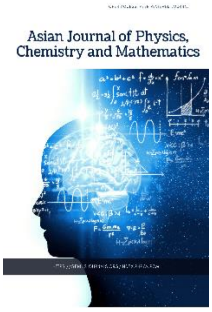

Methods of teaching the theoretical foundations of chemistry on the basis of problem-based learning

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ABSTRACT

This article mainly presents the basics of the methodology of independent learning in the development of students ' independent thinking in the teaching of the theory of chemistry

Keywords: stages of educational innovation process, module, credit, independent study, chemical theory, experiments, taxonomy.

Today, the following theories are mainly presented in the implementation of teaching students the basic theories of chemistry in the formation of chemical concepts:

1. The theory of atomic structure.
2. Solution theory.
3. The theory of electrolytic dissociation.
4. The theory of formation of complex compounds.
5. The structural theory of organic chemistry is based on the fact that in the process of teaching topics students learn the structure of substances and their properties, as well as the chemical laws of their reactions and the synthesis of new substances by applying them in industry.

The study of each chemical theory, of course, has its own characteristics, but there are many methodological aspects, these features apply to all chemical theories. In this process, one of the general methodological processes is the analysis of chemical theories with the help of chemistry teaching methods and how to teach them methodically and in what way and with what technologies. In many textbooks and manuals on chemistry, as well as the experience of teaching chemistry of our great Methodist scientists, two different methodological views on how to study theories are applied.

The most widely used theory today is solutions, which are basically based on teaching all the laws that go into solution because all chemical reactions take place mainly in solutions.

This topic begins with the topic of water, which is mainly based on giving students the following chemical concepts: What is a solution, how is it formed, types of components solution (saturated, unsaturated and super saturated), Solubility, solvent , solution of methods of solution concentrations (percentage, normal, molar and molar and titer of matter), separation of substances from solution, methods of filtration and explanation of diffusion processes.

methodologist must provide a theoretical basis for what process occurs when a substance dissolves in a solvent, mainly in water, and a chemical understanding of what other reactions occur .

We know that any inorganic substance, such as a metal, oxide, acid, or salt, dissolves in a solvent , but the salt first dissolves, then hydrolyzes, decomposes into ions, and dissociates . Based on this, the teaching of solution theory in the school chemistry course is carried out in three stages.

1. Initial acquaintance with solutions.
2. To deepen the theory of solutions on the basis of atomic molecular theory.

Further expansion of the theory of solutions on the basis of the theory of electrolytic dissociation .

In teaching this theory , the general properties of soluble water and its physical and chemical properties are formed by giving students chemical concepts using simple methods and experiments based on concrete examples. In this case, the Methodist teacher introduces all the waters of nature, ie natural water, spring water, drinking water, distilled water, snow water and water formed on the basis of chemical reactions, and all of them contain N and ON ions, these ions form melting mechanisms they must provide complete chemical knowledge about what they do [5-6].

The teacher demonstrates the melting process to students by taking a few glasses of chemicals based on the demonstration method, adding the same amount of water to it, and adding different substances to it to see if it is soluble. For example: solubility of salts of sand, soil, sodium chloride, potassium permanganate, rock, sugar, sugar, copper sulfate . In this case, they see that some substances are soluble, some are insoluble, and the rest are distributed throughout the vessel , and on this basis, students develop chemical concepts about the mechanisms of solubility and diffusion, and students about the solution, solvent and solute. In order to further develop this theory , it is necessary to teach students the solubility coefficient in explaining the melting mechanism. In order to further develop this process , chemical concepts are generated and based on experience by comparing the theory with the solubility table by demonstrating the theory on the basis of experiments . To do this, the Methodist teacher is invited to demonstrate the following experiments. For example, we take a few beakers and put the following substances in them: A chemical reaction takes place in sodium metal, potassium nitrate, ammonium nitrate, sodium hydroxide, magnesium sulfate, silver chloride, ammonia, lime, glass fragments, copper oxide, iron oxide, barium sulfate and show the mechanisms of dissolution of salts by taking the solubility table and comparing which of them are soluble and which are insoluble. Students think independently and draw general conclusions based on the results of their experiments. In order to further develop this process, the student will gain knowledge of the methods of melting and supersaturated solutions and recrystallization by demonstrating in practice the methods of recrystallization and recrystallization of the solute by evaporation of the solution. We recommend that you perform this experiment as follows: Take a porcelain cup, add sodium sulphate solution to it, heat it, separate the dissolved salt by evaporating the water in it , and weigh it to calculate how much salt has been obtained. Afterwards , demonstrating to students the process of separating the sediment from the solution leads to the formation of ideas about the methods of separating the two insoluble components in each other. For example, when a solution of barium chloride is exposed to potassium chromate, a yellow precipitate is formed, which, if required, is separated from the solution by filtration. In this case, the filtrate contains a yellow precipitate of barium chromate , and the filtered solution is sodium chloride with water. Through this experiment , the student develops a new skill, namely, the ability to filter, precipitate, dissolve, and perform chemical experiments. In order to further expand the theory of solvents , the Methodist explains the theoretical foundations of gaseous substances, such as the solubility of solids and liquids in solvents, and provides information about the mechanism of its melting. To reinforce this theory, the teacher should prepare a demonstration experiment in which SO is first obtained by means of a gas extraction device, and if it is exposed to water in a glass, bubbles are formed. students will see that a drop of barium chloride solution results in the formation of a white milky precipitate, and they are convinced that gaseous substances can also be dissolved in a soluble aqueous medium. The following examples can be given by the Methodist teacher , who has developed his knowledge that he increases the solubility of sediments formed by chemical reactions by converting them into a complex state. When a solution of silver nitrate is exposed to sodium chloride, we can see the formation of a water-insoluble white precipitate . When this precipitate is exposed to an ammonia solution, it is determined that the white precipitate dissolves. In this case , we can explain the mechanism of dissolution of white sediment by the fact that it is transformed into a complex compound [1-4].

