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Ўзбекистон

# **K**ompozitsion **M**ateriallar

Ilmiy-texnikaviy va amaliy jurnali



Ўзбекский научно-технический и производственный журнал  
**Композиционные материалы**

EDS (Energy Dispersive X-ray Spectroscopy) natijalari asosida quyidagi elementlar aniqlangan:

- Uglorod (C) – 47.02% (mass)
- Azot (N) – 8.47% (mass)
- Kislород (O) – 33.74% (mass)
- Mis (Cu) – 10.77% (mass)

Oltinugurt (S) signali spektrda zaif aniqlangan. Ushbu natijalar kompleks tarkibidagi organik ligand va metall ionning muvaffaqiyatli koordinatsiyalanganligini tasdiqlaydi.

EA va SEM natijalari bir-birini to'ldiradi. EA natijalari molekulyar formulaga mos elementar tarkibni ko'rsatsa, SEM-EDS kompleksning morfologik va tarkibiy strukturasi ko'rsatadi.

Kompleksning yuqori uglerod va kislorod miqdori organik ligand asosli strukturaga ega ekanligini bildiradi. Mis ionining mavjudligi 10% dan ortiq bo'lishi kompleksning metall markazli strukturaga ega ekanligiga dalildir. SEM tasvirlardagi aglomeratsiyalar sintezning kristallanish sharoitlarini takomillashtirish zarurligini bildiradi.

Sintez qilingan Cu(II)-AMTT kompleksi EA va SEM usullari yordamida har tomonlama tahlil qilindi. Natijalar kompleksning nazariy tarkibga to'liq mos kelishini va yuzaning xos morfologik tuzilishini ko'rsatdi. Bu birikma biologik faol modda, katalizator yoki korroziyaga qarshi vosita sifatida istiqbolli namuna hisoblanadi.

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## OPTIMIZATION OF BERTOLE SALT OBTAINING TECHNOLOGY THROUGH SILVINITE RECYCLING

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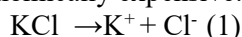
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**Abstract:** The article presents methods for obtaining Bertholle salt with a content of up to 65% by processing ilvinitite and determining the composition of the obtained salts using modern devices. Methods for separating potassium chloride and sodium chloride from each other and electrolysis, as well as methods for recycling the product using waste-free technology, are presented.

**Keywords:** sylvinitite, hydrogen, oxygen, potassium chloride, sodium chloride, bertole salt, electrolysis, technology, potassium hydroxide.

**Introduction.** Today, chlorine compounds are considered to be of primary importance in the chemical composition of the earth. In particular, the role of chloride compounds with active metals is unparalleled. Sylvinitite, a salt formed by the chlorides of sodium and potassium, is one of the most common substances in the world. Extracting potassium and sodium ions from sylvinitite is economically expensive.



It can be extracted mainly using electrolysis methods. Salts are dissolved during electrolysis by releasing potassium or sodium ions into the cation and chlorine ions into the anion.

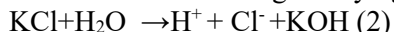
**Literature review.** Russian scientists have conducted experiments on obtaining sylvinitite through mineral processing and the initial sylvinitite ore, which contains potassium chloride (KCl) and sodium chloride (NaCl) and is sent for processing to

obtain the target product potassium chloride (KCl), contains clay-carbonate mixtures (clay clay), which have a high specific surface area. [1-2]

Scientific research has been conducted around the world to study the composition of chlorides and their isolation. In particular, the reduction of potassium chlorate to oxygen at high temperatures and its effect on metal combination reactions were studied. [1-2]

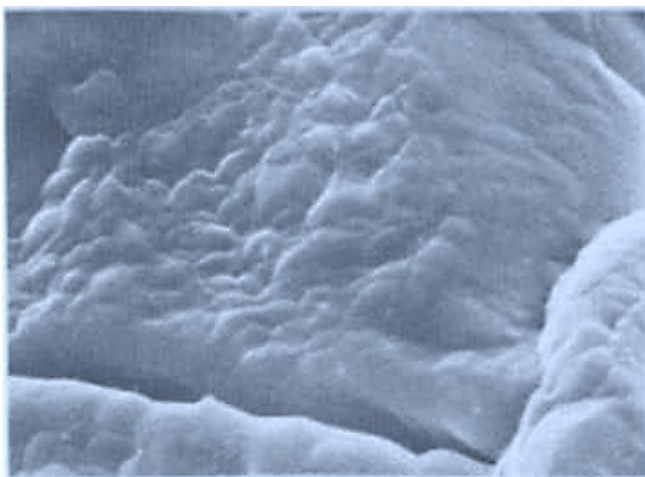
**Research methodology.** These experiments used analytical methods to separate salts based on their water solubility coefficients. In the determination of Bertole salt, substances were identified using a high-resolution scanner (dermatogamma) and characterized based on DTA curves. Potassium chloride was isolated by electrolysis and passed through a hot alkaline solution.

**Results and their analysis.** The experiment began with the electrolysis of 1012 grams of sylvinit. Figure 1. In this experiment, the Cl<sup>-</sup> ion contained in sylvinit was collected in the anion and collected in a column through a drying device.

