

## ABSTRACTS

UDC 663.253.34

**Evaluation of the protective effect of antioxidants on anthocyanins in rose table wine / M.V. BIL'KO** // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 3 – 11. – Bibliogr.: 19 names. – ISSN 2079-0821.

The anthocyanins are the most important components of rose. Anthocyanins show low-stability in rose wine. The article presents the results of the study of the anthocyanins complex in rose wine and rose wine model system by HPLC and antioxidants efficiency of using to protect the representatives of anthocyanins from oxidation. Rose table dry wine anthocyanins are presented in three groups. Glycosides delphinidin, cyanidin, petunidin, peonidin, malvidin, their acetyl and n-coumaroyl derivatives were found. It is found that the oxidation induced model systems results in reduced anthocyanin content at 3 – 32 % depending on the variant of the experiment. Installed greater resistance to oxidation glycosides malvidin and glycosides peonidin. It was proved that sulphur dioxide and reduced glutathione ensured preservation of model system rose wine anthocyanins by 94 %. It was shown that the combination of antioxidants, which include glutathione yeast recovery, sulfur dioxide with or without tannin in rose wine helps protect malvidin glycosides and their derivatives, to-torve account for more than 2/3 of anthocyanins from oxidation. Established some antioxidant effect of anthocyanins in relation to others.

**Keywords:** rose wine, high performance liquid chromatography, anthocyanins, antioxidative effect, oxidation.

UDC 681.513.63 : 519.712

**Double-step adaptive algorithm of identification of non-stationary objects / A.A. BOBUKH, A.M. DZEVOCHKO, M.A. PODUSTOV, A.S. KRAVCHENKO** // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 11 – 17. – Bibliogr.: 9 names. – ISSN 2079-0821.

At design of the computer integrated control systems (CICS) of stationary and non-stationary objects of the majority of chemical and adjacent productions it is necessary to have rather reliably working algorithms of identification. The recurrent method of the smallest squares and its various modifications developed for identification of stationary technological objects, which turn out by minimization of square functional and use direct measurements of input and output parameters at creation of estimation, are analyzed. In article it is shown, that for identification of non-stationary technological objects the specified adaptive algorithms of identification have limited functionality and small accuracy. Therefore, the double-step speed-optimized algorithm of non-stationary technological objects identification is offered. It allows to use on each iteration not all available information on background of object, as it becomes in a recurrent method of the smallest squares, but data only of two last supervisions, that gives the chance to trace drift of identification objects parameters of the majority of chemical and adjacent productions that conducts to improvement of objects management process quality, and it in turn provides positive economic effect.

**Keywords:** recurrent method of the smallest squares, double-step adaptive algorithm of non-stationary technological objects identification.

**Computer calculations of equilibrium composition for multicomponent solution / M.N. VOLOBUYEV, R.P. MIGUSCHENKO, A.L. SINCHESKUL, A.V. KRAMARENKO // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 18 – 21. – Bibliogr.: 4 names. – ISSN 2079-0821.**

For computer calculations of multicomponent systems composition, including electrolyte solutions, provided an own program. Minor restrictions on the nature of interactions in system can significantly simplify algorithm for finding a solution without loss of accuracy. Program algorithm description contain only tree positions. Checking the program operation was carried out in two ways. First one is comparing program results with the exact calculation for simplest systems. For such purposes we used a multibasic acid ( $H_3PO_4$ ) solution. In this case coincidence for obtained results is perfect. The second way is comparison of calculated and experimental values for buffer solution pH. In buffer systems  $KH_2PO_4 + Na_2HPO_4$  higher calculation error was about 1 %. According to results of comparison it can be concluded that program allows to obtain particle concentrations with acceptable accuracy for most technological problems. Program implementation simplicity allows not only to solve technological problems, but also to work with students and as a basis for writing more generalized application.

**Keywords:** computer calculations, program realization, algorithm of solution, electrolyte solution, equilibrium composition, multicomponent solution.

