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БАЛИҚ МАҲСУЛОТЛАРИНИНГ КИМЁВИЙ ТАРКИБИ

CHEMICAL COMPOSITION OF FISH PRODUCTS

ХИМИЧЕСКИЙ СОСТАВ РЫБНЫХ ПРОДУКТОВ

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Аннотация

Мақолада балиқ маҳсулотларидан бири бўлган консерваланган балиқ таркибидаги озиқ-овқат қўшимчаларининг кимёвий таркиби ва уларнинг инсон танасига таъсири ҳақида маълумот берилган.

Annotation

The article provides a brief overview of the chemical composition of food additives in canned fish and their effects on the human body.

Аннотация

В статье дается краткий обзор химического состава пищевых добавок в рыбные консервы, входящие в состав рыбных продуктов, и их влияние на организм человека.

Таянч сўз ва иборалар: *балиқ, консерва, қўшимчалар, сақлагичлар, стабилизаторлар.*
Keywords and expressions: *fish, canned food, food additives, preservatives, antioxidants, stabilizators.*
Ключевые слова и выражения: *рыба, консервы, пищевые добавки, антиоксиданты, стабилизаторы.*

Fish and fish products have long been loved and consumed as a product that cleanses the human body, strengthens bones and teeth. The rapid digestion and dietary value of this product further increases its value. Fish meat is superior to beef and mutton due to its storage of many vitamins and trace elements.

Eating fish is beneficial in many diseases. The consumption of fish and fish products in a regular diet reduces the risk of heart disease, improves vision and sleep, relieves rheumatoid arthritis, lowers cholesterol, speeds up metabolism, lowers blood pressure, in neurological diseases, increases sexual potency of men, is considered to be beneficial for the liver [1].

Fish products come in a variety of forms, including salted herring, canned fish, hot and cold smoked fish, dried fish, and caviar [2].

The fish products are classified into three groups in accordance with the salt in their ingredients:

1) Very salty – the products with 14% or more salt

2) Average salty – the products with 10-14% salt

3) A little salty – the products with up to 10% salt

The fish type with a little salt in it is very delicious and soft, but the only problem is the problem with its storage, that is, they cannot be stored for a long period of time.

Fish products are canned for long-term storage and transportation. Canning is a product that is placed in an airtight container, heated in a strictly defined mode, to ensure the destruction of microbes and their destruction, which can cause damage in the conditions formed inside the waterproof can.

The production of fish products has a number of peculiarities in the use of food additives. This is due to the specifics of fish processing technology and the stereotypes formed among consumers in relation to fish products [3].

The analysis of the work of companies selling food additives and fish processing enterprises has made it possible to distinguish the following categories of food packaging, which are relevant in the production of fish products:

1. Salting mixtures and accelerators of ripening of various fish species - herring, salmon, cod. Salting mixtures consist of mixtures of salting ingredients. The traditional composition of salting mixtures - salt, sugar, flavor enhancer is used. In addition, the salting mixture used to make fragrant fish marinade retains more fragrant substances and their extracts, flavorings. They serve to shorten the technological processes associated with the preparation, mixing and

introduction of recipe components (other than fish). Approximate amount - 5%. Maturation intensifiers consist of a mixture of ingredients for salting. It differs from other salting mixtures in the presence of ingredients that accelerate the ripening of fish meat.

2. Structural ingredients and mixtures (fishburger, crab sticks, pate, sausage, fish and caviar pastes, canned food) for fish mince and products made from it. The functional characteristics of this category and the composition of the mixture of ingredients depend on which fish products are intended. The bases of the compositions are usually proteins (animal and plant proteins) and hydrocolloids. Depending on the function of the mixture, it also contains emulsifiers, antioxidants, phosphates, flavorings or aromatic herbs, salt, sugar, flavor enhancers, dried vegetables, softening components (fiber, wholemeal bread, potato paste) [4].

3. Concentrated sauces, marinades and dry mixes for pouring into preserves. Dissolving or dispersing sauces and other infusions in water, oil, or emulsion serves for quick preparation. Such compositions usually contain dry components: salt, sugars, flavorings and their extracts, flavorings, dried vegetables, flavor enhancer E621 - sodium glutamate or its analogues, thickeners, preservatives, dyes, antioxidants. The composition also includes tomato powder, vegetable oil, wine, and marinades - acid regulators [5].

