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TECHNOLOGY OF OBTAINING SUPERPHOSPHATE FROM CENTRAL KYZYLKUM PHOSPHORITES WITH A LOW CONTENT OF FREE PHOSPHORIC ACID

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Annotation: The article shows a decrease in the amount of free acids of simple superphosphate can be achieved through the use of technology for long-term storage of products, as well as mixing technology using screws.

Keywords: superphosphate, sulfuric acid, washed phosphoconcentrate of Central Kyzyl Kum, free acid, acid decomposition, storage, screw mixing, reduction of free acid.

In the period of technical development of the present time, population has grown rapidly, land resources and water resources are reduced, rational use of mineral resources of the world scale, further development of the existing fertilizer production industry, as well as the production of new types of fertilizers are causing problems. When speaking of new types of fertilizers-fertilizers with a lot of easily digestible substances by the plant in the composition, which do not pollute the environment during the production process, which are not high in the cost of production are understood. On the basis of such requirements for fertilizers, it is possible to develop agriculture, to provide the population with a high level of mineral fertilizers for the reproduction of abundant and high-quality food products, including fruits and vegetables, and even technical raw materials[1].

When providing fertilizers, it is worth noting not only the amount of fertilizer, but also the fact that it contains nitrogen, phosphorus and potassium substances, which appear to be absorbable in the composition of the fertilizer.

In our country there are several types of mineral fertilizers production industry, among which the nitrogen and phosphorus fertilizer industry has developed on a large scale. The main raw material for phosphorus fertilizer is phosphorites[2]. This mineral is a local central Kyzylkum phosphorite, on the basis of which phosphorous mineral fertilizers are produced, the content of which is from 15% to 46% of the current.

It is known that in modern times, every industrial production is subjected to the demand for the use of technologies with little output and without output as much as possible. If it is not possible to apply the technology without waste, it is necessary to create an opportunity to establish the use of the generated waste as a secondary raw material. It is worth noting that the technology of production of phosphorus mineral fertilizer – simple superphosphate, based on the technology without the release of phosphorites, is still used in practice.

When the superphosphate reacts with sulfuric acid - phosphorite -, which is obtained for the reaction in the composition, the following process is observed:

$$Ca_5F(PO_4)_3 + 5H_2SO_4 = 3H_3PO_4 + 5CaSO_4 + HF\ .$$

c As is known, in addition to the main phosphoric acid, which is formed in the process of decomposition of phosphoric acid kaltsium digidro-and gidrophosphates are formed:

$$2Ca_5F(PO_4)_3 + 17H_2SO_4 = 3Ca(H_2PO_4)_2 + 7CaSO_4 + 2HF\ ,$$

$$2Ca_5F(PO_4)_3 + 4H_2SO_4 = 6CaHPO_4 + 4CaSO_4 + 2HF\ .$$

In addition to the specified calcium compounds of phosphoric acids, which are formed at the initial stage of phosphocontcentrate, there are cases of free formation, as well as cases of non-decomposition of calcium compounds in the composition of phosphorite. Therefore, according to the technology of production of superphosphates, they are stored for several days in ovens. During this period, free acids go through the process of decomposition of phosphorusitlarni that is not decomposed.

Research methods and object. Laboratory work was carried out in a laboratory device with a simple glass reactor, using a simple mixer with a slight addition of sulfuric acid to phosphorite of the specified stexiometric standard, by mechanical distillation. To conduct laboratory work, a thermal concentrate of Central Kyzylkum phosphorite (composition: R2O5 – 25,68%; Sao – 53,28%; SO2 – 2,68%; MgO – 1,22%; R2O3 – 3,58%; SO3 – 5,01%) and a 70% solution of 93% sulfuric acid were obtained. The stexiometric norm of sulfuric acid was determined by the amount necessary for the decomposition of calcium in phosphorite.

The spacing lasted up to 5 minutes and divided them into 2 parts, each of which was analyzed at the specified times(up to 20 days). The phosphorkk contained was determined in the photocolorimetric method, λ = 440 nm wavelength[3].

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Results of the study: sulfuric acid, which is given by a stexiometric norm of 60-70% in relation to the content of kaltsium in phosphorite, forms phosphoric acid at the initial separation stage as a result of decomposition of phosphorite. But no matter how much it is crushed, there will be pieces that do not decompose in appearance, which are in the composition of phosphorites. This can be seen from the graphic image below(picture 1):

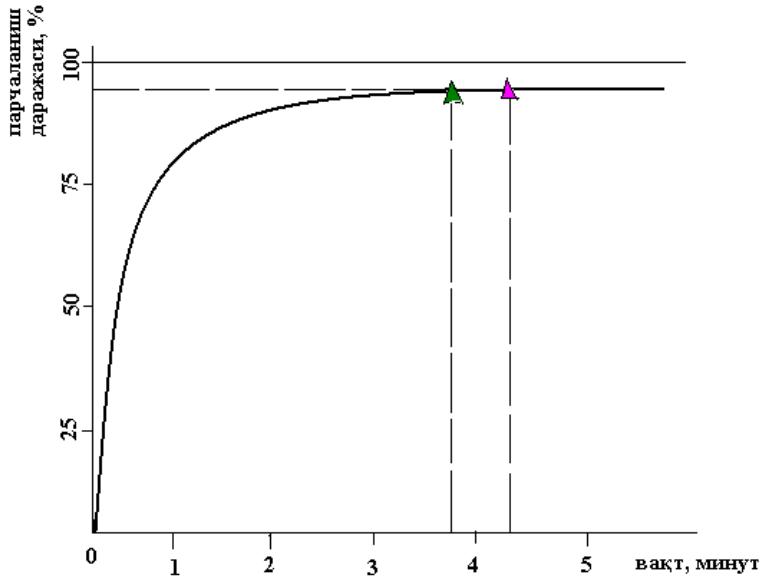

Figure 1: the degree of decomposition of phosphorites in sulfuric acid when obtaining ordinary superphosphate.

