

ABSTRACTS

UDC 665.36

Use of electromagnetic field in the process of sunflower oil freeze / A.A. Netreba, F.F. Glagkiy, G.V. Sadovnichiy, T.G. Shkalyar // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 3–14. Bibliog.: 10 titles. – ISSN 2220-4784.

The possibility of using electromagnetic processing for extracting wax and wax-like substances from sunflower oil. The electrical characteristics of the suspension of wax substances in sunflower oil, namely the dielectric constant and conductivity, as well as their behavior under electromagnetic methods impact on the system «oil - related substances». Effects of electromagnetic fields on the behavior of related substances in the process of freezing was evaluated by the change in the electrophysical characteristics of the suspension of wax and wax-like substances in sunflower oil, indicating the delivery charges associated substances. This property underlies improvement process step filtering the slurry using a fibrous filter material of polysulfone having a stable electrical charge because particle capture occurs in Depth Filter through electrostatic interaction. Shows the intensification of technological processes of crystallization of wax compounds and filtering the slurry under the influence of the electromagnetic field.

Keywords: sunflower oil, wax-like substances, the dielectric constant, conductivity, the polarization of the electromagnetic field, fibrous filter materials based on polysulfone.

UDC 665.11

The scientific and technological basis of using recyclable materials oil industry / P.F. Petik, Z.P. Fediakina // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 15–24. Bibliog.: 23 titles. – ISSN 2220-4784.

In this article the analysis of scientific literature on the use of secondary resources and waste oil industry: sunflower meal, hydration precipitation, soap stock, spent bleaching clay and filter powders, as well as deodorizing straps arising from the extraction and refining of sunflower oil. A feature of the publication is that it uses the results of scientific research carried out by graduate students of the department of technology of fats and products of fermentation of the NTU «KPI» in the development of innovative technologies for utilization of fat-containing waste oil obtaining and fat processing.

Keywords: processing fat-containing waste, meal, phospholipid emulsion, soap stock, bleaching clay, filter powder, shoulder straps deodorization.

UDC 378.65.011.56

EU Energy Week 2014 in NTU «KPI» / S.I. Bukhhalo, O.I. Olkhovskaya, A.V. Serikov, A.V. Serikov, N.N. Zipunnikov, S.P. Iglin, S.E. Garder, A.I. Klimashko, A.A. Borhovich, S.K. Lizunov, E.G. Shekhovtsov, V.A. Poznokos, D.V. Kolobrodova, M.S. Gakhova // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 25–35. Bibliog.: 13 titles. – ISSN 2220-4784.

The results of complex innovative projects continuation, that are running according to inter-universities collaboration are presented in the paper. The features of basic projects – participants of EC Week are discussed to implement modern innovative model of education. Its practical realization is very important and it is possible only for high level of training staff professionalism and is directed to create the conditions for effective reproduction of scientific and educational personnel, strengthening the youth in the science, education and high technologies, saving the sustainability of generations. The most effective ways are energy- and resource saving, environmental safety, social, economic and legislative relations in the society.

Key words: complex innovative projects, EC Energy Week, resource- and energy saving, social-economical and social-legislative relations.

UDC 641.447:664.5

Definition of quality of food products of plant material by treatment of microwave field with vacuuming / V.M. Mikhailov, I.V. Babkina, S.V. Mikhailova, S.A. Shevchenko // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 36–41. Bibliog.: 5 titles. – ISSN 2220-4784.

In the article presents the results of research of indicators extracting, swelling and chemical composition of food products from the roots and green spicy vegetables produced during processing in a microwave field in a vacuum and simultaneous mixing, as well as atmospheric conditions. Was proved the most higher quality of powdered roots and green spicy vegetables obtained with microwave drying, vacuuming of 50 kPa and simultaneous mixing. Investigations shown, that extract determined that the maximum share of water-soluble solids exceeds on 23...26%. Swelling ratio exceeds on 6,5...9,4%. Research has shown the chemical composition of a high degree of conservation of the physicochemical properties of the feedstock by reducing the duration and temperature reduction process.

