

Возобновляемые источники сырья и полимеры на их основе / А.М. КАРАТЕЕВ, Д.А. ЛИТВИНОВ, А.Г. КОРЯГИН, О.С. КАЛКАМАНОВА // Вестник НТУ «ХПИ». – 2015. – № XX (XXXX). – (Серия: Химия, химическая технология и экология). – С. 139 – 150. – Библиогр.: 15 назв. – ISSN 2079-0821.

Представленная работа является обзором трудов авторов, работающих над созданием экологически безопасных полимерных материалов на основе фурфурилглицидилового эфира (ЭФУ) и его производных, получаемых из продуктов переработки растительного сырья. В работе представлены новые производные ЭФУ на основе жирных кислот и пентафталевых олигоэфиров, кинетические закономерности их синтеза и механизм полимеризации ЭФУ и его производных в присутствии новых комплексных органических катализаторов, а также на основе ЭФУ представлена новая концепция синтеза линейных и сетчатых «неизоцианатных» полигидроксиуретанов, которые обладают термообратимыми свойствами.

Ключевые слова: биомасса, экологически безопасные полимерные материалы, фурфурилглицидиловый эфир, комплексные органические катализаторы, четвертичные аммониевые и фосфониевые соли, неизоцианатные полигидроксиуретаны.

ABSTRACTS

UDC 621.794.48.436

Technological scheme of regeneration of spent sulfuric acid solutions containing sodium sulfate / V.I. BULAVIN, A.V. KRAMARENKO, V.P. ULYANOV, I.V. ULYANOVA // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 3 – 15. – Bibliogr.: 1 name. – ISSN 2079-0821.

In this paper we propose a flowchart of the equipment providing regeneration of spent solutions after the etching of glass fiber. These solutions contain sulfuric acid and sodium sulfate. Sulfuric acid can be returned in the production cycle with utilization sodium sulfate. Processing begins with a clarification of spent solution by coagulation of organic impurities. After that clarified solution must be partially evaporated in a special acid-resistant boiler heated by gas burner. It reduces the volume of solution by several times. The hot concentrated solution then sprays via nozzles to the "fluidized" bed reactor blown with hot products of combustion. Here the solution decomposes to sulfuric acid vapor and a granular sodium sulfate. The vapor condenses giving a concentrated sulfuric acid suitable for recycling. Residual sulfuric acid fog after the condensation can be eliminated by fibrous filter. The basic requirements to the industrial equipment for regeneration are developed.

Keywords: regeneration, the spent etching solution, sulfuric acid, sodium sulfate, glass fibers, "fluidized" bed.

Features of phase formation aluminous cement based chemical waste / R.M. VOROZHBYYAN, G.N. SHABANOV, A.N. KOROHODSKAYA // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 15 – 24. – Bibliogr.: 5 names. – ISSN 2079-0821.

Alumina cement is one of the binders, which is used in different conditions and modes of operation, but the cost of the binder constitute it not available for widespread use. In connection with task is the development of optimum modes of producing alumina cement-based waste and selection of effective technological condition.

This article presents the results of a study of phase formation processes in the synthesis of cement based on resource energy-efficient chemical waste. The possibility of describing the processes of phase formation in accordance with the equation Ginstlinga-Brounshteyna, determine the dependence of the degree of conversion of calcium oxide, calculated reaction rate constant. The presented results of X-ray analysis allows implement synthesis and allow the process control phase ratio in the synthesis of a new class of aluminate cements with chemical waste. The interaction of calcium oxide with aluminum oxide, and nickel in the raw mix composition of a given phase as the main phase formed dialyuminat calcium, monoaluminate calcium, as well as ternary compound at the diffraction maximums corresponding gehlenite.

Keywords: phase formation, aluminous cement, waste water treatment, waste catalyst carrier, raw meal, X-ray, diffraction peak.

UDC 536.416:667.613:667.633.22

Determination of internal stresses of coatings based on water-borne coating materials / I.M. KAS'YANENKO, V.Yu. KRAMARENKO // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 24 – 32. Bibliogr.: 13 names. – ISSN 2079-0821.

