STUDYING THE RHEOLOGICAL PROPERTIES OF ACIDIC VIGENAR ACID MONOETHANOLAMMONIUM AND CARBAMAMMONIUM NITRATE SOLUTIONS

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Annotation: This article analyzes the creation of new liquid nitrogen fertilizers with plant growth stimulants based on liquid carbamide saltpeter with the addition of a physiologically active substance. The production of new liquid fertilizers with physiologically active substances based on monoethanolamine urea ammonium nitrate is considered.

Key words: Carbon dioxide, ammonia, acetic acid, urea, water, ammonium nitrate, urea-ammonium nitrate, monoethanolamine.

In the Republic of Uzbekistan, as a result of the consistent implementation of the priority industrial development program and industry programs for modernization of production, technical and technological renewal, the role of processing industries producing competitive products with high added value in the structure of the industry is increasing. Today, more than 78 percent of the industrial products produced in our country are accounted for by these industries.

In the last 3 years, the volume of production of localized products in our country has almost doubled.

This year, special attention was paid to conducting an active investment policy for the modernization of operating enterprises, technical and technological re-equipment, and the acceleration of the organization of new production based on modern high technologies.

Today, the experience of many developed and leading countries in the world economy clearly proves that to achieve competitiveness and access to world markets, first of all, consistent reform of the economy, deepening of structural changes and diversification, high technologies it can be implemented by ensuring the rapid development of new enterprises and production sectors, modernization of operating capacities and acceleration of technical renewal processes.

A well-thought-out policy on optimization of arable land and zoning of agricultural crops is being carried out in our country, which allowes to increase the production of other agricultural products several times while maintaining the relatively stable volume of cotton production, the most important raw material and exportable product.

In order to substantiate the process of obtaining liquid nitrogen fertilizers with physiological activity based on monoethanolammonium monoethanolammonium with disubstituted acetic vigenar acid and urea-ammonium nitrate, the physicochemical properties

of solutions in the [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O] – 2SN_3COOH·$NH_2C_2H_4OH$ system were studied.

rN environment, density, viscosity, crystallization temperature were determined. A "content-property" diagram was constructed for the given system (Fig. 1).