Key words: quality, food products, microwave field, vacuuming, mixing, chemical composition, extracting, swelling.

UDC 678:519.713

Ecological safety as a component of the concept of waste management for complex enterprise energy mix / S.I. Bukhhalo // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 42–56. Bibliog.: 25 titles. – ISSN 2220-4784.

The research of environmental safety and solving the problems of chemical technological problems of scientifically grounded integrated processes of different originated polymer wastes and their life cycle are discussed. The possibilities of these problems solution were shown with use of processes simulation with taking into account the changes of physical-chemical, molecular, chemical and mechanical characteristics of polymer materials during exploitation. The goal is the selection of the environmentally safe energy- and resource saving methods of polymer production of new nomenclature from secondary polymer raw materials and development of effective equipment for processes. At the same time, the ways of non-conversable polymer wastes utilization are indicated.

Key words: environmental safety, utilization, polymer wastes, life cycle, identification, estimation criteria, scientifically grounded processes.

UDC 664.3

Investigation of synergism between sunflower oil tocopherols and oxidation inhibitors of extract from the walnut leaves / O.V. Bilous, I.M. Demidov, S.I. Bukhhalo // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 56–64. Bibliog.: 9 titles. – ISSN 2220-4784.

The article examines the impact on the stability of oxidation inhibitors to oxidate sunflower oil. The article describes the characteristics of the processes occurring in fats when exposed to oxygen and explains the need for the storage of fats in the unoxidized state. It also analyzes the current level of oxidation inhibitors usage in the industry and provides comparative analysis of synthetic and plant oxidation inhibitors. The results of studies of the interaction between sunflower oil to-

tocopherols and oxidation inhibitors extracted from the leaves of walnut is given. The article describes a method of installation and functioning of the device for cleaning sunflower oil from tocopherols. The results of the full factorial experiment, in which the variation factors are: the concentrate of tocopherols, the concentrate of the walnut leaves extract, the concentrate of citric acid is provided as well. The output parameter of given full factorial experiment is induction period. The obtained data were analyzed and based on it were given recommendations for concentration of the oxidation inhibitor from walnut leaves extract injected into sunflower oil.

Keywords: tocopherol, oxidation inhibitors, sunflower oil, the induction period.

UDC 644.8:658.562.5

Computer simulation of heat flux distribution in the IR-dryer / V.M. Mikhailov, L.V. Kiptela, S.Yu. Saenko, A.N. Zagorul'ko // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 65–69. Bibliog.: 4 titles. – ISSN 2220-4784.

One of the main directions of processing the fruit and berry raw products (FBRP), which allows to preserve the maximum value of food and biological of the products is to use drying technology. Studies have shown that the use of IR-radiation in FBRP drying technology allows to preserve the BAS (biologically active substances) in the product. Based on the results of studies a vertical IR-dryer was designed, providing the following advantages: decreases the duration of the drying process by forced convection; improves the quality of the final product by mild heating and low temperature; provides uniform thermal field at the receiving surface and between the trays due to the cylindrical shape of the IR-dryers; reduces dimensions and ease of construction due to rectangular carbon infrared heater in the vertical IR-dryer; intensifies the drying process due to the possibility of controlling the amount of fresh air incoming into the working chamber and the use of waste heat in the process of IR-drying.

Keywords: modeling, distribution, design, IR drying.

UDC 519.713: 504.064

Integrated method of identification for environmental system objects compliance development / T.V. Kozulia, M.O. Bilova // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 70–78. Bibliog.: 5 titles. – ISSN 2220-4784.

The main aspects of the need to improve methods to ensure assessment of complex objects, based on the theory of comparator identification are provided in the article. The approach to a comprehensive methodology for the identification of significant factors violations of environmental compliance, identify the level of environmental natural and man-made systems and evaluation of environmental quality at various levels of research facilities are proposed. The application of the method of principal components as a first step of analysis of the general state of the controlled system, algorithmic support its implementation in conjunction with the comparator method of identification is presented in the paper. The results of practical implementation of the improved method in addressing the ecological state of the regions of Ukraine are obtained and analyzed. Perspective of further studies involving a larger number of data analyses and separation of the following areas (environmental, economic, social) with the identification of tangible environmental hazards requiring managerial control are identified.

