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## **COMPLEX FERTILIZERS BASED ON PROCESSING OF THE BROWN COAL AND PHOSPHORITES**

The results of the study process of producing complex fertilizers by oxidation of the Angren brown coal with a mixture of nitric and sulfuric acids, and subsequent decomposition of oxidation products with mineralized mass and slime phosphorite of Central Kyzylkum. The result complex fertilizers were obtained. The commodity properties of the resulting product of fertilizers were defined. They are not compressed, even with a high moisture content will remain full their friability.

At present it is worsen more that world food problems determined with high rate of population growth reduction such resources as arable land suitable, fresh water reserve. One of main tasks of agriculture food industry is in securing country population with food. In this connection, fertilizer industry makes important attention.

During there are performed the wide fields activities on ensuring population by quality food. In this area special attention is given, including quality nitrogen, phosphorus and potash fertilizer productivity, growth of efficiency of mineral fertilizer and increasing humus in soil is base of its fertility. Moreover, organic fertilizer application in agriculture has singular importance, increases productivity and improvement of physico-chemical and land reclamation condition of soil [1].

The soils of Uzbekistan on the content of this important element related to low income. The meter layer of black soil, for example, on one hectare 350-700 tons of humus contains, while the best cotton soil zone - gray soils contain only 65-85 tons [2]. The soils are in the process dehumification. It was found that the decrease of humus content in the soil by 1% leads to lower crop yields by about 5 quintals of grain units per hectare [3].

The aim of research work is to develop a technology of complex fertilizer on the basis of oxidized brown coal from the Angren deposit using Kyzylkum phosphate.

In this study, a representative sample of fine coal grade BOMSSH (brown, walnut, small, seed, rubble) has been used, which has, after drying, to air dryness and grinding in a ball mill to a particle size of 0.25 mm, the following composition (wt.%): moisture 14.1, the ash 13.7, organics 72.2, humic acid 4.1% on organic matter. To carry out laboratory experiments

the following CK phosphorites were used mineralized mass (MM) containing (wt.%):  $P_2O_{5total}$  14.68; CaO 40.80;  $Al_2O_3$  1.17;  $Fe_2O_3$  1.37; MgO 0.53; F 1.85;  $CO_2$  12.84; and slime phosphorite (SP) containing (wt.%):  $P_2O_{5total}$  11.57;  $P_2O_{5accep.}$  1.29; CaO 41.08;  $Al_2O_3$  1.84;  $Fe_2O_3$  1.42; MgO 0.61; F 1.52;  $CO_2$  20.91;  $P_2O_{5accep.} : P_2O_{5total} = 9.01\%$ .

Oxidation process of coal was carried out by 30% nitric acid in which sulfuric acid had been entered in an amount to its concentration in the nitric acid solution was 5 %. The weight ratio of the organic portion of coal to nitric acid monohydrate was taken 1: 1.6 and 1: 2.0. Coal oxidation process was conducted at a temperature of 40°C for 2 h. The obtained samples of the oxidation products were treated by different types of Kyzylkum phosphorites. In the case of using MM, highest content of humic acids (14.03%) contains fertilizer obtained at a weight ratio to the organic portion of coal to nitric acid monohydrate 1: 1.6, concentration of sulfuric acid in the nitric acid solution is 5% and acid norm on the decomposition of the phosphorite flour is 80% from stoichiometry.

This fertilizer also contains 7.37% of  $P_2O_{5total}$ , 6.71% of nitrogen, 24.86% of organic matter, and the relative content of acceptable form in it is 85.62%. It also contains 8.04% of CaO in water-soluble form is also very important as calcium is the six most essential plant nutrients.

There have been found the optimal conditions for obtaining OMF based on use of other types of SP. For SP acid norm is 80%, the composition of fertilizers (wt.%):  $P_2O_{5total}$  5.74; 5.03% of nitrogen, 20.62% of organic matter and humic acids 11.05%. Determined the hygroscopic point in three variants of fertilizers, the composition of which is given in table 1.

Table 1. Composition of complex fertilizer

№	The weight ratio of the coal: $HNO_3 : H_2SO_4 : MM$	Norm of the acids on CaO %	Chemical composition, %						
			$P_2O_{5tot.}$	$P_2O_{5accep}$	CaO <sub>tot</sub>	CaO <sub>w.s.</sub>	N	Organic substances	Humic acid
1	10:16:2,67:35,3	60	8,75	6,19	24,18	8,67	5,66	21,02	11,92
2	10:20:3,33:44,1	60	9,04	6,00	25,02	9,61	5,83	16,08	9,80
3	10:20:3,33:33,1	80	7,76	6,90	21,65	9,34	6,93	17,40	10,57

Hygroscopic point of the fertilizers equal to №1 -46.2%; №2- 45.1%; №3- 40.4%. There have been found the optimal conditions for obtaining OMF based on use of other types of phosphorite. Commodity properties of

fertilizers were defined. They are not become compressed. Even with high moisture content the fertilizer retain complete friability. The strength of the granules exceeds the requirements of GOST. Increased hygroscopicity requires packing of the product in bags.

Based on the results of laboratory experiments and experimental work in the model laboratory plant it was installed that basic technological parameters of the process of obtaining OMF. The basic technological scheme has been proposed, the material balance has been compiled and the economic indexes for production of one ton of OMF have been calculated.

Thus, the resulting organic-mineral fertilizers possess considerable advantages. In the first they are concentrated and they can be transported in the long distance and export. The second the economic effect will be not only of benefit when production organic-mineral fertilizers, and form application them in the agriculture.

When application humic containing fertilizers unconditionally will increase humic in soil, as well as the structure, physico-chemical properties of soil will improve significantly, using coefficient nutrients of applied fertilizers will increase, the crop of the agriculture plants will raise.

Thus, nitric-sulfuric acid processing of brown coal of Angren deposits and phosphorite of Central Kyzylkum allows to obtain highly effective complex fertilizers.

#### REFERENCES

1. Workshop on Soil / Ed. I.S.Kauricheva. - M .: Agropromizdat, 1986.
2. Patent №8658 Japan. Cl. 16 AO The method of obtaining ammonium salts of humic acids from lignite / Higuchi Kozo, Asagawa Kazuo.
3. Patent №3111404 United States. Cl. 71-24. The method of obtaining granulated ammonium humates (fertilizer) / Karcher John C., Canfield Charles L.