NEW METHODS OF FOOD PRODUCTS PROCESSING BY INFRARED RADIATION

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At present, the most progressive are the electrophysical methods of processing food products, the use of which allows to solve a number of technical problems at a higher degree of labor organization and intensification of processes. In recent years, such methods of heat treatment as high-frequency, ultrahigh-frequency and infra-red heating have been widely used.

Unlike all other heating methods, in which heat is perceived by the surface of the product and penetrates into the middle due to thermal conductivity, when processed in the field of electromagnetic radiation, energy is absorbed by the body processed by all its volume.

IR radiation, which is understood as the invisible area of irradiation adjacent to the red part of the spectrum, is the most interesting among these methods of thermal treatment. In the general spectrum of electromagnetic vibrations, infrared rays occupy a relatively small area with wavelengths from 0.76 to 750 μm. Infra-red radiation (IR radiation) is used for heat treatment (smoking and drying) of food products, including meat.

The feature of IR radiation is the ability of radiant flood to penetrate inside the product. The penetration depth depends on the properties of the heated product as well as on the radiation wavelength: the smaller the wavelength, the greater is the penetration depth.

Heat treatment of products with the help of IR radiation has undoubted advantages over other methods of heat treatment, as this reduces the processing time, eliminates the introduction of the additional amount of fat for frying, improves sanitary and hygienic manufacturing conditions. The increased interest in IR radiation is promoted not only by the desire to accelerate technological process, but also to increase the finished products output, palatability properties of the finished products.

One of the main conditions for successful use of IR radiation for food products processing is to ensure the maximum possible uniformity of irradiation. Creation of a uniform heat flux on the surface of the product

guarantees stability of the technological process and high quality of the finished product.

Rational use of infrared energy in a particular technological process occurs primarily due to the availability of information concerning optical properties (throughput, absorption and reflection abilities) of the treated material, spectral and energy characteristics of the used radiators, their correct combination, and the specificities of physical and chemical properties of the product.

One of the main factors that determines the success of IR rays usage for heat treatment is the ability to penetrate into the processed products at a certain depth, to influence molecular structure and circulation of gases in pores, due to which the temperature increases not only on the surface, but also at some depth. This widens the heating area; reduces duration of heat treatment and allows to drive a radiant flux of high density without fear of burning the product. Thermal energy is transmitted to the product by radiation in the absence of direct contact between the generators and the heated product. Culinary products do not require overturning during heat treatment by IR radiation, because the crust is formed simultaneously on both sides due to the influence of infrared rays, on the one hand, and the contact of the product with the surface of the sheet, also heated by a radiant flow – on the other side.

The quality of products processed by infrared radiation meets technological requirements. Equally important is that frying in such devices ensures the preservation of nutrients. The product is fried in the preheated cell of the apparatus, while proteins such as meat, fish rapidly curtail on the surface of the product in the result of intense influence of infrared rays, and the pores of muscle tissue clog that prevents from juice exudation. Therefore, meat and fish cooked in infrared devices are soft and juicy, whereas when frying meat in a frying pan or sheet tin, intense juice exudate that leads to large losses of the finished product's mass.

The prospects for the research in improving the processes of infant food processing are in the integrated approach to determining the optimal factors that have an impact on the process for different types of raw materials.