Keywords: socio-ecological-economic system, comparing identification, environmental quality, risk assessment, principal component analysis.

UDC 519.713: 504.064

Analysis of complex ecological estimation of natural and manmade complexes / D.I. Emelianova // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 79–87. Bibliog.: 8 titles. – ISSN 2220-4784.

The article provides an algorithmic support which determines the ecological level of systems of natural environment and processes in it. The given algorithmic support allows identifying nega-

tive factors disturbing the homeostasis of man-made complexes, and provides complex ecological quality assessment of man-made objects. Using the proposed algorithm of the quality assessment of a complicated system-systematic formation based on MIPS-numbers, risk-characteristic as to the conditions of objects and processes connected with ecological state disturbance, we have received a complex assessment of the studied territory. The investigation involving the complex ecological assessment methodology on the level of system objects allows taking into account the transformation processes of ecological safety destabilization when determining the situation safety level based on the results of monitoring the balance violation factors, which gives the grounds for creating a complex mechanism for quality management of anthropogenic territories.

Keywords: complex quality assessment, risk analysis, MIPS-analysis, resource efficiency, environmental management.

UDC 674.8

Modern problems of charcoal burning and pyrolysis of wood / V.E. Ved, A.N. Mironov // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 88–95. Bibliog.: 5 titles. – ISSN 2220-4784.

A historical overview of the development of technologies of charcoal burning is presented. The preconditions for the transition between stages of technologies for the production of charcoal are considered. Gradual replacement of the timeworn ways of charcoal burning to more relevant methods of pyrolysis of wood and wood waste is demonstrated. Examples of the use of charcoal in the modern human's lives are given. A wide application of it in various spheres of national economy is displayed. Shortcomings of artisanal production methods of charcoal are delineated. The problems faced by fabricators of wood pyrolysis' products are designated. The necessity of creating more advanced technologies for the production of charcoal, which would ensure the maximum energy efficiency of production is determined.

Keywords: wood, coal, charring, pyrolysis, drying.

UDC 658.28:665.63:338.44

Extraction data for the pinch analysis process atmospheric distillation unit ELZU on AVT-A12/6 Saratov refinery / L.M. Ulyev, O.I. Khimich, M.V. Kanischev // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 96–107. Bibliog.: 7 titles. – ISSN 2220-4784.

The article examined the installation of oil processing at the facility AVT-A12/6 Saratov refinery by flows that will be used during the heat integration process. As a result of the survey the atmospheric distillation of crude oil by the established rules were extracted stream data systematized and tabulated. On the basis of certain flows was constructed grid chart. The preparatory phase is completed successfully. During the extraction of data was obtained the necessary information, which will be further used for the application of pinch technology in the atmospheric distillation unit with CDU on ABT-A12/6 Saratov refinery. The preparatory phase is completed successfully. During data extraction was obtained the necessary information, which will be used for the application of pinch technology for the installation of an atmospheric distillation unit ELZU on AVT-A12/6 Saratov refinery. Further, on the basis of the data will be proposed modernization of existing production which reduces investment in reconstruction.

Keywords: heat transfer, heat recovery, heat exchanger, oil, pinch.

UDC 658.28

Data extraction process integration for thermal power stabilization of oil in the oil industrial / L.M. Ulev, M.A. Kerzhakova // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 108–115. Bibliog.: 18 titles. – ISSN 2220-4784.

