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DEPENDENCE OF THE PRODUCT YIELD ON THE SPACE VELOCITY OF THE INITIAL GAS MIXTURE AT VARIOUS TEMPERATURES

Abstract: *This article describes the results of experiences which were held in Kitab district of the Republic of Uzbekistan. Moreover it also gives some recommendations to use the granulation of mixture with a small amount of water.*
Key words: *product, experiments, granular, calcining, natural chalk, carbon dioxide, porosity, gas mixture, nitrogen, powder.*
Language: *English*

Introduction

The experiments were carried out on granular lime obtained by calcining the natural chalk of the Kitab deposit. Thanks to granulation, an increase in the porosity of lime was achieved. In order to increase the contact surface of the solid phase with a gas mixture of ammonia and carbon dioxide, as well as to ensure uniform distribution of the gas stream over the cross section of the reactor without flare or piston breakthroughs.

The granulation of the mixture was carried out by mixing powdered lime with a small amount of water. Due to this, after drying and grinding the mixture to the desired size, sufficient porosity and strength of the granules was ensured.

The study was carried out under constant conditions accepted as initial in previous experiments. The volumetric velocity of the initial gas mixture of ammonia and carbon dioxide was varied from 3000 to 9000 hours $^{-1}$.

The experimental results are shown in Fig. 1, from which it can be seen that with an increase in the initial gas mixture to 6000 hours $^{-1}$ there is a sharp increase in the nitrogen content in the product from 24.3 to 30.4%. A further increase in space velocity did

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not lead to a significant increase in the nitrogen content in the product.
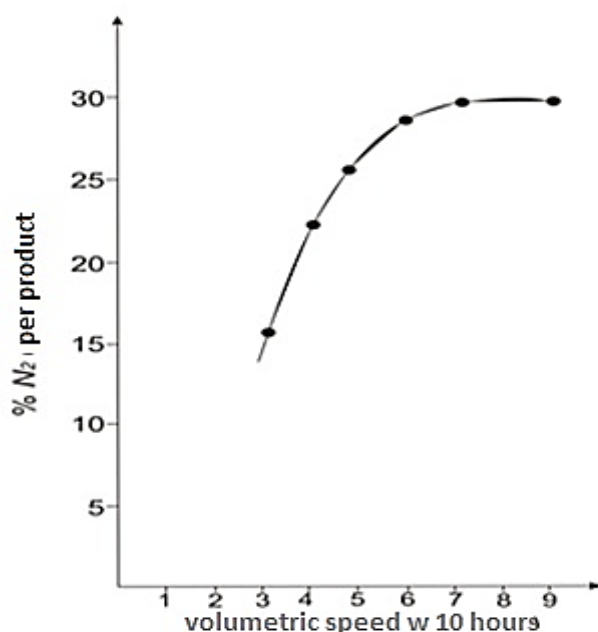

Fig. 1 Influence of the volumetric velocity of the reaction gas mixture on the formation of $CuCN_2$ Cao, Nh3 and CO_2

