

**DETECTION METHODOLOGY OF CHICKEN FAT IMPURITIES IN SUNFLOWER OIL**

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The paper presents the results of a study of the possibility of using methods for determining the fatty acid, acyl glyceric and composition of sterol fraction to detect falsification of sunflower oil by chicken fat. It is analyzed the state of regulatory and scientific information on the methods of oil and fat identification and identified the need to establish regulations on melted chicken fat and its blends with sunflower oil. It is experimentally investigated the possibility of using methods for determining the fatty acid, acyl glyceric and composition of sterol fraction to detect falsification of sunflower oil by chicken fat. It is established and confirmed by the round of inter-laboratory testing of sunflower oil samples mixed with chicken fat that the main method to detect forgery is the method of determination of sterol fraction that allows detecting even the 0,5 % of sterol impurities of animal origin and additional method is the method of determining an individual acyl glyceric composition.

Keywords: forgery, sunflower oil, chicken fat, fatty acid, acyl glyceric composition, sterol fraction.

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EFFECTIVENESS RESEARCH OF NEW CATALYST FOR OIL AND FAT INTERESTERIFICATION BY USING CHROMATOGRAPHIC ANALYSIS

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Distribution of interesterification process as a tool for oil and fat modification, as well as the need to import industrial catalysts that are unstable chemical compounds and dangerous in terms of safety, determine the feasibility of introducing new interesterification catalysts.

In this article the efficiency of the new interesterification catalyst – potassium glycerate, which were obtained in the laboratory conditions is investigated. As a result of chromatographic analysis it was found a change of triacylglyceride composition of palm olein after the interesterification reaction in the presence of potassium glycerate and industrial catalysts – sodium methyllate. The study of calculated statistically equilibrium triacylglyceride composition and output and interesterified samples of palm olein showed that triacylglyceride composition obtained after reaction with potassium glycerate is more close to settlement. So potassium glycerate is an effective catalyst for chemical interesterification of fats. The results of the study confirmed the possibility of using potassium glycerate in enterprises of oil and fat industry with the process of interesterification of oils and fats. Moreover, it can get directly at the enterprise.

Keywords: interesterification, catalyst, fatty acid composition, palm olein, triacylglyceride composition, gas-liquid chromatography.

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OBTAINING ARABINO GALACTAN-CONTAINED COMPLEXES WITH ANTHOCYANINS AND BETANIN ANTIOXIDANTS

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The conditions of anthocyanins and betanin complex formation by arabinogalactan were investigated. It was established that the greatest degree of binding of biologically active compounds from biopolymer matrix occurs when the combination of their 0,1% aqueous solutions in volumetric ratios is 1:1. Complex with betanin formed at a temperature 18–22 °C, complex with anthocyanins – at a temperature 40–45 °C. The formation of the complex of betanin and anthocyanins with arabinogalactan is proven with methods using gel chromatography, UV and IR spectroscopy and derivatography. The complex formation of low-molecular biologically active compounds with biopolymers accompanied by a change in their UV and IR spectra compared to the individual components. According to differential IR spectroscopy, formation of stable complexes is provided by hydrogen bonds between the interacting components. According to derivatography, destruction of these bonds is in a low-temperature range, degradation of biopolymer components takes place at a much higher temperature. pH and thermal stability of immobilized betanin and anthocyanins are increased as a result of the complex formation. Immobilization in arabinogalactan contributes to the preservation of their biological effects: antioxidant activity in the composition of complexes increases compared with free betanin and anthocyanins. The obtained complexes are polyfunctional high active physiologically functional food ingredients.

Keywords: biopolymers, polysaccharides, arabinogalactan, gum arabic, betanin, anthocyanins, antioxidants, food ingredients.

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IMPROVEMENT OF MERCHANDISING ASSESSMENT OF FRESH TOMATOES AND FORMATION OF THE CONSUMER PROPERTIES OF THE PRODUCTS OF THEIR PROCESSING

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The article is devoted to scientific substantiation and improvement merchandising assessment of fresh tomatoes and the formation of consumer properties their products. There were developed and scientifically substantiated methods and parameters of the new method of sample preparation of plant raw materials to the merchandising analysis, the main feature of which is to

obtain a liquid phase by separating the shredded pulp into fractions via a cyclic freezing and centrifugation, which is characterized by reversibility of phase with relating to the operations of freezing and thawing.

