

Chemical transformations of volatile organic compounds in animal-derived products after irradiation

Tuesday 2 July 2024 17:50 (15 minutes)

Radiation technologies are actively used to extend the shelf life of food products and ensure their microbiological safety [1]. However, radiation exposure can cause a variety of physicochemical and organoleptic changes in animal-derived products. This is caused by the intense oxidation of biomacromolecules, such as proteins and lipids, which can change the texture, color, and smell of meat [2]. The intensity of physicochemical processes occurring in biological objects can be assessed by the presence and concentration of volatile organic compounds (VOCs) [3].

This work of scientists from Moscow State University is aimed at identifying and analyzing the physical and chemical changes in products after their radiation processing. In this study, a series of products - beef, turkey and salmon - was irradiated using the UELR-1-25-T-001 accelerator with a maximum energy of 1 MeV. Also, to explain the dose behavior of the concentrations of volatile organic compounds in products, a series of model studies were carried out on the irradiation of standard samples of volatile organic compounds - 1-hexanol. The concentrations of volatile compounds were determined using a gas chromatography-mass spectrometer Shimadzu GCMS-QP2010 Ultra (Shimadzu, Japan).

Based on the results of the study, a mathematical model was developed that describes the dependence of the concentrations of standard volatile compounds and VOCs identified in food products on the radiation dose. It was found that aldehydes make it possible to assess how radiation affects the product's lipid and protein components. It has been established that ethanol may indicate a decrease in microbial enzymatic processes occurring in meat products during storage [4].

This research was funded by the Russian Science Foundation, grant number 22-63-00075.

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Section

Applications of nuclear methods in science, technology, medicine and radioecology

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Session Classification: Applications of nuclear methods in science, technology, medicine and radioe-

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