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PEDAGOGICAL PRINCIPLES OF TEACHING THE SUBJECT OF HYDROLYSIS OF SALTS IN CHEMISTRY EDUCATION

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Article history:	Abstract:
Received: January 6th 2023 **Accepted:** February 6th 2023 **Published:** March 14th 2023	This article presents a method of teaching the basics, linking the theory of salt hydrolysis with the theory of electrolytic dissociation . At the same time, the theoretical foundations of the theory of dissociation of acids, bases and salts and methods of teaching their properties are given It presents a teaching methodology based on the technology of problem-based learning of the mechanisms of dissociation of acids, bases and salts and the mechanism and methods of writing ion equations of ion exchange reactions.

Keywords: educational technology, dissociation, ions, acids, bases, salts, dissociation mechanisms, ion exchange reactions, melting mechanisms, hydration.

Currently, in the school chemistry course and the higher education system, the teaching of solutions and processes between solutions leads to the study of the mechanism of any chemical reaction. For this, knowledge is formed about this topic by explaining the mechanism of dissociation theories to the students about how the substance dissolves in the solvent. This process should be explained as follows: The theory of electrolytic dissociation of S. Arrhenius is the theoretical basis of many topics in chemistry. This theory is useful in the study of processes occurring in electrolytic solutions. Also, based on this theory, electrolysis, hydrolysis, amphoteric properties, electrical conductivity, electrode potentials, and oxidation-reduction processes can be explained. In this, the mechanism of the processes that lead to the breakdown of electrolytes into ions in water is taught in depth. The student's knowledge is developed with the help of such concepts and knowledge as the hydration of ions, the energetics of the dissociation process, the dependence of dissociation on the dielectric constant of the solvent, finding the dissociation constant based on the equation of Oswald's dilution law, determining the hydrogen index, and the rate and constant of hydrolysis [1].

Determining the sequence of study of electrolytic dissociation topics at the next stage of education about the theoretical foundations of electrolytic dissociation has important didactic value in adequately explaining the cause of the dissociation process. This process begins with M. Faraday's laws on electrolysis as knowledge. True, Faraday introduced the concepts of electrolyte, non-electrode, cathode, anode, ion, cation, and anion, which are necessary for understanding the theory of dissociation. Study of "electrolytes and non-electrolytes" . In order to prove that there are ions in the solution, the teacher lights one of the conductors coming from the current source by connecting the latter directly to the electrodes and demonstrating the experiment of a light bulb burning when the connection is dropped into the solution. This experiment, which took place with the help of electricity, will remain in the minds of students. Further verbal explanations by the teacher about the role of the solvent in the process of dissociation of electrolytes do not change the conclusions drawn by the students from the experimental results. Therefore, when electrolytes are dissolved in water, they separate into ions, and the mechanisms of processes, energies, and other factors affecting their dissociation are explained and formed in the minds of students. After that, the presence or abundance of ionization that creates electrical conductivity in the solution is determined based on the results of the experiment by demonstrating the electrolyte or non-electrolyte, strong or weak electrolyte, of the substances obtained [2] .

In the process of studying the topics of the "Theory of Electrolytic Dissociation" section, students get the wrong idea about the dissociation of electrolysis, which is its central issue. The lack of improvement in the teaching methodology of the section and the textbook can be justified by the consequences of non-compliance with the didactic requirements for the lesson content.

The main goal of studying this section is for students to form ideas about the mechanism of dissociation of electrolytes into ions when they are dissolved in water, to define acids, bases, and salts based on this theory, and to justify their chemical properties. The ability to write stepwise dissociation equations and full, reduced ionic equations of exchange reactions is considered to be acquired.

The main task of studying the topics of the department is to deepen students' ideas about substances and chemical reactions based on their knowledge of electrolytes, electrolytic dissociation, and ionic reactions, and to substantiate the theoretical issues of the department with chemical experiments. Atomic structure, chemical bonds, and chemical reactions are explained based on theories of mechanisms.

