

PHOSPHORITES OF KARAKALPAKSTAN AND THEIR USE IN AGRICULTURE AS LOCAL FERTILIZERS

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ABSTRACT

In order to create scientific foundations and develop a technology for producing phosphorus-containing fertilizers, the process of activation of low-grade phosphorites with mineral salts - ammonium sulfate, ammonium nitrate, mono ammonium phosphate (ammophos), urea nitrate, ammonium chloride, potassium chloride and urea was studied. Chemical methods of activation of phosphorites of Karakalpakstan can significantly expand the prospect of supplying agriculture with new forms of phosphorus fertilizers.

Keywords: low-grade phosphorite, agriculture, nitrate, urea, potassium chloride, new form, perspective.

INTRODUCTION

As a socially oriented market economy develops in the Republic of Uzbekistan, one of the decisive factors is the development of the chemical industry, in particular, the production of mineral fertilizers.

In the context of the development of intensive farming technologies, with the increase in the leaching of nutrients to the soil, the removal of trace elements also increases significantly. Therefore, increasing the scale of production of fertilizers with trace elements is of particular importance.

It is practically impossible to carry out an even distribution of small amounts of substances containing trace elements in a large mass of fertilizers on significant acreage. Therefore, in order to avoid uneven distribution of trace elements, it is necessary to introduce them into the production cycle of obtaining the main fertilizer.

Currently, the scientifically justified need of the republic's agriculture for fertilizers is expressed in the following figures: 839.6 thousand tons of nitrogen, 518.3 thousand tons of phosphorus and 278.9 thousand tons of potash fertilizers based on 100% nutrients. There are

three large plants for the production of nitrogen fertilizers in the republic, which fully cover the need for agriculture in them.

MATERIAL AND METHODS

Currently, phosphorites are the main raw material of the Karakalpakstan's tuk industry. The expansion of the raw material base by involving low-grade phosphorites in the production of local fertilizers can also be carried out on the basis of phosphate raw materials from Karakalpakstan. There are rich deposits of phosphorites that can be used in agriculture as a raw material of local importance. At the same time, the deposits of phosphorites from the Sultan-Uizdag, Ketzmenshi, Borlytau, Chukai-Tugai, Khojakul, Krantau, Nukus and others deposits can be particularly noted.

The upper layer of phosphorites of the Sultan-Uizdag deposits is represented by sandy nodules, which contains 12.5% P₂O₅, 2-6% one and a half oxides. The lower layer, with a thickness of up to 0.35 m, consists of large nodules, sometimes soldered into a phosphorite plate. In the eastern part of the Sultan-Uizdag mountains, the phosphorous layer comes to the surface and is available for open-pit mining. The phosphorites of the Khojakul, Chukai-Tukai, and Khojeyli deposits belong to the Nodular types and are not continuous single horizons within this zone.

The average content of phosphorus pentoxide in the horizon varies from 5 to 22%. The established reserves within the three deposits amount to more than 36 million tons of ore. The total estimated reserves of phosphorous raw materials are estimated at about 13 million tons of 100% P₂O₅. Such an amount of reserves is capable of providing the agriculture of the Republic of Karakalpakstan with phosphorus fertilizers for a very long period.

RESULTS

These phosphorites belong to low-percentage phosphates, occur in the form of nodules and nodules among clay and calcareous rocks and contain a significant amount of non-phosphate mineral glauconite in the form of bound iron and aluminum oxides. Clay-type phosphorites are found in small quantities. Karakalpak phosphorites contain up to 12% CO₂, i.e. they belong to highly carbonized phosphates.

Previously conducted studies on the processing of unenforced Kyzylkum phosphorites into simple and double superphosphates, nitrogen-phosphorus-calcium fertilizer showed that high-carbonate Kyzylkum phosphorites undergo exiled activation under the influence of various factors. It is known that the more carbonate Ion there is in a phosphate mineral, the greater the specific surface area (porosity) of the phosphate, and the higher its reactivity will be.

When phosphorites are heated to the decomposition temperature of fluorocarbonapatite to fluorapatite, their solubility decreases sharply. Apatites are chemically very stable, and practically insoluble in water. Therefore, in the production of fertilizers, they are decomposed by mineral acids or thermal methods. The higher the agrochemical efficiency and citric solubility of phosphates, the greater the degree of substitution of the phosphate ion with the carbonate ion in the phosphate mineral. Phosphorites can be used for direct application, since they have better solubility compared to apatites.