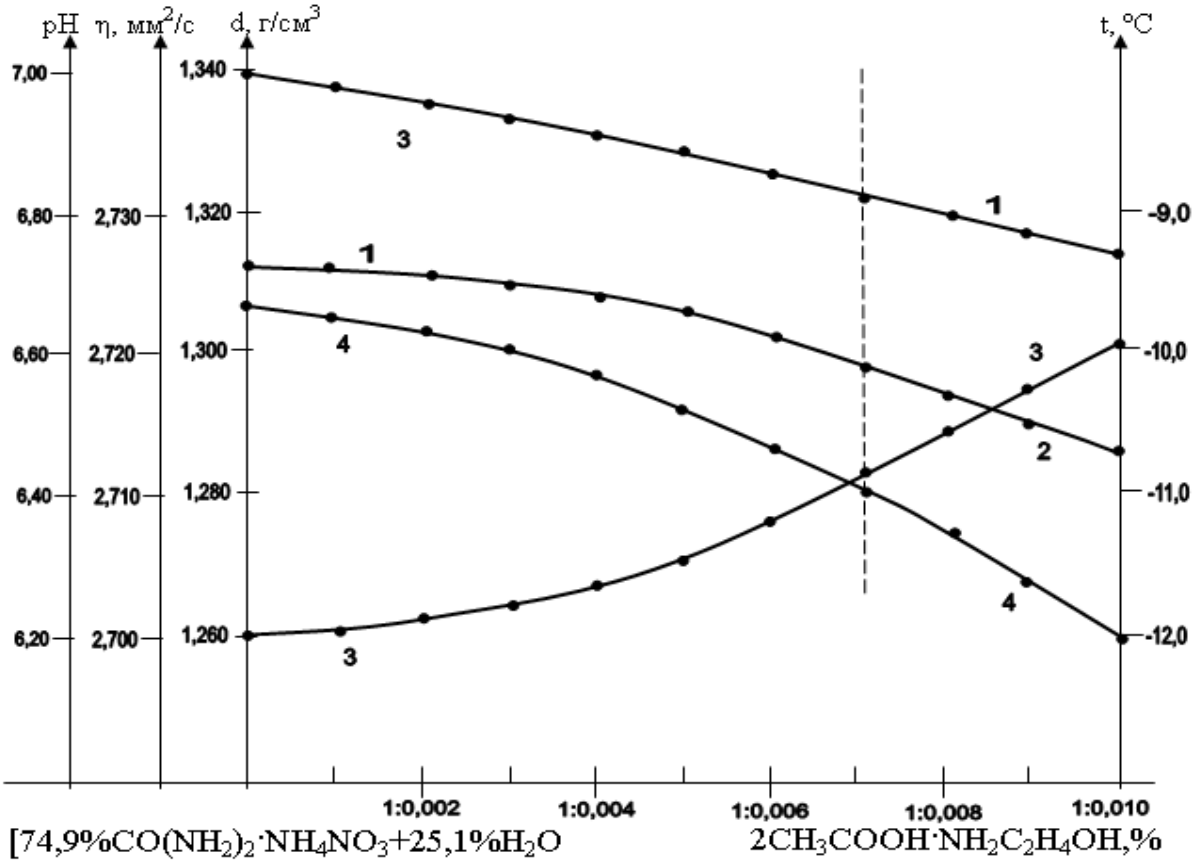

Figure 1. Solutions by mass ratio of medium rN (1), density (2), viscosity (3), crystallization temperature (4) [74,9% $CO(NH_2)_2$·NH_4NO_3+ 25,1%H_2O]:2SN_3COOH·$NH_2C_2H_4OH$ changes.

In the system [74,9% $CO(NH_2)_2$·NH_4NO_3+ 25,1%H_2O]:2SN_3COOH·$NH_2C_2H_4OH$ according to the values given in the "crystallization temperature-content" diagram, when 2SN_3COOH·$NH_2C_2H_4OH$ by 0.1% to a solution of 74.9% urea-ammonium nitrate, the temperature of crystallization, which is formed again in the solution, decreases from 9.7 to 12.0°C (Table 1)

As the concentration of monoethanolammonium monoethanolammonium, which is added, is increased, the pH of the solution decreases indefinitely, that is, from 6.95 to 6.73.

Table 1

Points of fertilizer composition	Composition of the solution, %			Crystal temperature °C	density, g/cm²	Visco-sity mm²/c	rN	S_o:Q ratio
	$CO(NH_2)_2$·NH_4NO_3	2SN_3COOH·$NH_2C_2H_4OH$	H_2O					
So	74,90	0	25,1	-9,7	1,301	2,700	6,95	-
K_1	74,895	0,01	25,095	-9,75	1,3008	2,701	6,90	1:0,0001
K_2	74,890	0,02	25,090	-9,82	1,3007	2,7015	6,89	1:0,0002
K_3	74,885	0,03	25,085	-9,90	1,3005	2,702	6,86	1:0,0003

K_4	74,880	0,04	25,080	-10,1	1,3003	2,704	6,84	1:0,0004
K_5	74,875	0,05	25,075	-10,5	1,2985	2,706	6,82	1:0,0005
K_6	74,870	0,06	25,070	-10,7	1,2965	2,709	6,80	1:0,0006
K_7	74,865	0,07	25,065	-11,0	1,2945	2,712	6,78	1:0,0007
K_8	74,860	0,08	25,060	-11,4	1,2930	2,715	6,77	1:0,0008
K_9	74,855	0,09	25,055	-11,6	1,2900	2,717	6,75	1:0,0009
K_{10}	74,850	0,1	25,050	-12,0	1,2895	2,720	6,73	1:0,001

Physicochemical characteristics of [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O]:2SN_3COOH·$NH_2C_2H_4OH$ system solutions.

Addition of up to 0.1% 2SN_3COOH·$NH_2C_2H_4OH$ to the system reduces the density and viscosity of solutions.

The "property-composition" diagram analysis of the [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O]:2SN_3COOH·$NH_2C_2H_4OH$ system refers to the ease of obtaining liquid nitrogen fertilizers which have physiological activity based on KAS and two-place sour acetic monoethanolammonium.

Based on the results of the research and the obtained values, the composition of the component fertilizers in the following proportions was selected:

[74,9% $CO(NH_2)_2$·NH_4NO_3+25,1%H_2O]:2SN_3COOH·$NH_2C_2H_4OH$=

=1:0,00065÷0,00070

When studying the water solubility of quantitative liquid nitrogen fertilizers consisting of sour acetic salt of monoethanolammonium, its good solubility was revealed.

