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COMPLEX FERTILIZERS BASED ON LOCAL RAW MATERIALS

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ANNOTATION:

Phosphorites of the Central Kyzyl Kum are characterized by a high degree of carbonate content, the concentration of CO_2 in some formations reaches 27 % or more. To involve the Kyzylkum phosphorites in the production of concentrated phosphorus-containing fertilizers, ore dressing is required by reducing the proportion of calcite and sesquioxide compounds. One of the effective methods of enrichment of high-carbonate phosphorites can be selective removal of carbonates from the ore by using dilute acids or thermochemical removal of CO_2 with subsequent leaching of free calcium oxide with water or solutions of nitrogen salts. It should be noted that the Kyzyl Kum phosphorites have a high degree of carbonate content, the concentration of CO_2 in some samples reaches 27 % or more. Naturally, with such a high carbonate content in the feedstock, the best way to enrich it is thermal.

Keywords: phosphorites, physical and chemical properties, deposits, concentrate, carbonate content, beneficiation, washing scheme.

INRODUCTION:

The Republic of Uzbekistan is a developed agro-industrial country. Agriculture employs 40 % of the working-age population. More than 97 % of all agricultural products are obtained from 4.3 million hectares of irrigated land. Cotton and grain crops are the main crops grown. At the current stage of economic development in Uzbekistan, much attention is paid to providing the population with a variety of agricultural products. An important role in solving this problem is assigned to the production and effective use of mineral fertilizers.

It is possible to provide more than 37 million of the population of the Republic through intensification, in particular, chemicalization of agricultural production.

It is known that 40-50 % of the crop yield is obtained from the use of mineral fertilizers. In recent years, the provision of agriculture in the republic with mineral fertilizers, in particular, for phosphorus and

potassium, has significantly decreased. This led to a decrease in the effectiveness of the applied fertilizers due to the violation of the ratio of nutrient components in the soil solution. The phosphorites of the Central Kyzyl Kum deposits are of great importance for the Republic of Uzbekistan. The total reserves of granular phosphorites are estimated at 10 billion tons of ore. The most promising and studied are the Dzheroyskaya and Sardarinskaya areas, the probable reserves of which to a depth of 100 m are more than 100 million tons of P_2O_5.

In the Upper Cretaceous, Paleocene and Eocene deposits, several industrial types of phosphorite ores have been established: granular.

Phosphorites are characterized by a high degree of carbonate content, the concentration of CO_2 in some formations reaches 27 % or more. To involve the Kyzylkum phosphorites in the production of concentrated phosphorus-containing fertilizers, ore dressing is required by reducing the proportion of calcite and sesquioxide compounds.

One of the effective methods of enrichment of high-carbonate phosphorites can be selective removal of carbonates from the ore by using dilute acids or thermochemical removal of CO_2 with subsequent leaching of free calcium oxide with water or solutions of nitrogen salts. For example, the authors of the works by hydrochloric acid concentration of Dzheroy phosphorite ore obtained fosconcentrates containing 25.8-27.5 % P_2O_5. At the same time, the degree of extraction of P_2O_5 into the concentrate reaches 96-99 %, the yield of the concentrate is 66-73 % and the degree of decarbonization is 77-86 %.

It should be noted that the Kyzyl Kum phosphorites have a high degree of carbonate content, the concentration of CO_2 in some samples reaches 27 % or more. Naturally, with such a high carbonate content in the feedstock, the best way to enrich it is thermal. At present, an industrial plant for enrichment by washing phosphorite ore from chlorine is in operation. The scheme of ore washing and obtaining finished products includes the following technological operations (Fig. 1).

