



## RESEARCH OF FLAVOR PROFILES OF THE RED AND WHITE WINES OF SHABO TERROIR

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The article presents the results of comprehensive research in the SARCO laboratory (France), which allowed establishing the list and the concentration of flavor compounds responsible for the high-quality, secondary and tertiary flavor of wines. Ratings of the typical flavor of wine is a complex task because the high-quality features depend not on the specific chemical component, but from the general flavor-active compounds present in grapes and wine. Studies to determine the typical flavor of grape varieties of Shabo terroir previously carried out and there are no objective data in addition to sensory evaluation. In the world scientific research practice, methodical approaches were developed to sensory evaluation of flavor/bouquet and wine tasting, which allow numerically reflect its individual characteristics on the intensity of shades. However, the subjectivity of sensory method does not allow using it as the main one. A combination of sensory and analytical techniques is particularly important in addressing the influence of interactions with non-volatile flavor compounds and other volatile compounds. The aim of the studies was characteristic flavor profile of red (Merlot and Cabernet Sauvignon) and white wines (Chardonnay and Telti-Kuruk) produced in LLC «Industrial-trading company Shabo». Studies to determine the flavor profile of Shabo terroir wines were held for the first time. The studies found that red and white wines are present in sufficiently high concentrations of lactones: in Cabernet Sauvignon 1,6–2,0 times greater than in Merlot, in Telti-Kuruk 2,0–2,4 times greater than in Chardonnay. It was found that the varietal flavor of wines Merlot and Cabernet Sauvignon is a 3-isobutyl-2-methoxypyrazine. The primary flavors as actively influence the bouquet of white wines Chardonnay and Telti-Kuruk are  $\beta$ -damascenone,  $\beta$ -ionone and 3-mercapto-1-hexanol. 4-mercapto-4-methyl-2-pentanone, which is the «calling card» of wine Sauvignon Blanc, was found in small quantities only in the white wine Telti-Kuruk.

**Keywords:** red and white wines, Merlot, Cabernet Sauvignon, Chardonnay, Telti-Kuruk, wine flavor substances.

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## RECIPE OPTIMIZATION OF VEGETABLE PASTA WITH IODINE-CONTAINING RAW MATERIAL

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The article discusses the relevance of developing technology for vegetable pastes with iodine-containing raw materials for the prevention of iodine deficiency disorders. Some the results of own research in this area are shown.

The main purpose of the study is to optimize the recipe of vegetable pastes with iodine-containing raw materials to meet the food needs of indigenous people through mathematical processing of experimental data.

Based on the author's research and taking into account the data contained in this article, ingredient composition of vegetable paste with a high content of iodine and nutrients-synergists based on the use of protein and plant material were grounded and developed.

Consistency of the developed vegetable pastes enables using them to prepare sandwiches, banquet decoration snacks, as mince and stuffing for cheese, potato rolls, pastry and so on.

The research allowed to develop recipe and manufacturing process of obtaining rolls with vegetable pasta with iodine-containing raw material, which is enshrined in the approved technical specifications: TU U 10.8-05476322-002:2013 «Culinary products. Rolls with vegetable stuffing» and technological instructions for TU U 15.8-32214657-003:2010 «Culinary products. Rolls with vegetable stuffing».

Thus, the broad interpretation of the problem of iodine deficiency and results of our study can be used not only specialists in nutrition and food, but endocrinologists and other doctors. This allows us to recommend developed culinary products to prevent iodine deficiency disorders.

**Keywords:** iodine deficiency, hydrated kelp powder, aquatic organisms, vegetable pasta.

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## RED TABLE WINES QUALITY IMPROVEMENT USING WINE YEAST STRAINS

page 17–21

In the presented article an influence of varieties (forms) and wine yeast strains on the quality of red wines is discussed and some of the results obtained by research are given. The main aim of the research is identifying wine yeast strains *Saccharomyces cerevisiae* that can improve quality indicators of red table wines due to changes in their physical, chemical and organoleptic characteristics.

The research results of physical, chemical and organoleptic characteristics of red table wines Cabernet Sauvignon, obtained using of wine yeast strains *Saccharomyces cerevisiae*, that selected from the grape forms of new selection by National Scientific Center «Tairov Institute of Viticulture and Wine-Making» — Odeskyi zhemchuh, Otrada, Ahat tairovskyyi, Charivnyi indicate the dependence of these characteristics on the used strain. It is proposed to use these strains for further microvinification of the above and other forms of domestic breeding. The results can be used in wine-making to improve the quality of wines and to create a unique wine profile of Ukraine.

