ISSN: 2349-7793 Impact Factor: 6.876., Volume: 16 Issue: 04 in April 2022

THE IMPACT OF PHYSICAL-CHEMICAL CHANGES ON THE QUALITY OF FOOD HYDROGENATED FAT DURING STORAGE

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Abstract: Modification of vegetable oils by hydrogenation is implemented in order to convert liquid vegetable oils into solid ones, while the selection of process conditions allows obtaining hydrogenated fats of varying degrees of hardness, which allows expanding their assortment and scope of application [1]. Vegetable oils are liquid in ordinary condition; therefore, many manufacturers use the method of hydrogenation in the presence of a catalyst to obtain a more solid consistency. During the hydrogenation process, hydrogen molecules are added to the oil to change the texture, stability, and increase the shelf life of the final product.

In countries around the world, manufacturers of oil and fat products widely use hydrogenated solid fats to produce margarines, spreads, confectionery, frying and baking fats for various purposes. Many manufacturers prefer hard fats due to their reasonable cost and long shelf life [1].

Technical and food hydrogenated fats are produced in industrial conditions; food hydrogenated fats of various brands are most widely used.

Cottonseed, sunflower, olive, corn, soybean, flaxseed, poppy-seed, rapeseed, sea-buckthorn, walnut, mustard, sesame and peanut oils are subject to hydrogenation.

Rancidity of food hydrogenated fats obtained from cottonseed oil during storage resulted because of incomplete refining of hydrogenated fats and non-compliance with storage conditions, is accompanied by the appearance of a specific odor and unpleasant taste in hydrogenated fat, caused by the formation of low-molecular carbonyl compounds and due to a number of physical-chemical processes. Factors that influence the rancidity of hydrogenated fats are temperature, light, oxygen, humidity and catalyst residues.

Two types of rancidity of food hydrogenated fats are distinguished – biochemical and chemical rancidity. Biochemical rancidity is typical for hydrogenated fat containing a significant amount of water. An increase in acidity may not be accompanied by the appearance of rancidity. Microorganisms developing in hydrogenated fat excrete lipoxidase enzymes, under the influence of which fatty acids are oxidized to β-ketoacids. Methyl alkyl ketones, formed during the decomposition of the latter, cause changes in the taste and smell of hydrogenated fat [2, 3].

Chemical rancidity is the result of oxidation of food hydrogenated fat under the influence of oxygen contained in the air (auto-oxidation). The first stage is the formation of peroxide radicals during the interaction of molecular O_2 of the hydrocarbon residues of both saturated and unsaturated fatty acids. The reaction is catalyzed by light, heat and compounds that form free radicals, peroxides,

ISSN 2349-7793 (online), Published by INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT, ENGINEERING AND SOCIAL SCIENCES.,
under Volume: 16 Issue: 04 in April-2022
https://www.gejournal.net/index.php/IJRCIESS

accompanied by a change in the organoleptic characteristics of hydrogenated fat. These factors lead to the formation of potentially harmful substances, which leads to a reduction in the shelf life of hydrogenated fat; the process also has important economic consequences, since hydrogenated fat becomes unsuitable for consumption, as a result, not only the organoleptic characteristics, but also its nutritional value, including biological value of hydrogenated fat change. In addition, primary oxidation products, peroxides, have a toxic effect on the human body [4].

The reaction of the process of rancidity of food hydrogenated fat obtained from cottonseed oil, exposed to atmospheric oxygen is shown in Fig.1.

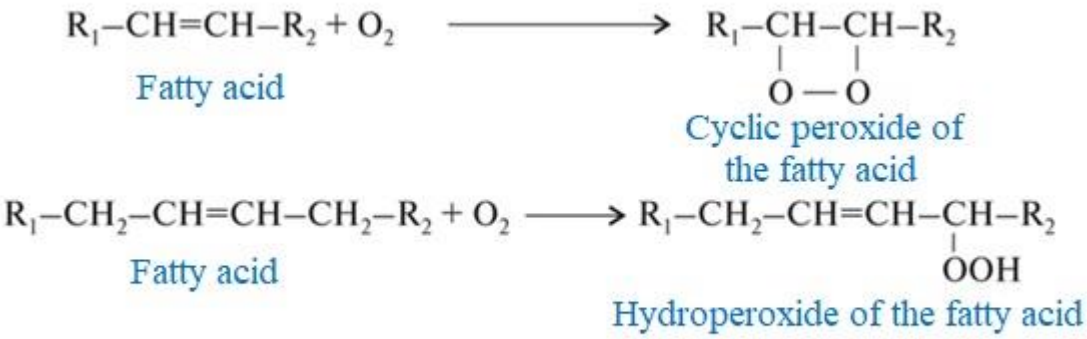

Fig. 1. Reaction of the process of rancidity of food hydrogenated fat under the influence of atmospheric oxygen