We present didactic materials for familiarizing students with the knowledge that is the basis for the creation of the theory of electrolytic dissociation. Every solvent, for example, water and the solution formed in it, has a vapor pressure at a certain temperature. The vapor pressure of the solvent above the solution is always less than the vapor pressure of the pure solvent. The reason for this is that the evaporation of the solvent is reduced as a result of the attraction between the solute and the solvent in the solution. Depending on the vapor pressure, the freezing temperature of the solution is lower than the freezing temperature of the pure solvent [3-5].

When studying the processes of electrolytic dissociation, it is difficult to explain the essence of the processes of dissociation into ions when substances formed from such bonds are dissolved in water without knowing the atomic structure and the ionic and polar covalent bonds. Therefore, the explanation of the process of electrolytic dissociation should be started after repeating the ionic and polar covalent bonds and instilling them in the minds of the students. The students of the class are asked a difficult question when explaining this topic: Why is the ionic bond between a typical metal, for example, sodium, and a typical non-metal, chlorine, strong? Students solve this problem on their own and come to this conclusion. The sodium atom has 1 odd-numbered electron in its outer electron shell and occupies a stable energy level with 8 inner electrons. The chlorine atom, having attached 1 electron, occupies the energy stable s^2 p^6 level. In this case, the sodium atom is positively charged (Na) and the chlorine atom is negatively charged (Cl). The resulting oppositely charged particles are tightly bound together by electrostatic attraction. As a result, a molecule with an ionic structure, NaCl, is formed. When a small crystal of NaCl is seen through a magnifying glass, it is known that it is in the form of a cube. The teacher draws on the blackboard the shape of the table salt crystal and the alternating sodium and chlorine ions in the crystal nodes and explains the concept of an ion. A charged atom (for example, Na^{+}) or a group of atoms (for example, $S0_4^{2-}$) is called *an ion.*

The properties of atoms, which are very different from the properties of ionization formed from them, are explained to the students using the example of table salt ions. The reason is based on the above-mentioned difference between the electronic structure of atoms and ions.

Then the electrical conductivity is determined by dropping the ground table salt crystal into a dry glass. In this case, the light bulb does not light up. Therefore, table salt crystals do not conduct electricity. The reason for it should be asked as a critical thinking question. Why does a table salt crystal composed of charged particles not conduct electricity? Students solve this question and come to the conclusion that free movement of ions in crystals is not possible because the ions located at the nodes of the crystal lattice are in oscillatory motion.

The use of problem-based learning technology is effective in explaining this topic in depth. For this, it is necessary for a methodical teacher to be able to analyze the theoretical foundations of problem-based learning technology. We know that the problem-based technology will be implemented as soon as possible.

When using the problem-based approach, it is important to remember that only the continuous use of the problem situation in the lessons, alternating one with the other, will encourage students to think. The most successful structured problem-solving situations can be found in self-proposed problem-solving lessons. In the implementation of problem-based education, the teacher should form such an interaction with the class that the students are active, take the initiative, and express their opinions openly. If the student's opinion is wrong, another student can correct this mistake during the discussion [4-5].

The teacher's questions must have a problematic description. When creating a problem situation and solving tasks, first of all, the teacher himself should be an example. He needs to express his opinion and justify it. A good presentation requires serious theoretical training and deep knowledge of the subject. The most beneficial aspect of problem-based learning is that it primarily teaches students to develop self-reflection and self-confidence in their own knowledge. Increases self-confidence. Since this approach is more emotional, it increases students' interest in reading and has a strong educational effect. This, in turn, builds confidence and a positive outlook and strengthens knowledge. Because the knowledge acquired through independent research remains in the memory for a long time compared to ready-made knowledge,

As a result of problem-based learning, students acquire new knowledge and identify new connections between concepts and facts known to them. Problem-based learning can also be used as a method to determine the intellectual capabilities of students. The disadvantage of this method of teaching is poor management of the thinking process. However, its advantage is that creative thinking requires independence and freedom. Students reach a specific result at different times. Therefore, this methodological approach requires more work and greater responsibility from the teacher than other methods. Equalizing students' thinking speeds in this case requires creativity from the teacher [1,2].