Since the developing of internal stresses is involved in all stages of coating life, its measurement is important for a better understanding of coating properties and for life prediction at different conditions of exposure. The effect of spontaneous cracking is well known for water-borne coating materials if their minimum film-forming temperature is exceed of the temperature of application. Therefore the problem of correct determination of internal stresses, even at low level of absolute values, is important for same materials. In this study the technique of internal stresses estimation by measurement of the flexible substrate deflection has been proposed and applied for coatings based on facade water-borne coating material. The possibility to measure with high accuracy for internal stresses below 1 MPa has been predicted and shown for polyethyleneterephthalate strips proposed as substrate. The similarity for dependencies of deflection development and mass losses of the film has been established at the time of film-formation facade paint at ambient conditions.

Keywords: internal stresses, elastic modulus, method of beam deflection measurement, console method, water-borne coating materials, mechanism of film-formation.

Non-isothermal kinetics in the thermal analysis of polymers. 2. Isoconversional analysis. / **V.Yu. KRAMARENKO** // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 32 – 41. – Bibliogr.: 12 names. – ISSN 2079-0821.

The kinetic studies of thermally induced reactions of polymers, such as cure of oligomers or thermal destruction, are traditionally performed by thermal analysis in non-isothermal regime. Investigations of such complex processes do not allow a change of a measured heat (DSC) or mass loss (thermogravimetry) to be separated into contributions from single reactions. The isoconversional method or free-model approach is widely used for kinetic description of such complex processes by assumption of possible dependency of apparent activation energy from the extent of reaction. An algorithm of experimental data treatment for non-isothermal measurements has been presented in this study. Two types of reactions, namely of two-order and autocatalytic reactions of epoxyamine cure have been considered for comparison of results of isoconversional analysis. In spite of similarity of extent reaction dependencies from temperature in non-isothermal regime, the modeling curves in isothermal conditions are demonstrated clear distinctions between two reaction types.

Keywords: thermal analysis, non-isothermal kinetics, formal kinetics, isoconversional analysis, complex reactions, autocatalytic kinetics.

Study the possibility of synthesis hydroxyapatite for biomedical applications from the solution and the hydrothermal method / **S.P. KRIVILYOVA** // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 41 – 47. – Bibliger 5 names. – ISSN 2079-0821.

The article describes on various methods for producing a synthetic hydroxyapatite. Hydroxyapatite of biomedical use produces by hydrolysis, anhydrous calcium phosphate, pyrolysis (decomposition solutions of base components in the hot zone of the reactor with their subsequent interaction) and deposition from solutions followed by freeze-drying and sublimation. The evaluation of the feasibility of synthesis of the crystalline $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ of high purity is made of solutions and a hydrothermal method. It is established that the stoichiometric ratio of the components and the geometrical dimensions of the produced crystals varies the regulation of phosphate ions state in the initial solution and the aging time. The parameters of the transition of the materials obtained in the crystalline state (due to residual absorption of calcium from the initial solution by mutual ordering of the primary microelements, and combining into crystals). The optimal concentration and time of components mixing, the environment of pH and parameters of endurance in the initial solution for receiving materials of the set composition and structure are defined. Schemes of formation, the modes of crushing and heat treatment providing ensure synthesis $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ of high purity with autoclave method are developed. It is defined that receiving a hydroxyapatite in the "wet" way which less energy-intensive is more perspective.

Keywords: hydroxyapatite, tricalcium phosphate, hydration, bioceramic materials, X-ray phase analysis, the processes of phase formation.

Methods of calculating the equilibrium number of phases in the synthesis of materials MgO – Al₂O₃ – SiO₂ / S. LOGVINKOV, G. SHABANOVA, A. KOROHOVSKA O. KHRISTYCH // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 47 – 54. – Bibliogr.: 13 names. – ISSN 2079-0821.

The paper presents a method for determining the initial concentration of the reactants in the solid phase reaction system MgO – Al₂O₃ – SiO₂ oxide for a given composition of the charge for the synthesis of materials. The main technological problem – forecasting qualitative and quantitative composition of phases in the synthesized materials based on quantitative content of the starting oxides in the raw material mixture. This qualitative and quantitative composition of the phases set microstructure and mechanical properties of synthesized materials. The method of calculation of the parameter λ -coordinates of solid-phase reactions that occur in the synthesis of materials of MgO – Al₂O₃ – SiO₂. The system of equations is advantageously carried out using automated computer programs (MathCad), which greatly simplifies the process of calculating. Calculated for a given oxide composition of the charge coordinate values of solid state reactions completely determine the equilibrium concentration phase at temperatures projected synthesis of materials .

