POSSIBILITIES OF WIDE USE OF PRACTICAL METHODS IN CHEMISTRY EDUCATION

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Abstract

This article is devoted to the possibilities of wider use of practical methods in chemistry education, the organization of experiments suitable for the topics being taught, limited only to theoretical methods. Such approaches increase students' interest in science and help to form creative, critical, creative thinking skills.

Keywords: chemical experiment, chemical bond, electrical indicator, covalent bond, ionic bond.

One of the main methods of teaching is the practical method, and the chemistry educational experiment is its main form. The experiment allows the student to draw conclusions about the changes of substances that are the object of chemistry research, about the objectivity of natural, artificial and synthetic phenomena with the help of sensory organs, to think clearly about the possibility of knowing them.

The fact that chemistry has an experimental nature is shown by the fact that every scientific concept, information, logically assigned task requires practical confirmation on the basis of experience. The process of understanding begins with the perception and perception of objects, events, processes, facts, and then goes to generalization and clarification. Chemical concepts are formed as a result of generalization of knowledge formed by accepting signs of processes and events. Theory becomes a developmental tool only when it is generalized along with experiment. Since the experiment has such a wide range of possibilities, it is advisable to use it in all subjects as much as possible, and to use its possibilities in subjects that are limited by theoretical methods in traditional teaching.

"Chemical bondsexperiences on the subject

Purpose of Work:

Types of chemical bonds, study and comparison of physical and chemical properties of substances with different chemical bonds.Comparison of electronegativities of elements.

Experiment 1. Examination and mutual comparison of electrical conductivities of substances with different chemical bonds

Necessary equipment: A device with an electric lamp connected in a series chain, an electric indicator, a glass.

Required reagents:sulfur, iodine, distilled water, carbon dioxide (CO_2), table salt, chalk, aluminum, piece of iron.

The order of work: Test the conductivity of the sulfur in the beaker using an electric bulb or electric indicator connected in series. Check the electrical conductivity of iodine, distilled water, carbon dioxide, table salt, chalk, aluminum, and iron. Try to explain the electrical conductivity of substances depending on the nature of chemical bonds in them.

sulfur,pay attention to the aggregate state of substances such as iodine, distilled water, carbon dioxide, table salt, chalk, aluminum, iron. Try heating them and compare their melting point as well. Explain the properties of these substances in connection with the type of chemical bond in them.

Experiment 2. Comparison of properties of substances with ionic and covalent bonds

Necessary equipment: A device with an electric lamp connected in a series chain, an electric indicator, a crucible, a glass.

Required reagents:KNO_3 (or $NaNO_3$), sugar.

The order of work: Prepare the KNO_3 solution in the first beaker and check the conductivity on the electric indicator. Prepare the sugar solution in the second glass. Check the current conductivity on the electric indicator. Explain both situations on the basis of their chemical bonding.

Add KNO_3 to the first crucible and heat until liquefied (310ºC). After liquefaction, lower the electrodes of the conductivity meter and observe the conductivity.

Test the conductivity by liquefying the sugar in the second crucible. Write your conclusions assuming that KNO_3 has ionic bonds and the sugar molecule has covalent bonds.

Experiment 3. Comparison of the oxidizing properties of molecular and atomic oxygen

Necessary equipment:test tubes, pipette, alcohol lamp.

Required reagents: Potassium iodide, H_2SO_4 solution, H_2O_2 solution.

The order of work: Add the sulfuric acid solution to the potassium iodide solution in the test tube. Put hydrogen peroxide in the second test tube and heat it like a test tube. Inject the evolved oxygen (O_2) into the mixture in the first test tube. Note the color change. Write the reaction equation.

Add the sulfuric acid solution to the potassium iodide solution in the test tube. Add hydrogen peroxide to it and heat the test tube. Note the color change. Compare the reaction rates assuming that molecular oxygen is involved in the reaction in the first case, and atomic oxygen in the second case. Explain in terms of chemical bonds why atomic oxygen is more reactive than molecular oxygen.

Experiment 4. Comparison of the reversibility of molecular and atomic hydrogen

Necessary equipment:test tubes, pipette.