4. Decorative sprinkles and additions. It consists of whole or crushed spices, pieces of dried vegetables or powder, chopped or crushed herbs, and the compounds contain a flavor enhancer E621 - sodium glutamate or its analogues, sugars, flavorings. Fragrant additives used in the composition of decorative sprinkles and compounds: red, fragrant, black pepper, ginger, turmeric, cloves, cumin, coriander, cinnamon, cardamom, mustard, nutmeg. Traditional dried vegetables that are part of the decorative sprinkles and additives: red peppers, green peppers, onions, garlic, carrots. Fragrant herbs for decorative sprinkles and additions: marjoram, basil, thyme, parsnip, celery, parsley, dill. Preserves are used in the preparation of hot and cold smoked delicacies.

5. Compositions that enhance the taste and aroma of fish products (flavor, aromatic compositions eliminate unpleasant taste and odor of fish products, enhance the desired organoleptic characteristics). The basis of these mixtures is extracts of spices and flavorings, as well as salt, sugars, emulsifiers, thickeners, antioxidants in liquid mixtures [6].

The following food additives are also among the fish products producers in steady demand.

6. Individual fragrances and their extracts.

7. Colors (yellow and red gamma, the coloring element that dissolves in oil and water is especially well-sold for salmon).

8. Preservatives. Currently, preservative compositions are widely used in the processing of fish products.

9. Smoking chemicals. Ingredients of wood pyrolysis products purified in a certain way. Smoked products give taste and smell to fish products, can be dry and liquid, more liquid is on demand - smoked flour is applied to the surface of the intended fish products.

10. Mixtures for baking. Baked flour or baked bread consists of bread, salt, sugars, fragrant fats and their extracts, aromatic herbs and flavorings, flavor enhancer E621 - sodium glutamate or its analogues. The approximate amount is 5-10%.

11. Compounds for the preparation of lezon, approximate composition: flour, emulsifiers, extracts or flavorings of aromatic substances, salt, sugars, antioxidants [7].

Phosphates perform many functions in the processing of fish products. The addition of salt and phosphates results in the dissolution, solubilization, or activation of muscle proteins. Proteins are moister and have the property of emulsifying fat. Phosphates and their mixtures used in the processing of fish products have an alkaline environment. The addition of phosphates with an alkaline environment to low-acid fish products increases the pH of the products and increases the moisture-binding properties of the proteins. Phosphates, which exhibit acidic properties, are used to soften and increase the color of connective tissue proteins, improve their color [8].

The addition of phosphates to fish products increases the ionic strength of muscle tissue, alters the ratio of activated and depleted proteins, and helps to immobilize added water as well as emulsify fats. Phosphates also form chelates with heavy metal ions (iron, copper) and bind them, reducing the oxidizing effect of metal ions. According to the above effect, phosphates increase the yield of the finished

product, prevent dehydration during defrosting, heat treatment, improve the consistency and slow down the oxidation of fats. Phosphate-treated fish and seafood are tender, juicy and nutritionally valuable. Phosphates interact with natural, non-denatured proteins because the treatment of fish and seafood with phosphates is preceded by heat treatment [9].

When processing fish products, the quality of the product is also improved by adding thickeners to them. These compounds combine with the water in the product to form a thick mass. Because these food compounds form colloids, they are often referred to as hydrocolloids. Concentrating compounds are high-molecular-weight compounds with a linear and branched structure that retain hydrophilic groups due to their chemical nature. These compounds are derived from more natural sources. Concentrating compounds from brown algae, such as alginic acid (E400), its salts and esters (E 401-404), seaweed agar (E406), carrageenan (E407) and fruit-derived pectin (E440) are widely used in fish production.

Condensers are added during the processing of products, mainly in the form of powder [10].

Orthophenylphenol sodium salt (E232) is a strong preservative that causes allergies, nausea and in people with asthma the breathing problem intensifies.

Emulsifiers are added to canned fish to bring the immiscible liquids in them to the same phase. In the manufacture of these products, lecithins (E322), mono and diglycerides of fatty acids (E472 s) and esters of glycerin (E472 b) are widely used as emulsifiers [11].

One of the indicators that attract buyers in the production of fish products is its color. Natural organic, mineral and synthetic dyes are used in the processing of fish products.