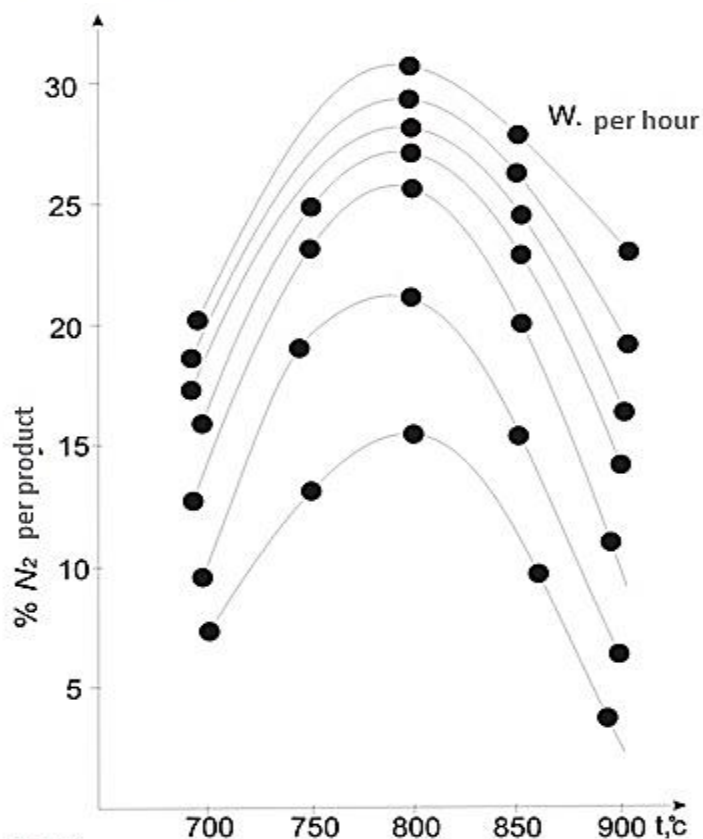
Fig 2:
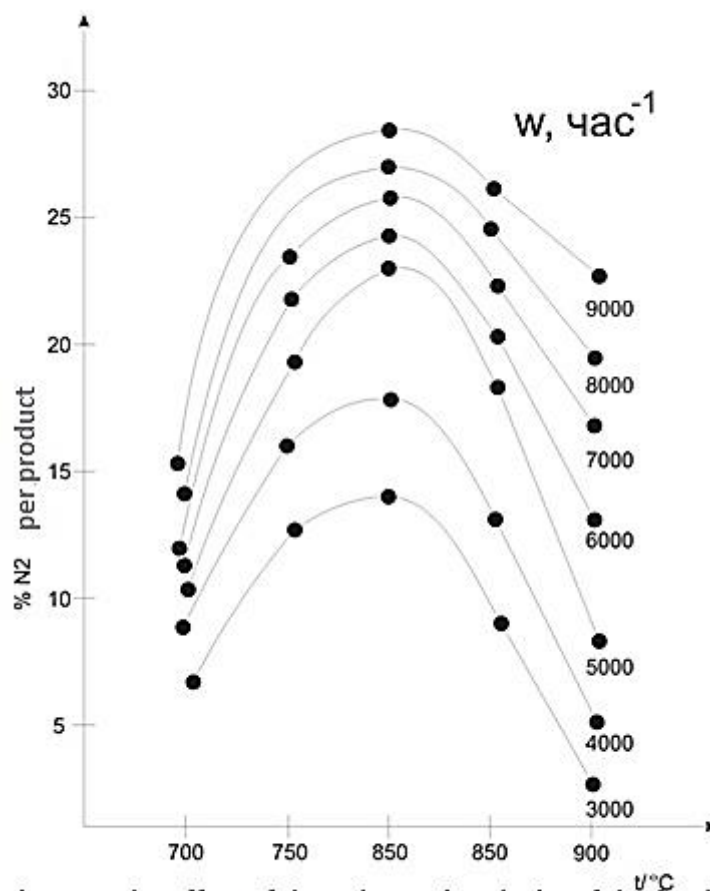The influence of the volumetric velocity of the spark gas mixture and temperature on the synthesis of lime $CuCN_2$ from (relations $CO_2:NH_3=1:9$)

Figure 3. The effect of the volumetric velocity of the feed gas mixture and temperature on the synthesis of CuCn2 from lime. Co2 NH3 ratio

It is known that in many homogeneous and heterogeneous catalytic and non-catalytic processes, the optimum temperature depends on the space velocity, the ratio of components in the initial gas mixture, and other factors.

First of all, we carried out a series of experiments on the synthesis of calcium cyanamide with the constancy of all parameters except the temperature, which varied in the range from 700 to 900 ° C, and the space velocity, which varied from 3000 to 9000 h-1 at two ratios of carbon dioxide to ammonia in the initial gas mixture - 1: 9, 3: 9.

The results of the experiments are presented in Fig. 2 (CO2: NH3 = 1: 9) and Fig. 3 (CO2: NH3 = 3: 9).
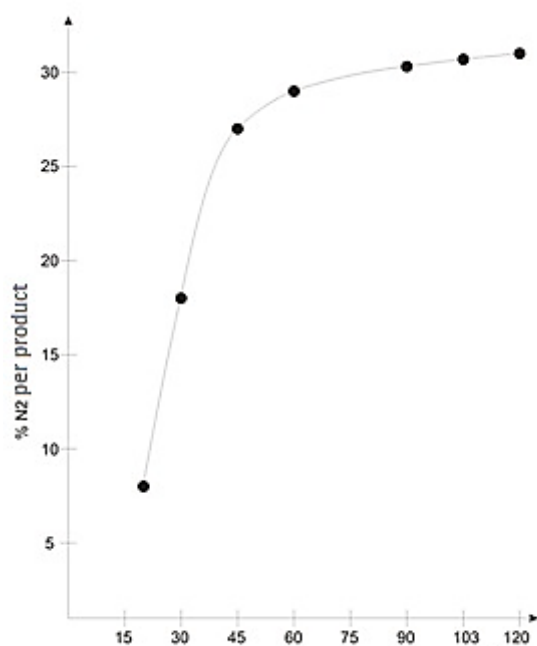
Figure 4. The effect of the duration of synthesis on the nitrogen content in the product.