Key words: the system MgO – Al₂O₃ – SiO₂, solid-phase reaction, the coordinate responses, method of calculation, the equilibrium composition of the phases, the change of concentrations.

The study of effective methods to protect oil and gas equipment from salt deposits / T.V. MELNICK // Visnyk NTU «KhPI». – 2014. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – C. 54 – 58. – Bibliogr.: 5 names. – ISSN 2079-0821.

It is known that each year the interest in enhanced oil recovery methods increases, and there is development of research aimed at finding evidence-based approach to the selection of the most effective technologies for the development of deposits. The contemporary technologies used in the development of oil reservoirs for oil and gas fields that are in their final stages of development are presented. The basic methods of intensification of oil, as well as ways to intensify oil recovery and improvement of the studied technological processes are discussed. The laboratory study of crystalline deposits of salts in the tubing is made, which results in determination of number of their members. Further avenues of research, which represent a set of measures aimed at determining the quality and quantity of the materials used; analysis and prediction of the rate of corrosion damage to the operating conditions; selection inhibitor compositions, foams as well as other technological solutions for the implementation of measures to restore the equipment of oil and gas wells and enhanced oil reservoirs are suggested. These methods will allow enhancing technology of oil extraction in oil and gas fields, which are on the last stage of their development.

Keywords: oil-bearing strata, salt deposits, acid treatment equipment oil and gas wells, tubing, reservoir pressure.

The selection of molybdenum leaching process based on thermodynamic and kinetic criteria / N.V. NIKOLENKO, I.S. SAMCHILEEV, A.N. KALASHNIKOVA, V.A. KOTOK // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 59 – 78. – Bibliogr.: 12 names. – ISSN 2079-0821.

A thermodynamic and kinetic analysis of the processes of acid and alkaline extraction of molybdenum oxide considered in example of processing iron-molybdenum catalyst methanol conversion was carried out. Leaching was realized in cycled reactor model with a solid fixed phase. It was found that at a flow rate of solutions through the layer of solid particles is not less than 0.04 m/s is limited by the leaching step by the diffusion layer of the product of the chemical reaction. First time theoretically and experimentally based choice of the optimal reagent for the leaching of molybdenum was done. Furthermore, comparative analysis of the leaching process of molybdenum showed that the best reagent should be considered a concentrated solution of ammonia. Also it was showed that in a row $\text{NaOH} > \text{Na}_2\text{CO}_3 > \text{H}_2\text{SO}_4 > \text{NH}_4\text{OH}$ speed of iron molybdate decomposition decreases. Thermodynamic data showed that the optimal pH value of leaching is 12 – 13. In case if pH value more than 13, the degree of purity of molybdate solutions is increases. It was found that the decomposition of iron molybdate by sulfuric acid solution is possible only in excess of solution of sodium sulfate or ammonium.

Key words: iron molybdate, the solubility, internal diffusion mode, leaching, catalyst, loop reactor.

Effect of lactic acid on morphological, cultural and physical and chemical properties of bakers yeast, enriched with microelements / T.A. OVSYANNIKOVA, L.V. KRICHKOVSKAYA, V.L. DUBONOSOV // Visnyk NTU «KhPI». – 2014. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 79 – 84. – Bibliogr.: 3 names. – ISSN 2079-0821.

The article presents a review of the literature and our own observations regarding the use of lactic acid in the production of baker's yeast, fortified with iodine and selenium. The aim is to study the effect of lactic acid on the morphology and properties of yeast culture, enriched with iodine and selenium, as well as the physico-chemical parameters (lift force, enzymatic activity, acidity and firmness of yeast during storage). The study used the yeast *Sascharomyces cerevisiae*, strain LK14 of museum cultures Kharkiv yeast plant in the form of yeast milk. In yeast cream administered potassium iodide (GOST 4232-74), sodium selenite (TU 6-09-17-209-88) and lactic acid (GOST 490-2006) in an amount of 2 – 6 % of the dry matter (DM) yeast. A control sample was used yeast cream without any additives. According to the experimental results the following conclusions: it has been shown that the presence of potassium ions in the additive, which enriches stimulate growth of colonies on dense nutrient medium. It has been determined that the presence of lactic acid inhibits the growth of foreign microflora. Indicators enzymatic activity, acidity and lift remained within normalized values, indicating the possibility of using lactic acid production of baker's yeast, enriched in trace elements.