It is reasonable to store food hydrogenated fat based on cottonseed oil in a sealed container, in vacuum packaging or in an inert gas atmosphere at subzero temperatures. Food hydrogenated fat should not contain easily oxidized metals such as copper, iron, manganese, their salts or organic derivatives of lead, tin and other metals.

Autoxidation is an irreversible process of oxidation of food hydrogenated fat, it cannot be avoided in its entirety, but it can be delayed by the addition of antioxidants. In order to slow down the oxidative processes in food fat during storage, it is advisable to use antioxidants. Among the antioxidants, the compounds of phenolic nature, i.e., ionol, butylated hydroxytoluene, butylated hydroxyanisole E-320, propylgalates are of greatest importance. Of the natural antioxidants, tocopherols are of greatest importance. The resistance of fats to oxidation increases 10-15 times with the introduction of antioxidants in an amount of 0.01%, [4].

Food hydrogenated fat should be stored in warehouses equipped with refrigeration equipment, at a temperature from -20 to 0°C with constant circulation and air flow with a relative humidity of no more than 80%, for a period of 1-12 months.

When storing food hydrogenated fat, it is advisable to use metal containers weighing no more than 50 kg, metal containers, road and rail tanks.

The shelf life of food hydrogenated fat is set by the manufacturer depending on the production scheme, storage temperature and type of packaging.

As a conclusion, it can be noted that in order to delay undesirable physical and chemical processes during the storage of food hydrogenated fat, it is necessary to act against one or more factors that contribute to changes in the quality of latter.

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It is necessary to understand that, depending on the purpose and further use, food hydrogenated fat is subjected to partial or complete refining of food hydrogenated fat. It should be noted that the refining of hydrogenated fat affects its chemical composition, nutritional value and its shelf life. When familiarizing with the assortment of food hydrogenated fat, it is important to understand the features of their composition and properties, storage conditions and expiration dates.

During the refining food hydrogenated fat, special attention should be paid to the indicators regulated by standards. Refining and deodorizing of hydrogenated fat is one of the most important technological processes of its processing. Technological refining processes consist of a complex of complicated physical, chemical and physical-chemical processes, on which the physical-chemical and organoleptic characteristics of the resulting food hydrogenated fat mainly depend [5, 6].

Margarines and spreads obtained with the addition of food hydrogenated fat, often used in the nutrition of the population, are direct ingredients and the main component of many food products.

References

1. Tovbin I.M., Melamud N.L., Sergeev A.G. Hydrogenation of fats. Moscow: Light and food industry. 1981, p. 296.
2. Guidance to the technology of obtaining and processing vegetable oils and fats. / Under generak edition of A.G. Sergeev and N.L. Melamud. Leningrad: All-Union Scientific Research Institute of fats. 1985. Vol. II, book 1, p. 287.
3. Korneva E.P. Assessment of oils, fats and their products. Quality and safety: textbook for universities. Korneva E.P. Novosibirsk, 2007, p. 272.
4. Khomutov B.I., Lovachev L.N. Storage of food fats. Moscow: Economics. 1972, p. 198.
5. Askinazi A.I., Kalasheva N.A. and others. Physical refining of hydrogenated fats. Moscow: Scientific Research Institute of Information and Technical and Economic Research of the Food Industry. Food industry. Serie 20. Oil and fat industry. Overview information. Issue 6. 1989, p. 132.
6. Arutyunyan N.S., Kornena E.P., Yanova A.I. and others. Technology of fat processing. Under edition of prof. N.S. Arutyunyan. 3rd edition. Moscow: Pishchepromizdat. 1990, p. 452.

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