An analysis of the graphs of the nitrogen content in the resulting product allows us to conclude that in the studied range of space velocities and CO2: NH3 ratios, the optimum temperature for the synthesis of calcium cyanamide from lime is 800 ° C.

A feature of obtaining experimental data is that at space velocities of more than 6000 hours $^{-1}$ the nitrogen content in the product of the synthesis of calcium cyanamide at 700 and 900 ° C is lower than at the optimum temperature of 800 ° C. Also, in the product obtained at 700 ° C, the nitrogen content is lower than the temperature of 900 ° C. The obtained regularity of the experiments on obtaining calcium cyanamide from lime the charge can be explained as follows: at a temperature of 700 ° C, the yield of calcium cyanamide strongly depends on the activity of lime, which disappears at 900 ° C and the negative effect of temperature on the exothermic process begins to affect ss interaction of lime with ammonia and carbon dioxide.

From the analysis of the constructed graphs (Figs. 2 and 3), the greater dependence of the yield of calcium cyanamide on the space velocity at a temperature of 900 ° C is noteworthy than at 700 ° C. This regularity can be explained by the negative effect on the synthesis of calcium cyanamide of gaseous products (CO2, H2 and H2O), which is stronger at relatively low space velocities than at high (more than 6000 hours^{-1}).

References:

1. Panjiev, O. K. (2019). Development of a technology for the production of calcium cyanamide from ammonia lime and span gas // *Young Scientist. Russia, No. 29 (267)*, pp. 5-7.
2. Yakubov, S.A., & Panzhiev, O.K. (2000). *Synthesis of calcium cyanamide based on local raw materials and industrial waste* // Materials of the second All-Russian scientific and technical conference. (p.128-129). Ufa.
3. Panjiev, O.X., & Yakubov, S. A. (2000). Problem of free carbon formation as a result of ammonia effect on carbon dioxide. // *Uzbek Journal of Chemistry, Tashkent, No. 1*, pp.51-53.
4. Yakubov, S.A., & Panjiev, O.K. (2001). Determination of the order of reaction of calcium cyanamide formation on ammonia. // *Uzbek Journal of Chemistry, Tashkent, No. 1*, pp. 17-20.
5. Panjiev, O., & Yakubov, S. (2000). *Carbon dioxide is a raw material for calcium cyanamide*. // Collection of materials of the scientific-practical conference "Problems of creating the

production and use of mineral fertilizers and defoliants based on local raw materials." (pp.46-47). Toshkent.

6. Yakubov, S.S., Panjiev, O.H., & Yakubov, S.A. (2000). *On the problem of free carbon formation during the synthesis of calcium cyanamide*. // Collection of materials of the Republican scientific-practical conference "New inorganic materials". (pp.157-160). Toshkent.

7. Panjiev, O., & Yakubov, S. (2000). *Synthesis of calcium cyanamide based on local raw materials and industrial waste*. // International conference "Waste - 2000". part II. (pp.128-129). Ufa.

8. Panjiev, O., Yakubov, S., & Vasilchenko, V. (). *Thermodynamic calculation of the composition of the exhaust gases from the synthesis of calcium cyanamide with excess reture gas.* ToshKTI Talabalaring ilmiy nazari wa tekhnaviy anzhumani bayenlari. (p.5). Toshkent.

9. Yakubov, S.A., Denisenko, O., & Panzhiev, O.K. (2001). *Thermodynamic calculation of the composition of the exhaust gases of the synthesis of calcium cyanamide with an excess of ammonia.* // Statements of scientific-theoretical and technical conference of students of Tashkent University of Information Technologies. (p.8). Tashkent.

10. Panjiev, O., & Yakubov, S. (2008). *Thermodynamic reaction of ammonia with dioxide carbon.* International Conference on "Chemical Technology 2008". (pp.59-60). Moscow.