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IMPROVEMENT OF PHYSICO-CHEMICAL PROPERTIES OF PHOSPHORIC ACIDS

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Abstract:

In this state, the three-stage method of obtaining concentrated phosphoric acid by vaporizing extraction phosphoric acid is presented by Central Kyzylkum. To increase the fluidity of concentrated phosphoric acid, after the first stage of the evaporation process, air is sprayed at a temperature of 30-40oC for 5-7 minutes. In which there is more iron than in ordinary sediments, and due to this, the viscosity of concentrated phosphoric acid increases significantly.

Introduction

In a world with the reduction of suitable soils for agriculture and the growth of the world's population, the provision of food products is a top priority. In this regard, providing the agro-industrial complex with mineral fertilizers, plant protection products, plant growth and development stimulants is the main direction of increasing crop yields. The correct use of mineral fertilizers gives up to 50% increase in yield. Therefore, providing agricultural production with the necessary fertilizers is important.[1 ref.Mom B]

The modern world scientific and technical development of the industry of highly concentrated, single phosphorus fertilizers, effective for application under winter plowing, is directly related to the introduction of methods for processing calcium and magnesium-containing sources of secondary raw materials. In this aspect, an important task is to substantiate scientific and technical solutions for the development of technologies for the production of concentrated, single phosphorus fertilizers using calcium and magnesium carbonate raw materials. To provide agricultural production with them, it is necessary to justify a number of existing scientific solutions, including the production of phosphoric acid, phosphoric fertilizers based on them.

The extraction phosphoric acids (EFCS) used to obtain mineral fertilizers with good physico-chemical properties are evaporated to the required concentration. When the initial EFC is evaporated to a concentration above 56%, it contains a significant amount of sediment and, when cooled to room temperature, almost completely loses its fluidity. To obtain phosphorus fertilizers with high phosphorus contents, more concentrated EFCS are required [2].

To obtain fluid EFCS by evaporation, the methods of adding sulfuric acid, blowers, as well as separation of precipitation by precipitation were used.

Objects and methods of research:

In this regard, to obtain more concentrated EFCS from Kyzylkum phosphorites containing 55-65% and to study their physico-chemical properties, the initial EFCS with a mass content.%: 27,45 ; 0,17 ; 0,90 ; 0,50 ; 1,10 ; 0,60 [3].

At the beginning, it was evaporated under atmospheric pressure in a quartz reactor equipped with a quartz stirrer to a level of 45-47%, since the most intense precipitation of insoluble particles and salts occurs. For the study, precipitation was separated by two methods:

1. The resulting donated acids were kept at a temperature of 35 = 40 ° C with constant stirring for 16 hours and then separated from the precipitate.

2. The above acid was sprayed with air from below for 5-7 minutes, after settling it was separated from the sediment.

3. Then evaporated to a concentration of 58.07%. They were analyzed by chemical and physico-chemical methods of analysis.

Results and their discussions.

The resulting concentrated EFC and precipitation were analyzed by the following methods:

- the phosphorus content on the CFK-3 colorimeter was determined by photometric method in a yellow phosphorvanadium molybdenum complex at a wavelength of □=440 nm;

- the content of calcium, sulfur, magnesium, aluminum and iron was determined by well-known methods of analysis [5].

The obtained data on the analysis of the composition of the acids evaporated at the 1st (samples No. 2 and No. 3) and the 2nd stage (samples No. 5 and No. 6), as well as the 3rd stage, which was obtained after the 1st and 2nd stage (samples No. 4 and No. 7) is given in table.1.1.

Analysis of the initial EFCS and solid sediment showed that as a result of evaporation up to 45-47% of the EFCS, calcium sulfate is deposited primarily, due to a decrease in its solubility as the EFCS cool down.

In addition, judging by the chemical composition of precipitation, wt.%:

Stage 1 sediment: - 15,08; - 29,0; - 2,54; - 0,08; - 0,70; - 10,07; - 17,39; - 8,67; – 1,16.
2- th stage: - 15,12; - 29,07; - 2,94; - 0,11; - 1,63; - 9,75; - 17,44; - 8,69; – 1,22.

Tab 1.1

Chemical composition of the initial and concentrated EFC from phosphorites of Central Kyzylkums

№pp	Ratio $SO_3 : P_2O_5$	Content of components, mass.%					
		P_2O_5	CaO	SO_3	MgO	Al_2O_3	Fe_2O_3
1	0,052	27,45	0,17	0,90	0,50	1,10	0,60
The resulting concentrated EFC of the 1st stage							
2	0,042	46,20	0,08	1,97	0,86	1,74	0,98
3	0,042	46,37	0,09	2,04	0,87	1,77	0,99
4	0,052	58,01	0,116	3,02	1,131	2,30	1,25
	The resulting concentrated EFC of the 2nd stage						
5	0,042	47,02	0,07	1,91	0,69	1,24	0,21
6	0,042	46,98	0,07	1,96	0,67	1,23	0,20
7	0,052	58,07	0,19	2,06	0,84	2,19	0,28

Microcrystalloscopic data shows that phosphates of cationic impurities of the initial EFC, sodium and potassium fluorides crystallize. The concentration of acids evaporated to 45-47% was carried out under atmospheric pressure by heating a quartz reactor equipped with a quartz stirrer through a wall in a special electric furnace.

As is known, the dehydration of phosphoric acid in the presence of sulfuric acid is intensified. In this regard, we have studied the effect of excess sulfuric acid on the dehydration process of evaporated EFCS, their chemical composition and physico-chemical properties.

