

CONTENTS, ABSTRACTS AND KEYWORDS OF PAPERS

INFLUENCE OF INTENSIVE HYDROTHERMAL TREATMENT OF GRAIN ON THE PROCESSES OCCURRING IN BARLEY FLOUR DURING STORAGE AND INDICATORS OF ITS SAFETY

A.A. Vybornov, L.V. Anisimova

The enzyme activity, determined by the acidity and the acid number of fat, and the growth of microflora in barley flour produced from grain, subjected to the hydrothermal treatment (HTT) and from the grain which wasn't subjected to the HTT during its storage have been explored. The results of the verification of conformity of the barley flour with regulated safety indicators are given.

Keywords: barley flour, hydrothermal treatment, acidity, acid number of fat, food safety.

RESEARCH AND DEVELOPMENT OF THE FLOUR COMPOSITE MIX-CONCENTRATE BASED ON BARLEY FLOUR AND SPICES

I.K. Nesterenko, L.V. Anisimova

Properties of the flour mix including first grade wheat flour, barley flour and turmeric was investigated. It was found that turmeric, as well as barley flour, baking degrades the baking advantage of mix. The necessary quantity of a dry wheaten gluten for receiving on the basis of the studied flour mix of bread, good on quality, was picked up. By results of research the flour composite mix (FCM) – a concentrate which part were barley flour, first grade wheat flour, spices (a turmeric, ginger) and a bread improver – a dry wheat gluten was developed.

Keywords: flour composite mix-concentrate, barley flour, hydrothermal treatment, turmeric, ginger, dry wheat gluten, baking mix.

METHOD OF ASSESSMENT AND SELECTION IDEAS FUNCTIONAL FOOD COMPONENT OF INNOVATIONS

S.V. Novoselov, E.A. Machenskaya, N.V. Gornikov

The development of criteria for evaluating and selecting ideas functional food prepared on the basis of innovative technologies, methods and calculation algorithm based on the theory of operations and mathematical logic.

Keywords: methodology, evaluation, selection, idea, innovation, functional products, food criteria.

THE QUALITY AND POTENTIAL FOOD USE OF PRESSCAKES OF OILSEEDS PROCESSED IN THE ALTAI REGION

M.S. Bochkarev, E.Ju. Egorova

The article is devoted estimation of quality, of nutritional value and potential of food use of presscakes and meals of oilseeds processed in the Altai region. Given the data of production of presscakes and meals of oilseeds in Russia and the region, the authors discuss the appropriateness of the food use of presscakes of oilseeds, produced by enterprises of the Altai territory. Proposed the general algorithm of action for the characteristics of technological suitability and determine of the directions of use of presscakes of oilseeds in recipes of new of food products.

Keywords: oilcake oilseeds, nutritional value of oil cake, indicators of quality and safety of presscakes of oilseeds, the use of presscakes of oilseeds, the algorithm for processing of presscakes of oilseeds.

PROSPECTS FOR THE USE OF SECONDARY RAW MATERIAL RESOURCES OF OILSEED PROCESSING AND OIL EXTRACTION PLANTS IN THE ALTAI REGION

E.Ju. Egorova

The involvement of secondary raw material resources from the enterprises of fat-and-oil industry to develop new food products is an actual task, giving the possibility of expanding the range of products enriched with indispensable in the diet components. The article is devoted the analysis of dynamics of production and processing of oilseeds in the Altai region, the prospects of using the secondary, perspective oilseed processing in the food processing industry.

Keywords: raw material oilseed, vegetable oil, oilcake oilseeds, raw material, secondary raw material.

ORIENTATION OF INDOOR AUTONOMOUS MOBILE ROBOT USING OBJECT-ORIENTED MAPS WITH ELEMENTS OF THE WORLD MODEL

D.A. Rogatkin, D.G. Lapitan

A method and hardware-software module of an autonomous mobile robot for orientation in indoor room-type environment was developed. The probabilistic algorithm for orientation was applied, which took into account errors of measurements by distance sensors and odometry sensors, additionally allowing recognition of rooms by means of its individual metric characteristics, specified in the robot's model of world.