**Improved wastewater treatment technology factories producing cheese / I.V. KHITROVA, I.V. PASHKINA, K.S.GLYADYA // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 22 – 30. – Bibliogr.: 8 names. – ISSN 2079-0821.**

The work deals with the problem of pollution of surface waters by nitrogen compounds resulting from the discharge of inadequately treated industrial wastewater treatment plants for the production of cheese. Various configurations of application for wastewater treatment of ammonia nitrogen tralytsiynih methods nitryfykatsiyi and denitrification require significant costs or chemicals to meet the needs carbon sources or increased costs of electricity for pumping effluent. In this regard was investigated the possibility of removing ammonia nitrogen from sewage plant producing cheese by ion exchange, using cation exchanger KU-2-8, vermiculite and klinoptylolitu "Akvamultolayt." Comparison of three dynamic volumetric capacity cation showed that the cation exchanger KU-2-8 and vermiculite are almost the same capacity for ammonium ions, which is higher than the capacity klinoptylolitu. The developed technological scheme wastewater treatment plant for the manufacture of cheese.

**Keywords:** ion exchange, the ammonium nitrogen, waste water, production of cheese, cationic, dynamic volumetric capacity, regeneration.

**The ways of modernization of annular flow of liquid media / A.N. DUBOVETS, I.I. LITVINENKO, M. A. PODUSTOV, E. I. LITVINENKO // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiy, khimichna tehnolohiya ta ecolohiya). – P. 30 – 39. – Bibliogr.: 3 names. – ISSN 2079-0821.**

A method is proposed modernization of the slot level control that allows you to eliminate the effect of liquid density on the results of the regulation, to reduce the sensitivity threshold of the regulator and control error. In addition, excludes errors caused by the presence of foam and wave formation on the surface of the liquid sticking on the sensor element controller of the solid phase of slurries, suspensions. Float sensing element of the regulator should be replaced with the sensor element, consisting of two slits. The gap is set so that when a predetermined level of liquid in the receiving tank flow regulator Q1 and Q2 of the liquid out of the slits are of equal value.

The sensitivity threshold and measurement error slotted regulator liquid medium can be reduced through use of sensitive elements that implement the differential principle, when the output signal of the sensing element is equal to 0 for a given level of liquid medium in the receiving capacity of the regulator, but is opposite in sign of the increment corresponding to the increase and decrease in the level relative to a predetermined value.

Float sensing element gap of the liquid flow regulator should be replaced with the sensor element, consisting of two slits in the choice of their parameters in accordance with the requirement

**Keywords:** sensor, air gap, suspension, slurry, hopper, tube, float, density, cylindrical, differential.

**Intensification technology for production biogas and fertilizer from municipal sewage sludge / A.V. IVANCHENKO, A.R. BELIANSKA // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 39 – 45. – Bibliogr.: 6 names. – ISSN 2079-0821.**

The analysis prospects introduction technologies for production biogas and fertilizer from municipal sewage sludge in Ukraine and abroad. It is noted, that one of the unresolved issues in the implementation of biogas plants in Ukraine remains the reduction of duration their work. For the first time effect of preliminary dispersion sewage sludge the duration of the process anaerobic digestion. In a laboratory reactor was loaded with 8 g of sludge at the exit from the installation mass of digested sludge was 5,44 g (68 %), 2,56 g (38 %) raw materials refracted into biogas volume 0,07 dm<sup>3</sup>. It is shown that the dispersion accelerates speed separation of biogas in 2,2 times. Investigated the structure dispersed activated sludge, as a result of dispersing it becomes thicker and processes have been intensified. Chemical analysis fermented complex fertilizers based on the urban waste water treatment facilities this composition, %: organic – 62,8; total nitrogen (N) – 6,5; phosphorus (P<sub>2</sub>O<sub>5</sub>) – 4,2; potassium (K<sub>2</sub>O) – 0,4. The technological scheme the site biogas production and complex fertilizers with the use of a dispersant and anaerobic digestion plant.

**Keywords:** activated sludge, dispersing, anaerobic digestion, biogas, complex fertilizers, urban wastewater.

**The mechanism of nano activity complexes formation Rh-Pd catalysts for cleaning CO<sub>2</sub> in production of carbamid** / V.V. *Kazakov* // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 46 – 50. – Bibliogr.: 4 names. – ISSN 2079-0821.