In problem-based teaching, the teacher's teaching method changes. In the process of teaching this topic, it is necessary to create a problematic situation when teaching the dissociation of bases, acids, and salts. It is done by asking the question, "Can you explain the possibility?" in which the teacher gives directions in order to alleviate the problematic situation, namely, that when a substance is dissolved in a solvent, it breaks into ions, which should be implemented; if there is a precipitate, such processes will not occur, i.e., the compound will not dissolve in any solvent. They begin to solve the problem. The teacher can make clarifications by showing his experiences in explaining this problem. One of the rules that students need to learn is that salts and alkalis in the crystalline state conduct electricity due to the presence of freely moving ions. They form the illusion of seeing with their own eyes, from which they draw general conclusions. It is necessary to develop this further. For this, the method of conducting experiments by taking other salts such as copper chloride, sodium acetate, ammonium acetate, and a substance such as barium sulfate to dissociate ions is used. It is also possible to form by showing indicators. We will carry out these experiments as usual. Take two test tubes, take 1 gram of sodium acetate, put dissolving water on it, and add 1-2 drops of phenolphthalein solution. Fill the second test tube. If we heat the first test tube a little, the solution in the test tube will turn red. Let's show the work and see that nothing changes in the second test tube. In this case, the reason for the reddening of the solution in the first test tube is that the sodium acetate powder dissolves in water, dissociation occurs, and the sodium ion binds with the OH ion in the water molecule and forms sodium hydroxide. The fact that the salt obtained in the second test tube is not dissolved or dissociated is explained by explaining the theoretical basis of its formation. In this, the students will have complete information about the theory of dissociation. By developing it further, students are told that the physical properties of electrolytes are divided into strong and weak electrolytes depending on the nature of the electrolytes and that terminal electrolytes completely dissociate and weak electrolytes partially dissociate into ions in solution, giving them examples [6].

Substances that dissociate into almost full ions in their solutions are called strong electrolytes.Almost all salts that dissolve in H_2O are strong electrolytes: Na_2SO_4, KCl, $AgNO_3$ .Bases (alkalis) soluble in H_2O include hydroxides of metals of group I, II-A (except Be, Mg).. Acids: HJ, $HClO_4$,HBr, $HMnO_4$, HNO_3 , H_2SO_4 , $HClO_3$,
$H_2Cr_2O_7$, H_2CrO_4 , HCl, etc.ubstances that partially dissociate into ions in solution are called weak electrolytes.

1. Bases that are slightly soluble in water include hydroxides of all metals, except metal hydroxides of group I and II-A. $Be(OH)_2$, $Mg(OH)_2$, $Fe(OH)_2$, $Fe(OH)_3$, $Cu(OH)_2$, NH_4OH

2. Weak acids - HCN, H_2SiO_3 , H_2CO_3 , HF, H_2S, HNO_2 , HClO, CH_3COOH, etc. Moderately strong H_2SO_3 , H_3PO_4 , HCOOH

When studying the processes of electrolytic dissociation, it is difficult to explain the essence of the processes of dissociation into ions when substances formed from such bonds are dissolved in water without knowing the atomic structure and the ionic and polar covalent bonds. Therefore, the explanation of the process of electrolytic dissociation should be started after repeating the ionic and polar covalent bonds and instilling them in the minds of the students. The students of the class are asked a difficult question when explaining this topic: Why is the ionic bond between a typical metal, for example, sodium, and a typical non-metal, chlorine, strong? Students solve this problem on their own and come to this conclusion. The sodium atom has 1 odd-numbered electron in its outer electron shell and occupies a stable energy level with 8 inner electrons. The chlorine atom, having attached 1 electron, occupies the energy stable s2 p6 level. In this case, the sodium atom is positively charged (Na) and the chlorine atom is negatively charged (Cl). The resulting oppositely charged particles are tightly bound together by electrostatic attraction. As a result, a molecule with an ionic structure, In this way, the students can imagine that the water molecule is a strongly polar molecule, and its structure is as follows: Because the common electron pairs connecting the oxygen atom and hydrogen atoms in the water molecule move towards the oxygen atom, the oxygen atom side of the molecule is negatively charged and the hydrogen atom side is positively charged. Therefore, it is explained that the water molecule is a strongly polar molecule and plays an important role in the dissociation process. Thus, dissociation occurs when any substance dissolves in water in a solvent, and they draw the general conclusion that they have the property of conducting electricity.

