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PHYSICOCHEMICAL STUDIES OF NPK FERTILIZERS OBTAINED FROM THE DECOMPOSITION OF PHOSPHORITES IN NITRIC ACID IN THE PRESENCE OF POTASSIUM CHLORIDE

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Annotation: This scientific article discusses the decomposition of phosphorites in nitric acid in the presence of potassium chloride and physicochemical studies of NPK fertilizers obtained from them.

Keywords: phosphorite, key chloride, chemical fertilizers, nitrogen, phosphorus, potassium, fruit tree, yield.

It has always been the concept of many farmers: the more chemical fertilizers are applied, the faster the crop will grow and the better the yield. In fact, this is not the case, and sometimes it is ineffective. Excessive use of chemical fertilizers can also cause a lot of harm. Today, let's analyze in detail the effects of large amounts of nitrogen, phosphorus and potassium fertilizers and what the harm of excessive amounts is.

The plant lacks nitrogen and is green and light in color, and the old leaves at the base turn yellow and turn brown after drying! If the fruit is small and the skin is hard, the fruit tree should not have nitrogen! It can produce chlorophyll and nucleotides!

Nitrogen fertilizer is the most necessary type of chemical fertilizer in agricultural production. It plays an important role in increasing crop yield and improving the quality of agricultural products. It is a component of amino acids, protein in plants, and chlorophyll, which plays a crucial role in plant photosynthesis. Nitrogen can also help crops grow. The application of nitrogen fertilizer can not only increase the yield of agricultural products, but also improve the quality of agricultural products.

Phosphorus deficiency in crops is very problematic, dark green plants are not attractive, and red and purple colors will also appear. After drying, the color is green and dark, and the root nodes

are also thin and short! The color of the main leaves turns yellow, the flowering time is a few days later, and the seed setting is smaller and less!

Phosphorus can not only increase crop yield, but also improve crop quality. It can accelerate the growth of grain crops, increase the size and fullness of grains, promote the flowering and fruiting of vegetables, fruits, cotton and other fruit trees, and increase the fruiting rate; increase the sugar content of fruits, sugarcane, etc., and increase the oil content of rapeseed.

Phosphorus is an important component of plant cell nuclei. It plays an important role in cell division and the differentiation and development of plant organs and tissues, especially in flowering and fruiting. It is an indispensable element for physiological metabolism in plants. Phosphorus in plants is mainly accumulated in plant seeds, and more phosphorus is stored in seeds, which is beneficial to the healthy growth of seedlings in the early stage. Phosphorus also has a good effect on improving the endurance, cold resistance and drought resistance of plants. Phosphorus also promotes the development of roots, especially the development of lateral roots and fine roots.

It is necessary to compensate for the deficiency of potassium in crops. The edges of the leaves turn yellow first, the edges of the leaves are severely scorched, the veins of the two-stage veins become chlorotic, and the transport of nutrients cannot continue. Organic compounds are not involved, the ionic form in the cell fluid, the activator of many enzymes, the metabolic process is strong!

The results of chemical analysis of the decomposition products of high-carbonate Kyzylkum phosphorites at various concentrations of nitric acid (50-120%) showed that the content of soluble forms of P_2O_5 is in the range of 6.1-7.7%. In the indicated concentrations of nitric acid, in our opinion, the salts $Ca(NO_3)_2 \cdot 4H_2O$, $CaHPO_4 \cdot 2H_2O$, $Ca(H_2PO_4)_2$ are formed. In addition, in an acidic environment, phosphorites are partially activated, and some do not decompose at all. Activated phosphorites are soluble in a 0.2 molar solution of Trilon B and a 2% solution of citric acid. We conducted X-ray and thermal analyses to determine the salt composition of NPK FERTILIZERS produced by the decomposition of Central Kyzylkum phosphorites with nitric acid (HNO_3 concentration -75 and 100%, P_2O_5:K_2O = 1:1) in the presence of potassium chloride.

X-ray analysis of complex fertilizers was carried out on a DRON-0.5 diffractometer with filtered, similar radiation, under conditions of voltage 25 kV, current 8 mA, and counter speed 2 deg./min. [1]. X-ray diffraction patterns of the samples are shown in Fig. 1. Identification of diffraction lines was carried out by comparing the peak spacing values of the fertilizer samples and the expected salts. The diffraction lines 5.20; 2.79; 2.45-2.46; 2.03A° belong to calcium nitrate tetrahydrate. The spacing between the peaks 4.23-4.24; 2.62-2.63 A° characterize calcium dihydrate hydroorthophosphate in the fertilizer. 3.69-3.70; Diffraction peaks at 2.95 A° prove the presence of calcium hydrate dihydroorthophosphate. 2.71; 1.837 A° distance between the diffraction peaks for fluorocarbonapatite, 2.22; 3.14 A° belongs to potassium chloride. Diffraction peaks 3.06-3.07; We can say that those with 2.25 and 2.27 A° belong to ammonium nitrate. Some lines overlapped with nitrates, phosphates and other compounds due to the close distance between the peaks.

The derivative of the sample (HNO_3 concentration - 100%, P2O5:K2O = 1:1) (Fig. 2) was plotted on the Paulik-Erdei derivative at 900 °C, the weight of the polished sample was 202 mg, the heating rate of TG-200 was 10 degrees/min [2]. The mass loss of the sample at 900 °C was 60.89%.