Methodologist proposes to study the ion exchange reactions that take place between solutions of electrolytes in the following group, dividing them into classes, and proposes the following sections.

1. Neutralization reactions.
2. Reactions with the formation of sediment.
3. Reactions with the formation of gaseous matter.

Therefore, the teacher must explain the essence of neutralization reactions on the basis of the theory of indicators, in which water is a weak electrolyte, so it is almost not broken down into ions. However, since acid and alkali solutions are colorless , it is not possible to visually see how much salt is formed when they interact and how much acid or alkali is left, but based on the theory of indicators, alkali in solution or the excess of acid can be said by detecting a change in the color of the indicator. Therefore, the teacher should experiment with the litmus indicator in a demonstration method, adding three cups of acid, alkali and water to determine the color of litmus in acidic, alkaline and neutral environments by slowly dropping the litmus indicator on them and It is necessary to pay attention to the change of color and to see with their own eyes that the color changes turn red in an acidic environment, bluish in an alkaline environment, and purple in a neutral environment. write down the results in their notebooks, and develop an understanding of the indicator, the litmus environment, the chemical concept, and the skills to identify it. They should explain the theoretical basis under which the salts undergo hydrolysis, stating that salts dissociate with the formation of a solution when dissolved in water and form a hydrolysis process. Then the hydrolysis equations should be focused on the stepwise hydrolysis process to salts that proceed under weak base and strong acidic conditions . Taking into account the gradual process of hydrolysis in such salts, we are based on the study of the mechanism of hydrolysis of salts by solving the equations of the processes that take place in it . The following experiments, for example, cover the hydrolysis of all other salts.

1. The effect of water on ferric chloride.
2. Implementation of ferric chloride by heating a solution of sodium acetate in combination with a solution of phenolphthalein.
3. Determine and substantiate the product of ferric chloride by observing experimentally with sodium carbonate and the indicator phenolphthalein.
4. The study of the mechanisms of hydrolysis of salts by analyzing the experiments by substantiating the process that occurs when a solution of ferric chloride is exposed to a solution of sodium acetate and buffer and phenolphthalein.

From these experiments, when iron (III) -chloride solution is exposed to a solution of sodium carbonate and phenolphthalein, iron (III) -chloride in the solution is first hydrolyzed in one step to form Fe $(OH)Cl_2$. As the next step progresses, the NCl solution released in the reaction dissolves the Fe $(OH)_2Cl$ precipitate formed in step 2. However, sodium carbonate added to the solution dissolves in water to form sodium hydroxide, which reacts with $Fe(OH)_2Cl$ to form a precipitate of $Fe(OH)_3$, which is a strong electrolyte. ions combine with sodium metal to form sodium chloride, as a result of which the salt is not hydrolyzed, the ions in the remaining solution are released as a gas, and the phenolphthalein solution turns red because the solution is alkaline. This reddens due to the formation of $Fe(OH)_3$ ions , but when litmus solution is used, the solution turns blue, which gives students new chemical insights by quoting reaction equations stating that the medium is so alkaline. The full explanation of this process is based on a complex teaching by quoting the equations of the hydrolysis process.

Of solutions is based on the methodology chosen by the Methodist teacher. The study of this topic is mainly based on a comprehensive study of all the processes that take place in solutions. It focuses on developing students ' ability to think independently about solutions and the processes that take place in them.

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