

Impact of accelerated electrons on the chemical parameters of chilled meat over long-term storage

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Radiation treatment of food products with properly chosen physical and technical characteristics of radiation (type of radiation, dose, dose rate, etc.) effectively increases the microbiological safety of products, preserving their taste and nutritional properties.

Changes in organoleptic properties of chilled meat products after radiation treatment are related to the degree to which ionizing radiation affects fatty acids, which may decompose into volatile compounds such as alcohols, aldehydes and ketones as a result of hydroxyl radicals and oxidation. The role of aldehydes as markers of food radiation treatment has been discussed in the literature [1].

The aim of this work was to obtain dependences of concentrations of volatile organic compounds in turkey meat on irradiation dose after exposure of 1 MeV electron beam.

Chilled turkey meat was chosen as an object of research. The samples were irradiated using continuous electron accelerator UELR-1-25-T-001 with the energy of 1 MeV. The samples were irradiated at doses of 0.25 kGy, 0.5 kGy, 1 kGy, 2 kGy, 5 kGy, 10 kGy and 20 kGy. The estimation of chemical changes was carried out using Shimadzu GCMS-QP2010 Ultra gas chromatography-mass spectrometer.

Within 13 days after irradiation the changes in concentrations of volatile organic compounds in samples irradiated at different doses were monitored.

The dependence of aldehyde concentrations on time after irradiation could be divided into 3 periods: the first 4 days, then from the 4th to the 8th day, and then from the 8th to the 13th day of observation. During the first period, relative fluctuations in the concentrations of this group of compounds were observed; the second period was characterized by a decline and approach of aldehyde concentration values in the irradiated samples to the reference values. During the third period, the dependence of pentanal concentration in all irradiated samples was close to the reference values. Concentrations of acetaldehyde and heptanal on the 13th day of observation were higher in all irradiated samples compared to the reference values.

Analytical relationships describing changes in the concentration of various volatile compounds in turkey samples as a function of irradiation dose and time after treatment were proposed, based on the fact that two competing processes take place in all the samples studied: decomposition of a chemical compound and formation of molecules of this compound due to the decomposition of other compounds.

1. Joong-Ho Kwon, Youngju Kwon, Tusneem Kausar et al. Effect of cooking on radiation-induced chemical markers in beef and pork during storage / Journal of Food Science 77:C211-5

The speaker is a student or young scientist

Yes

Section

1. Nuclear technology and methods in medicine, radioecology

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