Based on the basic provisions of a scientific hypothesis about the use of the liquid phase for further research, which is the representative and includes qualitative information on the status and properties of all the object of study as a whole, and applying to it the corresponding sensitive methods, we can draw conclusions about supplies feedstock to the tomatoes of open or protected ground and, therefore, their qualitative composition.

On the basis of the research it was found that the optical, electrophysical, thermodynamic and cryoscopic methods can determine the conditions of cultivation of tomatoes. So it was determined that the liquid phase from the ground tomatoes have more abrupt change of the current in two times in comparison with the greenhouse. Cryoscopy confirmed that the average molar mass of solute (μ) in the liquid phase of ground tomatoes in 1,6 times higher than the liquid phase of greenhouse tomatoes. The research results of the liquid phase of pepper showed that the average molar mass for soil types is more than the value of this indicator set for the greenhouse in 3,6 times. Research of the optical properties of the liquid phases of vegetables was found that the angle of light scattering in the liquid phase of a fresh greenhouse tomatoes 10...15 % more than the ground.

Consumer properties of the obtained vegetable liquid and solid phases were studied, changes in their cold storage were marked. Their functional and technological properties and the ways of further use in the food industry were empirically determined and proposed.

Keywords: tomatoes, merchandising assessment, sample preparation, liquid and solid phase, consumer properties.

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THE FORMATION OF CONSUMER PROPERTIES OF LIQUEURS

page 25–29

The excessive consumption of alcoholic beverages is one of the most important social and ethical problems in the world at the present stage. So scientists together with professionals of food industry are looking for ways to reduce the burden of alcohol on the human body and compensate for the lack of nutrients in it by developing new types of alcoholic drinks with natural plant materials.

The purpose of the research is analysis, specification, updating and modernizing the classification of liqueurs taking into consideration Ukraine's integration into the world and European Economic Community.

The article analyzes existing classifications of liqueurs. Drawbacks and disparity of standard classification of liqueurs are shown. On the basis of analysis of domestic and foreign classifications of liqueurs, modern assortment and requirements which are made by producers, sellers and consumers, the improved classification of liqueurs by different features is presented.

The analysis of regulations allowed to offer the classification of liqueurs according to the consumer properties of product, factors that form quality of liqueurs and the possibility of using liqueurs as part of cocktails.

Keywords: classification, assortment, liqueur-vodka products, liqueurs.

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ANALYSIS REQUIREMENTS FOR PAPER PACKAGING FOR FOOD

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The article analyzes the quality requirements for paper of food packaging in accordance with current regulatory documents. Parameters that characterize the quality of paper packaging for food products and should be normalized for standards are defined. The main purpose of research is to determine the requirements for paper packaging of food products and basic directions of development of the industry of competitive packaging materials in accordance with these requirements.

Quality requirements research for paper packaging was conducted by the analysis of the literature, the use of statistics and conducting research. For researching parameters of packaging paper and food products quality were used standardized methods.

It is established that the most though requirements should be made of the packaging materials intended for contact with food products:

- lack of migration of materials into food substances that worsen the organoleptic properties;
- lack of selection of packaging material chemicals in concentrations that can damage the health in case of them in the body;
- packaging materials must not change the nutritional value of foods, and their appearance must not change during the contact.

To improve the quality of wrapping paper it is proposed to use impregnated solutions which polymeric materials contain.

The results of the research should be used while revising and developing state regulations and technical specifications for the wrapping paper, while choosing packaging material for food products.

Keywords: packing paper, foods, quality, regulatory document, packaging, quality requirements.

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RESEARCH OF THE INFLUENCE OF SOFT DRINKS ON LIVER OF BIOLOGICAL OBJECTS

page 35–39

Ethyl spirit that negatively influences the organism of a human is toxic and has narcotic influence, is the complement of low-alcoholic drinks, even in a homeopathic concentration.