Keywords: autonomous mobile robot, orientation module, object-oriented map, robot coordinates, distance sensor, world model.

PROBABILISTIC SYNTHESIS OF KDP USING MUTUAL CORRECTNESS CONDITIONS

A.V. Zatey

On the basis of probabilistic estimates and computer experiments with application of probabilistic algorithms of synthesis of key distribution patterns in a computer network, it is shown that a combination of two well-known correctness conditions KDP, Key Distribution Pattern and HARPS, Hashed Random Preloaded Subset Key Distribution may increase the information rate of the combined scheme HAKDP, Hashed Key Distribution Pattern compared with data rate of schemes based on separate conditions.

Keywords: computer network, system key, key distribution patterns, information rate.

FINDING CORRESPONDENCES IN IMAGES USING A SPECTRUM OF GRAPHS FOR THREE-DIMENSIONAL RECONSTRUCTION TASKS

A.Y. Tuzhilkin, A.A. Zakharov, A.L. Zhiznyakov

The problem of finding of correspondences in images viewed in the article. The algorithm for finding of correspondences using a spectrum of graphs, and area features is provided. The developed algorithm is investigated to test examples.

Keywords: spectrum graph, matching, stereo image, rectifying, three-dimensional reconstruction.

MEASUREMENT OF PHYSIOLOGICAL PARAMETERS BY NON-CONTACT METHOD WITH THE USE OF MILLIMETER DOPPLER RADAR

S.M. Smolskiy, V.A. Filatov, V.A. Fedorov, E.S. Viktorinova

Non-contact methods of measuring physiological parameters of the person is not currently on-went wide application due to the complexity of both hardware and software implementation of the method. The article presents the results of engineering development of radar computer of the meter and testing it in a clinical setting. Is considered quasi-regular and stochastic components of the reflected from the human signal. Offers possible methods of assessing the functional state taking into account the stochastic nature of the reflected signals.

Keywords: Doppler radar, tachogram of the heart, rhythmogram of breathing, functional status, fractal dimension, attractor rhythmogram.

TOWARDS FAULT TOLERANCE FOR DATA TRANSMISSION ALGORITHMS IN WIRELESS SENSOR NETWORKS

L.I. Khudonogova, S.V. Muravyov

In wireless sensor networks (WSNs) sensor nodes are prone to failures. Analysis results show that existing approaches of fault tolerance provision do not take into account network congestion and energy conservation issues, or require extra temporal and financial costs. Therefore, development of the fault tolerant prioritized transmission algorithm, controlling network load distribution, is an urgent problem. Expression, allowing to calculate the number of faulty nodes, which can fail without crucial affecting on the network performance, is presented.

Keywords: wireless sensor network; fault tolerance; cluster topology; prioritized transmission.

EXPERIMENTAL APPARATUS TO DETERMINE THE SAUTER MEAN DIAMETER OF THE DISPERSED MEDIUM PARTICLES

S.S. Titov, E.A. Metsler, A.A. Pavlenko, V.A. Arkhipov

This article describes a mathematical apparatus for determining the Sauter mean diameter and mass concentration of dispersion mediaparticles. A schematic diagram of the experimental setup for the determination of these parameters. A principle operation of the experimental setup is described.

Keywords: aerosol, dispersion medium, particle size, optical density.

PROSPECTS OF USE OF COMPOSITE LIQUID FUELS BASED ON HYDROCARBON WASTE

A.B. Papin, A.Yu. Ignatova, E.S. Zlobina

The article there is a brief literature review by hydrocarbon fuels, the results of studies to prepare of composite liquid fuels from solid residue to pyrolysis of tires. Describes the advantages of composite liquid fuels.

Keywords: composite fuel, hydrocarbon fuel, technical carbon, the method of oil agglomeration.

COMPLEXES OF TRANSITION METALS WITH ORGANIC LIGANDS

N.A. Zolotuhina, J.A. Mikhaleiko, A.V. Tikhomirova, B.G. Tryasunov,
V.V. Chenskaya

The synthesis and IR spectroscopic analysis of transition metal complexes IIB and VIII B groups with organic ligands – methyl diethanolamine (MDEA), ϵ -caprolactam (ϵ -C₆H₁₁NO), dimethylsulfoxide (DMSO), dimethylformamide (DMF). Noted special features of the structure of coordination compounds. Thermochromic properties were studied.

