Fats Conversion in the Technological Processing and their Detection of Falsification

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Introduction. Nowadays manufacturers of the food products, which include animal fats and oils, replace partially or completely fat specified in the recipe for a cheaper fat of another composition or lower quality. Therefore, determining the type of fat in the finished product is a key issue revealing its forgery.

Materials and methods. The term “counterfeit goods” is often confused with the concepts of “fake substitute” (substitutes, imitators) and “defective products” (which is obtained due to the imperfect technology or low-skilled workers). This is no coincidence as many counterfeit substitutes and defective products are widely used for the purpose of natural products falsifying. The customer is not deliberately placed the information or placed it unreliable.

Often there is adulteration of the products that contain butter. Butter is a valuable food product in which 72.5 ... 83 % of milk fat is concentrated. Also butter contains 1.1 % of protein, 0.5 % of lactose, 0.2 % of minerals and 16-35 % of water. Butter contains vitamins A (from 2 to 12 mg %), D, E (3 mg%), C and B complex vitamins, whose number increases in old butter. Butter has a high calorie (about 7800 kcal / kg) and almost complete absorption (97 %) [1].

Butter is characterized by high organoleptic properties: taste, aroma, texture, colour. According to the current ISO it is forbidden to add vegetable fats into butter in the hydrogenated or natural forms [2].

The most common method of falsification of butter is its partial or complete replacement for margarine. It is a product derived from cheap oils, animal fats and fish, is hydrogenated and subsequent formation of fine water-in-oil system. The group also includes water, milk, salt, sugar, emulsifiers, antioxidants, preservatives, food colourings and other components [3].

At the same time, margarine contains antioxidants: buthylhydroxytoluene and butyl hydroxyanisol that cause cancer. Oleic and linoleic fatty acids, found in vegetable oils, in the content of margarines are fully hydrated and have transisomeric configuration space. Emulsifiers that are contained in margarine because of 20-25 % of water destroy red blood cells (plasmolysis) in the blood. Thus, margarine can be consumed only by healthy people in small amounts, and especially for the sick and children it is contraindicated.

Results. The use of modern technologies in the fats and oils manufacturing makes it difficult to detect counterfeit. Classical methods of the food analysis do not allow to detect fake and its

composition accurately and reliably. One of the modern methods of determining the authenticity of fat is capillary gas chromatography.

In modern gas chromatography high-efficiency capillary columns are used that enable to obtain information as to the identification of counterfeit. The principle of the sample preparation is based on meadow hydrolysis of triglycerides to free fatty acids followed by obtaining esterification reaction of methyl esters of fatty acids. Nographic chromatography separation of methyl esters of fatty acids is carried out on a gas chromatograph with fire-ionization detector with a capillary column installed. Even a perfect adulteration of butter can be recognized using capillary gas chromatography. Usually artificially produced oils have much in common with natural butter. But the resemblance is only in the presence and ratio of essential fatty acids. Modern high-performance tandem gas chromatography and chromatography mass spectrometry makes it possible to determine the butterfat in artificial mixtures, even if its content is less than 5 %.

During the study, the quality of oils and fats should be also determined the fatty acid composition and the ratio of cis- and trans- isomers of fatty acids.

Conclusions. Thus, it is suggested to use gas-liquid chromatography to determine the type of fat in such objects as pastry. Extraction of fat trim should be performed three times with chloroform crushed sample product for 2 min at room temperature. The fat content in the sample can be determined gravimetrically after steaming in a water bath aliquot of the extract. The degree of extraction of lipid components in this way, depending on the type of pastry and content in the oil is 96,0-99,0 %.

Fatty acid composition of fat extracted is planned to determine using the gas-liquid chromatography “Krystallyuks - 4000m”.

References

1. Obrayen R. D. Fats and Oils. Pro-creation, Composition and Properties, Demonstrate How. – Moscow, 2007. – 752 p.

2. ISO 4399 : 2005 “Butter”.

Scientific supervisor: Iryna Dovgun