The semi-finished product from plant raw material for low-alcoholic drinks is made by the method of fermentation, contains 4,0 % of alcohol and the mixture of extract substances from different plants. The risks of the development of toxic or side effects at the use of intermediate product for low-alcoholic drinks on the basis of the results received during preclinical researches on biological objects by quantitative indexes of antioxidant and prooxidant markers of homogenate liver of experimental animals are studied and estimated.

The studies of the drink on the model of normobaric hypoxia conducted in comparison with beer the volume part of alcohol of 4,0 % and solution of alcohol of ethyl spirit 4,0 %.

The semi-finished product for low-alcoholic drinks at intragastric introduction for 14 days in a maximally possible volume to mice showed the presence of antihypoxic properties indicates an antioxidant action in relation to brain tissues.

The content of DC, TBA-reactants, GR and activity of catalase in the homogenate livers of rats which received, the semi-finished product statistically did not differ from analogical data for the animals, which received pure water. It means that additional content of spirit in product does not strengthen the processes of prooxidation, caused by modeling of oxidative stress.

Antioxidant properties of the product from plant raw material for low-alcoholic drinks are investigated in the conditions of oxidative stress and on the model of sharp hypoxia at preclinical tests on experimental animals.

The results of the research showed that due its composition the drink possesses antioxidant potential; it is able to protect liver from negative influence of alcohol both in ordinary conditions and under the strengthened oxidation of the body.

Further work in this direction will create drinks with high alkoprotektive properties and expand the range of soft drinks.

Keywords: soft drinks, safety, biological objects, hypoxia, semi-finished, antioxidant properties.

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BIFIDOBACTERIUM ACTIVATION IN TECHNOLOGIES OF HEALTH-IMPROVING MAYONNAISE

page 40–44

One of the key areas of oil and fat industry today is to develop a range of fat emulsion products that provide good health. Emulsion fat mayonnaise type products deserve special attention among the products of oil and fat industry with the health-improving properties.

Guidelines for the production of health-improving mayonnaise enriched with bifidobacteria, in the scientific literature aren't available. Mayonnaise is an unfavorable environment for the development and preservation of bacteria of the genus *Bifidobacterium*, because product characterized by low acidity, the presence of dissolved oxygen, contains no bifidobacteria growth promoters and persists for a long time (90 days) at low temperatures — $(4 \pm 2)^\circ\text{C}$. Therefore research to study the possibility of use activated bifidobacteria in technology of mayonnaise with probiotic properties is relevant and timely.

It was investigated an activation process of adapted monocultures *B. animalis Bb-12*, mixed cultures *O3 B. bifidum BB + B. longum BL O3 + B. adolescentis BA O3* and mixed cultures of *B. bifidum BB O3 + B. longum BL O3 + B. breve BR O3* in whey cheese, enriched with fructose. Activation parameters of monocultures and mixed cultures of bifidobacteria in cheese whey (temperature $36\text{--}38^\circ\text{C}$, duration of 8 and 12 hours correspondingly) are proved, the number of viable bifidobacteria cells after activation and amount of lactic acid accumulated by them in the fermentation is defined. The recommendations on the mass fraction of serum enriched with activated bifidobacteria in mayonnaise recipes with probiotic properties are given.

Keywords: health-improving mayonnaise, bifidobacteria, activation, number of viable cells, fermentation, acidity.

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EFFECT OF HEAT TREATMENT WITH ANTIOXIDANTS ON RESPIRATORY SUBSTRATES DURING STORAGE OF ZUCCHINI

page 45–50

Despite the proven effectiveness of heat treatments and antioxidants to slow the respiratory metabolism, their combined effect during storage of zucchini in this aspect was not considered. In this article the influence of heat treatment with complex antioxidant on the level of respiration rate and discharge of dry substances, dry soluble substances, soluble saccharides and standard acids during storage of zucchini.

It was established that the combined effect of cooling, heat treatment and antioxidants allows inhibiting carbon dioxide emission immediately after treatment and stabilizing character of respiratory curve during storage, indicating the absence of metabolic disorders and normal functioning of the plant tissues. Using heat treatment allows almost twice reduce the rate of

consumption of dry and dry soluble substances, by 10...12 % of soluble saccharides and inhibit the growth of titrated acidity by 43 percent for Kavili hybrid and 50 % for Tamino hybrid.

