



## Case Method and Its Use in Chemistry

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| Article History  | Abstract  |
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| Received: 06 June 2023<br>Revised: 05 Sept 2023<br>Accepted: 29 Oct 2023 | <i>Case study is an educational technology consisting of a set of optimal methods and means of teaching, information, communication and management that ensure the guaranteed achievement of the predicted educational results in the process of implementing the educational goal and solving the described practical problem situation in the case.</i> |
| CC License<br>CC-BY-NC-SA 4.0  | <b>Keywords:</b> "Brainstorming", "Pinboard", "Cluster", "Design", "Case Study", "Basketball", "Situational role-playing Game", "Debate", "Cognitive Map", "Modeling", case study, educational situation.   |

### 1. Introduction

Independent student learning is essential for the development of developmental learning. However, the introduction of independent teaching methods with traditional teaching methods has become a difficult task. In recent years, 693 scientific and methodological studies and the experience of introducing independent education based on innovations and information technologies show that this problem can be solved. For example, independent training of students is carried out on the basis of innovative technologies "Brainstorming", "Pinboard", "Cluster", "Design", "Case Study". In the case of technology: "Brainstorming", "Basketball", "Situational role-playing game", "Debate". Interactive methods such as "Cluster", "Cognitive map", "Modeling" are widely used [1, pp. 692-693].

Case study (English Case - set, concrete situation, stage - learning) - is described in the case and developed in a realistic or artificial way, which directs students to express the problem and search for appropriate solutions for is not an educational method based on problem-situational analysis of the situation. A case study is an optimized, optimal approach to education, information, communication and management, which provides an intermediate approach to achieving learning goals and ensuring guaranteed learning outcomes in the process of solving the practical problem of the situation described in this case and educational technologies consisting of a set of tools. Cases are descriptive representations of specific conditions resulting from the vital organization of a group of people or individuals who help students express a problem and find a more appropriate solution [2, p.76].

The educational situation is a case study (English case. - collection, specific situation, research - study) - a method that creates situations that organize ordinary life and requires students to find a more appropriate solution, organizing ordinary situations taken from life or artificially created situations based on

A case is a descriptive statement of certain circumstances of the activities of a group of people or individuals, directing students to express the problem and search for a more appropriate solution [2, p.80].

A complex sequence of extracurricular research, methodological and project work includes the following sequence of actions of the teacher: creates a case (if the finished case is not used); develops and plans educational technologies; prepares students, develops educational and methodological support for their independent work with the case. The main stage: the introduction of case technology;

the sequence of actions of the teacher; determines the form, type and duration of training based on the work program (practical training / independent work / educational practice) [3, p.48].

## **2. Materials And Methods**

The created case should be reviewed and evaluated by an expert. Here are some ways to check:

1. The teacher's review of the case study and the relevance of the information presented in it to the real situation, as well as the interpretation of the facts presented, etc.
2. Expert assessment and the opinion of colleagues, the opinion of a case teacher about the educational value of the case, this is the second way to check it. Steps to implement the case: Introduction to the keys (individual, group); Identify and study the main problem (learning problem) (individual, group); Collect ideas and choose the optimal solution to the problem (individual, group); Presentation, analysis and evaluation of ideas; Selection, recommendations and modeling of the optimal solution for cases. [4, p.160].

There are several verification methods:

1. The analysis of the speakers' practical work and the correspondence of the information contained in it to the real situation, as well as the interpretation of the facts given, etc. are methods of its verification.
2. Stages of the work: Acquaintance with the keys (individual, group); Search and study of the main problems (educational tasks) (individual, group).
3. Collecting ideas and choosing the best solutions (individually, group).
4. Presentation, analysis and generalization of ideas.
5. Selection of optimal solutions for work, recommendations and modeling. [4, p. 160].

### **Case history.**

"Uzbekistan is rightfully proud of its underground resources, almost all elements of the famous periodic table have been found here. To date, more than 2,700 different mineral deposits and promising ore mining sites have been identified. They include about 100 types of mineral raw materials. More than 60 of them are involved in production. More than 900 mines have been opened, and their proven reserves amount to 970 billion US dollars. At the same time, it should also be noted that the total mineral resource potential is estimated at more than 3.3 trillion US dollars.

### **Questions about the Case:**

1. Give information about the reserves of copper, gold and silver from non-ferrous metal ores in our country.
2. What can you say about the proven reserves of gold, uranium, copper, tungsten, lead, zinc and other important minerals belonging to these groups in our country and the prospects for their increase in the CIS?
3. What is the role of the Australian company in accelerating the operation of mines?

### **Teacher's response:**

Our country is rich in mineral resources, especially non-ferrous metal ores. It should be noted here that the reserves of gold, silver, lead, zinc, copper and rare earth metals are very large. Currently, 40 mines of precious metals have been explored.

