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Volume-11| Issue-1| 2023 **Research Article**

"APPLICATION OF SOME METHODS OF OBTAINING CALCIUM ELEMENT AND ITS COMPOUNDS (EGG SHELL AS A NATURAL SOURCE) TO TEACHING IN CHEMICAL LABORATORIES."

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Abstract:. In this article, in order to develop the technology of teaching chemistry, several different methods of obtaining calcium and its compounds in laboratory conditions are considered. Information on the use of chicken eggshells, which are a natural and cheap raw material, but considered as waste, for the production of calcium element compounds, and at the same time, the possibility of introducing waste-free technology.

Keywords: Inorganic and organic substances, eggshell, calcium, micro and macroelements, calcium carbonate

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INTRODUCTION

Today, it is an urgent task to introduce simplified methods, using economic and natural resources, while teaching students using ICT in the teaching of chemistry and conducting laboratory activities. Currently, taking into account the above points, we are not limited to the use of inorganic methods for the production of calcium compounds, but the introduction of the use of waste products as raw materials and the enrichment of the lesson with the methods of obtaining environmentally friendly products will increase the interest of students in chemistry.

Chemistry is largely an experimental science. Only theoretical knowledge is not enough to learn this science, conducting practical training, conducting experiments, drawing conclusions based on the obtained results and comparing them with theoretical knowledge will increase students' worldview of thinking from the point of view of science. Laboratory classes in chemistry provide students with basic skills in working with laboratory equipment and containers and create conditions for performing simple experiments. Perfect mastery of theoretical knowledge and educational materials plays an important role in the correct and accurate performance of laboratory exercises [1].

Interesting experiments on calcium and its compounds.

Experiment 1. BLOWING AND MUDDYING THE WATER. Apparatus and reagents: 100 ml flask, glass tube. Clear lime water (slightly slaked lime is dissolved in water and filtered). Half of the flask is filled with a clear liquid, and a bent glass

tube is lowered into it. The bottle is then slowly blown through the other end of the tube (Figure 1). If the blowing is continued for a few seconds, the liquid will become cloudy and turn milky white. If the blowing is continued again, after a few seconds the white cloudy liquid will turn back into a clear liquid. Why does water become cloudy and clear again?

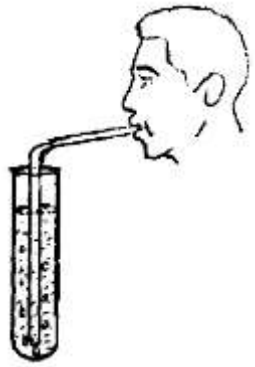

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Figure 1. Muddy water

Air contains 0.03-0.06% carbon dioxide gas. Exhaled air contains about 4% CO_2 gas. And the clear liquid in the flask was not water, but lime water. Lime water contains $Ca(OH)_2$ Exhaled CO_2 reacts with it to form the water-insoluble salt $CaCO_3$, which makes the liquid cloudy.

$Ca(OH)+CO_2=CaCO_3+H_2O$

If the blowing is continued, the CO_2 dissolves in the water and turns into H_2CO_3, which in turn dissolves the $CaCO_3$. again causing the liquid to become clear. In this case, the water-soluble calcium bicarbonate salt is formed:

$H_2O+CO_2=H_2CO_3$

$H_2CO_3+H_2O+CaCO_3= Ca(HCO_3)_2$

Experiment 2. "Burning snow."

Instruments and reagents. Porcelain saucer. alcohol lamp, wood shavings, snow or ice powder from the kitchen refrigerator, calcium carbide CaC2, canning jar. Snow or ice powder is placed up to 3/4 of the canned food placed on the plate, and 3-4 pieces of black stone are placed inside it. If a piece of wood is lit in the flame of an alcohol lamp and held over the snow, it will burn suddenly and continue to burn, producing black smoke (Fig. 2).

Why does snow burn?

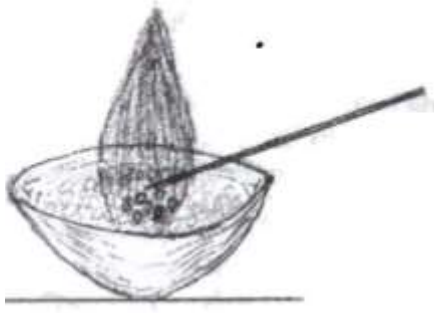

Figure 2. Constant "burning" of snow.