Between respiration rate and soluble saccharides during storage of zucchini on the basis of paired correlation analysis it was established direct connections in all variants of heat treatment with antioxidants and control of Tamino hybrid. Differences in orientation bonds in control Kavili hybrid may be related to their higher sensitivity to the cooling and breathing under the highest growth in the first stage. Inverse dependency between titrated acidity and intensity of respiratory were found. These correlations suggest that the main respiration substrate in the investigated groups of the hybrids is the organic acids.

Keywords: zucchini, storage, antioxidants, respiration rate, dry substances, sugars, standard acid.

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PROCESS METHODS OF PORE STRUCTURE AND PROPERTIES CONTROL OF HEAT INSULATION CERAMIC CONSTRUCTION MATERIALS

page 51–55

The objects of study were ceramic materials obtained with the help of gas-forming additives. The work models various types of pore ceramic structure on the basis of non-sinterable clay and different pore-forming agents. Both inorganic (marl, dolomite), organic (sawdust, turf) and organic mineral (coal flotation tailings, ash slag) pore-forming additives were used with specified particle size. Such structural characteristics of ceramic materials were established as preferable pore size, all types of porosity, volume content of solid phase and structure anisotropy factor characterizing its uniformity degree. Structural parameters were studied in connection with type of pore-forming agent and properties of model samples which ensure better operational properties of materials.

The highest mechanical strength was found in combined-type porous structures with tubular, globular and spherical pores in various combinations that were formed under usage of organic and organic mineral pore-forming agents. We observed a trend in materials to increase their strength with growth of closed porosity. Structure uniformity is found to improve with reduced pore-forming agent particle size, which makes the materials more strong and frost-resistant. Process parameters (type, quantity and particle size) of pore-forming agent were established enabling targeted formation of porous ceramics structure in order to improve the properties of heat insulation ceramic construction materials.

The results represent the scientific interest for professionals working in the field of building materials, particularly in the field of production technologies of heat effective ceramics for energy-saving construction.

Keywords: heat insulation ceramic construction materials, pore-forming agents, structure, density, strength, frost resistance.

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UTILIZATION OF HEAT-TREATED COAL-MINING OVERBURDENS IN CEMENT PRODUCTION INDUSTRY

page 55–58

The known disposal methods for coal-mining overburdens are considered in the article. It is established that most research is directed to the use of burnt heaps.

It is offered to fire fresh coal-mining overburdens in order to obtain a material with a high degree of amorphisation of output minerals.

By the method of infrared spectroscopy it is revealed that in the temperature range 573–870 °C quartz is transited in trydymite accompanied by structure disintegration. But obtained spectra show that the structure is still preserved as a result of firing to temperature 900 °C and although partially crystalline silica structure is amorphized, but not destroyed. In the same period, aluminosilicate is weakened and it is partially destructed Si–O–Al bond, that evidenced by the partial destruction of the crystal structure of aluminosilicate. These processes significantly increase the activity of heat treated supplements.

The effect of heat-treated overburdens on the physical and mechanical properties of the cement is investigated. The optimum temperature range of heat treatment of overburdens and studied the dependence of cement properties on temperature of firing overburdens. The possibility of using heat-treated coal-mining overburdens as mineral additives in the cement production is proved.

Keywords: cement, coal-mining overburdens, heat treatment, mineral supplement.

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ELECTROCHEMICAL FORMATION OF SnO₂-Sb_xO_y COMPOSITION-MODULATED COATING

page 59–61

The results of the study of tin and antimony anodic oxidation in complex pyrophosphate-tartrate electrolyte are presented. The conditions of SnO₂-Sb_xO_y composition-modulated coating formation are described. Such coatings are formed in three steps. The first step is the deposition of underlayer of tin doped by antimony from the tin pyrophosphate-tartrate strike bath. The second step is the formation of tin-antimony composition-modulated coating that includes the alternating layers of alloy and mixture of metals and metal hydroxides in the pyrophosphate-tartrate electrolyte. The alloy is deposited at the low current density. The mixture of metals and metal hydroxides are deposited at higher current density. The third step is the electrochemical oxidation of composition-modulated coating under anodic polarization in the alkalized strike bath. The SnO₂-Sb₂O₃ coatings may be used in the processes of catalytic oxidation of substances and energy devices.