Precious non-ferrous and radioactive metals contain large reserves of rare and rare elements as useful components, which significantly increases their value.

Our country is one of the leaders not only among the CIS countries, but also in the world in terms of proven reserves of gold, uranium, copper, tungsten, lead, zinc and other important minerals belonging to these groups, and the prospects for their extraction. the increase takes one. For example, Uzbekistan ranks 4th in the world in proven gold reserves and 7th in gold production.

Uzbekistan is one of the countries with huge reserves of gold in the world, 41 gold mines have been opened, including 33 gold mines. The Muruntov mine, considered the largest on the Eurasian continent, is among the largest mines in the world. The Zarmitan gold mine and other gold mines have been discovered in the Samarkand region. An Australian company with great authority in the world has been recognized as the winner of a tender held to accelerate the development of these mines. The Kizilolmasoy and Kochbulok mines with highly developed infrastructure were discovered near the city

of Angren, Tashkent region. Currently, these mines are producing on a limited scale. Well-known Japanese companies have won an international tender for the development of these mines. In recent years, new mines, such as Ajibugut, Bulutkon, Balpant, Aristants and Torboy, have been searched and studied in Kyzylkum, the world's largest gold mining region.

### Case history.

About non - ferrous metals , our great - grandfather Abu Rayhan Beruni writes in his works about metal the following: "There is no mine in other countries that produces gold in such quantity and purity; but the desert and sand dunes make the road difficult. Where there is gold, there is silver."

### Case task:

To provide information about the use of metals in chemical industries, the human body and household items based on these drawings.



### Teacher's response:

In the Middle Ages, the largest gold and silver mining facility was located in the Tashkent oasis. Central Asia was one of the major centers of the East for the extraction of metals, the production of products and coins. The inhabitants of ancient Sogdia and Bactria were highly cultured, knew and practiced the secrets of metal smelting and jewelry. Gold has been widely used between Amu Darya and Zarafshan since ancient times. The name of the Zarafshan River means "gold-bearer" in translation. In the Middle Ages, the largest gold and silver mining facility was located in the Tashkent oasis. Central Asia was one of the major centers of the East for the extraction of metals, the production of products and coins. The inhabitants of ancient Sogdia and Bactria were highly cultured, knew and practiced the secrets of metal smelting and jewelry. Gold has been widely used between Amu Darya and Zarafshan since ancient times. The name of the Zarafshan River means "gold-bearer" in translation. In ancient times, eleven metals were known, including gold, silver, copper, tin, lead, zinc (in the form of brass), iron, platinum, mercury, antimony and arsenic. By the end of the XVIII century, their number reached 20, and at the end of the XIX century — 50. Currently, about 80 metals are produced and used.

Metallurgy refers to the branch of science, technology and industry, which includes the processes of obtaining metal from ore and other types of metal-containing materials.

Research of metals and their sources by scientists of the Institute of History and Archeology of the Academy of Sciences of Uzbekistan, the National University of Uzbekistan (UzNU), the Institute of Cultural Studies of Uzbekistan. Little research has been done. According to M. N. Bubnova, by the I-II centuries, the use of minerals in Central Asia reached the highest level.

There are medicinal types of silver: collargol (up to 70% silver) and protargol (up to 8.3% silver). Silver nitrate is very toxic and is prescribed externally in medicine for erosions, ulcers, trachoma and other skin diseases.

The brain is the richest silver in the human body. About 0.1 mg of silver enters the human body per day. Most of all silver is contained in egg yolk (0.2 mg of silver per 100 g).

It is known that gold compounds increase the endurance of the body. From experiments it became known that gold compounds are active against tuberculosis. Chrysanol  $[\text{Au-S-CH}_2\text{-CH-OH-CH}_2\text{SO}_3]_2\text{Ca}$  it is used as an effective drug for tuberculosis, leprosy.

### **Case history.**

This metal has been known to mankind since ancient times, and its alloy was used in the early stages of life. In nature, this metal is rare. It is common in the form of oxide. Mines are found in Vietnam and Indonesia. Water does not affect it. Its compounds are called "Suzal Gold" and are used for wood processing. Look, he's afraid of the metal winter.

### **Case assignment:**

This metal has been known to mankind since ancient times, and its alloy was used in the early stages of life. In nature, this metal is rare. It is common in the form of oxide. Mines are found in Vietnam and Indonesia. Water does not affect it. Its compounds are called "Suzal Gold" and are used for wood processing. Look, he's afraid of the metal winter.

### **Use the Brainstorming method:**

1. Do you know the elements known to mankind since ancient times?
2. Define the alloy known since ancient times?
3. What metals are found in Vietnam and Indonesia?
4. What is "Suzal Gold"?
5. Find out which metal is afraid of winter?

The solution of the case.

