STUDYING METHODS OF OBTAINING BISCHOFITE FOR THE DEVELOPMENT OF TECHNOLOGY FOR OBTAINING IT FROM BRINE OF LAKES KARAUMBET AND BARSAKELMAS

Tojiev Rustam Rasulovich

Doctor (DSc) in Technical Sciences,

Rector of Fergana International Insitute of Food Technology and Engineering

Republic of Uzbekistan, Fergana

Email : Rustamjontojiyev 658@ gmail . com

Yusupov Ilyosbek Usmonbek o`gli

Master's student of the Department of Chemical Technology , Fergana Polytechnic Institute, 150107, Fergana , Republic of Uzbekistan, st. Fergana, 86

Email : ilyosbekyusupov 872@ mail . com

Abdulhamidov Abdusamad Mahmutjon o`gli

Master's student of the Department of Chemical Technology , Fergana Polytechnic Institute, 150107, Fergana , Republic of Uzbekistan, st. Fergana, 86

Email : abdusamad abdulxamidov3710@mail.com

ANNOTATION: *The results of chemical analysis showed that the main components of brine from lakes Borsakelmas and Karaumbet are sodium, magnesium cations, chlorine and sulfate anions. Calcium and iron are practically absent. The salt content in brine ranges from 30 to 42%. The chemical composition of brine from the Borsakelmas deposit is noticeably different from the composition of brine from the Karaumbet deposit in that it contains more sodium and chlorine ions. And the brine of the Karaumbet deposit has a higher content of magnesium and sulfate ions. It has been shown that the brine of the Karaumbet deposit contains more magnesium salts and less sodium salts, which is in good agreement with reference data on the study of solubility in the systems Na+, Mg2+//SO42-, CI- – H2O. The total salt content of Karaumbet brine is approximately 1.2 times higher*

than the Borsakelmas brine, but at the same time the NaCl content is 4-5% lower, which indicates that a significant part of the NaCl from the Karaumbet brine has already been separated into sediment and this process continues.

Key words: *defoliant, magnesium chlorate, hydrochloric acid, magnesium chloride, extraction of bromine, potassium and calcium, bischofite, Karaumbet, Borsakelmas brine.*

STUDY OF THE CHEMICAL, MINERALOGICAL COMPOSITION OF SALT LAKES KARAUMBET AND BORSAKELMAS

In the world, the main prospect for the development of agriculture is associated with increasing productivity and quality through the introduction of the latest technologies for soil cultivation and cultivation of crops, the creation of high-yielding varieties of industrial crops and, of course, the use of comprehensive measures, including the use of mineral fertilizers, plant protection products, defoliants and other preparations. Therefore, much attention has recently been paid to the development of new, highly effective, safe types of defoliants for cotton. Most new defoliants are based on the use of magnesium chlorate. The raw material for the production of the latter is magnesium chloride.

Magnesium chloride is used in the chemical industry, light industry, energy industry (additives to high-sulfur fuel oils burned by thermal power plants), construction, medicine (balneotherapeutic agent), as a raw material for the production of metallic magnesium. It serves as one of the types of raw materials for the production of magnesia, is used as a finishing agent in the textile industry and for impregnating wooden structures to make them fire-resistant, and is used for the production of defoliants; its solutions are used as antifreeze to prevent the freezing of switches on railway tracks [1-4].

A major consumer of bischofite is the construction industry. A small addition of it to cement raw materials allows plants to switch over to low-temperature synthesis technology. The new technology allows, by reducing the

firing temperature of cement raw materials by 300°C and easier grinding of clinker, to increase the productivity of cement kilns and reduce fuel consumption by 30% and electricity by 20% [5,6].

Magnesium chloride is a crystalline hexahydrate mixed with small amounts of tetrahydrate. According to GOST 7759-55, it must contain no less than 45.0% $MgCl_2$ and no more than 2.0% alkali chlorides, 1.6% sulfates ($MgSO_4$), 0.2% calcium salts (CaO) and 0.1 % insoluble residue [4] .