The main results of research on the regeneration of spent catalyst RPK-1 under the influence of electromagnetic and acoustic fields. It is shown that the treatment of the catalyst particles monochromatic beam sonar and polaritons, the formation of homogeneous centers nanokataliza and parallel to the annihilation of the catalytic sites are responsible for third-party chemical reactions. Differential equations that describe the mechanism for changing concentrations of the major products of the reaction. It is concluded that the spatial and temporal distribution of radical (H<sup>•</sup>, OH<sup>•</sup>) and molecular products (H<sub>2</sub>, H<sub>2</sub>O<sub>2</sub>) produced when exposed to water electromagnetic and acoustic waves. Analysis of physical, chemical and technical characteristics of the catalyst shown that electromagnetic and acoustic fields generated nanostructured catalytic contact with a physico-chemical characteristics, previously not observed in similar catalysts.

**Keywords:** synthesis of carbamid, carbon dioxide, combustible impurities, catalyst, catalyst regeneration, acoustic field, electromagnetic field, nanostructured catalyst contact.

UDC 620.22 : 419.8, 667.663.41/42 : 621.359 : 621.762. 539.3 : 539.193

**Composite electrolytic coatings based on copper and carbon nano-materials** / D.G. *KOROLLYANCHUK*, V.G. *NEFEDOV*, M.R. *BUKATINA*, M.P. *SHCHEBELSKAYA*, V.D. *ZAKHAROV*, V.E. *VAGANOV* // Visnyk NTU «KhPI». – 2014. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 51 – 59. – Bibliogr.: 7 names. – ISSN 2079-0821.

This work is devoted to the continuation of studies of the properties of composite electrolytic coatings with carbon nanotubkami as a filler. Usually, for obtaining wear-resistant and hard composite electroplating in an electrolyte injected to fill at a concentration of 500 g/l. As a filler, the most commonly used powders of hard materials: diamond, carbides, nitrides and oxides of metals. To reduce friction coating may introduce graphite. A special form of carbon nanotubes are, nanofibers, fullerenes. In our previous work it was shown that the composite electrolytic nickel based coatings containing carbon nanotubes at a concentration of 1 g/l of the crystal size decreases, and the microhardness increased to 30 %. In the above paper we continue the investigation of composite electrolytic coatings with carbon nanomaterials. The template used copper precipitates derived from sulfuric acid electrolytes and pyrophosphate. The filler used globule carbon nanotubes produced by pyrolysis of propane-butane mixture in the catalyst of nickel oxide, and magnesium. Concentration of the suspension was also up 1 %. It is shown that, when introduced into the electrolyte nanocarbon particles crystallite size is significantly reduced. Old polarization studies have shown that over-voltage slightly shorter. Current output on the concentration of carbon nanotubes in the electrolyte is practically independent and is about 98 %. The microhardness of the composite coatings obtained from sulfuric acid electrolyte is increased by 15 %, and from pyrophosphate – 7 %.

**Keywords:** Composite electrolytic coatings, carbon nanomaterials (CNM), carbon nanotubes (CNT), carbon nanofibers (CNF).

**Study of the properties of granular insulation material based on liquid glass and various fillers / E.Ju. KRJuChKOVA, T.E. RYMAR // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 59 – 65. – Bibliogr.: 2 names. – ISSN 2079-0821.**

In recent years in the field of building materials there is great interest in finding new inorganic insulation and methods for their production.

This study examined the physical-mechanical properties of the granular thermal insulating material, obtained by passing the liquid glass composition through a drawplate and subsequent thermal swelling of obtained granules in a laboratory microwave unit. Liquid glass composition consists of soda glass and an inorganic mineral filler of various types and quantities which is in the initial mixture. The influence of the type and amount of filler on the next properties of the granules is defined: apparent, true and bulk densities, sorption humidity and water absorption. The optimum content and type of the filler to obtain a granular material with high physical-mechanical characteristics is defined. It is proved that zinc oxide is acceptable filler for the production of thermal insulation materials.