Keywords: transition metals, ϵ -caprolactam, dimethyl sulfoxide, diethanolamine, methyl diethanolamine, IR-spectroscopy, the thermochromism.

RECYCLING OF MINERAL WOOL PRODUCTION WASTE

V.V. Firsov, V.V. Samoilenko, A.N. Blaznov, E.A. Penkina, T.K. Uglova

An analysis was performed regarding the composition and amount of mineral wool production waste. A recycling method is suggested for converting waste into granulated heat insulation material. A design of a granulation machine was developed and the granulation machine was fabricated. Experimental studies were carried out and the efficiency of the waste recycling in the developed machine was shown. The granulometric composition of non-fibrous inclusions was investigated. A new granulated heat insulation material with high thermophysical properties was obtained.

Keywords: heat insulation, mineral wool production, waste, non-fibrous inclusions, granulated material, granulation machine, particle size distribution.

THE STUDY OF NANOSCALE FILMS OF GALLIUM DURING HEAT TREATMENT

S.V. Bin, E.P. Surovoi, S.V. Zhuravleva

Methods of gravimetry, optical spectroscopy, microscopy are investigated transformations in nanoscale layers of gallium depending on thickness ($d = 2-74$ nm) and temperature ($T = 423-873$ K) heat treatment. Kinetic curves of degree of conversion are described satisfactorily in the framework of a linear, inverse logarithmic, parabolic and logarithmic laws. The measured contact potential difference for the films with Ga, Ga_2O_3 and photo-EMF for systems Ga – Ga_2O_3 . The diagrams of the energy bands of the systems Ga – Ga_2O_3 . The proposed model thermal transformations of Ga films, which includes stages of oxygen adsorption, redistribution of charge carriers in the contact field, Ga – Ga_2O_3 and the formation of gallium oxide (III).

Keywords: nanoscale films of gallium, oxidation, chart energy bands.

CHEMICAL TREATMENT OF OAT HULLS FOR BIOETHANOL SYNTHESIS

O.V. Baibakova

*The chemical pretreatment of oat hulls afforded a substrate (fibrous product) having a high reactivity toward enzymatic hydrolysis. The saccharification process of the fibrous product obtained from oat hulls was studied. Bioethanol was synthesized on the oat hull fibrous product broth using the *Saccharomyces cerevisiae* RNCIM Y-1693 strain. The simultaneous enzymatic hydrolysis and alcoholic fermentation was shown to enhance the bioethanol yield by a factor of 1.1 compared with separate hydrolysis and fermentation.*

Keywords: oat hulls, fibrous product, enzymatic hydrolysis, bioethanol.

ANALYSIS OF PHTHALATES AND BUTYL-HYDROXYANISOL IN NATURAL AND SEWAGE WATER

M.V. Andryukhova, O.I. Ruban, I.N. Murygina

A possibility was shown to separate, identify, and perform a quantitative analysis of phthalates and phenol derivatives in natural and sewage water by the methods of chromato-mass spectrometry and solid-phase extraction. Optimum conditions have been found for gas-chromatographic separation of the compounds investigated.

Keywords: chromate-mass spectrometry, phthalates, solid-phase extraction, natural and sewage water, xenobiotics, estrogen properties.

THERMAL INSULATION PLATE MATERIALS BASED ON MODIFIED PLANT MATERIAL

N.P. Musko, D.V. Shiryaev, K.A. Matveev

The results of the study of the physical and mechanical properties of the plate materials based on modified by VAG pine bark and wheat straw. It is shown that the insulating properties of board materials are determined by the VAG, the density and porosity in the studied range of temperature and time VAG vary slightly.

Keywords: board materials, modification of plant material, the method explosive autohydrolysis, density, porosity, thermal conductivity.

ABOUT POSSIBILITY OF TECHNOLOGICAL INFLUENCE ON PROPERTIES OF THE ANODE OXIDIC FILMS (AOF)

A.A. Vikharev, A.V. Vikharev, I.N. Murygina

In work questions of modification of anode oxidic films at different stages of their receiving, in different electrolytes are discussed at various temperatures, their stability.

