



Activation of Low-Grade Phosphate Raw Materials Using Nitric-Sulfuric Acids

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Abstract

In the research work, a chemical analysis of activation products of low –grade Central Kyzylkum phosphorite raw materials based on nitran-sulfuric acids was carried out. In this case, the amount of CaO in phosphorite for the decomposition of phosphorite samples was calculated in the stoichiometric norm of nitrate-sulfuric acids 80 and 100 in moderation. All forms of P₂O₅ and CaO, the main component of the samples obtained, total nitrogen, carbon four-oxide quantities were studied.

Keywords: *Phosphorite, nitric acid, ammonia, fertilizers, phosphorus, nitrogen, calcium.*

Introduction. An important problem is the solution of the issue of providing people with food in conditions of population growth around the world, in particular, a lack of Water Resources and a decrease in the share of per capita irrigated arable land [1, 2]. This can only be done through the intensification of the production of agricultural products and its chemicalization. The costs of the production and application of fertilizers increase the cost of recognition of agricultural products by 2-3 times. An average increase in the yield of agricultural crops by 40-50% is ensured due to the use of Mineral fertilizers. The effectiveness of the use of Mineral fertilizers and chemical plant protection products serves not only to increase productivity, but also to significantly increase labor productivity in agriculture.

Production of Mineral fertilizers one of the main directions of the modern scientific and technical development of the field of phosphorus fertilizers is the introduction of unconventional methods of processing low-grade phosphorites, that is, the development of technology for obtaining complex fertilizers by activating phosphorites by processing raw materials with an acid much less than the required amount for complete decomposition.

The work covers a wide range of research work on obtaining phosphoric, azotphosphoric and complex fertilizers by activating low-grade phosphate raw materials with phosphorus, sulfate and nitric acids. A phosphorus fertilizer of a similar type was also studied on the example of Central Kyzylkum phosphorites [3, 4]. But in this work, much better quality phosphate raw materials such



as ordinary phosphorite flour and thermoconcentrate were used. It has been shown that ammophosphate fertilizers can be obtained based on phosphoricum phosphorites with phosphorchislotaly decomposition, but they also relied on phosphorite concentrates.

Thus, the use of Phosphorite waste mineralized mass of the process of dry sorting of Central Kyzylkum phosphorite ore in these directions was not seen. In addition to it, there was no approach to obtaining complex fertilizers by dividing the products of nitran-sulfatkislotaly decomposition of low-grade phosphate raw materials into liquid and solid phases in a single technological cycle. There is also no data on obtaining complex NPSCa - fertilizers by activating low-grade phosphate raw materials with a mixture of nitric-sulfuric acids.

In order to solve this problem, experimental work was carried out with the aim of obtaining NPSCa-fertilizers in the composition of the mineralized mass on the basis of a nitrate-sulfate acid mixture. Before carrying out experimental work, the composition of all primary raw materials was studied. Then the amount of CaO in phosphorite to break down phosphorite samples is stoichiometric in moderation nitric-sulfuric acids 80 and 100 (HNO_3 : H_2SO_4 = 100 : 0; 90 : 10; 80 : 20; 70 : 30; 60 : 40; 50 : 50; 40 : 60; 30 : 70; 20 : 80; 10 : 90; 0 : 100) calculated in moderation.

Experiments were carried out in laboratory conditions in thermostat glass reactors equipped with a stirrer. A pre-measured sample of phosphorite is placed in a reactor, then gradually adding the specified amount of nitrate-sulfate acidates. The temperature in the decomposition process of phosphorite varies with an interval of 40-80 °C, depending on the acid norm, and lasts 5-10 minutes. All forms of P_2O_5 and CaO, which are the main components of the samples obtained (general, plant-absorbing and water-soluble), PH, total nitrogen, carbon four-oxide quantities, as well as the degree of carbonation, were analyzed.

From the results of chemical analysis of the composition of the resulting fertilizers, it can be seen that the decay levels of phosphorites change depending on the acidity norm. For example, the total P_2O_5 in decomposed samples under the influence of 80 stoichiometric norms of phosphorite nitrate-sulfuric acids is 9.87–10.81%, the total nitrogen is 2.03–8.98 %, the total SO_3 is 6.54–36.29%, the total calcium oxide is 28.54–36.29%, while the total P_2O_5 in samples taken in the it was found that 7.93%, total SO_3 was 7.89–44.23 %, total calcium oxide was 22.23–30.31%.

In conclusion, it is possible to obtain new high - quality complex nitrogen-phosphorus-calcium fertilizers based on samples from which mokin decomposes samples of low-grade Central Kyzylkum phosphorite in incomplete norms of nitric-sulfuric acids.

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