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STUDY OF THE POSSIBILITY OF USE OF LOCAL PHOSPHORITES AND SEMI-PRODUCTS OF THE PRODUCTION OF COMPOUND FERTILIZERS AS ADDITIVE TO AMMONIA NITRETRE

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ANNOTATION

The article shows the influence of the products of nitric acid decomposition of phosphorites Of Central Kyzylkum and Karatau, extraction phosphoric acid (EFC) from phosphorites Karatau, and nitric acid solutions of phosphates with a low ratio of Ca0/P205 on the quality of ammonium nitrate. The methods of further improving the quality of ammonium nitrate on the basis of heated nitric acid solution (ACR) of phosphorites Karatau and Central Kyzylkum, EFK and by changing the ratio of Cao/P_2 O_5 to ACR phosphates.

KEY WORDS: *Nitric acid decomposition, extraction phosphoric acid, ammonium nitrate, phosphorite, phosphate.*

INTRODUCTION

In the main directions of economic and social development of the Republic of Uzbekistan for 2017 - 2021. the modernization and intensive development of agriculture is envisaged: - deepening structural reforms and dynamic development of agricultural production, further strengthening the country's food security, expanding the production of environmentally friendly products, a significant increase in the export potential of the agricultural sector, etc.

MAIN PART

We know that year after year development in this direction requires the creation of new modern types of mineral fertilizers used in agriculture. To solve these problems on an industrial scale of the Republic, a number of large-scale measures were taken to produce high-quality local phosphorites and intermediate products of complex fertilizers as an additive to ammonium nitrate that meet modern agricultural requirements. For example, the second stage of the Kyzylkum phosphorite complex of the Navoi Mining and Metallurgical Plant was put into operation, which will increase the output of 26% washed calcined concentrate by more than 1.5 times. Today, the complex is the main resource base for enterprises of the republic that produce phosphate fertilizers. In this complex, a technology for obtaining phosphatized ammonium nitrate (AN) has been developed; the use of highly carbonized phosphorites as a phosphate additive is promising. However, the processes of obtaining nitrogen-phosphorus fertilizers (APF) by the interaction of NPP melt with various types of phosphate raw materials (FS) of the Central Kyzyl Kum in a wide range of AS:PS mass ratios, followed by granulation of the nitrophosphate melt in the granulation tower by the prilling method, have not been practically studied. There is also no information on the study of the process of obtaining AFC based on concentrated solutions of AS and unenriched phosphorites of the Central Kyzylkum.

It is known that apatite concentrate is a long-distance raw material and the deficit for it increases every year. Therefore, the use of local phosphorites as an additive to ammonium nitrate is more economical. In addition, at present, at many enterprises of the country that produce ammonium nitrate, or near them, production of ammophos and nitroammophos has been established. The use of intermediate products of these industries for the conditioning of ammonium nitrate is of great practical and economic interest. At the same time, there is no need to maintain technologically and operationally complex installations and storage facilities for the preparation of additives in the ammonium nitrate workshops.

Experimental methodology: In order to solve the above issues, we have conducted a study on the effect of products of nitric acid decomposition of phosphorites of the Central Kyzylkum and Karatau, extraction phosphoric acid (EPA) from Karatau phosphorites, and nitric acid solutions of

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phosphates with a low Ca0 / P205 ratio on the quality indicators of ammonium nitrate. Methods have been developed and proposed for further improving the quality of ammonium nitrate based on a heated nitric acid solution (NAC) of Karatau and Central Kyzylkum phosphorites, EPA and by changing the CaO/P2O5 ratio in NAC of phosphates.

Results of the study and their discussion: According to the above methodology, we studied the effect of AKF from phosphorites of the Central Kyzyl Kum and Karatau on the physical and mechanical properties of ammonium nitrate [1-6], and developed the design of the AKP neutralizer of apatite in the passing flow of ammonium nitrate melt.

For the preparation of ACR additives, Kyzylkum phosphorites from the Sardar site, phosphate concentrate obtained from the ores of the Jeroi site, and Karatau phosphate flour were decomposed with 55% nitric acid at a rate of 120% of stoichiometry. The compositions of the original phosphorites and nitric acid extracts after their separation from the insoluble residue are given in table.1.

ACR phosphates were added to the melt of ammonium nitrate at 1800 C and at the same time the required amount of gaseous ammonia was supplied for neutralization. Granules of ammonium nitrate were obtained by spraying the melt from a height of 12 m.

In order to determine the stability of the quality indicators of saltpeter samples during long-term storage, caking and granule strength were determined after a day and 6 months of storage at room conditions, a thirty-fold modification transition IV ↔ III and moistening of saltpeter by 2%. Analysis of the obtained results (Table 2.) shows that the strength of ammonium nitrate granules with the addition of AKP from the phosphate concentrate of the Jerooy site increases with an increase in the amount of additive introduced (0.2 - 2.0% in terms of P2O5) by 2.5 - 5, 0 times compared to saltpeter without additive. When stored for 6 months, the strength of pure nitrate granules decreased by almost 2 times, and the strength of nitrate granules with an additive decreased by only 8.9 - 9.9%. The high strength of the granules is maintained even after a 30-fold modification transition IV↔III, as well as when the product is moistened by 2% [7 - 13].

