

INVESTIGATION OF RADIATION-CONVECTIVE CONVEYOR DRYING OF BASALTO-BENTONITE CARTONS AS THE FIRST STAGE OF INNOVATIVE MODERNIZATION OF HEAT TECHNOLOGY

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Research goal is to study the process of drying the basalto-bentonite cardboard in a conveyor drying installation of continuous action, obtaining specific energy indices of the installation and identifying the possibilities for its further modernization.

Work results. Experimentally, on the laboratory equipment, the kinetics of radiation drying of samples of basalt bentonite cardboard was obtained, processing of results was carried out by Krasnikov method. Using the methods of CFD simulation and field experimental measurements, the values of velocity and temperature of the drying agent in the cross section of the drying chamber were obtained. Under conditions of controlled operation of experimental and industrial plant for different technological regimes, the basic technical characteristics and specific energy indices of the installation were obtained.

Conclusions

The study of kinetics of drying allowed to establish qualitative and quantitative indices of the process of radiation drying of basalto-bentonite cardboard. In the case of high-temperature radiation drying of cardboard, it is observed that the value of the reduced first critical moisture content in the region with low values is delayed, in comparison with the same indicator for convection drying of plates. This peculiarity of the process proceeds to increase the temperature in the first drying chamber to the values of 570-600 °C, without the risk of local overheating of the material. At the step of the decaying drying rate, which is mainly realized in the second drying chamber, in order to avoid local overheating of the material, the temperature in the chamber is limited to 440 °C. The decrease in the temperature level of the process in the second drying chamber is offset by an active gas-dynamic picture, in which the average speed agent of drying in the range of the inflow stream can reach values of ± 5 m / s. The results of the controlled operation of the experimental industrial plant demonstrated satisfactory specific energy indices, which for a similar type of plant can reach values of 1200-2000 kcal / kg of moisture. Energy-efficient modernization of the conveyor drying plant should apply in addition to the traditional articles of the thermal balance of the plant and such articles as effective (intensive) preparation of the drying agent with optimization of its gas dynamics in the drying chamber.