In order to assess the possibility of using concentrated EFC from phosphorites of Central Kyzylkums in the production of phosphorus-containing fertilizers with high indicators, to determine the conditions for their transportation, storage and control and automation of production in a wide temperature range (20-120 ° C), the density, viscosity and electrical conductivity of concentrated EFC from phosphorites of Central Kyzylkums were determined. The results of the definitions, are summarized in Tables 1.1-2.4.

Tab 2

Density, (kg/m) of concentrated extraction phosphoric acid from phosphorites of Central Kyzylkums

No. of samples from Table 1	Temperature, °C					
	20	30	40	50	70	80
Evaporated EFC after the 1st stage						
2	1721,7	1709,1	1699,7	1693,4	1676,5	1668,9
3	1721,4	1709,4	1699,1	1693,6	1676,8	1668,5
4	1862,4	1752,7	1844,6	1836,5	1820,3	1823,4
Evaporated EFC after the 2nd stage						
5	1722,6	1709,4	1698,9	1692,4	1676,7	1668,7
6	1722,9	1709,5	1698,6	1692,8	1677,1	1668,6
7	1863,3	1753,8	1844,9	1837,7	1820,9	1824,4

As can be seen, with an increase in the temperature of concentrated EFC, the density decreases, from the data given, the most noticeable effect on the density of concentrated EFC with iron deposition when obtained with a blower.

It is known that with an increase in the concentration of EFC, the viscosity increases. An increase in temperature rectilinearly lowers the density of all the samples studied. The pronounced effect of the acid content is noticeable when analyzing the viscosity data (Table 1.3)

An increase in concentration leads to an increase in viscosity in the region of low (20 -40 ° C) temperatures by 15-20 times, and at high temperatures (100-1120 ° C) by 7-8 times, i.e. as the temperature increases, the effect of acid concentration on viscosity weakens[4].

Tab 3

Viscosity, (MPa • s) of concentrated extraction phosphoric acid from phosphorites of Central Kyzylkums

No. of samples from Table 1	Температура, °C					
	20	40	60	80	100	120
Evaporated EFCS of the 1st stage						
2	67,18	31,10	15,91	11,43	7,12	4,31
3	66,98	30,89	15,91	11,41	7,14	4,27
4	696,22	218,05	94,48	49,16	26,95	18,32

Evaporated EFCS of the 2nd stage						
5	56,28	20,43	10,54	8,23	4,38	3,61
6	57,26	20,58	10,85	8,42	4,28	3,57
7	598,66	158,02	89,43	44,97	25,91	16,31

By studying the electrical conductivity of evaporated EFCS, it was established (Table.4), which significantly depends on the acid concentration and temperature. An increase in the content and a decrease in temperature leads to a decrease in the specific electrical conductivity of the evaporated EFC.

An increase in temperature from 20 to 120 ° C increases the electrical wiring-

The concentration of concentrated (55-56% EFA is 9-14 times, while in solutions containing 40-42% it is only 3.2-3.3 times. Moreover, with an increase in the content of free sulfuric acid in the evaporated EFCS, the electrical conductivity of the latter increases (Table.4), due to an increase in the concentration of hydrogen ions in the system.

Tab 4

Specific electrical conductivity (10-2 Cm/m) of evaporated EFC from phosphorites of Central Kyzylkums

№ samples from Table 1	Temperature, ºC					
	20	40	60	80	100	120
Evaporated EFCS of the 1st stage						
2	4,07	6,75	9,25	12,82	16,37	18,48
3	3,97	6,61	9,32	12,86	16,41	18,39
4	1,63	3,17	6,05	9,78	12,33	16,15
Evaporated EFCS of the 2nd stage						
5	5,59	7,91	10,73	14,77	19,88	21,94
6	5,67	7,89	11,12	14,76	19,81	21,98
7	1,98	5,11	8,18	11,75	14,66	17,13

Table 4 shows that with purification from precipitation after concentration of 45-47%, the electrical conductivity increases by 3-4 10-2 Cm / m.

Conclusion.

Despite the fact that the technology of extracting EFC from phosphorites is simple, in the process of obtaining concentrated phosphorus fertilizers, their concentration by pretreatment is necessary. For this, of course, the evaporation process is used. Vacuum evaporation conditions were used for this. Thanks to this, we have achieved energy savings. Secondly, when we bring phosphorite to a concentration of 45-47%, the mixture becomes cloudy and a precipitate appears. To reduce the temperature to 20-40°C is cooled naturally with a stirring period of 16 hours, and then the sediment is separated by sedimentation.

According to the new technology, additional iron-containing substances (including aluminum) in the mixture are additionally deposited by spraying air from below on the cooled EFC about 47% for 5-7 minutes. At the same time, when the EFC is brought to a concentration of 56-58%, the viscosity is significantly reduced compared to conventional deposition. This is important in the technology of obtaining mineral fertilizers from concentrated phosphoric acid.

The experiment was carried out by collecting and trapping fluorine gas in the form of waste and precipitation against environmental damage, i.e. pollution. The essence of this lies in the fact that when using these methods in the production process, environmental pollution is excluded [5].

Bu mayola oryali bschlazhak kimegarlarga sanoat rivozhlanishida atrof-muҳitni muҳofaza kilish, ularni asrash yillarini shrgatish orkaliam bylazhak kadrlarni ecologist ongining rivozhlanishiga erishish mumkin[5].

Thus, the development of modern evaporation technologies from phosphorites of Central Kyzylkums, evaporation of concentrated EFCS and highly effective fertilizers based on them is one of the main requirements of the present time.

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