Section 2. EQUIPMENT OF FOOD PRODUCTION ENTERPRISES AND IMPROVEMENT OF PROCESSES AND APPARATUSES OF FOOD PRODUCTION ENTERPRISES

DETERMINATION OF SEMI-PRODUCTS SAFETY INDICATORS FOR BUTTERMILK MILKSHAKES

G. Dejnichenko, T. Yudina, O. Rudochenko

One of the main tasks of health protection is the assurance of food products safety. This obliges producers to take multi-directional measures towards the provision of food products safety at local, national and international levels. The technology of semi-products for buttermilk milkshakes (which are perishable products) is developed. Therefore, the aim of this work is to determine the main safety indexes of semi-products for buttermilk milkshakes.

On the basis of the conducted research it was established that safety indicators of semi-product milkshakes correspond to medical and biological requirements of raw materials and food safety. Analysis of heavy metal salt content in the developed semi-products established that concentration of lead, cadmium, mercury and arsenic salts in products did not exceed standard maximum limit allowed. Dynamic research of microbiological safety of semi-products for buttermilk milkshakes was combined with hygienic substantiation of their shelf life. It is proven that storage temperature of semi-products specimens being researched influences upon bacterial growth in products.

Keywords: protein-hydrocarbon milk raw materials, semi-finished products, buttermilk, milkshakes, safety record.

ANALYTICAL REVIEW OF PROGRESSIVE DRYING PROCESSES FOR HYDROBIONTS

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This article is devoted to the questions of the advanced process for drying hydrobionts. The analysis of theoretical researches concerning different methods of drying hydrobionts is presented. Specific features of technological and physical-chemical properties of hydrobionts during
drying in a fixed layer, and the influence of temperature regimes on qualitative indicators of a dried product are considered.

The prospective of applying the method of vibration for drying hydrobionts at the use of fluidized layer with oscillation is formulated. The improvement of the process and equipment for drying heat-labile shellfish and algae via the process of drying in a fluidizing layer with the vibration will allow intensify the drying process, increase the yield of the dried products and improves quality characteristics of the end product.

**Keywords:** hydrobionts, process, drying, fluidization, layer, oscillation, vibration.

**ANALYSIS OF THE EFFICIENCY OF THE PROCESS OF DRYING IN THE HEAT-MASS TRANSFER MODULE AT HIGH PRESSURE**

V. Potapov, O. Gritsenko

The main methods of energy saving in the processes of convective drying are heat utilization of drying agent and forced drying of drying agent with the purpose of intensification of mass transfer. Earlier we proposed the method of drying in the heat-mass transfer module (HMTM) under increased pressure and the filtering of the drying agent through the material. According to this method, crushed wet material is placed in a hermetic heat-mass transfer module where an excessive pressure is created by external compressor. Due to compression in compressor the air is heated to the necessary temperature. Air is completely are saturating by vapour during filtration through a porous structure of the wet material then condensated under excess pressure and vapour-liquid mixture is removed from heat-mass transfer module.

The work deals with the mathematical modeling of drying agent state during processes of convective drying and drying in the heat-mass transfer module under the excessive pressure.

The estimates were performed for the consumption of the drying agent and power consumption of two methods of drying with the identical evaporating power.

It is shown that the consumption of drying agent at the same evaporating power is identically for standard mode of convective drying ($t_1=60...160 \, ^\circ C \, \varphi_2=0,4$) and filtration drying in HMTM under the excessive pressure ($p_1=0,15...0,4 \, MPa$). The energy consumption for convective drying in these modes is higher on 45...85% than for the filtration drying in heat-mass transfer module for the same value of evaporating power.
Keywords: drying of wet materials, heat-mass transfer module, the overpressure, energy efficiency.

IMPROVEMENT OF DEVICES WITH COUNTER INVOLUTE STREAMS FOR FOOD INDUSTRY

M. Savchenko-Pererva, A. Yakuba

This work is devoted to the equipment used for cleaning dust-Laden flows, drying of granulated and loose materials, granulation products and for recovering a wide range of dust in the chemical, construction, food industry and other industries that require gas cleaning maintaining the quality of the caught dust for further use.

Such equipment is devices with corresponding twisted threads for increase of efficiency of dust collecting in general. It is necessary to increase the fractional efficiency, due to relations between the cost of gas and torque, and this is possible due to changes of constructive elements, namely the increase of the diameter of the collector in the lower part together with the puck that is located inside the dust collector.