DISCUSSION

The use of finely ground phosphorite as a direct fertilizer, without any chemical processing, would provide agriculture with the cheapest fertilizer. But with direct application, the fertilizing effect of finely ground phosphorites is more pronounced on acidic soils, less on neutral and alkaline ones. Phosphorous flour is traditionally used as a phosphorus fertilizer on acidic soils.

At pH = 7.0 and above, phosphorous flour can be effective only if special techniques are used to improve its effectiveness (for example, composting with manure, peat, etc.). Our soils are slightly alkaline and methods of activating phosphate raw materials are especially promising for them. In this regard, chemical activation of phosphates can be considered as one of the rational methods of their activation and increase in solubility.

Thus, chemical methods of activation of Karakalpakstan phosphorites can significantly expand the prospect of supplying agriculture with new forms of phosphorus fertilizers. It is known that in the presence of ammonium salts, carbamide and potassium chloride, the solubility of phosphorites increases dramatically. The combined use of phosphorous flour with nitrogen fertilizers is of great and multifaceted importance. In addition to the fact that ammonium nitrate and ammonium sulfate themselves serve as nitrogen food for plants, these soil acidifying fertilizers have a direct effect on increasing the solubility of phosphorous flour and enriching the soil with phosphoric acid. Solubility mainly depends on the nature of phosphorite and the norm of mineral salts.

The increased reactivity of Karakalpak phosphorites and the fundamental possibility of the transition of phosphorus phosphorites into digestible forms in the presence of the above-mentioned salts makes it possible to obtain complexly mixed phosphorus-containing fertilizers using acid-free methods. Here, activation is understood as the conversion of the form of P₂O₅, which is indigestible for plants, into raw materials, into digestible.

Increasing soil fertility in conditions of intensive agriculture is inextricably linked with the effective use of mineral fertilizers. The lands of the Republic of Karakalpakstan lack a mobile and plant-digestible form of phosphorus. As a result of insufficient provision of nitrogen and phosphorus fertilizers to agriculture in Karakalpakstan, crop yields have decreased. In agricultural practice, there are necessary prerequisites for the effective use of not only easily digestible phosphates, but also fertilizers with reduced solubility, such as superphos, thermophosphates, condensed phosphates and complex fertilizers with limited solubility of the phosphate component.

CONCLUSION

The shortage of mineral fertilizers can be compensated by the use of new types of fertilizers based on the chemical activation of poor Karakalpak phosphorites.

It is well known that the most important and scarce element is phosphorus and its compounds, which play an important role in the vital activity of organisms of the biosphere, and cannot be replaced by anything in a living organism, especially in plant nutrition. Providing agriculture with sufficient amounts of phosphate fertilizer is the most urgent problem, which has been repeatedly noted in the decisions of decision-making bodies.

The need of Karakalpakstan for phosphate fertilizers has so far been met by far-imported tuks.

The discovery of granular phosphorite deposits in Central Kyzylkum can dramatically reduce the range of phosphate fertilizers. As well as the discovery of other industrially valuable phosphorite deposits on the territory of Karakalpakstan and will help the development of the republic's production forces, which will help reduce the cost of fertilizers produced. [1, 2] In the territory of the Southern Aral Sea region, phosphorite deposits have been identified, mainly of the nodular and pebble type. Their capacity is 0.3-0.8 m; the content of P2O5 is from 5 to 23%.

They are confined to the terrigenous-carbonate-phosphorite and terrigenous-phosphate formations of the Late Cretaceous and Eocene. It should be noted that the use of already known and planned to be evaluated Nodular phosphorite ores can be more cost-effective in the production of ammophos from them - a complex, highly concentrated phosphorus fertilizer. Jelly phosphorites have a relatively high solubility in weak acids, which makes it possible to use them in the form of finely ground phosphorite flour. Phosphorite flour can be used as a phosphate fertilizer primarily for cotton, as well as for rice crops, which make up a significant part of the sown areas of Karakalpakstan.

Thus, in order to create scientific foundations and develop a technology for producing phosphorus-containing fertilizers, the process of activation of low-grade phosphorites with mineral salts - ammonium sulfate, ammonium nitrate, monoammonium phosphate (ammophos), urea nitrate, ammonium chloride, potassium chloride and urea, used in agricultural production as standard tuks, was studied.

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