ACTIVATION OF KYZYLKUM PHOSPHORITES WITH UREA NITRATE

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Abstract: One of the ways to effectively use phosphorites is by chemically activating them with mineral acid complex compounds of urea (urea nitrate, urea phosphate, urea sulfate) to obtain complex phosphorus fertilizer with gradual effect [1-4]. Phosphorites with nitric acid compound of urea are processed using non-traditional methods, providing an opportunity to organize the production of phosphorus fertilizers in the places of use.

Keywords: fertilizer, phosphorites, acidic soil.

It is known that the main composition of phosphorites consists of medium salts that are poorly soluble in water. Therefore, the plant can absorb phosphorus from them with difficulty, only in acidic soil conditions. Softened (or mechanically activated) phosphorite flour is economically inefficient to obtain, transport and use in agriculture.

Phosphorites of Central Kyzylkum decompose easily and quickly under the influence of mineral acid and salts. This is because the presence of carbonate mineral calcite in phosphorites in three different forms, i.e., «exocalcite», «endocalcite» and

phosphate ions are bound isomorphously (CO_2) in the structural rings of phosphate minerals.

Based on the results of studying the water solubility of Central Kyzylkum phosphorite samples, the data showed that they are practically insoluble in water. Therefore, it is ineffective to use phosphorite in agriculture as a phosphorus fertilizer without activation.

The above-mentioned mineralogical and material composition, structural features of phosphorites confirm the possibility of chemical activation of these raw materials. In order to convert the calciumfluoroapatite contained in phosphorites into the form of plant-absorbable phosphate salts, and to obtain slow-acting complex phosphorus fertilizers, phosphate raw materials were processed with urea, which is well soluble in water.

The amount of the main nutrient elements in the complex phosphorous fertilizer obtained as a result of phosphorite processing, that is, different forms of phosphorus anhydride and calcium oxides (total, water-soluble, plant-absorbable part), nitrogen and pH parameters were chemically analyzed using certain standard methods.

The process of obtaining complex fertilizer by activating non-enriched phosphorite flour (P_2O_5 — 16.38%, CaO — 45.93%, CO_2 — 18.15%, SO_3 — 1.86%) with nitrate urea salt was studied (table).

In laboratory experiments, mixtures of 50:50-10:90 were prepared on the basis of phosphorite flour and urea nitrate (by mass) and the resulting mass was mixed for 30 minutes and dried.

As a result of the research, it was found that the change in the level of activation of phosphorites depends on the amount of salt in the mixture.

Contained in the complex fertilizer added to phosphorite in the amount of 50% urea nitrate (pH=6.60) 98.41% of total phosphorus content of 8.19% is in plant-absorbable form, and 37.48% is in water-soluble form. The degree of activation

(decomposition) of phosphorite increases with the increase in the amount of urea nitrate.

Table

Chemical composition of complex fertilizers obtained by activating phosphorite flour with urea nitrate, %

Urea nitrate: phosphorite flour	N			P_2O_5			CaO			pH
	total	nitr.	amide	total	plant-absorb.	water-soluble	total	plant-absorb.	water-soluble	
50:50	12.18	4.16	8.12	8.19	8.06	3.07	22.97	21.32	19.34	6.60
60:40	14.61	4.87	9.74	6.55	6.45	4.82	18.37	17.77	15.90	1.99
70:30	17.05	5.68	11.37	4.91	4.84	4.71	13.78	13.49	12.44	1.16
80:20	19.49	6.50	12.99	3.28	3.24	3.20	9.19	9.06	8.69	0.64
90:10	21.92	7.30	14.62	1.64	1.63	1.61	4.59	4.54	4.52	0.08

As the amount of urea nitrate in the mixture increases from 60% (pH=1.99) to 90% (pN=0.08), the part of plant-absorbable P_2O_5 in activated phosphorite flour increases from 98.47 to 99.39%, and the part of water-soluble R_2O_5 increases from 73.59 to 98.17%.

It can be observed that the amount of nitrogen increases due to the urea content of nitrate urea in the fertilizer. For example, 12.18% of the total amount of nitrogen nutrients in fertilizers with 50% nitrogen urea added to phosphorite flour contains 4.16% of the total nitrogen nutrients in the form of nitrates, 8.12% in the form of amides, 8.01% and 12.39% of the total nitrogen nutrients are all in the form of amides. By increasing the amount of urea nitrate added to phosphorite flour from 50

to 90% of the mass of fertilizer, the nitrogen content of the obtained fertilizer increases by 1.80 times.

The activation of phosphorites under the influence of urea nitrate can be explained as follows. With an increase in the amount of urea nitrate in the fertilizer, the environmental values decrease from pH=6.60 to pH=0.08, and its acidity increases further. Complex compounds of urea with mineral acids decompose the minerals contained in it as a result of interaction with phosphorite.

New types of complex fertilizers, created on the basis of experience, can be used to activate mineral nutrients, including phosphates, in the soil, which cannot be absorbed by plants.

Therefore, in the activation of phosphorite flour with urea nitrate, it is possible to obtain effective complex fertilizers with nutrients in the necessary proportions for the growth and development of agricultural crops.

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