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Biotechnological preparations for improving the quality of building materials

© **Nina B. Gradova**,[1]* **Marina M. Baurina**,[1+] **Galina I. El-Registan**,[2]
Yury A. Nikolaev,[3] and **Sergey P. Sivkov**[4]

[1] *Department of Biotechnology;* [4] *Department of Chemical Technology of Composite and Binding Materials. D.I. Mendeleyev University of Chemical Technology of Russia. Heroes Panfilovtsev St., 20, 1. Moscow, 125480. Russia. E-mail:* [1)] *baurinamm@mail.ru*

[2] *Federal Research Center Fundamentals of Biology, Winogradsky Institute of Microbiology, Russian Academy of Sciences. pr. 60-letiya Oktyabrya 7, corp. 2. Moscow, 117312. Russia.*

[3] *Joint Stock Company "Mosvodokanal". Pleteshkovskyper St., 2. Moscow, 105005.*

*Supervising author; [+]Corresponding author

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Abstract

Obtaining binding components based on microbial biomass and activated sludge for increasing the technical and operational characteristics and technical and economic parameters of the production of concrete mixtures, increasing the strength characteristics of cement-concrete materials is one of the promising areas of use of biotechnological processes and biopreparations. Practical use of such additives allows simultaneously solving the ecological problem of utilization of excess microbial biomass and activated sludge of treatment facilities. The regimes of autolysis of biomass of *Saccharomyces cerevisiae*, *Endomycopsis fibuligera*, *Rhodotorula rubra*, fungi *Penicillim lanosum*, bacteria *Bacillus subtilis*, *Methyllococcus capsulatus*, as well as biomass of aerobic activated sludge of biological wastewater treatment with a content of ammonium nitrogen up to 0.1% have been developed. The concentrations of oleic acid and sodium chloride were selected to activate autolysis of biomass, as well as concentration of copper sulfate as an antiseptic for the long-term storage of autolysates obtained. Experimental conditions showed the effective use of the obtained protein binding additives in the manufacture of soil blocks, which exceeded the strength characteristics of ground blocks made with the addition of Perma-Zyme.

The laboratory regimes of the autolytic processes of anaerobic activated sludge of methane tanks were developed, the dynamics of the yield of protein substances in the aqueous phase during the autolysis was studied, the phase of the yield of the greatest number of high molecular fractions of the protein were determined. The regimes for obtaining protein-based binding additives based on the activated sludge methane tanks were developed, the concentrations of oleic acid and toluene were selected. Samples of protein binding additives in which the strength characteristics of concrete mixtures increased up to 38% and for compression up to 28% in modeling experiments at the concentration of not more than 0.1% of the concrete mixture volume were obtained. The obtained results testified to the prospects of production of binding additives based on microbial biomass to improve the technical and economic parameters of the production of concrete mixtures with improved technical and operational characteristics.

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