**Keywords:** thermal insulation, fire protection, liquid glass, swelling, mineral filler, density.

**Sugar syrup preparation process control in kvass production / E.I. LYTVYENENKO, S.N. BYKANOV, A.A. LYTVYENENKO, I.V. BABKINA // Visnyk NTU «KhPI». – 2015. № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 66 – 70. – Bibliogr.: 3 names. – ISSN 2079-0821.**

The functional block diagram of the control process of obtaining sugar syrup in the production of kvass is developed. The different structures of control loops are developed. Control loop water supply, contour dosing feed sugar, the control loop process temperature, control loop time cooking syrup, contour control sugar levels, water and finished syrup, control loop pump motor, control circuit filter differential pressure, the contour of the quality control of sugar syrup, are considered. The structure and operation of control circuits are described. The choice of modern process control has been recommended. In functional control scheme was used automated complex (programmable logic controller). Selection converters, diaphragms, actuators, actuators, valves, sensors, thermocouples, sensors, densitometers for the operation of the functional control scheme was recommended. Control and management process proposed in the paper allow for the preparation of sugar syrup with the optimal parameters and to receive a specified product quality. Technology of production of sugar syrup, methods for its preparation and special technological equipment are presented.

**Key words:** sugar syrup, apparatus for cooking syrup, kvass, automated complex, control, converter, circuit, regulation, sensor, actuator.

**Cosmetic oil for skin cleaning / T.T. NOSENKO, T.O. VOLOSCHENKO, T.V. SIDORENKO // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 71 – 77. – Bibliogr.: 11 names. – ISSN 2079-0821.**

Researching for creation of cosmetic oil for skin cleaning was carried out in this work. In particular, vegetable oil compositions were created on the basis of their physiological effect, fatty acids composition and recommended ratio of main fatty acids. Designed formulations of fat compositions maximally approximated to recommended ratios of main fatty acids (oleic : linoleic, linoleic : linolenic). The main oils for dry skin were sunflower higholeic oil, containing about 84 % oleic acid, and rape oil which contains  $\alpha$ -linolenic acid. Apricot and grape seed oil, jojoba and almond oils were predominated in fat formulations for normal skin type. The laboratory obtained oil from *Sambucus nigra* seeds was also included in oil compositions. It was abounded on polyunsaturated fatty acids – linoleic and  $\alpha$ -linolenic acid. The content of carotenoids was determined in cosmetic compositions too. These pigments increase the regeneration of skin epithelium due to their antioxidant properties. The sources of carotenoids in designed formulations were *Sambucus* and rape oils. Thus, the formulations of new cosmetic oils that can be used for skin cleaning were designed in this study.

**Key words:** cosmetic oil, fatty acids, vegetable oil, polysorbate-20, cromollent, essential oils, skin

UDC 666.3.016

**Production of ultra dispersed alumina powders, modified by additives of nanosized zirconia / S.YU. SAYENKO // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 78 – 84. – Bibliogr.: 5 names. – ISSN 2079-0821.**

In article the results of researches on development of a method of production bimodal powder compositions of  $\text{Al}_2\text{O}_3 - \text{ZrO}_2$  (5 %  $\text{Y}_2\text{O}_3$ ) and  $\text{Al}_2\text{O}_3 - \text{ZrO}_2$  (4 %  $\text{MgO}$ ) are presented, which is based on oxide alumina ( $\gamma\text{-Al}_2\text{O}_3$ ) saturation by water solutions of nitrate Zr, Y and Mg salts with the subsequent heat treatment. It is set that this method allows to produce the nanocrystal grains of dioxide zirconia which are evenly distributed in oxide alumina structure of mainly tetragonal modification with a size of particles 0,05 – 0,1  $\mu\text{m}$ , that favorably influences high-quality consolidation and sintering of products of the demanded form. This method provides the high degree of transformation of transitional forms of alumina oxide into stable modification – corundum ( $\alpha\text{-Al}_2\text{O}_3$ ) with fine-grained structure (< 4  $\mu\text{m}$ ).

Uniform distribution of the modifying additives composition of  $\text{ZrO}_2 - 5\% \text{Y}_2\text{O}_3$  and  $\text{ZrO}_2 - 4\% \text{MgO}$  also promotes the effective growing of material to the high degree of dispersion, that must favourably influence on a quality of samples formation and sintering.

The made powders are perspective for production of high density ceramics of different setting.