**Keywords:** grape variety, wine yeast strains, organoleptic evaluation of wine.

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## PREPARATIVE CHROMATOGRAPHY USAGE FOR RELEASE OF MONOFRACTIONS OF COMPLEX MIXTURE FROM THE NATURAL SOURCES

page 21–25

An opportunity to use the laws and mechanisms of preparative gas chromatography to release of monofractions of complex mixtures is shown in the article. Scientific principles and practical development are given for manufacturing nozzle of preparative

column, consisting of the stationary phase type Polyethylene glycol adipate-6000 deposited in batches on the solid support section of Chromosorb A.

Nozzle is heterogeneous in nature and divided into sections with different dispersion of solid support and a different number of stationary phase on it. Selectivity factor of the column is  $1,26 \pm 0,04$  for this decision. The number of theoretical trays is  $482 \pm 4,0$ . Productivity of carvone release is  $8,67 \dots 9,05 \text{ cm}^3$ , cariofilen release —  $3,46 \dots 3,51 \text{ cm}^3$  per hour. Purity of released monofractions is  $0,94 \dots 0,99$ . The proposed technological solutions preserve native connection, fully meet the requirements of natural products and can be used in any area of production.

**Keywords:** monofraction, pure substance, essential oil, preparative column, solid support, stationary phase, productivity.

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### IMPROVING THE METHOD OF DETERMINING WAX-LIKE SUBSTANCES IN VEGETABLE OILS USING HIGH-TEMPERATURE GAS-LIQUID CHROMATOGRAPHY

page 26–30

The article defines the scientific approaches regarding the improvement of the standardized method of determining wax-like substances using high temperature gas-liquid chromatography. Experimental studies matched the type of capillary column, type of stationary phase, the composition eluent and the feed rate, temperature parameters of the chromatographic separation. The results of the monitoring of sunflower oil with different content of wax-like substances have confirmed the ability of the method. The possibility of qualitative identification of waxes by using chromatographic profiles is shown. Process conditions of the chromatographic analysis were established. There are gradient programming thermostat and temperature, the optimal injector temperature, composition and feed rate eluent (1 drop/s); selected internal standard — hexatriene (paraffin  $C_{36}$ ). The result of the monitoring of sunflower oil with different content of the waxes is shown that the improved method of determining wax-like substances is reliable and can be recommended for technical control of raw materials and finished products in the production of refined oils. It is experimentally confirmed that in the presence of external standard (sunflower wax) wax-like substances

in vegetable oils is possible qualitative identify by comparison of the chromatographic profiles of the standard and sample.

**Keywords:** oil, wax-like substances, high temperature gas-liquid chromatography, standards for comparison.

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### INFLUENCE OF TECHNOLOGICAL FACTORS ON THE PENETRATION DEGREE OF BAKERY PRODUCTS OF SPECIAL PURPOSE

page 30–35

Developing gluten-free bakery products for the restaurants and social catering is shown in the article. Influence of the components of the liquid dough phase and the transglutaminase enzyme on penetration degree of foot steam small bakery products with rice dough is studied in the article. Water, milk, kefir and milk whey are investigated as the liquid dough phase. Influence of these factors on the level of technological penetration of finished products is established. Feasibility of using milk whey and transglutaminase enzyme in the recipe of the dough with rice flour is experimentally proved. These supplements help to increase the compressibility of finished products and prevent their rapid hardening. Possible explanation of the impact of whey and transglutaminase enzyme on the dough structure with rice flour and finished products is given.

**Keywords:** social catering, rice dough, steam treatment, penetration degree, hardening.

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### THE INFLUENCE OF CULTIVATION CONDITIONS ON BIOSYNTHETIC ABILITY OF *EREMOTHECIUM ASHBYI* GUILLIERM.

page 35–41

Despite the extremely poor riboflavin amount in the food for people and animals and its important role in the biochemical processes of metabolism, yet little attention is paid to the production of vitamin B<sub>2</sub> by biotechnological means. Therefore, the main aim is to study an impact of physical and chemical parameters of fermentation and various power sources of ascomycetes *Eremothecium ashbyi* to producing the desired product.