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In agriculture, bischofite used to produce magnesium fertilizers. Microadditives of bischofite increase the balance of feed and provide an increase in daily weight gain compared to the control in pigs by 16%, in young cattle up to 23% and chickens up to 8-12%.

Today, the world pays special attention to the development of technology for producing pure magnesium oxide salts with the involvement in the production of available raw materials, brines of salt lakes, sea water, and natural deposits. In this aspect, an important task is the development of technology for obtaining magnesium chloride from the lakes of Karaumbet and Borsakelmas.

In order to determine the composition of brine from lakes Borsakelmas and Karaumbet, 11 samples of solutions from these lakes were selected. Seven samples

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from the salt loading site approximately 2 km from the shore, where the staff building is located (northern part of the lake);

from a pit where salt was previously mined;

in the north of the lake, 200 meters from the shore;

700 meters from the shore, the center of the future pool;

500 meters south of the center of the basin;

500 meters east of the center of the basin.

Samples were taken from Lake Karaumbet:

from the place of salt extraction ;

NaCl salt was previously mined , the mixed salt zone;

pit No. 1, where brine is selected and pumped to the plant;

pit No. 2, where brine is selected and pumped to the plant.

The samples were kept for 3 days at room conditions, filtered, subjected to chemical analysis, and some physicochemical characteristics of the solutions were determined. The results of the chemical analysis are shown in tables 1-2. Serial numbers of samples correspond to sample numbers.

Chemical composition of brine from the Borsakelmas and Karaumbet deposits

	M							
		MgO						

As shown by the results of chemical analysis, the main components of brine from lakes Borsakelmas and Karaumbet are sodium and magnesium cations, chlorine and sulfate anions. Calcium and iron are practically absent. The salt content in brine ranges from 30 to 42%.

As can be seen from the tables, the chemical composition of brine from the Borsakelmas deposit is noticeably different from the composition of brine from the Karaumbet deposit. Thus, the brine of Lake Borsakelmas contains more sodium and chlorine ions. The content of Na_2O ranges from 9.97 to 15.43%, and chlorine - from 15.2 to 23.5%, while these indicators for the brine of Lake Karaumbet vary from 8.91 to 12.06% and from 15. 6 to 18.9%, respectively, for Na_2O and chlorine.

Rapa from the Karaumbet deposit has a higher content of magnesium and sulfate ions. The magnesium content in Karaumbet brine is 2-3 times higher and ranges from 4.55 to 6.27% in terms of MgO, while the brine of Lake Barsakelmes contains from 1.37 to 4.57% magnesium oxide. Consequently, the brine of the Karaumbet deposit contains more magnesium salts and less sodium salts, which is in good agreement with reference data on the study of solubility in the systems

$$Na^+, Mg^{2+} // SO_4^{2-}, CI^- – H_2O.$$

In addition, the total salt content is also higher, as indicated by the salt content data. Based on the analytical data, the salt composition of brine was calculated (Table2). In this case, it was assumed that all $Na^{+\text{in the solution}}$ is in the form of NaCl, the remaining chlorine is in the form of $MgCl_2$. Sodium ions not associated with chlorine form with sulfate ions Na_2SO_4, and the remaining part of sulfate ions is associated with magnesium.

Table 2

Salt composition of brine from the Borsakelmes and Karaumbet

deposits

Averaged compound							
Averaged compound							

As can be seen from the table, in Karaumbet brine the NaCl content ranges from 16.8 to 22.7%, $MgSO_4$ - from 5.2 to 8.3%, $MgCl_2$ - from 6.2 to 8.3%.

the Borsakelmas deposit contains from 18.8 to 29.0% NaCl, from 1.8 to 4.7% $MgSO_4$ and from 1.2 to 7.1% $MgCl_2$.

The total salt content of the Karaumbet brine is approximately 1.2 times higher than that of the Borsakelmas brine, but the NaCl content is 4-5% lower, which indicates that a significant part of the NaCl from the Karaumbet brine has already

been separated into sediment and this process continues.

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