Table 1. Chemical composition of phosphorites of the Central Kyzylkum, Karatau and ACR based on them

Components	Feedstock, %			Components	Nitric acid solution, %		
	Phos conc. participation Jeroy	Phosphorites involved. Sardar	Phosphorites of Karatau		Phos conc. participation Jeroy	Phosphorites involved. Sardar	Phosphorites of Karatau
P_2O_5	22.95	27.38	25.80	CaO	14.73	16.11	14.80
CaO	37.71	48.12	41.80	P_2O_5	8.23	9.34	9.95
MgO	1.20	1.48	2.55	MgO	0.42	0.45	0.95
Fe_2O_3	5.28	0.21	1.21	Fe_2O_3	3.21	0.09	0.85
Al_2O_3	10.36	2.25	1.42	Al_2O_3	5.61	0.95	0.81
CO_2	4.60	9.42	-	H_3PO_4	11.36	12.88	6.30
F	2.09	2.65	2.10	HNO_3	10.20	11.20	11.10
H.o.	12.55	11.80	15.80	H.o.	-	-	-

When the content of the additive in the amount of 0.5% P2O5 nitrate does not cake. With an increase in the amount of additive, caking decreases at a 30-fold modification transition IV ↔ III and moistening by 2%. As can be seen from the data in the table, additives from phosphorites of the Sardar and Karatau sites have a similar effect on the strength of granules and caking of saltpeter, but to a lesser extent than the additive from Jeroy phosphate concentrate. This can be explained by the different content in the original phosphorites of sesquioxides - iron and aluminum, which, as is known, increase the strength of the granules and reduce the caking of saltpeter, as well as by the different CaO / P2O5 ratio in the original phosphorites.

Studies have shown that the separation of AKR from the insoluble residue of phosphorites is an extremely difficult operation, since a significant part of it consists of highly dispersed particles of silicic acid and compounds of sesquioxides. In order to simplify the technology of preparation of ACR, experiments were carried out on introducing it into the melt of ammonium nitrate with a silty part after separation from the coarse fraction of the insoluble residue by decantation.

CONCLUSION

The results of the study show that the presence of an insoluble residue in the clay part of the ACR significantly improves the physical and mechanical properties of ammonium nitrate.

The above studies indicate the possibility of using phosphorites from the deposits of the Central Kyzylkum and Karatau as an additive to ammonium nitrate without separating the silty part.

The high efficiency of additives based on nitric acid solutions of Karatau and Central Kyzyl Kum phosphorites, extraction phosphoric acid, as well as intermediate products for the production of nitroammophoska - nitrophosphate melt with a reduced ratio of CaO/P2O5 was established. A method for introducing these additives into the ammonium nitrate melt is proposed.

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Table 2. Influence of ACR from Kyzylkum and Karatau phosphorites on the physical and mechanical properties of ammonium nitrate

The amount of additive in terms of P2O5, %	Humidity Fischer, %	Strength of granules, MPa				Слеживаемость, МПа			
		Beginning	After 6 months of storage in rooms. conditions	After 30 modifications. transitions IV ↔ III	When moistened by 2%	Beginning	After 6 months of storage in rooms. conditions	After 30 modifications. transitions IV ↔ III	When moistened by 2%
1	2	3	4	5	6	7	8	9	10
Addition of AKP from the phosphate concentrate of the Jeroy site									
-	0,29	1,21	0,63	0,31	0,28	0,07	0,67	0,44	1,22
1,50	0,29	2,96	2,71	2,59	2,31	not following	0,06	0,08	0,32
1,00	0,30	4,30	3,99	3,56	3,68	not following	not following	0,03	0,11
2,00	0,32	5,81	5,46	4,89	4,74	not following	not following	not following	0,04
The same with the silty part of the insoluble residue									
1,00	0,28	4,76	4,72	4,72	4,58	not following	not following	not following	0,09
2,00	0,30	7,61	6,95	7,30	7,05	not following	not following	not following	not following
Addition of AKP phosphorite of the Sardar site									
0,50	0,28	2,03	1,75	1,73	1,41	0,05	0,25	0,30	0,65
1,00	0,29	3,06	2,99	2,88	2,34	not following	0,18	0,24	0,39
2,00	0,29	3,53	3,51	3,28	2,78	not following	0,11	not following	0,10
The same with the silty part of the insoluble residue									
1,00	0,27	3,87	3,79	3,68	3,06	not following	not following	0,09	0,11
2,00	0,28	4,74	4,61	4,52	4,18	not following	not following	not following	0,05
Addition of AKP phosphorites Karatau									
0,50	0,28	2,14	2,13	1,50	1,38	0,06	0,39	0,56	0,43
1,00	0,30	3,43	2,56	2,50	2,38	not following	0,11	0,20	0,34
2,00	0,33	4,21	3,74	3,65	3,07	not following	not following	0,06	0,14
The same with the silty part of the insoluble residue									
1,00	0,31	2,68	2,60	2,55	2,09	not following	0,13	0,04	0,12
2,00	0,30	4,58	4,24	4,12	3,88	not following	not following	not following	Not following

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