International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 15**
https://ijcm.academicjournal.io/index.php/ijcm

Study of the Process of Obtaining Sodium Dihydrogen Phosphate Monohydrate from Central Kyzylkum Phosphorites

Tursunov Bakhtiyor Chori's son
Master of Termez State University

Khodjamkulov Sakhomiddin Zoirovich
Ph.D., Termez Institute of Engineering and Technology

Hamidov Azim Panji's son
Graduate student of Termez State University

ABSTRACT

The results of studies on the preparation of sodium dihydrogen phosphate monohydrate from simultaneously added mixtures on the basis of EPA from phosphorites of the Central Kyzylkum are presented. The ability to purify oxides, calcium, and fluorine by pre-desulfurized sodium carbonate and metasilicate and washed desalinated barium carbonate with washed calcined phosphorus concentrate by deep desulfurization and ammonization of deep disulfated acid with ammonia gas is shown in p-51.4.

Na2O:P2O5 = 0,41-0,44 or pH 6,2-6,5 the addition of sodium carbonate to a solution of ammonia in the ratio allows to obtain purified solutions of sodium ammonium phosphate.

KEYWORDS: desulfurization, sodium metasilicate, barium carbonate, ammonia, purification, carbonate, monohydrate, sodium dihydrogen phosphate, deftorization.

Introduction

With the development of science-intensive and nanotechnology, ground-based production has improved, and the need for convenient, inexpensive, and chemically pure compounds is increasing. In this regard, sodium phosphates have a special place. They are consumed in large quantities and used in many sectors of the economy of the Republic.

Production of sodium orthophosphates based on extractive phosphoric acid (EPA) from Central Kyzylkum (MK) phosphorites has been launched in Uzbekistan. However, due to the content of compounds, especially fluorine, they do not meet the requirements for nutrients, and even more so food, sodium phosphates [15].

EPA from phosphatites of the Central Kyzylkum is strongly contaminated with compounds and sulfates associated with phosphate raw materials. The content of sulfuric acid is 2.5-4%, stored in the form of soluble sulfur salts during the processing of phosphoric acid. There are no enterprises producing thermocouple and purified phosphoric acid in the country. Therefore, all studies on the production of pure phosphorus salts are focused on the purification of EPA by precipitation methods [4, 7, 13, 14].

Technical solutions have been found to increase the fluoridation rate of EPA with sodium carbonate from 37-39% to 81-84%, to desulfurize the acid with calcium-containing reagents,

International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 15**
https://ijcm.academicjournal.io/index.php/ijcm

and to produce sodium orthophosphates by partially diffracted EPA and sodium neutralization. [3, 5, 6, 8, 10-12].

Crystals of sodium dihydrogen phosphates separated from the obtained solutions contain 0.37-1.5% SO3, 0.024-0.050% MgO and 0.090-0.20% CaO, depending on the hydration of the salt. Wet refined and dried salts contain 1.42% SO3, 1.93% MgO and 0.25% CaO. However, sodium hydrogen phosphates contain 0.51–1.07% SO3, 1.60–2.88% MgO, and 018–0.32% CaO.

In order to obtain purer salts of sodium phosphates, the possibility of purifying the original acid from sulfates with barium carbonate and from calcium, magnesium and oxides by pre-ammonization of the acid was studied.

Research methods. To obtain pure salts of phosphoric acid, we used industrial EPA from Central Kyzylkum phosphorites previously fluorinated with sodium carbonate and metasilicate and disulfurized with washed, calcined phosphate concentrate (mass%) of the composition: P2O5 - 15,98; CaO - 2,1; MgO - 0,62; Al2O3 - 0,72; Fe2O3 - 0,65; SO3 - 0,0022; F - 0,35.

Purification of acids from sulfates and then neutralization with gaseous ammonia to a pH of 4.5-5.0 was carried out in a laboratory block consisting of a glass reactor, a mechanical stirrer and placed in a thermostat.