As can be seen from the picture, phosphorite reaches a high degree of decay within the first minute. In order to achieve a greater decomposition of the formed superphosphate, they are stored in the form of pellets up to 20-25 days in the Ovens. The main reason for this is that during the initial sulfuric acid decomposition, phosphorite decomposes and phosphoric acid is formed. However, all of the sulfuric acid included in the process is contained in the free sulfuric acid superphosphate, since it does not fully react. It remains to say that even the initially formed free phosphoric acid does not fully participate in the decomposition of phosphorusitlarni. Therefore, superphosphates obtained in the technology of superphosphate production are put on long-term storage.

A lot of scientific research is being carried out on modernization of the current production processes, identifying the shortcomings observed in the current technologies and eliminating these shortcomings. In this regard, when ordinary superphosphate was examined under experimental conditions, it was determined that even after mixing 20-25 times in 2-3 days with the help of an ordinary shovel mixer, its composition contained an excess of the norm of undistorted phosphorites. In order to eliminate this, by mixing this superphosphate with a Shnek mixer applied in the experiment, a reduction was achieved in the amount of free acids contained in the superphosphate and the amount of undissolved phosphorites, resulting in a mixture with a Shnek mixer compared to a simple shovel-device mixer.

In the process of storing superphosphates, separation was carried out in two ways, comparing them to each other, with Schneider separation, a significant reduction in their amount compared to simple mixing was achieved on account of the decomposition of phosphorusitlarni, in which the free acids in it did not react.

These were determined on the basis of chemical analysis of GOST 20851.2-75 – phosphate and mineral fertilizers by neutralization of free acids in superphosphate, decomposition levels of phosphorites were determined on the basis of differences between them in total and absorbable phosphors[4,5,6,7,8,9,10,11,12].

Total um in the composition of superphosphate. superphosphate was analyzed by melting in zar water, a solution of assimilated ozl Peterman. The results of the chemical analysis were repeated 3 times, and the average value of the results obtained can be seen through Table 1 below:

Decrease in the amount of free acids in the composition of superphosphate, depending on the time, on the account of % :

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Table 1

лота тури	**нда**	**нда**	**ында**	**ында**	**ында**
result of simple spacing					
H_2SO_4					
H_3PO_4					
result of schnekle spacing					
H_2SO_4					
H_3PO_4					

The degree of decomposition of phosphorites in the composition of superphosphate, on the account of % :
Table 1

ay	y	ay	ay	ay
result of simple spacing				
5	6	8	2	3
result of schnekle spacing				
8	2	4	8	6

According to the results of the analysis, the final stage of the technology of obtaining a simple superphosphate – according to the terms of their storage and the types of mixing, the degrees of decomposition of phosphorites can be seen through the graphic image below(Figure 2):

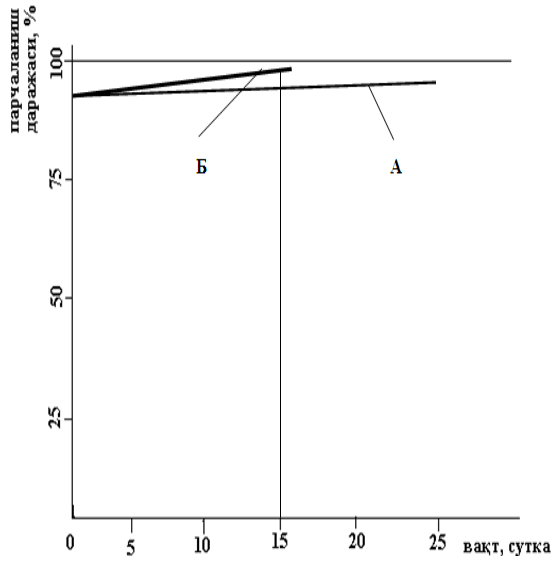

Figure 2: increasing the degree of decomposition of phosphorite by long - term storage of simple superphosphates: A - in the method of simple recombination; B-recombination through a syringe mixer.

As can be seen from the picture, the degree of decomposition of phosphorite with a simple mixed superphosphate content is almost equal to the degree of decomposition of phosphorites with a daily storage of 25 with a Shnek mixed when stored 10 days. This means that the phosphorus deposited in storage can also be achieved by yaxshilab thoroughly decouplingtirishga shortening their maturation period.

Conclusion. Both the excess of the norm of the amount of free acids contained in a simple superphosphate, and the excess of the amount of undissolved superphosphate, also have a negative effect on the quality of fertilizer. According to the results of the obtained experience, the spacing of the product obtained in ordinary superphosphate production enterprises with the help of a shnek during a long storage period leads to a better mixing of superphosphate, which in turn leads to an increase in the quality of the finished product. In addition, the time of maturation of an ordinary superphosphate is reduced by 2 times. The degree of decomposition of phosphorite in the bun reaches a high indicator.

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