The main biosynthetic indicators of *E. ashbyi* culture, which were defined in the fermentation process, are filamentous biomass and riboflavin. In this work an optimal pH values for the best accumulating biomass and riboflavin environment is defined and positive effects on increasing the intensity of mixing on yield of the desired product are shown. For biomass accumulation it is recommended to create a nutrient medium with pH 5,5–6,0 and use low mixing level. To maximize riboflavin biosynthesis is necessary pH 7,5 and intensive mixing.

For the first time shows the rate of riboflavin synthesis by *E. ashbyi* strain depending on sources of carbon and nitrogen supply, which is especially important for the further improvement of production technology of riboflavin. The best results for riboflavin synthesis were shown to sorbitol, fructose, galactose and methionine, arginine, peptone. The most promising complex environment is unhopped beer wort.

**Keywords:** *Eremothecium ashbyi*, riboflavin producer, submerged cultivation, physiological and biochemical properties.

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### ANALYSIS OF THEORETICAL PREMISES FOR BIODETERIORATION OF LEATHER MATERIALS AND LEATHER PRODUCTS

page 42–48

The process of producing leather materials and products with predictable antimicrobial properties require science-based approach to finding new ways to protect materials during their production.

Creating biocidal compounds for leather materials based on environmentally friendly natural minerals is actual scientific and practical problems.

Mechanism of the influence of chemical composition, structure and leather production technology on microbiological stability of the finished product in this research was carried out by generalization and systematization of ideas about biodeterioration of leather. Degree of change of consumer properties of leather under the influence of microorganisms is determined.

Analysis of processes to enhance biological stability of natural leather and its products is conducted in the context of protecting the leather at all stages of processing, from the pair of skins. Significant impact of leather preparatory operations on biological stability of finished leather is determined. The interrelation between leather production technology and its microbiological stability is defined. An analytical review of some ways to protect leather materials from biodeterioration and biodestructions by treatment with biocidal compounds is conducted. Requirements to biocides are generated on the basis of sanitary safety of consumers.

Analysis of theoretical assumptions for leather biodeterioration points to promising research into purposeful creation of biocidal compounds for leather materials that would have high activity against harmful biological factors, non-toxic, safe to use, environmentally friendly, affordable, cheap and does not affect the physico-mechanical, physico-chemical and other consumer properties of the leather and leather products.

**Keywords:** raw material, biodeterioration, microorganisms, leather, footwear, properties, quality, biocides.

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## THE INTERACTION OF DERMA COLLAGEN WITH MINERAL AND POLYMER COMPOUNDS

page 48–54

Analysis of the existing research aimed at expanding the range of filling and retanning materials and increasing environmental leather industry showed that the actual trend is the use of compositions based on bentonite clay.

To assess the effectiveness of the developed polymer-mineral compositions is expedient to establish the nature of the interaction between the surface of the material and collagen to predict the effectiveness of structuring the derma and rational use of chemical compounds created in the leather production.

IR spectroscopy was chosen for the experiment. The object of this article is the infrared spectroscopic study of the interaction of the derma collagen with modified montmorillonite and acrylic emulsion.

As a result of analysis of the infrared spectra it was concluded that mineral and polymer compounds can significantly change the structure of semi-finished chrome through the formation of bonds of various nature: coordination, electrovalent, hydrogen bonds and van der Waals forces. The most likely is the formation of new types of hydrogen bonds Si-O...H-N and Si-O...H-C between the active centers of modified montmorillonite and NH- and CH- protein groups. Interact with chrome gelatin in the case of use of acrylic polymers is involving carboxyl and carbonyl groups of MBM-3 and amino, ester, peptide groups ionized groups COO<sup>-</sup> and NH<sub>3</sub><sup>+</sup> of chrome gelatin.

Such interaction will promote the efficient structuring of the collagen structure of the derma in the following manufacturing processes and improve operational properties of the leather.

**Keywords:** filling composition, interaction, IR spectroscopy, active groups, chemical bond, collagen, derma.

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### OBTAINING OXIDE COMPOUNDS OF METALS FROM WATER SOLUTION BY CONTACT NON-EQUILIBRIUM PLASMA TREATMENT