Separation of liquid and solid phases was performed by centrifugation. AAnalysis of initial, intermediate and final products was carried out by certain methods of chemical and physicochemical analysis. [1, 2, 8]

Results and discussion. The results of ammonization of partially disulfated and disulfated EPA without pre-deep desulfurization showed that with an increase in pH from 3.8 to 5.0, the content of CaO decreased from 0.5% to 0.18%, MgO from 0.5 to 0.0. Showed. 39%, Al2O3 from 0.136% to 0.019%, Fe2O3 from 0.096% to 0.016% (Table 1).

Table 1 The effect of the ammonization rate of EPA (pH) on the chemical composition of the liquid phase.

№	pH	Chemical composition, weight. %							
		P_2O_5	N	CaO	MgO	Al_2O_3	Fe_2O_3	SO_3	F
1	3,8	14,05	2,21	0,49	0,49	0,136	0,096	0,0016	0,04
2	4,0	13,88	2,66	0,31	0,44	0,061	0,053	0,0016	0,021
3	4,5	13,82	2,73	0,21	0,41	0,032	0,028	0,0017	0,012
4	5,0	13,37	2,82	0,17	0,39	0,019	0,016	0,0018	0,011

As can be seen from the table, the content of magnesium, aluminum, iron, sulfates and fluorine oxides is much higher.

Therefore, partially fluorinated and sulfated phosphoric acid was deeply desulfurized with barium carbonate in the stoichiometric norm of barium, no residual amount of SO3, ammonia with gaseous ammonia at pH 4.5-5.0, separated by centrifugation and neutralization of liquid and solid phases. Sodium carbonate ratio N2O: P2O5 = 0.42-0.45 (pH 6.3-6.6). The data obtained are presented in Table 2.

International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 15**
https://ijcm.academicjournal.io/index.php/ijcm

Table 2 Influence of sodium carbonate on the chemical composition of the liquid phase of deep desulfated and ammonium EPA

Na_2O/ P_2O_5	pH	Chemical composition, weight. %								
		Na_2O	P_2O_5	N	SO_3	CaO	MgO	Al_2O_3	Fe_2O_3	F
0,42	6,3	5,64	13,41	2,72	0,0009	0,007	0,14	0,0007	0,0005	0,0006
0,43	6,4	5,70	13,26	2,67	0,0007	0,006	0,12	0,0007	0,0004	0,0006
0,44	6,5	5,76	13,11	2,64	0,0006	0,005	0,11	0,0006	0,0004	0,00055
0,45	6,6	5,83	12,98	2,62	0,0005	0,004	0,10	0,0005	0,0003	0,00055

Sodium carbonate was added to Na2O: P2O5 ratio = 0.42-0.45. Deep desulfurization, ammonization, and introduction of sodium carbonate lead to significant changes in the chemical composition of the liquid phase. The content of sulfates does not exceed 0.0005-0.0009% SO3, CaO 0.004-0.007%, MgO 0.10-0.14%, aluminum, iron, fluorine oxides SO3. Sodium ammonium hydrogen phosphate tetra hydrate was evaporated at a temperature of 40–50 ° C under vacuum to obtain a liquid phase; After cooling to a temperature of 25–30 ° C, the salt crystals separated. The results for dry matter are given in Table 3.

Table 3 Chemical composition of sodium ammonium hydrogen phosphate tetrahy drate

Na_2O/ P_2O_5	Chemical composition, weight.%								
	Na_2O	P_2O_5	N	SO_3	CaO	MgO	Al_2O_3	Fe_2O_3	F
0,42	14,53	34,43	5,95	0,0019	0,015	0,31	0,0015	0,0011	0,001501
0,43	14,65	34,08	5,82	0,0015	0,013	0,26	0,0015	0,0009	0,001501
0,44	14,78	33,71	5,74	0,0013	0,011	0,24	0,0013	0,0009	0,001302
0,45	14,87	33,43	5,67	0,0011	0,010	0,22	0,0011	0,0007	0,001302

The amount of Na2O varies from 14.53 to 14.87%, P2O5 from 34.43 to 33.43%, and nitrogen from 5.95 to 5.67%, depending on the initial ratio of Na2O: P2O5. The content of other compounds, with the exception of magnesium, is less than one per cent. The magnesium content is 0.31-0.22%. In terms of fluorine content, sodium ammonium phosphate tetra hydrate meets the requirements for nutrient phosphates.
Table 4 shows the rheological properties of sodium ammonium phosphate solutions.