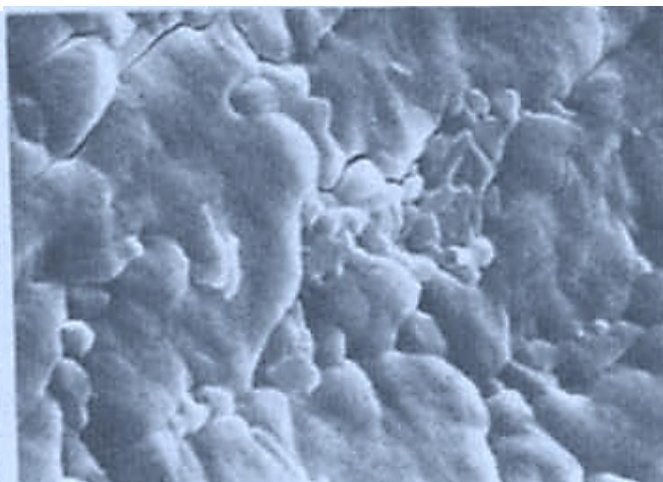


As the concentration of the alkali solution remaining in the solution increased, it began to collect in a crystalline state at the bottom of the

electrolysis device. This alkali was separated and an alkali solution was prepared, the prepared solution was heated to a temperature of 85 °C. Dry chlorine gas was introduced into the boiling alkali, in this experiment, chlorine was oxidized to chlorate salt in a boiling alkali solution.



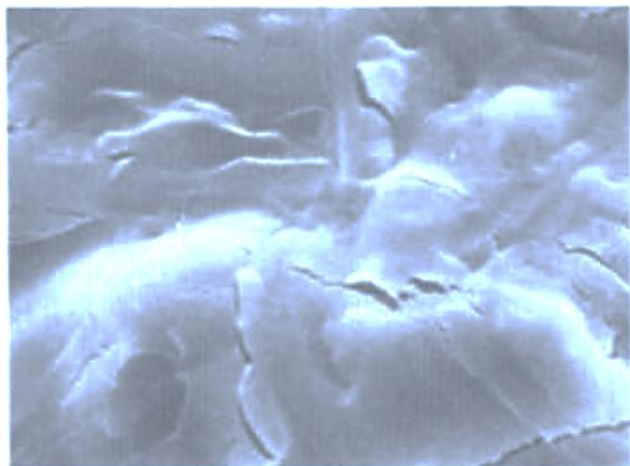
**Figure 1. NaCl va KCl salt DTA curves**



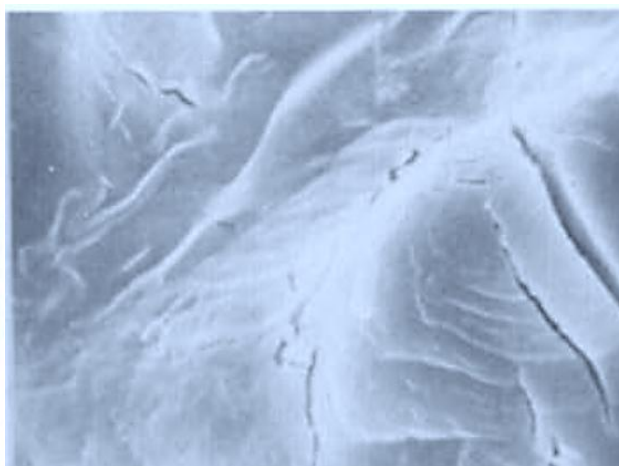
**Figure 2. KClO<sub>3</sub> va KCl NaCl salts DTA curves**

When the composition of the salts obtained was examined, it was determined that they were chloride and chlorate salts of potassium and sodium. 2.rasm. These salts were separated from each other by their solubility, that is, the product was heated to 102 °C and at 72 °C, potassium chlorate and at 50

°C, sodium chlorate salts were observed to precipitate in crystalline form at the bottom of the container. The obtained crystals were examined by DTA. Figure 3-4. Potassium and sodium chlorates were detected in the composition of the examined products.



**Figure 3. 72<sup>0</sup>C crystal obtained up to NaClO<sub>3</sub> va KClO<sub>3</sub> salt DTA curves**



**Figure 4. 50<sup>0</sup>C crystal obtained up to NaClO<sub>3</sub> va KClO<sub>3</sub> salt DTA curves**

These salts are used in many industrial production facilities. The technology for producing Berthollet salt from sylvinit is mainly developed in industrial plants by drying the chlorine produced by electrolysis. This is because the low moisture content of chlorine leads to the formation of hydrochloric acid. Hydrochloric acid will corrode any iron or polyethylene. As a result, the chlorine

gas composition is destroyed and the pipes are corroded. This scientific work is considered green technology, and the creation of the technology is considered waste-free.

The efficiency of obtaining Bertole salt is 450 grams, with a yield of 70%, when the market price of 1 kg of sylvinit is 1,500 sum, and the chlorate salt is extracted from its composition by electrolysis

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