Keywords: anode oxide of aluminum, anodizing, structural anions, derivatografiya.

EFFECTS OF SHORT RUBBERIZED CORDAGE ON PROPERTIES OF RUBBER

N.L. Panteleeva, O.P. Panchenko

The effect of the concentration of rubberized cord fibers on the properties of rubber for rail pads. It has been shown that increasing the concentration of the filler rubber-cord above 40 % by weight. It causes deterioration of the rubber compounds and gaskets.

Keywords: fiber, under-rail pads, properties.

INVESTIGATION NANOSCALE FILMS OF NICKEL BY THE METHOD ZAUERBREYA

V.E. Surovaya, L.N. Bugerko, E.P. Surovoi, S.V. Bin

As a result of investigations of the optical properties of the films nanorazmenyh thick nickel ($d = 3\text{--}60\text{ nm}$) before, during and after heat treatment ($T = 373\text{--}873\text{ K}$), found that along with a decrease in the range $\lambda = 320\text{--}1100\text{ nm}$ and an increase in the range $300\text{--}320\text{ nm}$ the optical density of the sample is formed by the absorption spectrum of the new substance. Estimated optical bandgap of the resulting material is $E \approx 3,5\text{ eV}$, agrees satisfactorily with the band gap of the nickel oxide (II). Depending on the thickness of samples and processing temperatures kinetic curves of the degree of conversion satisfactorily described in the framework of a linear inverse logarithmic, cubic and logarithmic laws. Comparison of the mass of nickel oxide (II), defined by the method Zauerbreyia assuming full conversion of the films of nickel in nickel oxide (II), and calculated according to the equation reaction leads to coincidence.

Keywords: nanoscale nickel film, nickel oxide (II), oxidation, method Zauerbreyia.

USE OF ELECTRIC FIELD FOR CLEANING OF SURFACES

M. Yu. Stepkina, O.B. Kudryashova, E.V. Muravlev

The description of a number of the most widespread substances and methods applied to neutralization of dangerous substances is submitted. Pilot studies according to penetration of fine powder into surfaces of various materials and a configuration with application of electrostatic dispersion are conducted. Efficiency of the offered electrostatic way of putting the adsorbing powder on various surfaces is confirmed.

Keywords: decontamination, electrostatic naspyleniye, adsorption, nanosorbent.

STRUCTURE AND CHEMICAL CONSTITUTION OF BACTERIAL CELLULOSE

E.K. Gladysheva

*Infrared spectroscopy and nuclear magnetic resonance methods were used to characterize the structure and chemical constitution of bacterial cellulose samples obtained with the *Medusomyces gisevii* producer on a synthetic nutrient broth and an enzymatic hydrolyzate medium produced from oat hull pulp. The chemical purity of the microbial cellulose was determined by IR spectroscopy: the samples contain no impurities typical of plant cellulose, as the absorption bands indicating aromatic compounds are absent. The bacterial cellulose samples produced on the synthetic nutrient broth and the enzymatic hydrolyzate medium derived from oat hull pulp have identical IR spectra. The NMR spectroscopy technique confirmed the identities of the chemical constitutions of the bacterial cellulose test samples and plant cellulose.*

*Keywords: bacterial cellulose, *Medusomyces gisevii*, infrared spectroscopy, nuclear magnetic resonance, enzymatic oat hull hydrolyzate.*

THE STUDIES OF THE STRUCTURE AND THERMOMECHANICAL PROPERTIES OF MELAMINE-FORMALDEHYDE FOAM

A.L. Vereshchagin, N.V. Bychin, N.A. Nikiforova

It was studied the morphology of melamine-formaldehyde foam (MFF) by method, of scanning electron microscopy, thermal properties – by DTA/TGA and their mechanical-properties – TMA. It was established MFF characterized by open porosity. The cell size is 250–300 microns, and the thickness of the cell forming edges of 3–5 μm . The modulus E_{10} is 0.96 kg/cm^2 , a residual strain of 1.2 % at a density of 7.6 kg/m^3 . The temperature of beginning intensive decomposition of MFF in air and in a nitrogen atmosphere is 383 and 388 °C respectively.