Endothermic effects at 100-330 °C characterize the loss of adsorption moisture, calcium nitrate and calcium hydrogen phosphate, and water of crystallization of ammonium nitrate. Weakly extended effects in the range of 330-400 °C characterize the decomposition of $CaHPO_4$ to pyrophosphate. In the areas of the greatest loss of sample mass, calcium nitrate simultaneously converts to nitrite.

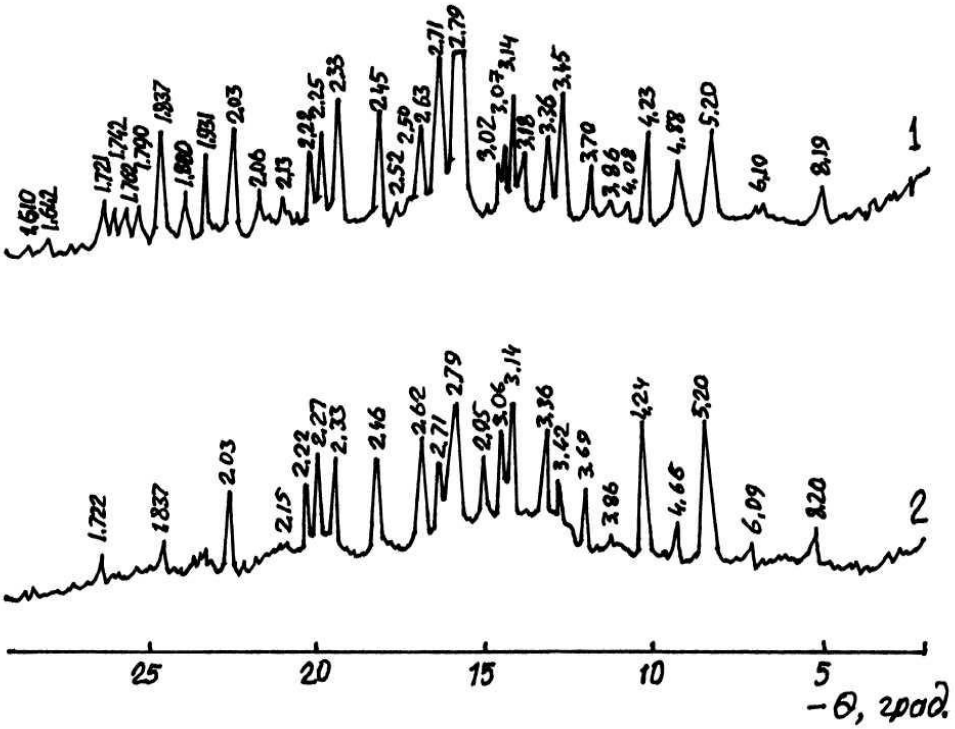

Fig.1. X-ray diffraction patterns of **NPK FERTILIZERS** with HNO_3 concentrations of -75 (1) and 100% (2) and P_2O_5:K_2O =1:1.

Extensive thermal effects were observed in the samples at 510-7300C, which is explained by the polymorphic transformation of the quartz mineral, accompanied by the decomposition of residual carbonates and other minerals.

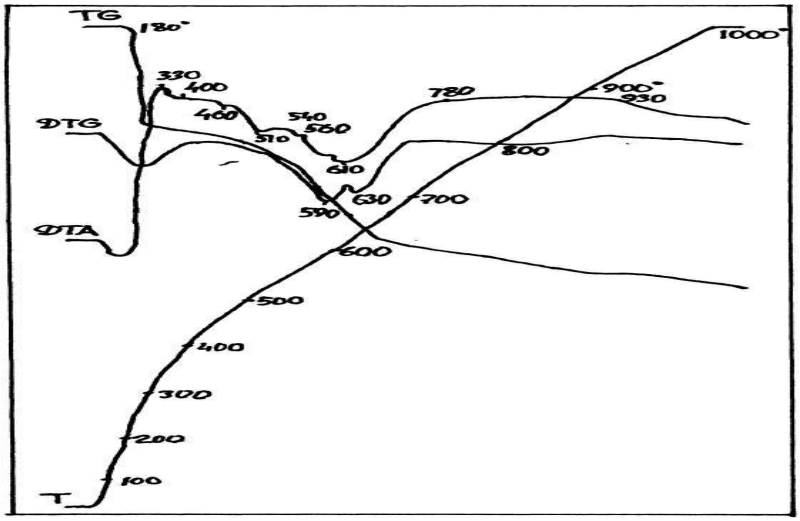

Fig.2. Derivatogram of **NPK FERTILIZERS** with HNO_3 standards - 100%, P_2O_5:K_2O = 1:1.

In the samples, extensive thermal effects were observed at 510-730°C, which is explained by the polymorphic transformation of the quartz mineral, and the simultaneous decomposition of residual carbonates and other minerals.

Thus, the results of studies of **NPK FERTILIZERS** obtained on the basis of unenriched phosphorites of the Central Kyzylkum using various methods (thermogravimetry and X-ray) show that the composition of the fertilizer mainly consists of calcium and ammonium nitrate, calcium dihydrate hydroorthophosphate and monophosphate, activated phosphates and potassium chloride.

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