Required reagents: FeCl3 solution, HCl solution, Zn.

The order of work:prepare a solution of iron (III) chloride and divide it into two test tubes by adding hydrochloric acid solution to it. Into the solution in the first test tube, inject hydrogen obtained in a degassing device through a tube (hydrogen is obtained by putting zinc in a hydrochloric acid solution in a degassing device).

Add zinc metal grains to the same solution in the second test tube. Note that the iron(III) chloride solution changes from reddish brown to pale green (FeCl2). Draw a conclusion, taking into account that hydrogen is reducing in the processes in both test tubes, only molecular hydrogen in the first test tube, and atomic hydrogen in the second test tube participate in the process.

$$2FeCl_3 + H_2 \rightarrow 2FeCl_2 + 2HCl$$

Experiment 5. Observing that hydrogen chloride has a covalent bonding nature in a paraffinic solution, and an ionic bonding nature in its aqueous solution

Necessary equipment:test tubes, pipette.

Required reagents: NaCl, H2SO4 (conc.), Zn, paraffin.

The order of work: Put 1 g of NaCl in a test tube, add 2-3 drops of sulfuric acid (concentrated) and immediately pour 3-4 ml of paraffin over it. Shake the test tube well. Concentrated sulfuric acid absorbs water in paraffin, dehydrates it, and reacts with NaCl to form HCl. The resulting HCl remains dissolved in anhydrous kerosene. Slowly pour the solution into another test tube and add 1-2 grains of zinc. Note that no change occurs. Then add 1-2 ml of water to the test tube. Observe the evolution of hydrogen as a result of the reaction between zinc and an aqueous solution of hydrochloric acid. Explain the reason why hydrogen chloride exhibits two different properties when dissolved in non-polar solvents (kerosene) and in polar solvents (water) by changing the nature of the bond.

In the educational system, it cannot be recognized that the main position of the chemical experiment in education is being used at the level of demand, there is still a need to conduct many studies in this regard.

Used Literature

1. Kuchkarov M. A. POSSIBILITIES OF USING A CHEMICAL EXPERIMENT ON THE FORMATION OF STUDENTS’CRITICAL THINKING COMPETENCIES //European International Journal of Multidisciplinary Research and Management Studies. – 2022. – Т. 2. – №. 04. – С. 108-112.
2. Кучкаров М. А. Об использовании электронной таблицы в химических вычислениях //Химия в школе. – 2011. – №. 4. – С. 53-54.

3. Кучкаров М. А. ИСПОЛЬЗОВАНИЕ ЕСТЕСТВЕННОй ПРОДУКЦИИ В ХИМИЧЕСКОМ ЭКСПЕРИМЕНТЕ //Педагогические науки. – 2010. – №. 4. – С. 27-28.
4. Кучкаров М. А., Холикова Д. Д., Хайдарова Д. Б. КОМПЬЮТЕРНАЯ ИГРА" СБОРКА ПРИБОРОВ ДЛЯ ХИМИЧЕСКОГО ЭКСПЕРИМЕНТА" //Вопросы гуманитарных наук. – 2011. – №. 3. – С. 98-99.
5. Кучкаров М. А., Махкамов М. Ё. РОЛЬ КОМПЬЮТЕРНЫХ ИГР ВО ВРЕМЯ ОЗНАКОМЛЕНИЯ С ХИМИЧЕСКой ПОСУДой И ПРИБОРАМИ //Вопросы гуманитарных наук. – 2011. – №. 3. – С. 96-97.
6. Bakhromovna D. G., Asamovish K. M. The Needs of Interdisciplinary Integration in the Educational System //Eurasian Scientific Herald. – 2022. – Т. 10. – С. 41-44.
7. Sharipovna N. M., Asamovish K. M. TEACHING THE SECTION OF OXYGEN-CONTAINING ORGANIC COMPOUNDS ON THE BASIS OF MODULE EDUCATIONAL TECHNOLOGIES //Berlin Studies Transnational Journal of Science and Humanities. – 2022. – Т. 2. – №. 1.5 Pedagogical sciences.