OBTAINING NP-FERTILIZERS BASED ON HYDROCHLORIDE ACID DECOMPOSITION PRODUCT OF THERMOCONCENTRATE AND UREA

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Enter. Today, on a global scale, special attention is paid to the development of new methods of enrichment of different types of phosphorite, and in the ongoing scientific research, the development of technology for obtaining high-quality phosphorite concentrate using nitric acid and solvents is one of the important tasks. Development of effective methods of chemical enrichment of phosphate raw materials in our republic; calcium chloride solvents formed during the enrichment of high carbonate phosphorites with hydrochloric acid determining the optimal conditions for the extraction process; one of the urgent problems is to create technologies for obtaining phosphorus fertilizers based on chemically enriched high-quality phosphoconcentrate. We set ourselves the goal of obtaining phosphoconcentrate by decomposing central Kyzylkum phosphorite with hydrochloric acid and filtering it, and increasing complex fertilizers from it.

Research object and methods. In order to do this, the experiments were conducted under laboratory conditions in a laboratory apparatus consisting of a tubular glass reactor equipped with a screw stirrer driven by an electric motor. For laboratory work, washed-burned phosphoconcentrate (YuKFK) of Central Kyzylkum (composition: P_2O_5 – 25.71%; CaO – 55.68%; CO_2 – 2.83%; MgO – 1.19%; P_2O_3 – 3.79% ; SO_3 – 5.01%) was carried out by continuous mixing with incomplete standards of 31.4% hydrochloric acid for 1-2 hours at a temperature of 65-85 ^oC. A certain amount of hydrochloric acid was completely consumed in 4-6 minutes to decompose the phosphate raw material. In this case, the acid and phosphate raw materials react intensively in the reactor. Foaming was not observed due to the very low content of carbonate in the thermoconcentrate. After splitting the phosphate raw materials, the calcium chloride contained in the chlorophosphoric acid slurry was filtered. In order to prevent the loss of phosphorus oxide during filtration, with ammonia gas until the hydrogen index is rN=5.0-5.5 neutralized. The neutralized chlorophosphoric acid slurry was diluted 1:1 with water and filtered to extract the calcium chloride. The filtrate produced in the first filtration process is sent to be used as a raw material for obtaining chlorate-based defoliants. The resulting phosphoconcentrate was repulped with water in a 1:1 ratio and filtered (this is the second filtration) to further wash away the calcium chloride in the phosphoconcentrate. The filtrate produced in the second filtration process is used to filter calcium chloride from the newly produced chlorophosphoric acid slurry. To increase the range of complex nitrogen-phosphorus fertilizers, NP-fertilizers were obtained by reacting a certain amount of urea (or a 70-72% solution of urea) to the phosphoconcentrate obtained after the second filtration. Nitrogen, phosphorus, calcium and moisture in the obtained fertilizers were determined using known methods. These methods are detailed in works [1-8].

Research results and discussion. Acid stoichiometric norm is 45% when the ratio of nitrogen and phosphorus is N:P P_2O_5=1:2 in NP-fertilizer Numum. – 12.64%, total P_2O_5. – 24.33%, P_2O_5 own. – 11.68%, Total. – 33.42% and CaO– 9.33% and the sum of nutrients is ∑NPCa.=46.30% (table).

When the acid level is 45%, with increasing urea content in the fertilizer, i.e., when the ratio of nitrogen and phosphorus ($N:P_2O_5$) changes from 1:2 to 1:0.5, the level of phosphoconcentrate decomposition increases from 48.00 to 50.95%. goes When the acidity level increases from 55 to 75% (N:P2O5 ratio is 1:2), the amounts of phosphorus and calcium absorbed by plants increase from 14.74 to 21.77% and from 11.75 to 18.15%, respectively. The degree of thermoconcentrate decomposition increases from 58.00 to 78.00% (table).

table

Complex NP-fertilizers based on phosphoconcentrate and urea

$N:P_2O_5$	chemical composition, %										
	N			P_2O_5			CaO			H_2O	
	public.	amid.	amm	public.	above.	water.	public.	above.	water.		
when the stoichiometric ratio of the acid is 45%											
1:2	12,64	12,16	0,48	24,33	11,68	-	33,42	9,33	0,12	0,45	
1:1	19,4	19,02	0,38	19,4	9,51	-	26,65	7,59	0,09	0,38	
1:0,7	23,47	23,15	0,32	16,43	8,21	-	22,57	6,56	0,08	0,34	
1:0,5	27,29	27,02	0,27	13,64	6,95	-	18,74	5,55	0,06	0,28	
when the stoichiometric ratio of the acid is 55%											
1:2	12,7	11,93	0,77	25,41	14,74	-	30,39	11,75	0,12	0,50	

1:1	19,91	19,31	0,6	19,91	11,75	-	23,81	9,36	0,09	0,39	
1:0,7	23,99	23,48	0,51	16,79	10,07	-	20,09	8,02	0,08	0,33	
1:0,5	27,79	27,37	0,42	13,9	8,48	-	16,62	6,76	0,07	0,27	
when the stoichiometric ratio of the acid is 65%											
1:2	13,38	12,15	1,23	26,76	18,20	1,26	27,17	15,04	0,68	0,99	
1:1	20,73	19,78	0,95	20,73	14,30	0,97	21,05	11,81	0,52	0,76	
1:0,7	24,82	24,02	0,8	17,37	12,16	0,82	17,64	9,39	0,44	0,64	
1:0,5	28,58	27,92	0,66	14,29	10,15	0,67	14,51	7,84	0,37	0,53	
when the stoichiometric ratio of the acid is 75%											
1:2	13,95	12,34	1,61	27,91	21,77	1,87	22,26	18,15	0,98	1,45	
1:1	21,41	20,18	1,24	21,41	16,91	1,43	17,08	14,10	0,75	1,11	
1:0,7	25,5	24,47	1,03	17,85	14,28	1,20	14,24	10,95	0,63	0,93	
1:0,5	29,22	28,38	0,84	14,61	11,83	0,98	11,66	9,07	0,51	0,76	

Also, the dependence of the changes in the amount of total phosphorus P_2O_5 and calcium CaO in complex NP-fertilizers on the acid level and N:P_2O_5 ratio was studied.

The obtained data confirmed that an increase in acidity from 45 to 75% leads to an increase in the amount of total phosphorus P_2O_5 and a decrease in the amount of total calcium CaO. For example, when the acid level is 45%, the N:P_2O_5 ratio is 1:2, the total phosphorus content is 24.33%, and the total calcium content is 33.42%. In the same proportion, when the acid level is 75%, the total phosphorus is 27.91%, and the total calcium content is 22.26%.

Summary. Therefore, it was found that the amount of phosphorus in the phosphoconcentrate is enriched as a result of the decomposition of the thermoconcentrate at high stoichiometric standards of acid, as a result of which the calcium in it is released in the form of calcium chloride during the filtration process.

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