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KINETICS OF THE DRYING PROCESS OF CULTIVATED MUSHROOMS

In investigation of the drying process of cultivated mushrooms by known methods, it was established that none of the methods of drying can provide the minimum electric energy consumption for the preparation of the final product with high quality indices. That is why we proposed to combine two methods, namely, to use infrared rays in combination with convection under forced air circulation. To prove the efficiency of our method, an investigation of the drying process of cultivated mushrooms was performed, and the advantage of the radiation—convective method over other methods exactly for cultivated mushrooms was experimentally verified. Infrared radiation is absorbed predominantly by the surface of the material, which causes a temperature gradient, directed inside the product cut into pieces, in the surface and near-surface layers. This hinders heat and mass transfer, i.e. deteriorates the conditions of transfer of moisture from internal layers to external ones, but during drying in pulsed heating—cooling mode under simultaneous convective and IR energy supply with air recirculation, an increase in the quality of the final product, a reduction in power consumption, and an acceleration of the drying process was observed. Rational parameters of the drying process of cultivated mushrooms were determined from experimental investigations.

The mode of drying of cultivated mushrooms was chosen on the basis of quality characteristics, which are determined in the quantitative relation of conservation of proteins. During heat treatment, proteins shrink. The initial stage of shrinkage of proteins (denaturation) begins from heating of the product to 40°C, as a result of which proteins lose their native properties. During the heating of the product to a temperature above 70°C, the coagulation of proteins occurs.

An analysis of the results of the experimental investigations indicates that the influence of the speed of motion of the heat carrier on the drying process of cultivated mushrooms is of great importance. As moisture is removed from the material, the influence of motion of the heat carrier on the dehydration process decreases. Taking into account the fact that an increase in the speed of motion of the heat carrier leads to an increase in the power of the ventilating equipment of the drying unit, it is reasonable to maintain the speed of motion of the heat carrier at an optimal level of 4.5—5.5 m/s. On the basis of the results of the investigation, we determined the rational power of dark and light tubular electric heating elements equal to 1.5 kW and 2 kW, respectively, under a specific load of 4.4 kg/m^2. For the preparation of dried mushrooms, beefsteak fungus (Fistulina hepatica) with the maximum amount of bioactive substances at smaller electric energy consumption, it is most efficient to use a layer with a thickness of 1.5—2.5 cm.

KEY WORDS: *cultivated mushrooms, kinetics of drying, infrared radiation, convection*

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APPLICATIONS OF NANOTECHNOLOGY IN FOOD INDUSTRY

Nanotechnology which is a novel technology for industry and science has a research interest about matter at dimensions of roughly 1 to 100 nanometers. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale. The nanoscale products have already being manufactured by many industries (such as microelectronics, aerospace, pharmaceutics and food) because of its potential. Developments in these industries are driven by fundamental and applied research in physics, chemistry, biology, engineering, and materials science. Applications of nanotechnology have a great impact on electronics but there are quite limited field of application for the food industry. However, achievements and discoveries in nanotechnology promise hope for food industry which is looking for new and available alternatives for improving food quality and safety. Nanotechnology has great opportunity in development of new functional materials, synthesis of new food products and/or ingredients, new delivery systems processed at micro and nano scales, food product development and food safety. In this study, it was aimed to review the applications of nanotechnology in food industry.

KEY WORDS: *nanotechnology, food industry, novel technologies*