NEW ORGANOMINERAL FERTILIZER BASED ON PHOSPHORITE WASTE AND MICROFLORA OF ACTIVED SLUDGE

N.A Doniyarov[1], PhD in technical science, associate professor, I.A. Tagaev[1], PhD in agricultural sciences, associate professor, M.N. Muratova[1], associate professor, L.S. Andriyko[2], PhD in chemistry

[1]Navoi State Mining Institute, 170 Galaba ave., Navoi, 210100, Uzbekistan
[2]Chuiko Institute of Surface Chemistry, NAS of Ukraine,17 General Naumov Str., Kyiv 03164,
andriykolyuda@gmail.com

The problem of creating new types of complex organomineral fertilizer with improved agro-ecological value and efficiency is currently relevant. These complex fertilizers containing both of micro and macronutrients can significantly increase the agricultural productivity and product quality and reduce the dose of fertilizer, balance the ratio of nutrients. There is an acute problem of finding new rational ways of low-grade phosphorites of the Central Kyzylkum region into high-quality phosphate-containing fertilizers. At the Kyzylkum Phosphorite Plant (CPP) of Navoi Mining and Metallurgical Combine (NMMC), during the enrichment process of highly carbonated phosphorites, waste is out of balance ores with a content of 13-15 % P_2O_5 and slurry phosphate with a content of 8-12 % P_2O_5. The total volume of accumulated waste phosphorites already reaches 13 million tons.

The aim of this work is the usage of microflora of activated sludge (AS) from biochemical treatment plants for municipal waste as an alternative for the recycling of non-conforming phosphorite ores.

For the cultivation of aerobic microorganisms of activated sludge involved in the processing ore and slime of phosphorites were created reactors, resembling in their design aero-tanks. 500 grams of phosphorite ore or slime per 2 liters of the liquid phase or solid precipitate of AS was loaded into these reactors (the ratio of solid to liquid S:L = 1 : 4). Variants for the interaction of activated sludge with phosphorites were kept for 14 days. The most interesting fact for in the samples with the liquid phase is the high activity of microorganisms in comparison with the control variants, that associated with the impact of a biogenic factor only. As the result, there was the transformation of mineral compounds of the ore and slime from the insoluble to the soluble form.

X-ray fluorescence spectral analysis of samples showed the presence of 25 elements in the solid phase, including those related to rare and scattered metals. For all samples, phosphorus is converted to a water-soluble form. Solid condensed sediments obtained after primary and secondary settlers with addition of low-grade phosphorites and slimes will have P_2O_5 up to 18-22 %, nitrates and nitrites – 12–14 % and K_2O 4–5 %, digestible by plants CaO and MgO, and a concomitant set of all trace elements. Along with the enrichment of phosphorites with microorganisms of AS and their secretions, they will be enriched with additional organic compounds and trace elements that stimulate the growth and development of plants. Thus, it is possible to obtain a new organic-mineral nitrogen-phosphorus poly-microelemental fertilizer.