Keywords: improvement, dust collector, efficiency, equipment, dust, flow, shell, diameter, research, gas.

INNOVATIVE METHOD FOR MAYONNAISE PRODUCING

G. Postnov, V. Chervonyi, V. Vasilenko

Existing technologies for mayonnaise producing are based on the use of surfactants that requires the use of additional equipment in the manufacturing process and affects the cost of the final product. Among the disadvantages of the methods of mayonnaise producing there are the labor intensity of processes, the use of different devices and machines for performing the processes of emulsification and homogenization, the inability of using the method in the restaurant business enterprises. The article aims to change the method of mayonnaise producing with using the ultrasonic waves to receive a final product of high quality, to reduce its cost, to reduce the duration of the process. In the study the authors have suggested to perform the processes of emulsification and homogenization of the emulsion by using the ultrasonic waves at the frequency of 22 kHz during 10...15 minutes with the intensity of radiation of 3...5 W/cm². The realization of this method will allow improving the quality of final product through the use of ultrasonic processing, reducing its cost, intensifying the
technological process through a combination of emulsification and homogenization processes.

**Keywords:** manufacturing, process, mayonnaise, ultrasound, dispersion.

ELECTROCHEMICAL METHOD OF DETERMINING THE RATE OF MASS TRANSFER PROCESSES DURING OCEAN FISH SALTING

G. Postnov, M. Chekanov, V. Chervonyi, O. Yakovliev

The article considers the electrochemical method of determining the rate of mass transfer processes during ocean fish salting. The Atlantic herring whose trunk is weighing 300...350 g was chosen as the object of the study, in order to reduce the fat impact on the NaCl diffusion during the salting. During the studies there were used fish samples subject to be salted in 5, 10, 15% aqueous NaCl solution. Fish raw materials were subject to salting during 24 hours. According to the research results the change of electrical properties of raw fish was confirmed due to its salting stating from indicators of resistance and conductivity. Thus, the resistance value for the fish which was subject to salting in 15% NaCl solution, at the depth of 10 mm from the skin surface is reduced by 14...16% as compared with 10% NaCl solution. Further research in this direction will provide correlations needed to determine the values of NaCl concentration in different products within the sample, will contribute to receiving new dependencies on the kinetics of the process of salting.

**Keywords:** fish, raw material, resistance, conductivity, concentration.

NEW EFFECTIVE TECHNOLOGIES OF PRODUCTION OF CONCENTRATED PRODUCTS ON THE BASE OF FRUIT AND VEGETABLE RAW MATERIAL

V. Mayak, O. Mayak, B. Liashenko, A. Sardarov

Development of the theory of processes and improvement of equipment based on the creation of theoretical models of hydro, heat and mass exchange processes, that are based on the structural and mechanical properties of the products made the basis of new effective ways of
producing concentrated products from high quality fruit and vegetable raw material with minimum loss of raw material theory.

New ways of producing paste-like concentrate of beverages and candied fruit with RFV are proposed. The construction of effective screw scrapper mixer (SSM) is designed. Rational parameters of the investigated processes and equipment are determined. Economic efficiency of scientific and technical developments is proved; a set of measures is performed for their implementation into production is realized.

**Keywords:** rheological properties, candied fruits, drinks, jams, concentrates, processes, production.

**THE DEFINITION OF HYDRAULIC RESISTANCES UNDER FLOWING OF NON-NEWTONIAN FLUIDS**

E. Biletsky, O. Petrenko

The research paper is devoted the study of non-Newtonian fluid flowing in channels of technological equipment in food production.

Local resistance coefficients in the form of integrated formulae for wide range of Reynolds numbers were theoretically and experimentally studied and determined. The formulae for description of hydraulic resistances at tapering, widening and bending of the channel were built with use of the analogy approach.

The experimental installation which allows measuring of pressure losses at the mentioned sections for flowing of organosilicic non-Newtonian fluids like PMS-5, PMS-6, PMS-20, PMS-25 was proposed.

The obtained data are the crucial factors for making hydraulic processes calculations in food production technological equipment for reducing of energy costs and materials consumption.

**Keywords:** non-Newtonian fluid, flow, hydraulic resistance, coolant, stepped channel.