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# FILLING SAUCES FOR CANNED FISH AND THEIR LAYER KINETICS

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**Abstract:** The article presents dressing sauces prepared on the basis of sauce-paste semi-finished products that can be used in the preparation of canned fish, and their physical properties, including the stability of the system as one of the indicators of the quality of sauces, stability, stratification and analysis of the conclusions obtained as a result of a large number of experiments are presented.

**Keywords:** sauce paste, sauce, canned fish, semi-finished product, organoleptic indicator, quality scale, consistency, stratification.

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**Introduction.** In many sectors of the food industry, including the production of canned goods, fillers with different properties and characteristics are used, namely emulsions (water + oil) or suspensions (flour + water), which are complex colloidal systems. They can be based on water, honey, vegetable oils, animal fats, various functional sauces, and diluted hygroscopic organic particles.

Sauces are not only a complement to canned fish products, but also play a special role in the diet and cooking of peoples around the world. It is known that the human body should consume protein, fat, carbohydrates, and minerals in amounts consistent with scientifically based recommendations, which are important because they are easily absorbed by the body and affect the proper functioning of metabolic processes. In this process, sauces have a unique functionality, and based on their properties, they perform certain functions in the preparation of canned fish as well as in eating.

In this regard, based on the industrial use of sauces, it is important to take into account the correct selection of products used to obtain sauces, their processing, and their compatibility with the canned products being prepared. When choosing sauces for canned products, taking into account the main raw materials, including the type of fish, their size, and chemical composition, the sauce should make up for the substances that are lacking in canned fish, improve the organoleptic, physicochemical properties of the finished products, and give them their own unique quality characteristics. For this reason, it is necessary to expand the possibilities of their application by developing a technology for filling sauces for canned fish that will increase its organoleptic, physicochemical properties, based on personal experiments and research analysis.

Sauces are commonly used in the preparation of meat, fish, canned vegetables, and culinary products, but the traditional tomato sauces are the most commonly used. In the

production of canned fish, due to the fact that the fish pieces are completely immersed in the sauce, they are subjected to uniform heat treatment, the fish pieces soften and reach a uniform state of readiness. Sauces also serve a similar purpose as a topping in the preparation of other canned goods. Complementary sauces add juiciness to food, harmonize the taste and aroma of the product, and play an important role in creating the organoleptic characteristics of the product. Cooking fish products in sauce leads to rapid softening of the meat, because the acid present in the sauce (mainly tomato, sour cream) accelerates the conversion of collagen into gluten.

In the production of canned fish, special requirements are imposed in accordance with technical regulations, one of which is the stability of the structure (shape) of fish or its pieces in packaged canned food. The role of fillers in the formation of such organoleptic properties is considered to be very high. "Canned fish in tomato sauce" is prepared using traditional technologies in accordance with the requirements of GOST 16978-2019.

In some canned fish available in shopping malls today (with tomato sauce, filled with vegetable oil, etc.), we can see that 65-80% of the fish pieces in the canned fish have been mechanically crushed and ground into a filler (sauce or vegetable oil). This negatively affects the organoleptic, physicochemical properties of canned fish, as well as reduces its use in catering establishments. In order to prevent the above-mentioned quality changes in canned fish and increase its functional properties, we propose to use sauces prepared based on tomato sauce-paste semi-finished products as a filler for the preparation of canned fish.

**The purpose** of the research is to use sauces based on a new type of functional sauce-paste semi-finished products in the production of canned fish, and to study the stability and layering stability of sauce systems.

**The object** of the research is tomato-based sauce-paste semi-finished products, sauces made from them, and canned fish.

**Methods of the study.** Organoleptic characteristics of tomato sauce-paste semi-finished products and sauces prepared on their basis. Sedimentation analysis was carried out for new stable systems using the modified Tilgner method to determine the degree of dilution of semi-finished products.

In assessing the recipe and technology of the semi-finished tomato sauce paste offered as a filler for canned fish, as well as the possibilities of its application, we will analyze the following.

The following sequence of processes is used in the development of the recipe and technology of semi-finished sauce-paste: washing, inspection, cleaning, finely chopping carrots, onions, garlic and sautéing in oil separated from the previously prepared liquid base-broth for the sauce, adding crushed tomatoes or tomato paste and bell pepper puree and continuing to sauté. In parallel, wheat flour is sautéed at 100-110°C and sugar and salt are added to the cooled flour. Tomato and red bell pepper puree is mixed with sautéed vegetables and sautéed flour. Sugar and salt are dissolved in the remaining broth and mixed for 5-7 minutes until the components have a uniform consistency and cooled

to 4-60C. The finished product is a homogeneous mass of medium density, with a tomato aroma and taste with a vegetable aroma, and a bright red color.

Based on numerous experiments, the optimal proportions of the necessary raw materials according to the recipe of the product obtained are as follows (100 g): Broth for making sauce - 250; wheat flour - 170; carrots - 70; onion - 50; garlic - 26; tomato paste - 290; red sweet pepper puree - 110; sugar - 17; salt - 17.

To prepare a filling (sauce) for canned fish, the semi-finished product is mixed with hot water in a ratio of (1:3 thick, 1:5 medium, 1:7 liquid) and cooked for 15-20 minutes, then the taste is adjusted. We offer a recipe for preparing a filling (sauce) for canned fish based on sauce-paste semi-finished products (Table 1).