Table 4 Density and viscosity of the liquid phase of sodium ammonium phosphate

pH	Density, g/sm3				Stickiness, MPa·s			
	20°C	40°C	60°C	80°C	20°C	40°C	60°C	80°C
6,3	1,240	1,234	1,230	1,228	3,41	2,17	1,42	1,10
6,4	1,242	1,236	1,232	1,230	3,50	2,23	1,49	1,14
6,5	1,244	1,238	1,234	1,232	3,71	2,37	1,59	1,20
6,6	1,246	1,240	1,236	1,234	3,96	2,55	1,68	1,29

As the pH of the solutions increases, the density and viscosity decrease slightly and reach 1,240–1,246 g / cm3 and 3.41–3.96 mPa at 20 ° C.

An increase in the temperature of the solutions leads to a decrease in the density and viscosity of the solutions. At pH 6.3, an increase in temperature from 20 to 80 ° C reduces the density from 1,240 g / cm3 to 1,230 g / cm3, and under these conditions the viscosity decreases from 3.41 MPa to 1.10 MPa. This shows the specific properties of sodium ammonium phosphate solutions. Sodium ammonium phosphate tetrahydrate solutions were dried at 90 ° C to obtain

International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 15**
https://ijcm.academicjournal.io/index.php/ijcm

sodium dihydrate monohydrate, the chemical composition of which is given in Table 5.

Table5 Chemical composition of sodium dihydrogen phosphate monohydrate

Na_2O/ P_2O_5	Chemical composition, weight. %								
	Na_2O	P_2O_5	N	SO_3	CaO	MgO	Al_2O_3	Fe_2O_3	F
0,42	21,91	52,23	0,44	0,0029	0,023	0,47	0,0023	0,0017	0,0022
0,43	22,13	51,79	0,40	0,0024	0,020	0,42	0,0023	0,0015	0,0021
0,44	22,41	51,38	0,35	0,0020	0,017	0,37	0,0021	0,0014	0,0020
0,45	22,68	50,93	0,31	0,0017	0,015	0,33	0,0020	0,0012	0,0020

about the chemical composition, sodium dihydrogen phosphate monohydrate contains 0.44-0.31% nitrogen, 0.47-0.33% MgO, 0.023-0.015% CaO and thousands of other compounds, including sulfates.

Conclusion. Thus, studies have shown the possibility of obtaining EPA-based sulfates, oxides, calcium and fluorine-free sodium dihydrogen phosphate monohydrate from phosphorites of Central Kyzykum using barium carbonate to remove sulfur based on the stoichiometric norm of barium in the residue. Ammonization of sulfate ions and disulfated acid with gaseous ammonia to pH 4.5-5.0, followed by neutralization of the ammonia solution with soda water in the ratio Na2O: P2O5 = 0.41-0.44.

References.

1. Vinnik M.M., Erbakova L.N., Zaitsev G.I. Phosphate raw materials, phosphate and complex fertilizers.
2. Mirmusaeva K.S., Asamov D.D., Mirzaqulov X.Ch., Sodiqov B.B., Volynskova N.V. Investigation of the process of neutralization of extracted phosphoric acid from sodium phosphorites with sodium carbonate // Chemical technology. Control and management. - Tashkent, 2011. - No 2. - P. 14-20.
3. Khudjamqulov S.Z., Melikulova G.E., Mirmusaeva K.S., Mirsaidov M.X., Mirzakulov X.Ch. Study of the process of precipitation of sodium fluoride from extraction phosphoric acid based on Central Kyzylkum phosphorites // Journal of Chemical Technology. Control and management ". - Tashkent, 2016. No 1. - P. 34-40.
4. Patent № 2492142 (RF). IPC S01V33 / 10. Sodium silicofluoride production method. T.V. Sharipov, A.G. Mustafin, D.I. Shayaxmetov; Published 09/10/2013. The bull. № 33.