Keywords: tin, antimony, oxide, pyrophosphate, tartrate, complex, coating.

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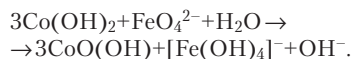
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EFFECT OF COBALT COMPOUNDS ON STABILITY OF FERRATES(VI)

page 62–66

Decomposition of ferrate(VI) in the presence of cobalt compounds in different oxidation states is investigated in the article.

It is shown that the decomposition rate of the alkaline solution of sodium ferrate increases with the introduction of Co compounds in the system in conjunction with the following number: Co₂O₃–CoO(OH)–CoSO₄·7H₂O–Co(OH)₂. The greatest effect is destabilizing substances which contain Co(II). It was established experimentally that Co(II) compounds in an alkaline environment are rapidly oxidized by ferrate(VI) anion preferably to cobalt oxyhydroxide CoO(OH). If FeO₄²⁻ concentration is significantly higher than Co(II) concentration, as it happens in the majority of cases, the reaction between them is as follows:



Therefore, Co(III) compound, instead of Co(II), may be regarded as catalysts of the ferrate decomposition. It was shown that the crystalline K₂FeO₄ and BaFeO₄, containing impurities of cobalt as Co₂O₃, are more stable in comparison with solutions with similar concentration of cobalt compounds. The results are interested for the development of effective technologies for producing ferrate(VI) of various metals.

Keywords: stability of ferrates(VI), cobalt compounds, catalysis, decomposition, potassium and barium ferrates.

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INCREASE THE LEVEL OF ENVIRONMENTAL SAFETY FOR MECHANICAL VENTILATION OF LIGHT-OIL STORAGE TANKS

page 67–72

This paper evaluated the environmental risk of degassing light oil-storage tank, by quantifying emissions of hydrocarbon vapors in the air. To determine the basic parameters of the degassing tank that is carried out by mechanical ventilation, it has been created test bench geometrically similar to RVS-5000. Based on theoretical and experimental data, it is calculated the concentration of harmful substances (hydrocarbons) in the air for degassing method using in Ukraine, at all stages.

Based on international experience, it is shown the need for hydrocarbon vapor recovery units, as in the current operation, and during the full decontamination. An analysis of existing and exploited in various countries systems for vapor recovery of hydrocarbons is conducted.

The presence of the aerodynamic resistance in plants for hydrocarbon vapor recovery does not allow degassing tank using in Ukraine under the current regulations of the degassing process.

To improve the environmental safety of the degassing process of tanks, taking into account the need for a filtration system to trap hydrocarbon vapors and increase the overall efficiency of the degassing tank, it is proposed a fundamentally new ejector-vortex method of supplying fresh air into the space of the tank, based on which the new technology of mechanical ventilation of tanks was created.

Keywords: degassing tanks, mechanical ventilation, harmful substances, environmental hazards, degassing method.

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INTENSIFICATION OF TOWER GAS WASHER IN THE SODA ASH PRODUCTION

page 72–77

The results of studies on the effectiveness of existing designs of soda production absorbers for purification of gas emissions from ammonia are given. The main sources of ammonia emissions from the production of soda ash production are defined and shortcomings of existing equipment are shown.

Protection of air from pollution by industrial emissions is one of the most important issues of our time that covers in one way or another almost all countries of the world, regardless of their level of industrial development. It does not recognize territorial borders.

Therefore, the creation of new designs of machines for cleaning, improvement of the existing gas purification equipment is the only way to increase the volume of economic activity and the expansion of production.

Based on the analysis of design and the performance of the absorption apparatus it is proved expediency of creating a new structure of the vortex unit, which will increase the degree of purification, reduce the production area, which occupies the dust removal equipment, and reduce the energy costs of the cleaning process.

The authors have developed a new design of the vortex absorber and materials are sent at obtaining a patent of Ukraine.

Keywords: soda ash, absorption, vortex absorber, bubble principle, mass transfer apparatus, gas emissions.

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