The article is devoted to the stabilization of oil installations oil fields. Light fractions of petroleum (hydrocarbon gases from ethane to pentane) is a valuable raw material from which get products such as alcohols, synthetic rubber, solvents, liquid motor fuels, fertilizers, artificial fibers

and other products of organic synthesis, widely used in industry. So should strive not only to reduce the loss of light fractions of the oil, but also to the preservation of hydrocarbons extracted from oil-bearing horizon for further processing. The article is a brief description of the process of stabilization of oil. The technological flows and are their main characteristics. A table streaming and built lattice diagram the existing process.

Keywords: stabilization of oil, grid diagram, table production, utilities, heat recovery.

UDC 547.53

Energy saving potential for processes of benzene-toluene-xylene fraction and hydrodealkylation in the production of benzene / Ulyev L.M, Yatsenko, O.A., Ilchenko M.V. // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 116–124. Bibliog.: 10 titles. – ISSN 2220-4784.

The relevance of the topic due to the fact that rising energy prices encourages more efficient use of energy, as the level of energy consumption has a significant impact on the cost of finished products. The shortcomings of the existing heat exchange systems which lead to an increase in energy consumption was identified in this paper. The possibility of improving the heat integration processes for benzene-toluene-xylene fraction and hydrodealkylation in the production of benzene was considered. The composite curves for existing process were built. The minimum temperature difference and the values of hot and cold utilities were defined for existing process with the help of composite curves. Heat power recuperation at the existing flowsheet was analyzed. The grid diagram of the existing flowsheet was built for this. The optimal value of the minimum temperature difference for heat exchanges equipment was defined. As a result of implementation of the retrofit project the consumption of hot and cold utility can be reduced by 10% and 30%, respectively.

Keywords: benzene, pinch analysis, grid diagram, composite curves, utility

UDC 621.91

Determination of the defects when drilling multilayer composites/ G. L. Khavin, E. S. Kasian // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 125–132. Bibliog.: 9 titles. – ISSN 2220-4784.

The problem of determining the crack length of the delamination when drilling composite laminates drill with central and peripheral cutting edge – «candle stick drill. The solution is based on the use of a ratio Hocheng H. and Tsao C.C. For determine the integrated thrust forces used the known from the literature empirical relation. It is assumed that a given fixed value of the depth of the crack. On the basis of the dependence, the ratio of the diameter of the drill to length crack delamination and ratio of the force acting on the periphery of the drill to the value of its central part. The total value of the trust force is determined by the diameter of the drill and the amount of feeding. Using the obtained analytical relation, we calculated the distribution of crack length of delamination during drilling of CFRP for varying depth of its occurrence and the ratio of peripheral to trust forces.

Keywords: crack delamination, crack depth location, multilayer composites.

UDC 666.266.6

Assessment of resorption level and biological action of calcium silicophosphate glass-ceramic materials in vitro / O.V. Savvova // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 133–139. Bibliog.: 9 titles. – ISSN 2220-4784.

Solubility of calcium silicophosphate glass-ceramic materials in bodily fluids has been investigated. It has been established that test materials have low levels of destruction and can be used as medical items. Results of assessment of biological action have shown that the trend of mass augmentation for these materials in simulated body fluid is increased

during 30-90 days; curve of augmentation is governed by parabolic law with intensification of the process during 90-180 days. Possibility of formation of apatite-like layer on the surface of resorbing glass-ceramic materials in vitro has been established. Perspectivity of the use of experimental materials as a base for obtaining bioactive materials for maxillofacial surgery and orthopedics for filling bone defects has been confirmed.

Keywords: bioactive glass-ceramic materials, calcium phosphates, hydroxyapatite, resorption, bone implants

UDC 666.266.6

Perspective directions of synthesis of bioactive glass-ceramic materials for bone implants / O.V. Babich // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 140–144. Bibliog.: 9 titles. – ISSN 2220-4784.