page 60–63

The data obtained as the authors themselves with the assistance of laboratory equipment as well as data obtained from the literature, are used in the article. This study examined obtaining superfine powders of oxygen-containing compounds of cobalt and copper in the water solutions. The necessity of these studies due to the fact that the characteristics of the particles greatly depends on the production method, and, therefore, further studies were necessary for particles obtained by the treatment of water solutions by contact non-equilibrium plasma. When using the plasma chemical processing method for the  $\text{Co}(\text{OH})_2$  in water and  $\text{CuSO}_4$  solution, sediments with dimensional characteristics in the range from 8 to 110 nm were obtained. Larger particles are shown in the form of agglomerates 0,5–5 microns. Sediments of cobalt compounds are presented in the form of  $\beta$ -form of cobalt hydroxide(II),  $\text{CoO}$ ,  $\text{Co}_3\text{O}_4$ , and copper compounds in the form of  $\text{Cu}_2\text{O}$ ,  $\text{CuO}$  and  $\text{Cu}$ , which is confirmed by X-ray diffraction data. The possibility to control the process of synthesis of particles by adjusting its parameters was proved that thanks to its constructive design is straightforward and is advantage of this method along with the possibility of using very dilute solutions. These studies point to the prospect of using the particles with desired characteristics for the development of catalysts for chemical processes in the production of ceramics, and dyes, as well as industries, including the development of chemical current sources.

**Keywords:** contact non-equilibrium plasma, solution, nano-sized particles, oxygen compounds of cobalt, copper.

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### DEVELOPMENT OF DECORATIVE ENAMELS FOR GOLDWARE, SILVERWARE AND COPPERWARE

page 55–59

The paper analyzed the characteristics of decorative enamels for goldware, silverware and copperware. The main types of jewelry enamels and techniques for obtaining products using special application techniques were considered, as well as the requirements to them were formulated. Analysis of the current state of production of decorative enamels and their products is given.

The results of the development of low-melting lead-free opacified enamel with high gloss are given.

It is investigated an effect of additives  $\text{TiO}_2$ ,  $\text{MoO}_3$ ,  $\text{Fe}_2\text{O}_3$  on the properties of lead-free glass and enamel coatings based on it.

It is detected component ( $\text{MoO}_3$ ) and its rational amount (3,0 wt. %) to obtain a white enamel coating, which can be used as a basis for the light-colored enamels. Lead-free glass coatings were obtained on copper with diffuse reflection factor (DRF) to 67 %, the specular reflection factor (SRF) to 72 %.

Developed green, mustard, purple, blue, brown and enamel glass coatings with high gloss have good adhesion to copper samples and may be recommended for testing under production conditions.

The paper shows the possibility of enamel coatings of different colors and shades for art and jewelry application on the glass base of the same chemical composition of different chromophores.

**Keywords:** enamel, gold, silver, copper, fondant, decoration, glass base, gloss.

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### RESEARCH OF ELECTRO-PHYSICAL AND OPERATING PROPERTIES OF POLYORGANOSILOXANE — GRAPHITE COMPOSITIONS

page 63–68

This article is devoted to solving scientific and practical problem — the development of new siloxane graphite conductive composite materials with adjustable electrical properties and high thermal stability. Such compositions can be used as heating devices in some premises for different purposes, heating shoes, anti-icicle mean.

The results of research of electrical conductivity for system polyorganosiloxane-filler in a wide concentration range of the last and impact of ethyl silicate-40 on its shift. It is established that the experimental compositions based on polyorganosiloxane graphite system GLS-1 have percolation effect within 32–35 weight % of graphite, coating electrical resistivity abruptly dropped to a level of  $165 \cdot 10^{-3}$  Ohm·m. Increasing the concentration of graphite to 60 weight % leads to a further reduction in resistivity to a level of  $90 \cdot 10^{-3}$  Ohm·m.

The most significant decrease in electrical resistivity in the system PMFS-GLS-1 is achieved at injection of additional 5 weight % of ethyl silicate-40 with further heat treatment followed by 3 hours at 250 °C. The value of this index does not exceed  $30 \cdot 10^{-3}$  Ohm·m. The test systems are characterized by a negative temperature coefficient of resistance over wide concentration range of the filler and have high adhesion ability to substrates of different nature. There are hydrophobic coatings.

Filler concentration significantly affects the electrical properties of the composition, so the dependence of power density of filler content (at almost the same temperature of heating surface) is parabolic in nature with minimal filler concentrations in the range 55...60 weight %, regardless of the nature of binding and for system PMFS-GLS-1 in the temperature range 175...185 °C at a concentration of 31,5–55–76 weight % specific power is under 0,718–0,639–0,997 W/cm<sup>2</sup>, and PFS-GLS in the temperature range 170...195 °C and concentration of 30–60–70 weight % it is under 0,938–0,530–0,927 W/cm<sup>2</sup>.