**Keywords:** powders, zirconia, milling, particle size distribution, phase composition, alumina ceramics.

UDC 666.9.015.7 : 536.78

**Thermodynamic analysis of the reactions in the system  $\text{Si} - \text{Ca}(\text{OH})_2$  / A.A. SALEY, L.O. SNIZHKO, O.O. SIGUNOV, T.V. KRAVCHENKO, L.O. KHMARSKA, M.M. KONONOVICH // Visnyk NTU "KhPI". – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 85 – 91. – Bibliogr.: 5 names. – ISSN 2079-0821.**

It was presented the results g thermodynamic analysis of the reactions in system  $\text{Si} - \text{Ca}(\text{OH})_2 - \text{H}_2\text{O}$ , that is typical for technology of cellular gas concrete The possibility of realization of directional

synthesis mineralogical composition of hydration product has been revealed in the investigated system. As one of hydration products were considered calcium hydrosilicate as tobermorite, foshagite, xonotlite, girolite, okenite and hillebrandite. They have possessed the most consistent initial thermodynamic characteristics. Analysis of calculation results achieved that the smallest value of Gibbs energy change of formation reactions hydrosilicates are corresponding to the stoichiometric ratio of the initial components. Nature of Gibbs energy change from temperature is ambiguous and depends on the ratio of calcium hydroxide and metal silicon in the hydrated system. Analysis of research results displays that the least stable with increasing pH of solution is girolite, and most sustainable is hillebrandite, solubility occurs almost at the equilibrium pH of saturated solution of calcium hydroxide. Under normal conditions of hydration and lime surplus all previously formed low-basic hydrous directly or sequentially transformed into high-basic: okenite in girolite, girolite in tobermorite, xonotlite in tobermorite, xonotlite in foshagite, foshagite in hillebrandite. Thermodynamic probability of passing of such reactions has been confirmed by negative values of Gibbs energy reactions.

**Keywords:** concrete, metal silicon, thermodynamic analysis, lime, hydration, mineralization, Gibbs energy.

UDC 502.31

**Public activity of the population of cities and the role of environmental information therein / N.N. SAMOILENKO, A.N. RASSOHA, V.I. AVERCHENKO, O.O. MAMEDOVA // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 92 – 98. – Bibliogr.: 5 names. – ISSN 2079-0821.**

The current trend of growth of urbanized areas and the deteriorating environmental situation in their is shows. The problems of community participation in making decisions on environmental concerns of the city are considered. Based on the results of questionnaire the level of public awareness about the ecological state of the city is defined, as well as preparedness of initiative citizens in improving it. Insufficient dissemination of ecological information among townspeople was observed. This fact is an obstacle for the formation of environmental awareness of inhabitants of the city, as well as in the implementation of practical activities to protect the environment in their place of residence. In order to increase their awareness, joint work is needed for all participants of information process in society: authorities of environmental management, enterprises, public service organizations and others. Revitalization of the work of community councils operating in Ukraine with state authorities is appropriate. This will expand the functions of the citizens in finding solutions for ecologically important social tasks. Thus, it is necessary to increase the level of dissemination of information about the activities of such councils in the population, as well as significantly improve the communications between them.

**Keywords:** urbanized territories, ecological condition, questionnaire, ecological informing, community council.

UDC 66.069.833

**Temperature control of oilseeds during thermal processing / V.V. SEBKO, V.N. BABENKO, T.S. TIKHOMIROVA, K.A. PETUKHOVA, A.K. MINKOVA // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 99 – 105. – Bibliogr.: 9 names. – ISSN 2079-0821.**

Investigated three-parameter eddy current method of measuring the average diameter control  $d_{sr}$ , electrical resistivity  $\rho$ , and temperature  $t$  samples of oilseeds. The basic relationships that describe this method of measuring control. The algorithm of the measurement and calculation procedures for the measurement of the sample on the basis of oilseeds transformer eddy probe TVP. The scheme of heat RTA which allows you to simulate the heating of the sample of oilseeds during the joint control of the measuring three parameters of the sample. Thus, the aim is to develop a method of measuring three parameters of the sample. Thus, the aim is to develop a method of measuring three parameters of the sample on the basis of oilseeds heat transformer eddy probe TVP when simulating the process of heating at temperatures ranging from 20 °C to 160 °C, which corresponds to the process of thermal treatment of industrial. In this case, if you use a fixed frequency  $f$ , measured with the heating of the samples and to determine the temperature-dependent parameter  $x_t$  taken from the test range, you can get a rational modes of heat eddy current device.

**Keywords:** micro camera, eddy current method, measurement control, eddy current device, thermal converter, joint control of three parameters.