Tin has been known to mankind since ancient times. An alloy of tin and copper "bronze". Tin deposits are found in Vietnam and Indonesia. Tin (IV) sulfide has a golden yellow color, called golden solution, and is used in painting oil objects and plaster sculptures. Tin suffers from the tin plague in the cold, so it is called a metal that is afraid of winter.

**Case history.** More than 75% of the world's silver is extracted by satellite in the lead and copper industries. To obtain pure gold, it is also purified from silver and silver is isolated in its pure form. Silver ores are enriched by flotation and gravity methods, a concentrate is obtained, which is then dissolved in cyanide solution.

### **Case study:**

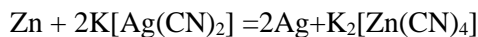
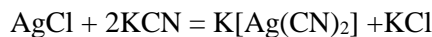
1. What reagents are used to convert silver-rich ores into chlorides?
2. What is aluminum alloy?
3. What is obtained on the basis of Dore metal?
4. Explain the process of  $\text{Ag}_2\text{Zn}_2$  formation.
5. Write the equation of the reaction of obtaining silver through complex silver compounds.

### **The teacher's decision.**

At some enterprises, silver-rich ores are processed into silver chloride by chlorination with the addition of table salt. Zinc or aluminum (dust) is used to separate silver from a cyanide solution. Then it is oxidized, refined and silver is obtained. In the lead industry, zinc is added to the reactor and forms a chemical compound with silver. With the help of pyrometallurgy, zinc is evaporated, and the remaining silver is sent for cleaning. In the copper industry, silver slag is transferred from copper to the anode, and then into the sludge during electrolysis. Then the suspension melts at a temperature of about 10,000 °C, evaporates to selenium and tellurium, passes through the chimney and is captured by floats. The Dore metal, that is, an alloy of gold and silver, is obtained in a melting furnace. The next process is



afinage, in which gold is separated from silver, in which it is treated with acids and pure silver is obtained by electrolysis. In addition, silver ore is mainly mixed with lead ores. Therefore, silver-containing ores are liquefied and oxidized under the action of oxygen in open baths. As a result, the liquefied mixture in the form of lead floats to the surface, and silver settles as a metal without oxidation. In addition, liquefied ores are exposed to zinc. Silver dissolves better in zinc than in lead, and precipitates in the form of  $\text{Ag}_2\text{Zn}_2$ . Silver is extracted by distillation of sediment. When extracting Ag from sulfide ores, the liquefied mass is exposed to sodium cyanide, the resulting silver complex is treated with zinc and the metal is extracted.



#### 4. Conclusion

Almost any teacher who wants to implement case technologies with the help of a manual and a set of situations can do it very professionally. However, it should be noted that the choice of using interactive educational technologies should not be an end in itself of the educational process for a teacher. Each of the above technologies of situation analysis should be implemented taking into account educational goals and objectives, the characteristics of the student group, its interests and needs, skill level, regulations and many other factors. As noted above, the greatest effect can be achieved with a systematic approach to the choice of traditional and innovative learning technologies, their rational combination, complementarity and effective management of group and intergroup discussion. Effective teaching with the help of interactive technologies, including the method of situational analysis, is possible only in cases when the teacher himself is a competent communicator and freely controls the game. It is these features that make a modern teacher competitive and allow him to quickly master not only the latest theoretical information, but also advanced technologies.

#### References:

1. Мамадалиева Н. И., Уришева Ф. М. Примерная технология и пути его применения в процессе обучения химии. Тезисы докладов X Международной научно-практической конференции Ливерпуль, Великобритания 27-29 мая 2020 г. С. 692-693.
2. Ишмухамедов Р., Абдукадиров А., Пардаев А. Инновационные технологии в образовании (практические рекомендации для педагогов-преподавателей образовательных учреждений). - Т.: Фонд «Талант», 2009. С. 76-77.
3. Ходиев Б.Ю., Голиш Л.В. Способы и средства организации самостоятельной учебной деятельности: Учебно-методическое пособие в помощь первокурснику. - Т.: ТГЭУ, 2006. С. 48
4. Ишмухамедов Р., Абдукадиров А., Пардаев А. Инновационные технологии в образовании (практические рекомендации для педагогов-преподавателей образовательных учреждений). - Т.: Фонд «Талант», 2008. С.180.
5. Тохтаев Х., Аристонбеков Р. и другие. «Неорганическая химия», Т, издательство «Ношир», 2011 г.
6. М.С. Хотамова. Учебно-методический комплекс неорганической химии. Навои 2016
7. Парпиев Н.А., Муфтахов А., Рахимов Х. «Теоретические основы неорганической химии». Т., Узбекистан. 2001 г.
8. Тохтаев Х., Аристонбеков Р. и другие. «Неорганическая химия», Т, издательство «Ношир», 2011 г.
9. Лутфуллаев Э. и др. Неорганическая химия. Самарканд 2009.