Keywords: melamine-formaldehyde foam, polyurethane foam, DTA, TGA, TMA, Basotect 3012 V.

SCALING UP THE DILUTE NITRIC-ACID PROCESS FOR PULP FROM MISCANTHUS

Yu.A. Gismatulina

The chemical composition of the whole batch of Miscanthus harvested in 2013–2014 was determined and included 47.60 wt.-% K rschner cellulose, 19.25 wt.-% acid-insoluble lignin, 5.60 wt.-% fat-wax fraction, 4.54 wt.-% ash, and 16.53 wt.-% pentosans. Pulp specimens were obtained in laboratory-scale and pilot-scale conditions by the dilute nitric-acid method. The yield and quality of the pulp obtained under laboratory conditions were found to be a little bit higher than those of the pulp derived under pilot conditions: the higher α -cellulose content of 93.28 % versus 90.83 % and the lower total content of non-cellulosic components of 1.00 % versus 6.25 %; degrees of polymerization are 1230 and 1030, respectively. A pilot batch of pulp intended for the synthesis of cellulose nitrates was produced.

Keywords: Miscanthus, fat-wax fraction, K rschner cellulose, ash content, dilute nitric-acid method, laboratory conditions, pilot conditions, scale-up, α -cellulose, residual lignin, degree of polymerization, IR spectrum.

ON THE EFFECT OF FERMENTATION CONDITIONS UPON THE YIELD OF BIOETHANOL PRODUCED THROUGH THE CHEMICAL STAGE OF ALKALINE DELIGNIFICATION

E.A. Skiba, O.V. Baibakova

*The paper presents the results of producing bioethanol with the *Saccharomyces cerevisiae* RNCIM Y-1693 strain as a function of fermentation conditions of enzymatic hydrolyzates obtained from Miscanthus. A one-stage alkaline delignification method as the chemical pretreatment of Miscanthus was applied for successful enzymatic hydrolysis. The enzymatic hydrolyzate from a Miscanthus pulp was found to be a nutrient broth of biologically good quality. The hydrolyzate suspended solids slow down the fermentation process and reduce the bioethanol yield, whereas yeast extract introduced into the unfiltered hydrolyzate allows stimulating yeast metabolism and producing bioethanol in a high yield of 86 % of the reducing sugars concentration. The optimum dosage of the yeast extract is 1 %.*

Keywords: bioethanol, Miscanthus, alkaline delignification, enzymatic hydrolysis, alcoholic fermentation.

INFLUENCE OF RAW LIGNOCELLULOSE PREPROCESSING ON THE PROPERTIES OF CELLULOSE NITRATES

O.A. Panchenko, O.A. Napilkova

Partially substituted cellulose nitrates were obtained from raw lingo-carbohydrate materials after various kinds of preprocessing: explosive autohydrolysis, ultrasound, and trifluoroacetic acid treatment. It was shown that a proper preprocessing gives uniform cellulose nitrates with minimum degree of destruction.

Keywords: cellulose nitrates, trifluoroacetic acid, explosive autohydrolysis.

ENRICHMENT TECHNOLOGY FOR MATURE FINE TAILINGS OF TUNGSTEN-CONTAINING SANDS

A.N. Diachenko, S.I. Ivankov, R.I. Kraidenko, A.B. Manucharyants, D.G. Petkevich,
G.S. Spitsin, Yu.V. Perederin, A.G. Karpov, V.Yu. Yegorov

The existing concentrator flowsheet for enrichment of tungsten-containing raw materials at the ZAO Zakamensk factory is considered and its major shortcomings are revealed. The mineral composition of the initial mature fine tailings has been determined. Products that are put out of the process and have main tungsten losses in the ZAO Zakamensk processing line have been identified. Necessary modifications of the operational flowsheet for tungsten-containing raw material enrichment, which can increase the tungsten output into a marketable concentrate, are provided.

Keywords: enrichment, tungsten-containing tailings, tungsten trioxide, hubnerite, floatation.