Solubility values of liquid nitrogen fertilizers with the recommended composition Table 2

Water solubility ratio of liquid nitrogen fertilizers based on [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O] and sour acetic monoethanolammonium (OU MEA).

Table 2

[74,9%$CO(NH_2)_2$·NH_4NO_3+ 25,1%H_2O] : UKKMEA	Temperature, °C					
	15	10	5			10
1:0,00065	8,5	5,4	6,4	4,5	4,5	60,5
1:0,00070	9,6	7,6	8,4	6,8	8,8	63,5

As we have seen before, the following compounds are formed in the aqueous medium of acetic acid monoethanolamine and urea, monoethanolammonium salts of acetic acid, ammonium nitrate in an aqueous environment:

$SN_3COOH·NH_2C_2H_4OH$, 2$SN_3COOH·NH_2C_2H_4OH$, $SN_3COOH·NH_2C_2H_4OH·CO(NH_2)_2$, crystallization area, temperature and concentration limits for these compounds were determined. Among these compounds, formic and sour acetic acid monoethanolammonium salts were identified as physiologically active substances [4-6].

Depending on the physical and chemical properties and quantity of the indicated compound, carbamide ammonium nitrate is 74.9% mass, water with a crystallization temperature of -9.0°C is 25.1% mass, density - 1.3010% g/cm3; viscosity - 2,700 mm2/s and pN medium - 6.95% by mass of liquid nitrogen fertilizers based on carbamide-ammonium nitrate (KAS - 30%) increases the effectiveness of impact on agricultural crops. In order to

determine the optimal ratio of components and consumption standards of liquid nitrogen fertilizers with a physiologically active substance, the solubility of the system was selected based on the diagram, and liquid nitrogen fertilizers based on sour acetic acid monoethanolammonium KAS (30%N) were tested on the example of cotton.

According to the results of technological tests, the optimal amount of monoethanolammonium monoethanolammonium with one-place and two-place sour acetic acid was introduced as follows: the concentration of urea-ammonium nitrate is equal to 0.065 and 0.070%. Increasing or decreasing the content of sour acetic acid monoethanolammonium salt in liquid nitrogen fertilizers does not give agrochemical efficiency.

Depending on this requirement, liquid nitrogen fertilizers with the following mass ratio components are considered optimal: [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O] – sour vinegar acidic monoethanolammonium =1:0.00065,

[74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O] – is acid monoethanolammonium with disubstituted acid acetic acid =1:0.00070.

In order to obtain liquid nitrogen fertilizers with physiological activity [74,9%$CO(NH_2)_2$·NH_4NO_3+25,1%H_2O]–SN_3COOH·$NH_2C_2H_4OH$–H_2O system based on the solubility diagram, sour acetic acid monoethanolammonium (A content) it is advisable to dissolve in a 75.0% solution of ammonium nitrate (with N_0 content) and urea.

It can be seen from the diagram that when the acidic vigenar acid monoethanolammonium (point A) is dissolved in 75% carbamide ammonium nitrate (point N_0), the solubility of the system [45%$CO(NH_2)_2$+55%NH_4NO_3]-$NH_2C_2H_4OH$·CH_3NCOOH-H_2O in the diagram, the figurative point formed in solutions changes along the line "N_0 -A". The crystallization temperature of the initial solution consisting of ammonium nitrate and urea with a concentration of 75% was -9.7ºC. A solution of ammonium nitrate (N_0) settled in the saturation area of the system (Figure 2)

