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«PROCUREMENT OF LOCAL RAW MATERIALS COMPLEX FERTILIZERS WITH NITROGEN-PHOSPHATE-POTASSIUM CONTAINING MOISTURE»

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PROCUREMENT OF LOCAL RAW MATERIALS COMPLEX FERTILIZERS WITH NITROGEN-PHOSPHATE-POTASSIUM CONTAINING MOISTURE

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Abstract:

Objective. In the article, a study on obtaining complex fertilizers with a gel composition that preserves mineral components by introducing local raw materials FarPAN, organic and inorganic acids and MAP (monoammonium phosphate), MPP (monopotassium phosphate) as fertilizers, N:P:K fertilizers with different ratios work has been done. The optimal parameters for the synthesis of the obtained moisture-retaining complex fertilizers have been determined.

Keywords: complex fertilizer with gel composition, FarPAN, monoammonium phosphate, monopotassium phosphate, NPK.

Introduction. At the beginning of the 21st century, generally accepted crop cultivation technologies cannot provide stable high yields, respectively, improve the quality of life of the population, due to various factors, such as adverse weather conditions, environmental pollution, soil degradation and salinization, etc. d. [1].

That is why the main task at the moment in agriculture is to increase soil productivity, its regeneration and restoration.

One of the main ways to solve the problem in agriculture and horticulture is to maintain the water-salt balance and improve the physicochemical and physical properties of the soil, as well as replenish it with nutrients necessary for the growth and development of living organisms.

For growth and sustainable development, plants need macronutrients: nitrogen, phosphorus and potassium, as well as microelements: Na, Ca, B, Cu, Fe, etc. The presence of nitrogen available to the plant plays the most important role in plant life. Being the main component of amino acids, it is part of the cytoplasm, hormones, vitamins, etc., the presence of nitrogen affects all stages of crop development: from the beginning of plant growth to fruiting. The lack of nitrogen at the first stage leads to a significant decrease in the yield of products, and at the second stage - to a decrease in its quality [2,3].

Potassium is most important for plants from the first days of their growth until flowering. The presence of potassium contributes to an increase in frost resistance and resistance of plants to diseases, increases the absorption capacity of the root system, and promotes the absorption of carbon dioxide from the air [4]. In particular, a lack of potassium at the first stage leads to a delay in the growth of cereal crops and a drop in yield, and at the second stage, to a deterioration in the quality and deterioration of the keeping quality of grain [5].

But the use of various types of fertilizers without the use of the most important substance on Earth - water, is impossible, since water not only ensures the solubility and flow of nutrients in plants, but also making up to 95% of the mass of plants, ensures the flow of all vital processes of the system.

However, at present there is a significant shortage of water associated with the irrational use of agricultural land, plowing, alkalinization, desertification, etc. [6].

One of the ways to solve the tasks set is the use of sorbents, which allow not only increasing the water-retaining capacity of soils, but also improving the structuring of soil aggregates [7–10].

A number of studies have been carried out in this aspect. In particular, preparation of a new core–shell slow-release fertilizer formulation was conducted through the coating of commercial NPK fertilizer with hydrogel/clinoptilolite (Hyd/CL) nanocomposite. The Hyd/CL nanocomposite was prepared from free radical polymerization of sodium alginate, acrylic acid, acrylamide, and clinoptilolite zeolite. The uniform coating on the surface of the fertilizer granules was verified by scanning electron microscopy. The swelling kinetics as well as the water-retention property and water absorption rate of the prepared samples was studied [11-13].

Taking into account the above, in order to develop agriculture, horticulture and farms, to meet the demand for phosphorous fertilizers in our country, a number of researches were carried out at the Namangan Institute of Engineering and Technology, the Scientific Laboratory of Chemical Technology of Inorganic and Organic substances. As the main raw

material of our research, FarPAN substance produced in Ferganazot in the territory of our Republic was used [14-20].

Materials and methods. For research work in this laboratory, FarPAN, formalin, organic acid, sulfuric acid, nitric acid and MAP (monoammonium phosphate), MKP (monopotassium phosphate) N:P:K (10:10:40) and N :P:K (10:52:10) was used to study the mechanisms of obtaining complex fertilizers containing mineral components. The research was conducted in a laboratory equipped with a special mixer (model OSO-20). In order to create gel-containing complex fertilizers, the initial substances were sequentially placed in a glass (1000 ml), mixed in a water bath and heated at a temperature of 70-75°C. According to sample 1 obtained by the nitric acid method, the formation time of the gel-like mass was 32 minutes, by the sulfuric acid method it was 24 minutes, and by the sulfate+nitrate method it was 26 minutes. Among these samples, the level of water absorption showed that it was slightly higher compared to the remaining ones in the nitric acid method. The research was continued by introducing nitrogen-phosphorus-containing components, and the consumption of inorganic acids was taken as in sample 1 above. The environment and temperature of the mixture were monitored during the reaction for all 4 samples. The most important parameters in the synthesis of gel-containing complex fertilizers are listed in Table 1

Table 1

The most important parameters in the synthesis of gel-containing complex fertilizers

Basic reagents for obtaining gel-containing complex fertilizer	Consumption rate of inorganic acids								
	Nitrate method (HNO_3)			Sulfate method (H_2SO_4)			Sulfate+nitrate method (HNO_3+ H_2SO_4)		
	Growth medium (pH)	Production time (min)	Stuttering rate (times)	Growth medium (pH)	Production time (min)	Stuttering rate (times)	Growth medium (pH)	Production time (min)	Stuttering rate (times)
Farpan+formalin+Monoammonium phosphate	6,09	32	32	5,65	24	30	5,95	26	27
Farpan + formalin + monopotassium phosphate	5,78	19	24	6,13	6	23	5,42	20	21
Farpan + formalin + N.P.K (10.10.40)	5,91	43	21	5,82	22	18	5,74	37	15
Farpan + formalin + N.P.K (10.52.10)	5,98	31	28	6,01	25	26	5,89	34	20

In this table, we observed that the medium for the formation of gel-containing fertilizers (pH) was in the range of 5-6. In order to monitor the results of the analysis, the pH medium (model pHscan30S) was determined using the device. As can be seen from the table, the highest environment was formed by the sample obtained with MPP fertilizer with nitric acid. The low indicator was the sample when we added MPP fertilizer in the presence of nitrate + sulfate.