**Table 1.** Recipe for semi-finished sauce-paste for canned fish

№	Name of raw materials and semi-finished products	Consumption standards, kg	
		Brutto, g	Netto, g
1.	Semi-finished tomato paste	-	200
2.	Water	900	793
3.	Bay leaf	0,2	0,2
4.	Ground black pepper or grains	0,5	0,5
<b>Output</b>			<b>1000</b>

Organoleptic analysis of food products is one of the important aspects of determining their quality indicators. When conducting an organoleptic analysis of semi-finished products of sauce-paste for the preparation of canned fish, a point system was used to determine the level of significance of indicators.

The organoleptic characteristics of the semi-finished product were formed on the basis of the studies conducted (Table 1).

**Table 1.** Organoleptic characteristics of semi-finished tomato sauce and paste

№	Names of special qualities	Vegetable semi-finished product
1	Taste and smell	Clean, clearly defined, characteristic of the given type of vegetable and cooked raw, without foreign tastes and odors.
2	Subsequence	It is pasty and homogeneous throughout the mass.
3	Color	Homogeneous, typical for vegetable sauce-pasta semi-finished products.

As can be seen from the table, the smell and taste of semi-finished tomato sauce and paste are clearly expressed, without foreign smell and taste, characteristic of this type of vegetables, pleasant, the consistency is a homogeneous paste, and the color is characteristic of the same prepared vegetable raw materials.

The preparation of the filler (sauce) used for canned fish is carried out by observing sensory indicators and some physical and chemical studies. Sauces-fillings are a complex

colloidal system containing an emulsion (water + oil) and a suspension (flour + water). One of the main indicators of the quality of fillers is the stability of the system, the stability of layering. Sedimentation analyses were carried out in order to obtain new stable systems for determining the degree of dilution of semi-finished products. The kinetics of layering of topping sauces is shown in Fig. 1.

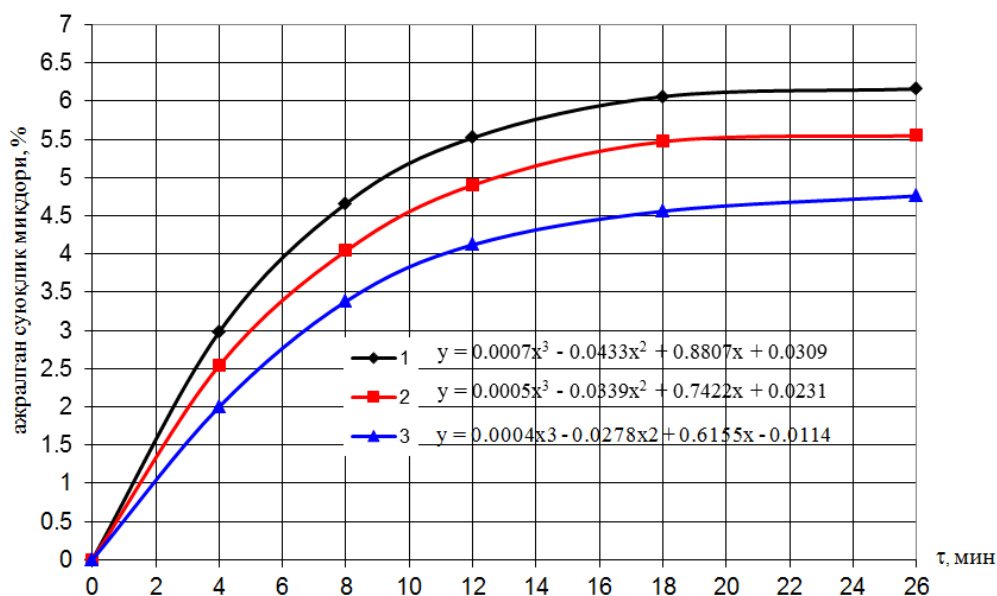


Figure 1. Kinetics of layering of sauce from semi-finished tomato paste. Dry matter content in lines: 1-15%; 2-20%; 3-30%.

When storing canned fish sauce filling, the release of moisture from it is considered a negative indicator and is called filling stratification. The stratification is inversely proportional to the amount of flour in the sauce. For example, with a tomato sauce content of 15% flour, 6.06% of water is released during an 18-minute storage period, with a flour content of 20% - 5.47%, with 30% - 4.56% water (Table 2).

Table 2. Water separation from filling-sauce from semi-finished tomato paste (coating kinetics), %

K.m. Quantity	Time, min				
	4	8	12	18	26
15%	2.98	4.66	5.52	6.06	6.16
20%	2.54	4.04	4.9	5.47	5.55
30%	1.87	3.38	4.12	4.56	4.76

In conclusion, it can be said that sauces based on semi-finished tomato sauce-paste (TU 16165217-01:2019) are more stable compared to sauces based on the requirements of GOST 16978-2019 and are characterized by an increase in stability. parts of fish in canned fish by 55-65%. This improves the consistency of canned fish, increases aesthetic

requirements, organoleptic and physicochemical indicators, and expands the possibilities of use.

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