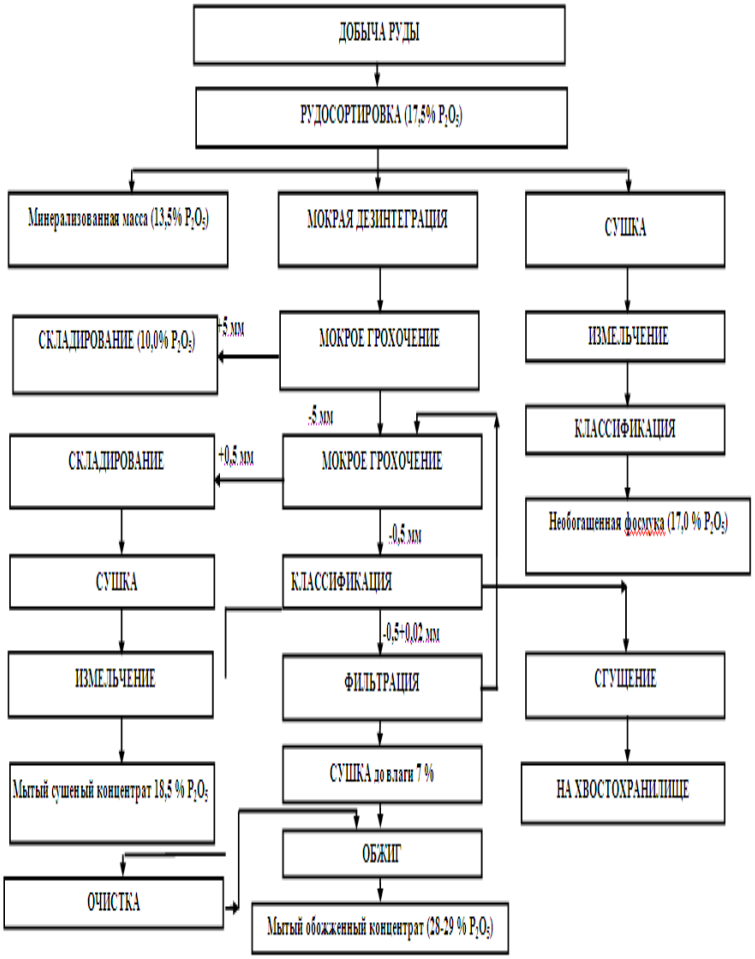

Fig. 1. Ore washing scheme

In order to determine the degree of decomposition of phosphate raw materials, depending on the concentration and rate of acid, the calculated amount of phosphorite was treated with concentrated sulfuric acid with thorough stirring for 10-20 minutes. With this approach of processing phosphate raw materials, the interaction of phosphorite with sulfuric acid proceeds very easily and practically without foaming and is completed in 5-10 minutes. The structural features of the

high-carbonate Kyzyl Kum phosphorites and the existence of three forms of carbonates in their composition characterize the intense reactivity of these phosphorites. During the sulfuric acid processing of high-carbonate phosphorites, the released carbon dioxide promotes the acceleration of the decomposition of the phosphate mineral - fluorocarbonate apatite. The process is exothermic, the temperature, depending on the concentration and rate of sulfuric acid, rises to 120 ° C and above. Intensive decomposition of carbonate minerals by sulfuric acid prevents the formation of a dense calcium sulfate crust, which shields the phosphorite surface.

To determine the optimal conditions for the process of sulfuric acid decomposition of MOPC, sulfuric acid with a concentration of 75.4 was used; 85.3 and 93.0% H2SO4. In order to save scarce sulfuric acid, phosphate rock was treated with acid at a rate of 20-80%. The acid rate was calculated on the decomposition of phosphate and carbonate minerals of phosphorite to the formation of monocalcium phosphate and calcium sulfate. The resulting product was subjected to chemical analysis. The results of the decomposition of MOPA, depending on the concentration and rate of sulfuric acid are shown in table. one.

As can be seen from the table, an increase in the H2SO4 norm from 20 to 80% increases the content of assimilable and water forms of P2O5, but leads to a decrease in the total form of P2O5. So, at a concentration of H2SO4 of 93%, an increase in its norm contributes to an increase in the assimilable form of P2O5 from 8.76 to 17.55% and the aqueous form from 5.24 to 7.46%. In this case, the content of the general form P2O5 decreases from 21.84 to 17.85%. The content of CO2 decreases under these conditions from 2.20 to almost completely absent, and the content of sulfates increases from 15.90 to 29.31% in terms of SO3. The moisture content of superphosphate is 2.37-2.68%. The chemical analysis of the decomposition products indicates that during the treatment of high-carbonate phosphate rock with sulfuric acid, the processes of decarbonization and decomposition of phosphate raw materials occur simultaneously. The decarbonization process proceeds completely and CO2 is not retained in the superphosphate. However, under these conditions, the phosphate degradation coefficient increases from 38.76 to 98.3%.

Table 1 Influence of the concentration and rate of sulfuric acid on the chemical composition of simple superphosphate from MOPA

№	Норма H_2SO_4, %	Химический состав масс. %								Кр., %
		$P_2O_{5об щ}$	$P_2O_{5у св.}$	$P_2O_{5вод и.}$	CaO	CO_2	SO_3	$CaSO_4$	H_2O	
	Концентрация серной кислоты 93 %									
1	20	21,84	8,76	5,24	44,66	2,20	15,90	23,28	2,37	38,76
2	40	20,33	11,78	7,57	41,60	1,42	21,23	32,51	3,35	57,97
3	60	18,94	14,88	7,48	31,75	1,17	23,75	40,36	4,20	78,64
4	80	17,85	17,55	7,46	36,20	-	29,31	47,60	2,68	98,31
	Концентрация серной кислоты 84 %									
5	20	22,02	8,18	4,90	45,00	2,26	16,06	23,47	1,96	37,15
6	40	20,33	12,07	7,36	42,16	2,12	21,52	32,97	2,84	58,90
7	60	19,20	14,96	7,31	39,27	-	24,06	40,38	3,13	77,97

A decrease in the concentration of sulfuric acid from 93% to 84% and 75.4% does not significantly affect the change in the chemical composition of superphosphate. The content of the assimilable form of P2O5 changes from 8.76-17.55% to 8..18-17.81% and to 7.53-17.46, respectively, for a sulfuric acid concentration of 84% and 75.4%.

the decomposition coefficient rises to 37.76-98.31%. The moisture content of the product does not exceed 4.20%.

The studies carried out and the results obtained have shown the possibility of obtaining simple superphosphate by decomposing MOOPA of phosphate raw materials with concentrated sulfuric acid. The use of concentrated solutions of sulfuric acid

intensifies the process of obtaining superphosphate, there is no need to maintain huge warehouses for maturation, it becomes possible to catch fluorinated and other gases released during decarbonization and decomposition of phosphorites.

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