EXPERIMENTAL DETERMINATION OF COEFFICIENT OF CONVECTIVE DIFFUSION OF FINE AEROSOLS

O.B. Kudryashova, N.V. Korovina, A.A. Antonnikova, I.K. Zharova

Work is devoted to experimental determination of coefficient of convective diffusion of aerosol particles with characteristic sizes about tens micrometers and less on the basis of physical and mathematical model of distribution of an aerosol in space of the closed rooms. The physical and mathematical model considers processes of initial scattering of particles when they brake in air, formation of primary cloud and further diffusive distribution. The experimental results received by means of optical methods of measurements of concentration of particles of model aerosols (powder of a pseudoboehmite and cosmetic clay) at which processing required values of coefficient of convective diffusion are received are given.

Keywords: fine aerosol, convective diffusion, fire-explosive danger.

INFLUENCE KREBS CYCLE INTERMEDIATES BACTERICIDAL AMPICILLIN AND CHLORAMPHENICOL TOWARDS STAPHYLOCOCCUS AUREUS AND SALMONELLA TYPHIMURIUM

A.L. Vereshchagin, T.V. Tatarnikova, L.L. Borina

It was investigated the influence of the drug concentration of the intermediates of Krebs cycle in bacteria-cinnosti ampicillin and chloramphenicol against Staphylococcus aureus and Salmonella typhimurium. It was established for a couple ampicillin – Staphylococcus aureus, maximum AK-efficiency of an antibiotic in dilution of 0.1 % is observed when the concentration of acids of the Krebs cycle were 10^{-8} , 10^{-13} , 10^{-15} ... 10^{-19} and at a dilution of 0.01 % at a concentration of 10^{-8} M. For a pair of chloramphenicol – Salmonella typhimurium, the maximum activity of an antibiotic in dilution of 0.1 % is observed when the concentration of acids of the Krebs cycle were 10^{-10} ... 10^{-12} , 10^{-14} ... 10^{-15} M, and in case dilution of 0.01 % at a concentration of 10^{-15} ... 10^{-16} , 10^{-18} and 10^{-20} M.

Keywords: intermediates of the Krebs cycle, ultra-low concentration, Staphylococcus aureus, Salmonella typhimurium, sodium salt ampicillin, chloramphenicol sodium succinate.

A METHOD FOR MULTIPLE PULPING OF EASILY RENEWABLE BIOMASS IN HYDROTROPIC LIQUOR

M.N. Denisova, I.N. Pavlov

The effect of the multiple pulping process of Miscanthus in a hydrotropic liquor on the pulp quality was studied. A conceptual possibility to carry out several pulping runs in the same hydrotropic liquor was established, the resultant pulp samples obtained from each of the five pulping runs being comparable in quality attributes. The increased active acidity of the liquor after each subsequent pulping is caused by the formation of organic acids during Miscanthus pulping. The more pulping operations, the higher the density and viscosity of the liquors due to yet more organic substances passing on to the liquid phase.

Keywords: Miscanthus, hydrotropic liquor, pulp, multiple pulping, pulping liquor recovery.

TUNGSTEN-MINING PRACTICE: STATE-OF-THE ART OF THE TECHNOLOGIES

R.I. Kraidenko, Yu.V. Perederin, D.S. Filatov, A.B. Manucharyants,
A.G. Karpov, M.S. Vasilishin

Studies on the modern scientific-technical and technological advances in the field of tungsten-containing compounds, their enrichment, and bringing them to a marketable product have been conducted. The paper reports comparative characteristics of different technologies in terms of safety criteria both for maintenance personnel and, on the whole, for the environment.

Keywords: tungsten, floatation, ion exchange, technology, leaching, enrichment.

**CREATION OF TEST SAMPLES FOR RESEARCHING
OF CHARACTERISTICS OF COMPLEX FOR STAND-OFF
DETECTION OF EXPLOSIVES TRACES**

E.V. Maksimenko, L.V. Chernyshova, A.V. Didenko

The work is devoted to theoretical analysis of methods of applying of determined quantity of explosives on the substrate. It was performed selection and practical applying of the most simple, accurate and affordable methods of producing of test samples. Surface concentration of explosives on the substrate was determined.

Keywords: explosives, test sample, surface concentration, dispersity, trace concentration.