The behavior of these systems as heating elements is studied. A one possible heater construction form developed compositions is proposed. Its performance characteristics are studied.

**Keywords:** composite materials, graphite, polyorganosiloxane, electrical conductivity, electrical resistivity, composite, polymethyl phenyl siloxane.

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### UTILIZATION OF THE HEAT-TREATED SILICATE ROCKS IN THE CEMENT AND CEMENT SLURRY MANUFACTURING

page 68–74

Reliable operation of oil and gas wells depends largely on the quality of cementing. Currently lightweight cements with large water-cement ratio are used. To improve the properties of cement slurries we can use fine lightweight additives with the components, which are capable of reacting with the hydration products of clinker component to produce additional amounts of calcium hydrosilicates.

An influence of the natural and heat-treated silicate rocks on the properties of cement and cement slurries is studied. It is found that the heat-treated silicate materials have a positive impact on the strength of cements and cement slurries. Research results show that strength of the samples, which contained heat-treated additives, higher than strength of the samples, which contain a corresponding amount of natural additives, at all concentrations of additives and all hardening time.

The increased strength of cements and cement slurries based on heat-treated materials is provided, first of all, by reactive decomposition products of clay minerals. During the heat treatment of materials is not only the initial decomposition of minerals, but also the formation of new ones. However, this does not lead to deterioration in the rheological properties of cement slurries.

Feasibility of using heat-treated silicate rocks as facilitating additives in the production of cements and cement slurries is confirmed

under the conditions of factory laboratory. Cement slurry based on heat-treated kaolin clay meet regulatory requirements for such materials. Values of water separation, setting time, thickening time and bending strength are almost identical within the control bentonite clay-based sample, and the strength of cement slurry at the age of 180 days with the heat-treated additive nearly in 1,5 times higher.

**Keywords:** cement, lightweight additives, cement slurry, water separation, strength.

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#### GAS EMISSION MONITORING OF PRE-HEAT FURNACE OF METATITANIC ACID PASTES

page 74–80

Due to the gradual convergence of national environmental legislation with European Union requirements it is necessary to conduct environmental monitoring of gas emissions of pre-heat furnace of metatitanic acid pastes. Critically analyzing the current system of clearing, it is established that technology isn't provide the use of exhaust gas heat. As a result is an irreversible loss of 27,8 MW of heat and thermal pollution of the atmosphere; degree of purification of harmful components doesn't exceed 55 %, which doesn't meet modern requirements, then – a significant excess of maximum permissible concentrations of pollutants; insufficient level of dust collection, which causes loss of pigment TiO<sub>2</sub>. Overall, the current technology is ineffective and has no prospects for intensification.

In the article the technological feasibility and economic viability of recycling waste and reducing energy consumption is proved. The concept of two-stage wet cleaning is proposed. Its implementation

provides high separation efficiency of TiO<sub>2</sub> particles, neutralization of harmful gas components and partial recycling of exhaust gas heat.

**Keywords:** purification of gas emissions, titanium(IV) oxide pigment, heat recovery.

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#### SYNTHESIS AND INVESTIGATION DARK POLYMER HYDROCARBON RESINS IN THE BITUMEN COMPOSITES

page 80–87

Thermal gas-phase pyrolysis of hydrocarbon raw materials in pipe furnaces remains to be the main strategic process of ethylene and propylene production. Nowadays, the possibility of the pyrolysis process intensification to increase the target product yield draws attention of scientists. But besides the olefins (target products) the pyrolysis process is the source of heavy pyrolysis pitch. Considerable



development of petrochemical industry requires finding new applications of the by-products from pyrolysis gas and liquid pyrolysis products. Methods of polymer hydrocarbons resin synthesis from the liquid wasters of ethylene and propylene production have been considered. Regularities of modification of polymer hydrocarbons resins (PHRs) insulating oil bitumen have been worked. The influence of the main factors on the physical and chemical properties of this process has been determined. The mechanism of influence petroleum polymer resins (cooligomer products) components to the complex technical and performance properties of the petroleum bitumen compositions have been regarded. Found that based on bitumen insulation compositions of the physical and mechanical parameters, electrical insulation and corrosion characteristics meet the requirements for insulation of underground pipelines have been defined. Polymer petroleum resins as modifiers significantly increase the inhibitory properties of bitumen matrix.

**Keywords:** dark polymer hydrocarbons resins, oil bitumen, hydrocarbons fraction, heavy pyrolysis pitch, modification, petroleum bitumen composition.

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