	Causes of the problematic situation	Efforts to get out of the situation
Separation of mixtures of substances. Determination of mass fraction (%)	Using different methods. Use of different concentrations in the determination of the substance. Determination of mass fraction (%) of matter.	Use separation methods. Be able to use different concentrations. Determination of mass fraction (%) of a substance.

The mass fraction of a substance in a mixture is the number of percent of the mass of the substance from the total mass of the mixture (assumed to be 100% of the total mass).

$$\omega_{ar.k.} = \frac{m_{ar.k.}}{m_{aralashma}} \cdot 100\%.$$

Another type of concentration, the probe, is widely used to determine the amount of precious metals stored in their alloys. It indicates how many milligrams of this metal are in a thousand milligrams of an alloy. For example, "585-grade gold" is not pure gold, but an alloy of gold, silver and copper, which means that there are only 585 mg of gold per 1000 mg of alloy. If 73 g of gold, 12 g of silver, 10 g of palladium, 6 g of nickel and 13 g of copper were obtained to prepare the alloy, determine the Probe and find the mass fraction (%) of the substances in it..

Table 2

"Problem situation"

The type of problem in the situation	Causes of the problematic situation	Efforts to get out of the situation
Separation of mixtures of substances in the sample.	Investigate the composition of alloys. Use of different concentrations in the	Determining the percentage composition of alloys. Be able to use different concentrations.

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Determination of mass fraction (%).	determination of the substance. Determination of mass fraction (%) of matter	Determination of mass fraction (%) of a substance

Solution: $m(_{alloy}) = 73g + 12g + 10g + 6g + 13g = 114g$

$$\omega_{(gold)} = \frac{73g}{114g} \cdot 100\% = 64\%$$

Sample - 640

DISCUSSION

Examples of question cases offered to students.

1. Keys. One of the non-traditional energy sources?

The most abundant element in the universe is hydrogen. About 75% of the total mass of the universe is hydrogen, and more than 90% of the total atoms in it are hydrogen. Hydrogen does not occur in the free state on Earth, it forms almost all organic matter together with carbon, which is part of the Earth's living crust, the biosphere. The mass fraction of hydrogen in the Earth's crust, the lithosphere, is 0.88% of the total mass, meaning that hydrogen ranks ninth among all chemical elements. But it ranks third in the number of hydrogen atoms. Only in the upper layers of the atmosphere does molecular hydrogen occur free:

- Describe the hydrogen atom according to its basic position in the periodic table of elements?
- What isotopes of hydrogen do you know? -
- What substances does hydrogen interact with, write the reaction equations, name the reaction products?
- Describe the physical properties of hydrogen?
- What is the degree of oxidation of hydrogen when it interacts with metals and non-metals?
- Why is hydrogen practically free?
- Why is hydrogen called hydrogen?

2.Keys. The most widely used metal in the industry?

In 1825 a precious metal was obtained from the price of gold. It is the fourth most abundant element in nature and the first among metals. This metal makes up 8.7% of the total mass of the Earth's crust. In the twentieth century, it was the second

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most important after iron. It is the world's second largest producer of cast iron and steel. It consists of various pyrotechnic compounds: - What kind of metal are we talking about ?; -

What is the position of this metal in Mendeleev's periodic table ?;

What is the structure of this metal atom ?;

What physical properties does it have ?;

What chemical reactions does this substance undergo and what substances are formed? Write the possible reaction equations and name the reaction products?

The following: - why under normal conditions these metal products are resistant to environmental factors ?;

Why was this metal equated to gold by the end of the nineteenth century ?; -

Based on what properties is it used in the national economy ?; -

Why are these metal utensils called poor utensils?

3. Keys. A representative of the most commonly used alkalis in industry?

Sodium bicarbonate, caustic soda, sodium hydroxide. This is all the name of a single item. These colorless crystals are widely used in chemistry, textiles, soap making and many other industries. It is hygroscopic and dissolves well in water by releasing large amounts of heat. Causes severe burns to the skin, very dangerous to the eye: - what is the graphic formula of this substance ?; - what class of inorganic compounds does it belong to ?; - why is it also called hydroxide ?; - why is sodium hydroxide called alkaline, caustic soda? - how and why does an aqueous solution of this substance change the color of the indicator ?; - what types of reactions to sodium hydroxide are characterized ?; - what are the products of the reaction of sodium hydroxide with acid oxides and acids? - write the possible reaction equations and name the reaction products ?; - what other substances does sodium hydroxide interact with? Give examples: - what other hydroxides are available? Why are they called that? The teacher can ask questions in learning situations. To them: - what is the main thing in the situation ?; - what problems in the situation did you identify and which ones do you consider to be the main ones? - what do you think about it? - Can you give a similar example from the operation ?; - how did you assess the situation? - What can be the final state of the received solutions ?; - have you forgotten anything important in the correct decipherment of information? For example, water is one of the most abundant substances in nature. There is no life without water. The reason we call our planet air color is that two-thirds of its surface is water. In middle-aged people, 65-75% of the body is water. It is impossible to imagine the life of all living organisms without drinking water. Drinking water is also used for human activities.

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Drinking water accounts for 2.6% of the planet's total water supply, most of which is located in the hemispheres of the North and South Poles and cannot be consumed. Available water accounts for 0.014% of the total water supply: - What is the source of drinking water? - What is the qualitative and quantitative composition of the water molecule ?; - Why is there no clean water in nature? - - In what aggregate conditions does water occur in nature ?; - What are the physical properties of water? - What are the main sources of water pollution? - What are the methods of water purification? - What are the methods of obtaining clean water in the laboratory and in industry? - What are the conditions for chemical reactions in water in the laboratory and in industry? - Why is water a universal solvent? - What substances can water react with? - What substances are formed? Write the equation of possible reactions, name the substances formed.This topic is presented in the form of a group discussion. Each group is given a case, in which the question is asked and observed, the information is in the form of text or students use Internet resources [7, 4, 6, 9, 10,11]. For 6-8 minutes, the group will work on their question, after which the speaker will pass the information to the other groups and answer the reviewers' questions (group members complete the answers, answer the questions that arise in the other groups). The discussion is moderated by a teacher.

Keys №1. Chemical properties of water. Can water burn? When and by whom was water first synthesized?

Keys №2 «Physical properties of water. In what aggregate conditions does nature water occur? Can water flow backwards? Why does the tip of a glass jar expand when it is placed in the freezer? ”

Keys №3 “What is the main source of water pollution? What methods of water purification do you know? Why is there no clean water in nature? ”

Keys №4 “The role of water in human life”.

CONCLUSION

In analyzing the situation, we distinguish four stages:

1) the message of the condition and the direction of the course of reasoning teacher;

2) discussion of the situation in pairs of a constant composition and frontally in the form of a controlled discussion teacher (using a case card);

3) consideration and clash of opinions; 4) the formulation of conclusions, decision-making, reflection.

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The procedure for reflection and assessment of students' work, since in pedagogical science the problem of assessing the self-sustained creative activity of students has not been solved.

We see the solution to this problem in the accounting of any reasoned proposal put forward by the student and based on his life experience and knowledge from the field of organic chemistry or special disciplines ("This is so, because ..."). You can invite the students themselves to identify those students whose ideas helped to get as close as possible to solving the problem.

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