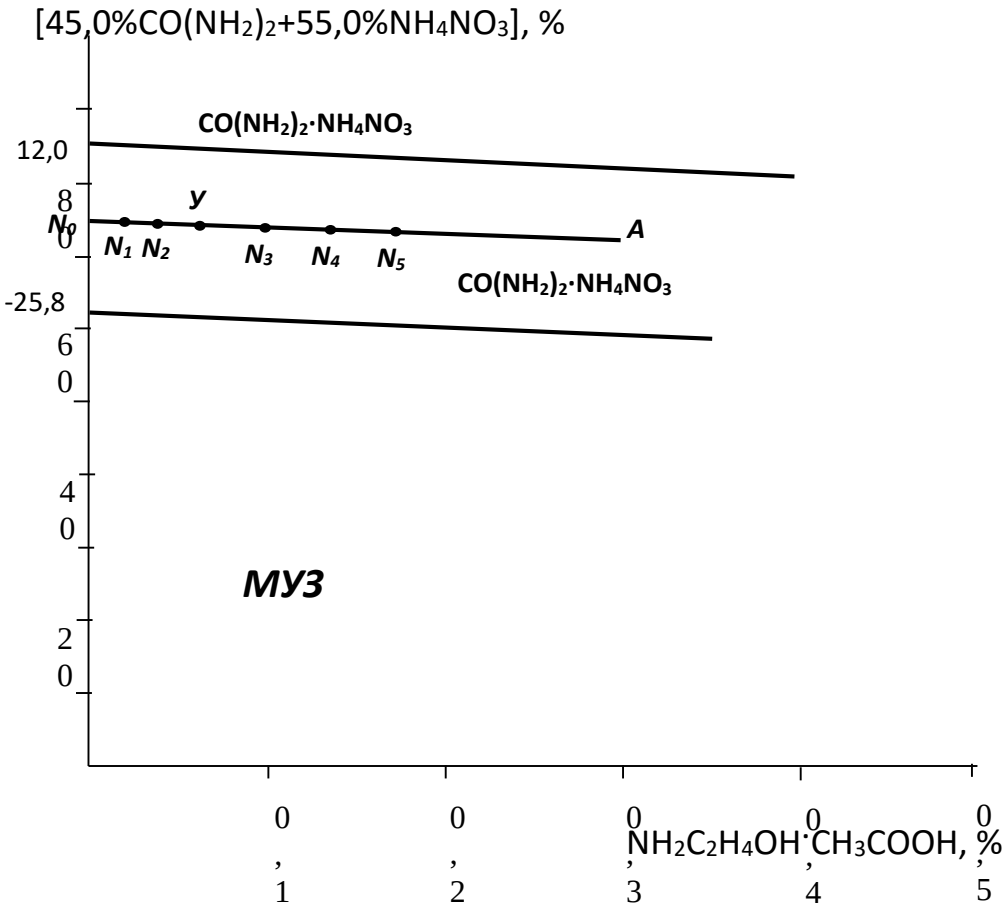

Figure 2. Solubility diagram for justifying the production process of liquid nitrogen fertilizers based on monoethanolammonium monoethanolammonium and urea ammonium nitrate, which is a substitute.

When monosubstituted acetic acid monoethanolammonium is dissolved in (point A), a solution containing N_0 is formed when the ratio "N_0:A" is equal to 1.0:0.00030. Urea ammonium nitrate is 74.96% in solution when the N0:A ratio is equal to 1.0:0.00050, monoethanolammonium monoethanolamine is 0.050%. The solution has a crystallization temperature of -9,83^{0}C.

Then, in a 74.95% solution of urea and ammonium nitrate in the ratio "N_0:A" of 1.0:0.00065 at point "U" 0.065% monoethylammonium monoethanolamine and 24.985% water are formed. The crystallization temperature of the liquid product at point "U" is -9.90ºC, its figurative point is located in the crystallization section of ammonium nitrate. Table 3 shows the density, viscosity and crystallization temperature of the solutions depending on the composition (of monoethanolammonium monoethanolammonium and urea-ammonium nitrate in the "N_0:A" ratio).

Table 3

Points of fertilizer composition	Composition of the solution, %			Crystal temperature °C	Density, g/cm^3	Visco-sity mm^2/c	rN	S_o:Q ratio
	$CO(NH_2)_2$ NH_4NO_3	SN_3CO OH $\cdot NH_2C_2H_4OH$	$_2O$					

No	75,00	0	25,0	-9,7	1,301	2,700	6,95	-
N_1	74,97	0,03	25,000	-9,79	1,3000	2,705	6,95	1:0,00030
N_2	74,96	0,05	24,990	-9,83	1,2994	2,709	6,94	1:0,00050
Y	74,95	0,065	24,985	-9,90	1,2985	2,712	6,94	1:0,00065
N_3	74,92	0,10	24,980	-10,1	1,2983	2,715	6,93	1:0,00100
N_4	74,90	0,13	24,970	-10,3	1,2980	2,718	6,92	1:0,00130
N_5	74,88	0,153	24,962	-10,5	1,2976	2,721	6,92	1:0,00158

Correlation of density, viscosity and crystallization temperature of a solution consisting of monoethanolammonium acetic acid monoethanolammonium and urea-ammonium nitrate in the ratio "N_0:A", it was found that in the process of dissolving monoethanolammonium acetic acid, the rN of the environment, density, and crystallization temperature decrease simultaneously and the viscosity increases

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