UDC 666.762

**Optimization of complex antioxidant composition / G.D. SEMCHENKO, D.A. BRAZHNIK, V.V. POVSHUK, I.N. ROZHKO, E.E. STAROLAT // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 106 – 111. – Bibliogr.: 8. – ISSN 2079-0821.**

The protection of carbon from oxidation at high temperatures is carried out by using antioxidants. Development of new complex of antioxidants and their distribution around the particles of graphite in the carbon sheaf of periclescarbon refractories is presented a considerable practical interest.

The results of the optimization of complex antioxidant consisting of Al, ethylsilicate and nickel oxalate, for protect against oxidation of carbon in periclescarbon products are presented. The dependence of the samples strength rates distribution and open porosity from the content of components in the composition of complex antioxidant are found. It is shown that irrespective of the components ratio in the composition of the complex antioxidant the open porosity periclescarbon se refractory after heat treatment at 180 – 200 °C does not exceed 17 %. High porosity may be related to the fact that during the temperature heat treatment the gaseous products of decomposition of nickel salt are allocated as a result of physical-chemical transformations of nickel oxalate. Therefore, synthesized precipitate of nickel oxalate has heat advisable before using of nickel organic precursor for remove of decomposition products of salt.

**Keywords:** antioxidant, ethylsilicate, periclas, nickel oxalate, optimization.

UDC 678.652:66.022.32

**Studying the properties of insulation materials cold porization based on liquid glass granulate / V.V. UNKOVSKAYA, T.E. RYMAR // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 112 – 118. – Bibliogr.: 2 names. – ISSN 2079-0821.**

In recent decades, a growing interest in the possibility of replacing organic polymeric inorganic in-



sulation foam that combine low thermal conductivity of heat resistance and incombustibility.

In this paper we investigate the properties of thermal insulation materials made on the basis of swollen liquid glass granules and binder obtained by cold swelling by dint of different blowing agents.

The binder consists of sodium liquid glass, filler, hardener, surface - active substance and a blowing agent. The choice of blowing agents. Was to find the optimal ratio of the granular thermal insulation material and liquid glass binder. Was investigated the effect of the amount and type of blowing agent in the physical and mechanical properties of the received swelling blocks: density, flexural strength, compressive strength, water absorption, hygroscopicity. The optimal content of different blowing agent in a communication system for thermal insulation materials.

**Keywords:** liquid glass, a blowing agent, swollen granules, the binder, foaming, curing, density.

UDC 621.039.736

**Obtaining of ceramics matrix based on the pyrochlore  $Gd_2Zr_2O_7$  / V.A. SHKUROPATENKO, R.V. TARASOV, K.V. LOBACH, V.V. STYPINA, A.G. MYRONOVA, M.A. ODEYCHUK // Visnyk NTU «KhPI». – 2015. – № 30 (1139). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 119 – 128. – Bibliogr.: 5 names. – ISSN 2079-0821.**

The solid-state synthesis of gadolinium zirconate pyrochlore  $Gd_2Zr_2O_7$  and obtaining of dense samples  $Gd_2Zr_2O_7$  are investigated. The solid-state synthesis of pyrochlore  $Gd_2Zr_2O_7$  spent in vacuum at temperature 1450 °C within 2 hours. Research of phase structure of the synthesized pyrochlore powder has shown, that under the given conditions on the X-ray diffraction pattern together with pyrochlore lines x-ray lines of oxides initial components are observed. Ceramic samples of pyrochlore  $Gd_2Zr_2O_7$  with relative density 92,5 % were produced by the method of hot pressing in vacuum at temperature 1450 °C, compacting pressure 50 MPa and mold-cycle time 1 hour. By methods X-ray diffraction analysis and electronic microscopy it is shown, that the received material, basically, it is presented pyrochlore  $Gd_2Zr_2O_7$  and insignificant quantity initial oxides. Bending strength, calculated by results of tests for diametrical compression of such samples, makes 58,74 MPa. Recommendations concerning use of the given researches for development of the ceramic materials intended for immobilization of actinide elements and REE-actinide of fraction high-level radioactive waste are given.

**Keywords:** solid-state synthesis, ceramic matrix, pyrochlore, radioactive waste, hot pressing, milling.