PHYSICO-CHEMICAL CHARACTERISTICS OF AMMOPHOS FROM A SOLUTION OF ENRICHMENT OF PHOSPHORITES OF CENTRAL KYZYLKUMS WITH EXTRACTION PHOSPHORIC ACID

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However, gradually the requirements of agriculture for mineral fertilizers began to be revised due to the accumulated experience in the use of fertilizers and the shortage of sulfur and calcium in phosphorus-containing fertilizers, as well as the requirement to produce part of mineral fertilizers with reduced solubility of nutrients.

Ammophos obtained from WBPC CK contains 46-48% P2O5 due to the high content of sulfates, oxides and a half, fluorine [5]. In addition, due to the high calcium modulus (CaO:P2O5) equal to 1.9-2.1, the consumption of sulfuric acid is greatly increased. All this makes ammophos from phosphorites of the CK economically inefficient. The conducted studies on the enrichment of WBPC with solutions of nitric and extraction phosphoric acids have shown the possibility of reducing the calcium modulus to 1.6, which reduces the consumption of sulfuric acid to 0.2 tons per ton of enriched phosphorite, compared with unenriched

Processing of enrichment solutions for ammophos was carried out in a glass reactor equipped with a mechanical stirrer, taps for supplying ammonia, installing a reverse refrigerator and a thermostat. To do this, we used the WBPC of the CK of the composition (mass. %): P2O5 - 26.20; CaO - 57.70; CaO:P2O5 - 2,202; MgO - 1,30; Fe2O3 - 0.43; Al2O3 - 0.60; SO3 - 3.21; F - 2.84, enrichment solutions obtained at the ratio of WBPC:EPA=1 : (5-6) of the following composition (table 1). The analysis of the initial, intermediate and final products was carried out by known methods of chemical and physico-chemical analysis [1-3].

Table 1. Chemical composition of the enrichment solution

Enrichment solution, S:L	Chemical composition, mass. %						
	P2O5	CaO	MgO	Al2O3	Fe2O3	SO3	F
1:5	16,93	3,98	1,45	0,73	0,21	0,82	0,84
1:6	17,32	4,10	1,48	0,75	0,21	0,81	0,83

To conduct studies of physico-chemical properties, ammophos was obtained from enrichment solutions with neutralization with gaseous ammonia (pH = 4.1). The X–ray image shows only diffraction maxima characteristic of monoammonium phosphate (NH4H2PO4) with interplane distances of 5.32; 3.75 Å, ferruginous lazulite (Mg,Fe)Al2(PO4)2(OH)2 - 3.20 Å, dicalcium

phosphate CaHPO4·2H2O - 3.04 Å; monocalcium phosphate Ca(H2PO4)2·H2O - 2.00 Å, as well as 2.68 and 1.65 Å, attributed to CaSO4·2H2O and CaF2.

