

**Physicochemical Properties of Natural Casein Protein Concentrate and
Structuring Concentrate in Mayonnaise Production
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When studying the behavior of milk proteins in model systems, it is necessary that the research conditions correspond to the real processing conditions of the modeled systems into food products. Since our research involves the use of milk proteins in the production of emulsion products, which mainly have an acidic environment, the solubility of milk proteins was studied precisely in this range. The dependence of the viscosity of CMP (presumably Casein Micellar Protein) and WPC (Whey Protein Concentrate) on pH is characterized by a maximum in the region of $\text{pH} = 10$ and $\text{pH} = 8$, respectively, while the dependence of the viscosity of CMC (Casein Micellar Concentrate) on pH increases more than 10 times in the region of $\text{pH} = 9$. When the pH is lowered to 5 and below, CMC precipitates, and this corresponds to the pH range of 4–5 for CMC. In this pH range, viscosity measurements of CMC solutions were impossible due to precipitation. To the right of this region, the viscosity of the solutions increases regularly, which is associated with the ionization of negatively charged carboxyl groups of casein. The decrease in viscosity to the right of $\text{pH} = 9$ is apparently due to the specific adsorption of Na^+ on negatively ionized COO^- groups, which leads to a decrease in the effective charge of these groups and, as a consequence, to a decrease in the size of the macroion and a decrease in the viscosity of their solutions.

Obviously, the best effect of concentrate preservation can be achieved with the maximum possible doses of added table salt. However, the amount of salt is limited by the salting-out effect of the protein, which begins to manifest itself at a sodium chloride concentration of 2.0 mol/L. Therefore, the salt concentration in liquid CMC should be below this value.

The critical micelle concentration (CMC) in aqueous solutions of liquid CMC, determined by the surface tension isotherm and conductometrically, is approximately 0.06%.

Changes in CMC in CMC solutions upon heating are similar to the behavior of solutions of ionic surfactants. The solubility of liquid CMC proteins at a concentration slightly above the CMC is minimal at pH 5.0 and has a local maximum at pH 6.0–6.2 (in the pH range 5.0–7.0).

Sodium chloride at concentrations up to 1.5–2.0 mol/L increases the solubility of CMC proteins, and at higher concentrations it decreases it due to salting-out, with the maximum effect for pH values close to the isoelectric point of casein.

When using table salt for preserving liquid CMC, its concentration in the product should not exceed 2.0 mol/L.

The use of liquid salted CMC is advisable to increase the proportion of soluble proteins in emulsion products.

For the production of mayonnaise, vegetable oils (mainly cottonseed oil), food additives, and flavorings based on local non-traditional raw materials, potable water, and other biologically active components were used as the main and additional raw

materials. In the research, refined and deodorized cottonseed oil (Tables 1-2-3) with various initial quality indicators and physicochemical characteristics were used as the main fat raw material.

(Note: Some abbreviations like CMP, WPC, and CMC are assumed based on context. It's important to clearly define these abbreviations within the full text.).

Characteristics of deodorized cottonseed oil

Physico-chemical quality indicators				Fatty acid composition (C), %		
Iodine number, % J ₂	Chromaticity, cu. Units.	Acid number, mg KOH/g	Refractive index, nD	16:0 + 18:0	18:1	18:2
110-112	4-6	0,07-0,17	1,4572-1,4578	27,0-31,0	14,9-19,8	55,1-56,0

Table 2.

Chemical composition (%) and energy value of cottonseed oil

Water	0,1
Proteins	0
Fats	99,9
Carbohydrates	0
Ash	Traces
Energy value, kcal	899

Table 3.

Vitamins and sterols of refined cottonseed oil

β - Carotene, mg / %	The consequence
Vitamin E, mg/%	99
including::	
- tocopherol	30
- tocopherol	47
-tocopherol	2
Sterols, mg including:	
Carotene, mg %	0,24
including:	
cholesterol	с.л.
trassicasterol	с.л.
campesterol	с.л.
stigmasterol	0,01
-sitosterol	с.л.
-stigmasterol	0,22
	с.л.

As can be seen from these tables, cottonseed oil with various physico-chemical parameters and fatty acid composition was used for the production of mayonnaise. Cottonseed oil was characterized by a certain chemical composition and content of

fat-soluble vitamins, which are important for ensuring the quality and nutritional value of products made on its basis. In the food industry, a large group of substances is used, united by the general term "Food additives". The use of food additives is permissible only if they do not threaten human health. With our participation, the serial production of a new type of mayonnaise "Classic" was carried out. A special feature of the new type of mayonnaise are the prescription components, their quantitative content and ratio (Table 4).

Table 4

The component composition of a new type of mayonnaise "Classic "

Ingredients	Composition, %		
	Var 1	Var 2	Var 3
Vegetable oil	54,0	54,0	54,0
Combined system	1,4-2,5	-	-
Compound (camelina, guar)	-	1,3-2,5	-
Modified starch	-	0,0-2,0	0,1-0,4
Stabilizer	-	-	0,01-0,03
Emulsifier E 475	-	-	1,0-3,0
Sugar	1,5-2,2	1,5-2,2	1,5-2,2
Salt	1,0-1,5	1,0-1,5	1,0-1,5
Baking soda	0,0-0,05	0,0-0,05	0,0-0,05
Mustard flavor	0,02-0,08	0,02-0,08	0,02-0,08
Egg flavor	0,0-0,06	0,0-0,06	0,0-0,06
Flavor enhancer	0,0-0,05	0,0-0,5	0,0-0,5
Taste enhancer	0,0-0,02	0,0-0,2	0,0-0,2
Acetic acid (80%)	0,0-0,4	0,1-0,4	0,1-0,4
Coloring	0,0-0,2	0,0-0,2	0,0-0,2
Antioxidant	0,06-0,10	0,06-0,10	0,06-0,10
Water	45,92-41,95	46,2-39,95	46,21-41,02
Total:	100,0	100,0	100,0

As can be seen from the data in the table.4. The formulation of a new type of mayonnaise uses a relatively low amount of vegetable oil. Special attention is paid to the use of combined systems, flavorings and antioxidants.

REFERENCES:

1. Stetsenko A.V. et al. Creation of high-quality low-fat emulsions based on surfactants of various types // Collection of abstracts, 1996.
2. Sarafanova L.A. Application of food additives (technological recommendations). –S-Pb.: :GIORD, 2002.
3. Paronyan V.H., Voskanyan O.S. et al. Innovative processes in food production // Fat and oil industry, 2003, No. 1, pp.20-21.