Nowadays, while instilling innovative components in the educational system, the scientific heritage and theories of foreign chemists and Methodists, especially the famous historians of chemistry B. Kedrov, chemical dialectic, V. Shtrube, the path of development of chemistry, and M. D. Jua, are engaged in the general history of chemistry. O. Benfey, V. Karpenko, B. Newbold, M. Pennington, P. Phillips, L. Corte, Z. Selak, J. Keutgen, and K. Javorova analyzed the issues of improving the scientific-theoretical foundations of chemistry. [2] R. Becker M. Galages conducted a lot of research on the methods of organizing and conducting direct chemical experiments. In accordance with their scientific theories, it is necessary today to implement the following in the formation of innovative ideas by the teacher in changing the quality of education:

1.The organizer-social pedagogue prepares students for independent lives. 2. The class leader creates and influences a positive psychological environment in the class; 3. helps and supports students in solving problems in the process of Methodist education; 4. A philosopher analyzes knowledge and experience to justify his views. 5. An experienced, close friend helps overcome obstacles and problems faced by students; 6. The researcher-innovator regularly works on himself, creates, and implements new ideas; 7. The leader of the educational process and its motivational means of achieving the goal considers the perspective, chooses teaching methods, teaches students to read, and takes a creative approach; 8. be able to work as an interactive team and teach others to work; 9. The counselor teaches from your personal example. The educator helps students develop physically, mentally, and spiritually. 11. A psychologist knows and understands himself well; 12. A Guide to Change: helps students improve their life skills; 13. Disseminator of information: conveys basic new information to students and teaches them how to apply it.

Among the studies on the preparation of teachers for innovative activities, the work of M.V. Klarin occupies a special place. In his work, he connects innovative activities with the need for organized continuous education through the development and implementation of socio-cultural projects. This approach is based on the possibility of free choice for the person, in which the study activity takes one of the leading places and can be an important, leading tool in the development of the person and a way to involve the person in the educational process.

The process of the teacher's preparation for innovative activity is as follows: predicting the overall success of the intended innovation and its individual stages; comparing the innovation with other innovations; selecting the most effective of them; determining their most significant and accurate level; checking the level of success of the innovation's implementation; and assessing the ability of the implementing organization to accept the innovation.

A new approach to the professional training of chemistry and pedagogy education, which is continuously developing in line with modern development, is to direct future teachers to pedagogical, cultural-educational, and scientific-research activities; it was shown that it is necessary to ensure the achievement of educational results by acquiring general cultural, general professional, and scientific competences. It was shown that the integrative methodology of ensuring the quality of professional training of students on the basis of the basics of chemistry is implemented through the theoretical and methodological integration of chemistry education. It was determined that the content of their professional-methodical training based on the basics of chemistry is the formation of chemical-methodical competence related to the acquisition of innovative educational paradigms, the development trends of the theory and practice of chemical education, and scientific competences [3,4.].

In the formation of innovative abilities of the teacher in chemical-methodological competence, it is necessary for the teachers of chemistry to acquire not only general cultural and general professional competences but also special competences (based on the specific characteristics of chemistry related to science) through the creation of innovative activities in students. guides the formation of chemical concepts.

Thus, the relationship between education and upbringing is not the same. A properly organized educational process will quickly pay off; that is, it will have an impact on students' learning. Cultivation of discipline, organization, activity, and other similar qualities in students will cause active and successful acquisition of knowledge. The unity of education leads to the comprehensive development of the student's personality in the educational process.

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