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Факультет хімічних та біофармацевтичних технологій

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БІОТЕХНОЛОГІЯ, ПРИКЛАДНА ХІМІЯ,
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RESEARCH ON THE TOXICOLOGICAL SAFETY OF THE PRODUCTION AND OPERATION OF PRODUCTS MADE OF SIRCOGYSMS COMPOSITE

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Recently, technical sulfur has been used in construction practice as an impregnating composition for modifying capillary-porous materials, including those based on gypsum.

Studies conducted in this direction show that products made of concrete impregnated with sulfur of various modifications can find wide application primarily in structures and products that are exposed to aggressive environments during operation, as well as in structures that have increased requirements for their physical and mechanical properties.

To study issues related to the toxicological safety of the production and operation of gypsum-sulfide products, a study was conducted jointly with the O. M. Marzeev Institute of Public Health of the National Academy of Medical Sciences of Ukraine.

Experimental studies of gypsum-sol samples impregnated with molten sulfur have established that products based on technical sulfur, TPP fly ash, and gypsum do not contain mercury, thallium, selenium, lead, bismuth, and chromium compounds that are harmful to the body and the environment.

It has been established that at a temperature of 40⁰C, gypsum sulfur materials do not emit sulfur dioxide and hydrogen sulfide into the inducing air environment, which allows them to be classified as chemically stable materials. Experiments have shown that in the aquatic environment, as well as in an environment simulating acid rain, no migration of inorganic compounds from the studied materials was detected.

During the impregnation of gypsum samples in an impregnation chamber at a temperature of 140...150 ⁰C, sulfuric anhydride (6.12 mg/m³) and trace amounts of hydrogen sulfide (0.008 mg/m³) are detected in the air of the working area, compared to their maximum permissible concentrations in the air of the working area of 10 mg/m³. In terms of the quantitative level of pollution and the qualitative composition of the pollution components, the air environment of the production of gypsum products belongs to the category of «moderately polluted» (class III).

Toxicological and hygienic studies of powdered gypsum sulfur material with dermal entry into the body (50% vaseline emulsion) allowed us to establish the following: after the first applications of the paste, there were no visible changes on the skin of the animals. After ten applications, pale pink erythema was observed in 2/3 of the experimental animals over the entire area of application of the paste. With subsequent applications, the intensity of skin hyperemia did not increase. The changes obtained can be classified as a moderately pronounced skin irritant effect of powdered gypsum-sulfur material.

Analysis of the information obtained during the performance of basophil degranulation and specific agglomeration reactions of blood leukocytes in guinea pigs sensitized with powdered gypsum-sulfide material indicates the absence of statistically significant changes in the indicators of the studied reactions in animals of the experimental and control groups. This gives grounds for concluding that gypsum-sulfide materials do not have allergenic activity.

Based on the conclusion of the Chief Sanitary Doctor of Ukraine, a composite material based on gypsum and sulfur is recommended for the manufacture of tiles that can be used in the construction of buildings of groups «B» and «C» (industrial and public buildings).