Natural dyes are dyes that are physically separated from plant and animal sources and in some cases are chemically modified to improve their technological and consumer properties. Some dyes are also obtained synthetically. For example, microbiologically derived b-carotene corresponds chemically to β-carotene derived from carrots. In this case, natural β-carotene is rarely used as a dye in the food industry because it is more expensive. The amount of dyes in plant raw materials depends on climatic conditions, the harvest season, and in any case their amount will not be high. Natural dyes are cleaned of additives when obtained. Modern technology makes it possible to obtain natural dyes with the desired color-forming composition. Due to their chemical nature, plant-derived dyes include flavonoids and carotenoids. Flavons and flavonols are common yellow dyes. They are found in parsley, wheat, rice, chrysanthemum flowers. Carotenoids (E160 and E161) give plants their yellow and orange color in most cases. The most important of these is β-carotene (E160a), which is also a source of vitamin A and an antioxidant in the human body. It is found in carrots and its name is derived from the Latin name of the carrot (*carota*) [12]. The yellow color of corn kernels is characterized by the presence of three carotenoids: carotene, zeaxanthin and cryptoxanthin. The red color of tomatoes and celery is due to the presence of lycopene (E160d). In the processing of fish, paprika resin oil E160s is used, which, along with dyeing, gives the product taste and aroma. Natural yellow dye is also curcumin (E100), which belongs to the group of chalcone and oxycetone dyes. It comes in two forms on sale: turmeric powder and turmeric extract. The color of red beets is characterized by the presence in it of the beta-dye substance - betanine (E162). Another dye belongs to the group of quinones (carmine E120) and is derived from the cosine insect [13].

Table 1.

Some food additives included in canned fish

Conditional Symbol of Compounds	Chemical formula	The names of food additives	Function	Source
E262	CH_3COONa	sodium acetate	Regulator	Artificial
E270	$C_3H_6O_3$	lactic acid	Preservative	Natural, Synthetic
E296	$C_4H_6O_5$	malic acid	Regulator	Natural
E322	A mixture of compounds	Lecithins	Antioxidant, emulsifier	Natural
E412	A mixture of compounds	Guaran	Thickener, stabilizer	Natural

E415	$(C_{35}H_{49}O_{29})_n$	Xanthan	Stabilizer	Natural
E401	$(C_6H_7O_6Na)_n$	Sodium alginate	Stabilizer	Natural
E162	$C_5H_{11}NO_2$	Betanine	Dye	Natural
E160b	$C_{25}H_{30}O_4$	Annato	Dye	Natural
E160c	A mixture of compounds	Paprika	Dye	Natural
E202	$C_6H_7KO_2$	potassium sorbate	Preservative	Natural, artificial
E210	$C_7H_6O_2$	benzoic acid and its sodium salt	Preservative	Natural, artificial
E211	$C_7H_5NaO_2$	sodium benzoate	Preservative	Natural, artificial

Table 2

The impact of certain food additives of fish products on human health

Sign	Chemical formula	Name	The impact on health
E120	TiO_2	Carmine	Causes allergy
E171	$C_7H_6O_2$	Titanium dioxide	May cause kidney and liver disease
E200	$C_7H_6O_2$	Benzoic acid and salts	May cause kidney and liver disease
E232	$C_{12}H_9NaO$	Sodium salt of orthaphenylphenol	Causes allergy andnausea
E239	$C_6H_{12}N_4$	Urotropin	Causes allergy
E300	$C_6H_8O_6$	Ascorbic acid	Excess amounts cause allergies and inflammation of the urinary tract
E330	$C_6H_8O_7$	Citric acid	Damages mucous membranes and the enamel layers of the tooth.
E331	$Na_3C_6H_5O_7$	Sodium citrate	Excess amounts raise blood pressure
E471	$C_{21}H_{42}O_4$	Mono and diglycerides of fatty acids	Increases the amount of cholesterol in the blood
E 621	$C_5H_8NO_4Na{\cdot}H_2O$	Sodium glutamate	Regular intake causes tachycardia, headache and allergies. Adversely affects vision
E954	$C_7H_5NO_3S$	Saccharin	Damages the enamel layer of the teeth. It has carcinogenic properties

Today, there is a growing interest in new types of food additives in the fish processing industry, which serve to improve the quality and shelf life of fish products. Especially in this area there is a growing trend of using natural components as food additives. This is due to the growing popularity of healthy eating and the consequent increase in demand for natural products. The consumer now evaluates the appearance, taste, consistency of products made using complex food additives.

It is no secret that in the food industry, in order to improve the quality and shelf life of products, natural, artificial and synthetic food additives are added to them. Food supplements derived from natural sources are harmless to the body and their use in the food industry does not pose a risk to human health. However, most food additives obtained by artificial and synthetic methods lead to the accumulation of compounds that are foreign to the body as a result of regular consumption of added products. Such compounds then cause a number of diseases in the body.

Instead of some synthetic food additives that have a negative effect on the human body, used to store fish products, we propose to develop food additives based on ferrocene derivatives that are harmless to the human body.

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