STUDYING PRODUCTS OF UF SEPARATION OF PROTEIN-CARBOHYDRATE MILK MATERIAL WITH THE AIM OF USING IT IN SEMI-FINISHED FOR DESSERT PRODUCTS

Zolotukhina I. Grand PhD in Engineering sciences. Associate Professor,
Deinychenko G., Grand PhD in Engineering sciences. Professor
State Biotechnological University. Kharkiv. Ukraine.
Maharramov M., Grand PhD in Engineering sciences. Professor
Lankaran State University. Lankaran, Azerbaijan

Baromembrane processes, in which the transfer of the substance through the membrane occurs under the influence of the differences in pressure, are in high demand among the membrane processes. At present, membrane methods are used in food industry for cleaning and concentration of fruit and vegetable juices in canning industry, diffusion juice in sugar production, for the concentration of milk and milk products, stabilization of soft drinks and grape wines, cold pasteurization of beer, for technological water preparation, oils purification, reception of protein from potato juice, separation of slaughter animals blood, secretion of enzymes, sewage treatment, separation of gases, etc. Reduction of membranes permeability in the process of separation prevents wide introduction of baromembrane processes, which is caused by the formation of a layer of precipitate on the membrane surface – i.e. concentration polarization.

At present time there is no common opinion concerning the methods of effective influence on the intensity of concentration polarization. Many authors consider that the most perspective direction for its elimination is the specification of hydrodynamic conditions for the performance of baromembrane process. This helps to decrease intensity of the formation of concentration polarization layer that results in the pollution abatement of the membrane surface by the particles of the disperse phase.

Mechanical methods are the most reasonable among the methods of active influence on the process of concentration polarization in terms of retaining native qualities of the components of the separated fat-containing highly molecular poly-disperse systems. Despite the availability of a large number of methods and devices for mechanical prevention of polarization layer formation on the surface of membranes, their potential capabilities remain vast. In particular, the application of barbotaging the flow of the separating system for its additional turbulation seems to be perspective.

It is known that during the ultrafiltration (UF) treatment of protein-carbohydrate milk material the fractions are received, namely, the concentrate, which is the initial product enriched in highly molecular milk

compounds. The research of quality characteristics of UF-division products allows to evaluate efficiency of UF treatment of protein-carbohydrate milk material. The dependence of dry substances in ultrafiltration concentrations of protein-carbohydrate raw milk on the duration of ultrafiltration in various modes of treatment is shown in Fig. 1. It shows that with the increase of UF-process duration both in blind and barbotage modes the content of dry substances in ultrafiltration concentrates grows

It occurs due to the extraction of the dissolvent (water) from the product along with low-molecular substances that results in the increase of protein and fat per unit of the volume of protein-carbohydrate concentrate. At this, the content of dry substances in concentrates of all three types of protein-carbohydrate raw milk during the ultrafiltration in a blind mode occurs more slowly than during the ultrafiltration in a barbotage mode.

It once again proves the fact that application of barbotage for liquid highly molecular poly-disperse systems under separation prevents the creation of UF-membrane of the polarization layer of highly molecular substances. It is followed by the increase in the membrane productivity and speed of passing through of the dissolvent with low-molecular substances contained in it.

Using the obtained UF-retentate technology of semi-finished products for the preparation of the structured desserts based on ultrafiltration retentates of skim milk (SFPSD SMUFR) and buttermilk (SFPSD BUFR) are substantiated, their rational concentrations are determined.

Chemical composition of semi-finished products based on the target use of protein-carbohydrate milk raw materials (PCMRM) nutrients was studied. The obtained results show that the developed semi-finished products exceed the control samples by the content of most nutrients. SFPSD based on UF-derived PCMRM in comparison with the control contain a higher amount of protein by 2.0…2.2%, with a simultaneous decrease in the mass fraction of fat by 15.0…15.9%, caloric content by 48… 50%. 18 amino acids, including all essential ones, have been identified in the developed semi-finished products. In order to determine biological value of the developed semi-finished products, amino acid score was calculated and compared with the standard. Analysis of the vitamin composition of semi-finished products for structured dessert based on UF-derived PCMRM showed that they were a valuable resource of vitamin D, B 12, biotin, pantothenic acid.

The advantages of the developed products in terms of nutritional and biological value, which are concluded in their enrichment with target nutrients and reduction of energy value, are proved.