Results and discussion. During the experiment, the formation times of each sample were also analyzed. The times analyzed in Table 1 were calculated after

the acid was poured at the last stage of raw materials in the production of gel-based fertilizers. The obtained samples were dried in a drying device at a temperature of 60◦C. It is presented in Fig. 1.

A) B) C) D)

Figure 1. Complex fertilizer with gel composition. A) Sulfate + nitrate method (HNO_3+ H_2SO4) MPP fertilizer, V) Nitrate method (HNO_3) MAP fertilizer, S) Sulfate method (H_2SO_4) N:P:K (10:52:10) fertilizer

Figure 1. shows the collection of white salts during drying in the gel fertilizer MPP in the Sulfate+nitrate method (HNO_3+ H_2SO_4) in the sample in A) and in the sample in C) in the sulfate method (H_2SO_4) N:P:K (10:52:10) and it was observed that more white salts were collected during drying in the gel-containing fertilizer.

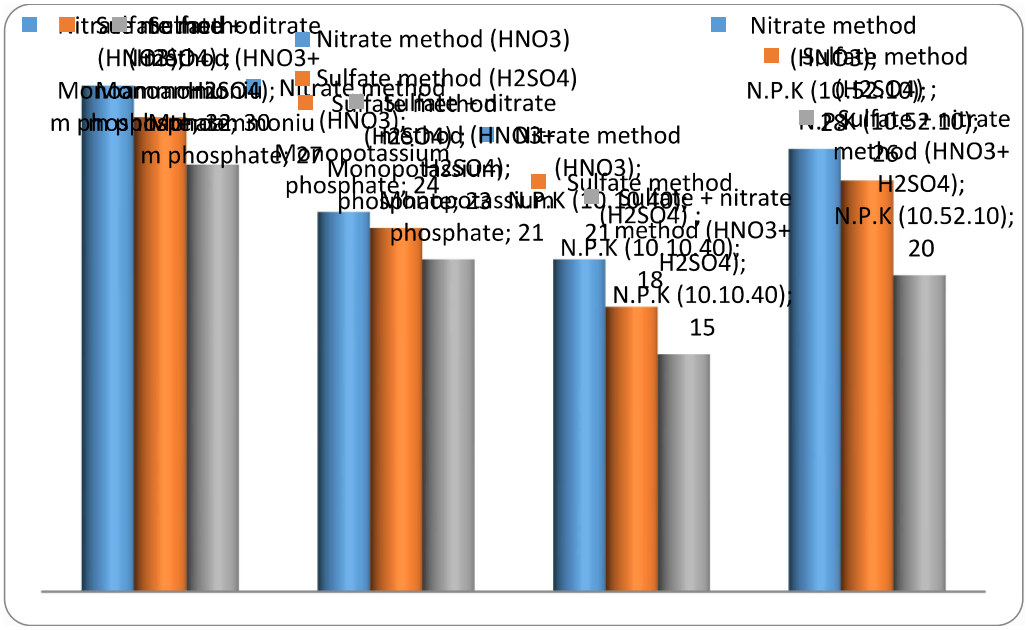

Figure 2. The diagram of the solubility of gel-containing complex fertilizers

In B) and D) samples, it was observed that this gel-based fertilizer, obtained by the nitric acid method, came out transparent. After that, the degrees of absorption of gel-containing fertilizers were studied. They are given in Figure 2.

For this, 1 g of samples were taken and 10 ml of water was poured into them. According to the obtained results, it was observed that the MAP gel-containing fertilizer obtained by the nitrate method was 32 times larger, and the N:P:K.

(10:10:40) gel-containing fertilizer sample by the sulfate method was 15 times larger.

Conclusions. From the laboratory analyzes obtained in this way, the environment and times of formation of complex fertilizers with gel composition were studied. The degrees of swelling calculated from the important indicators of the obtained samples were determined. In the future, it is planned to analyze the salts on the surface by physico-chemical methods after drying the samples obtained in gel-containing fertilizers with the presence of sulfuric acid. Translucent and moisture-retaining gel-complex fertilizers are used in agriculture, horticulture and farms as mineral fertilizers and water resource-saving complex fertilizers in water-scarce areas.

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STUDY OF THE STRUCTURE AND PROPERTIES OF POLYVINYL CHLORIDE FILLED WITH BAZALT MINERAL

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Abstract:

Objective. At present, many scientific results are being achieved in our country on the use of local mineral fillers in the field of composite materials production. To date, the use of mineral products for the protection of polymeric materials and building horse fires and various aggressive environments is one of the urgent tasks.

The purpose of the work is to obtain heat-resistant and mechanically strong thermoplastic composite materials by filling polyvinyl chloride with basalt mineral.

Methodology. The physical and mechanical properties of filled polyvinyl chloride (PVC) composites were studied, the melt flow index was determined by the viscometric method, the bending strength was

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