Synthesis trends of glass-ceramic materials for bone implants are analyzed in the article. Perspectivity of creation of bioactive glass-ceramic materials with adjustable levels of resorption and mechanical properties on the base of calcium silicophosphate glasses, which meet the requirements to bone implants, has been determined. Under the conditions of State-owned Experimental Prosthetic Orthopedical Enterprise and Certified Laboratory of RETC “Southern Railroad”, experimental-industrial and experimental-laboratory tests of the synthesized glass-ceramic material ZF-1 have been successfully carried out. Positive results of clinical and biological tests under conditions of public institution “Institute of Pathology of Spine and Joints named after M.I. Sitenko” of AMSU prove viability of the use of obtained glass-ceramic materials as bone implants.

Keywords: bioactive glass-ceramic materials, calcium phosphate, hydroxyapatite, resorption, bone implants.

UDC 666.26

Glasses in system RO-RO₂-R₃O₃-SiO₂ for brazing of electronic details / G.K. Voronov // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 145–149. Bibliog.: 5 titles. – ISSN 2220-4784.

The article considers the possibility of creating a frit with a low coefficient of linear expansion and fusing temperature for soldering components of microelectronics with high silicon content. The areas of glass formation in the system PbO-B₂O₃-Al₂O₃-ZrO₂-SiO₂ and the distribution of values of the coefficient of linear expansion of the glass. Synthesized glass samples and determined their ability to crystallize. Samples frit and explore their technological properties. Conclusions about the practical application of the synthesized frit.

Keywords: glas frit, glass forming system, crystalline phase, coefficient of expansion, soldering temperature.

UDC 666.293

Modern solutions for creation of bioactive glass-ceramic coatings on titanium for medical applications / G.M. Shadrina // Bulletin of National Technical University «KhPI». Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 150–156. Bibliog.: 7 titles. – ISSN 2220-4784.

Main problems of creation and long-term use of bioactive components of hip joint and lower jaw bone implants are given in the article. Methods of improving biocompatibility and mechanical characteristics of existing materials for this application are reviewed. It has been established that the modern solution of the problem of implant instability is creation of calcium silicophosphate glass-ceramic coatings that have a structure crystallized in volume. Technological scheme for obtaining bioactive glass-ceramic coatings on titanium alloys is proposed. Main characteristics of performance, mechanical and chemical properties have been investigated. The possibility of use of these materials on the loaded bone areas is substantiated.

Keywords: calcium phosphate coatings, biocompatibility, titanium alloys, slip technology.

UDC 666.293

Mo-containing direct vitreous enamels / A.P. Odintsova, O. V. Shalygina, L.A. Gavrilina
// Bulletin of NTU "KhPI". Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 157–162. Bibliog.:8 titles. – ISSN 2220-4784..

The basic principles of electrostatic powder technology POESTA, used on enamel enterprises of Ukraine, the requirements for powder and protective coatings vitreous. Analyzed current problems and peculiarities of obtaining Mo-containing nonpigment direct colored vitreous enamels produced by technology POESTA, the dependence of the effect of the concentration of MoO₃ on technical and operational characteristics and decorative coatings, as well as the results of research on the development and application of direct nonpigment colored vitreous coating for protection of steel parts of household appliances.

Keywords: glass-enamel, frit, muting agent, ionic mechanism, chemical resistance.

UDC 666.21

Energy efficiency and the environment in the production glass enamel / O.V. Shalygina
// Bulletin of NTU "KhPI". Series: Innovation researches in students' scientific work. – Khrarkov: NTU «KhPI», 2014. – № 49 (1091). – pp. 163–171. Bibliog.: 15 titles. – ISSN 2220-4784..

The article provides a description of the technological process of production of enameled products, which includes the manufacture of vitreous frit, powders, slurries, mixtures RTU and RTM, manufacturing of metal workpieces and surfaces before preparing their enameling coating, drying and firing of coatings shows their significant resource and energy consumption. The analysis of energy and resource in the enamelling industry. It is shown that for maximum effect the economy of resources relevant is the modernization of all stages of the production process of enameling. The basic development priorities of Ukraine enamelling grow back on the experience of European enterprises and existing national and European standards.

Keywords: enamel, glass enamel, energy and resource saving, energy consumption, environmental effectiveness, frit, powder electrostatic technology POESTA.