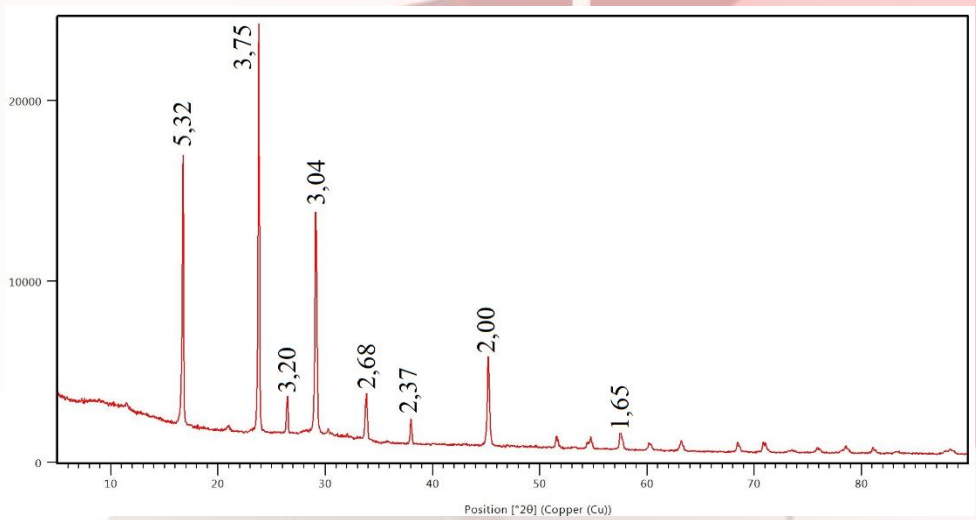

Fig. 1. X-ray of ammophos, pH = 4.1

Figure 2 shows the data of the IR spectrum of ammophos at pH = 4.1

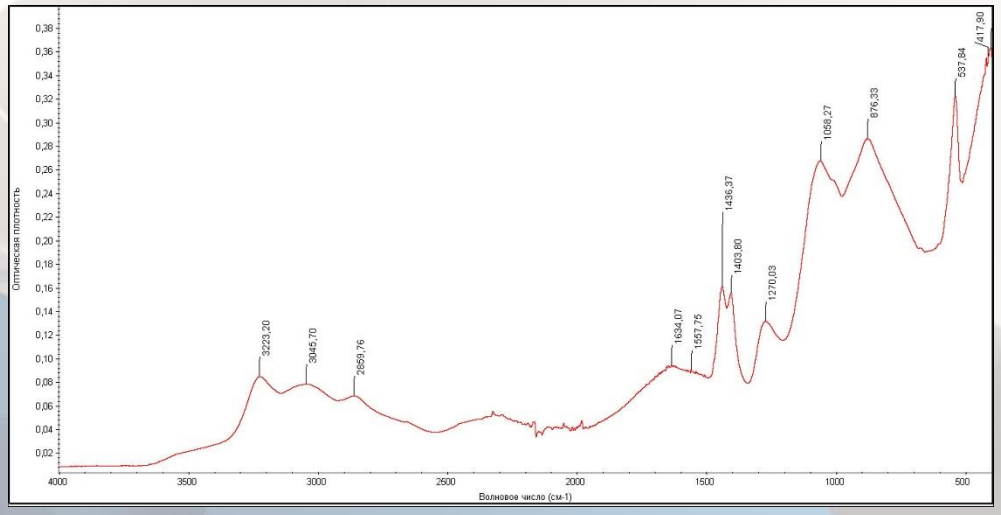

Fig. 2. IR spectrum of ammophos

The results of the IR spectroscopic studies show that the IR spectra of the main ammophos and the impurity coincide in the absorption bands of certain groups. For example, in the range of 1650-1590 cm-1, plane deformation vibrations of the NH and NH2 groups are observed, bands in the region of 1600-1400 cm-1 correspond to deformation vibrations of NH3+, NH2+, NH+.

The IR spectrum of ammophos has wide bands in the region of 876.33-1058.27 cm-1 PO42- and bands appear at 1634.07 cm-1, related to CaSO4=2H2O. The absorption bands at 2859.76-3223.20 cm-1 correspond to crystallization water.

Electron microscopic analysis of ammophos, the results of elemental chemical analysis are shown in figure 3. Energy dispersion analysis of ammophos showed the following element content: N-9.74%; O-46.38%, F-2.49%; Na-0.08%; Mg-2.68%; Al-1.17%; Si-0.26%; P-23.13%; S-1.02%; Ca-12.54%; Fe-0.51%, which corresponds to the requirement for ammophos.

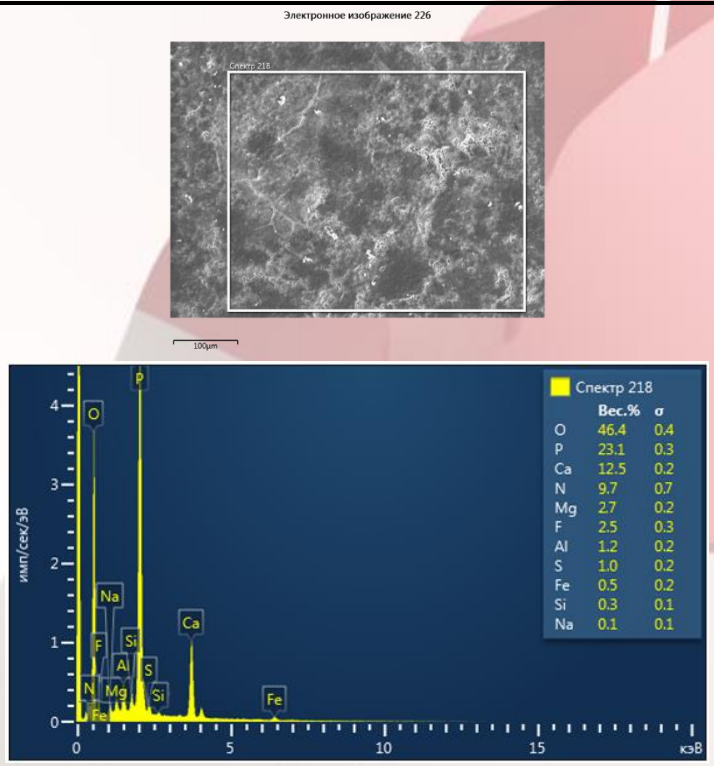

Fig. 3 - Energy dispersion analysis of ammophos, pH = 4.1

Thus, the possibility of obtaining ammophos has been experimentally established, optimal parameters of all stages of the process have been determined, and its physico-chemical properties have been clarified.

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