The black stone was calcium carbide. CaC2 reacts with water to form acetylene gas

$CaC_2 + 2H_2O$ - Ca $(OH)_2 + C_2H_2$

Acetylene gas ignites when a burning stick is brought close to the snow.

$2C_2H_2+5O_2$ -$4CO_2$ +$2H_2O$

Due to the large mass fraction of carbon in the acetylene molecule, it ignites [2].

Experiment 3.

We all know that eggs do not bounce, but crack when they fall to the ground even from a small height. What if we could bounce the egg without it cracking? For this, you will need simple things that are available in your kitchen. For this magical experiment with eggs, you will need vinegar and a glass jar. Pour vinegar and put the egg in a glass container. Acetic acid (CH3COOH) reacts with the calcium carbonate present in the shell and dissolves it. In the end, the only thing left is protein without a soft shell with a protective coating. Thus, the egg jumps out compressed. This is a great egg experiment that you can try at home.

Experiment 4. Preparation of calcium chloride from eggshell.

In the preparation of calcium chloride from eggshells, the concentration of HCl, the ratio of eggshell to HCl and their interaction have a significant effect on the percentage yield and purity of calcium. When crushed eggshells are mixed with a hydrochloric acid solution, bubbles form continuously for 3 hours, after which no more gas remains, leaving only a small amount of eggshell in the mixture. 110-115°C on the plate, the crystals obtained in this way are analyzed by X-ray diffraction.

The drying temperature can affect the forms of CaCl2 obtained. At 204.4°C, hydrated calcium chloride is formed, and at 371.1°C, anhydrous calcium chloride is formed. Properties of eggshell. Analysis of eggshells showed that, in addition to CaCl2, it contained 1.75% Mg and its hydroxide, 0.18 mg/kg As, no more than 20 mg/kg Pb, and 15 .9 mg/kg fluoride. Summary of the work: 100 kg of crushed and dried eggshell consists of 95.74 kg of ash, mainly calcium carbonate. Eggshell can be prepared by hydrolyzing calcium chloride.

The reason why we use calcium obtained from egg shells is that the part of egg shell, which is currently considered a waste product, is a natural source of calcium and phosphorus. It is used as a 5% additive to the feed of animals (cattle, chickens) in agriculture to start getting calcium from it, to produce calcium water. In some places, crushed holly is used as a fertilizer for gardens (mainly tomatoes and house flowers).

Eggshell is a natural product. The main element of the eggshell is calcium carbonate, which is about 90% of the eggshell. The rest of the egg shell consists of more than 30 trace elements, the most useful for humans are phosphorus, iron, sulfur, silicon, zinc, manganese and molybdenum, amino acids lysine, methionine, and cystine [3].

Conclusion.

Based on the above-mentioned research works and the ideas mentioned in the literature, we can say that chemistry is a difficult subject to study and at the same time to teach, but it is also interesting and the most important for all areas of life. It is no exaggeration to say that it proved once again that it is a necessary and important science. Today, the use of innovative technologies for teaching and conducting laboratory activities in chemistry is lacking, as it has become clear that the use of cheap, high-quality, natural and environmentally friendly raw materials is necessary for teaching chemistry to children and for the chemical industry. . Taking this into account, we have given examples from several laboratory exercises, and at the same time, we can conclude that the same and even better results can be achieved from eggshell powder as a natural source, as a useful, harmless and cheap raw material.

REFERENCES:

1. Fayziyev X.O., Atqiyayeva S.I. //“Laboratoriya mashg’ulotlarini bajarish uchun” uslubiy qo’llanma. S-3,10.Bo’stonliq. 2022.

2. T. Do‘stmurodov, A. Aloviddinov. //“Qiziqarli kimyo.” S-22, 38-39. Toshkent. 2005.

3. Fayziyev Xayrullaxon Omonilloyevich, Xabibullayev Abdullazizxon Omonillo o‘g‘li, Atqiyayeva Sanobarxon Ismoilxon qizi. //“FERTILIZERS USED IN CULTIVATION OF MEDICINAL AMARANTH PLANT AND NATURAL SOURCES ENRICHED WITH COMPOUNDS OBTAINED FROM CHICKEN EGG SHELLS AS NATURAL BIOACTIVE FERTILIZER.” International Journal of Education, Social Science & Humanities. FARS Publishers. Volume-11| Issue-1| 2023. Pp-321-325. https://doi.org/10.5281/zenodo.7523871