Keywords: bakers yeast, lactic acid, potassium iodide, sodium selenite, lift force, enzymatic activity, acidity, firmness.

Environmental problems of taxation for discharges of pollutants / V.I. UBERMAN, L.A. VASKOVETS // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 84 – 98. – Bibliogr.: 15 names. – ISSN 2079-0821.

Found the errors in principles of taxation for discharges of pollutants included in the structure of the indicator mineralization of water and explored the contradictions between the requirements for environmental safety of special water use and tax legislation. The Tax Code of Ukraine wrongly provides payment from water users with dual environmental tax: as for water mineralization, as and for its components - chlorides and sulfates. Shown that maximum admissible concentrations (MACs) for water bodies which given in the Tax Code must be considered as inadequate criterions for determining the environmental taxation. Also the principle of taxation does not takes into the account industrial content of water use, resulting the tax applies to the mass of discharged pollutant as a whole, rather than to mass increment due to the use of water. Discovered the effect and the causes of erroneous double taxation for components of mineralization of returned water. Evaluated the sum of erroneous taxation in general for Ukraine and for different regions. Shown that the taxation of the masses mineralization, chlorides and sulfates, discharged in Ukraine and its regions in 2014, performed at the rates stipulated in the Tax Code, it leads to absurd a large amount of taxes (comparable to the income of the state budget of Ukraine) and indicates methodically wrong approach to the principles of taxation for discharge of pollutants. It is shown that in the Tax Code of Ukraine it is necessary to distinguish between two cases: for which the MAC is needed, but not yet installed, and when the MAC do not must installed.

Key words: discharge of pollutants, environmental standards, environmental tax, tax on mineralization of water, harmonization of environmental and tax legislation.

UDK 666.9

The study of hydration products of special radiopaque barium-containing cement / N.S. TSAPKO // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 99 – 107. – Bibliogr.: 5 names. – ISSN 2079-0821.

The article is devoted to the study of hydration products of domestic radiopaque cement for the needs of dentistry. A comparative analysis of existing dental materials. The possibility of receiving domestic rentgencontrastnoe cement based on calcium aluminate and barium disilicate is a silica for the needs of clinical dentistry. Describes a general view of the hydration process of barium-containing radiopaque cement based on calcium aluminate and barium silicate. When hydrated barium-containing cement is observed the influence of individual, components, phases, therefore, present as quasirational and topochemically mechanisms. The basic results of research of hydration products of barium-containing cement held involving complex physico-chemical methods of analysis. Given the description of the microstructure of hydrated cement, it is established that the structure of the presented sample is fine-grained with uniform distribution of crystals in the volume. The data specific dental test. Set the composition of hydrated cement composition optimal, which fully complies with the requirements for dental endodontic filling materials.

Keywords: oxide, cement, dental, radiopaque materials, hydration, structure, properties.

Optimization of alkali – slag binder / H. SHABANOVA, A. KOROHODSKA, A. KOROLYOV, A. NAHORNII, O.O. HAPONOVA, S. BYKANOV // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 107 – 114. – Bibliogr.: 8 names. – ISSN 2079-0821.

The results of the development of alkali – slag binders compositions on the base of granulated blast furnace slag of PJSC «Dniprovsk Metallurgical Plant named after F.E. Dzerzhinsky», Portland cement PC 1-500-N JSC of «Eurocement Ukraine» and fine grinding sand of Novovodolazhskoe field. It was determined the chemical and phase composition of the slag, the results of which established the possibility of using it to get high-quality alkali – slag binders. As activators used caustic soda and sodium water glass. Optimization of the proportion of components alkali – slag composition was performed using the simplex -lattice method of experiment planning. According to the results of experimental data calculated coefficients of expressing the dependence of the strength (Y_{σ}) on the proportion of the components of the alkali – slag composition, construct of simplex – diagrams «composition – strength» and the projection of lines of equal level for the compositions, hardening in air and under water. It was found that for alkali – slag composition of high strength (above 25 MPa) is necessary to observe a certain proportion of slag, fine grinding sand and Portland cement.

Keywords: slag, alkali – slag binder, Portland cement, fine grinding sand, strength, hardening conditions, optimization.

Influence of additives-electrolytes on physical and mechanical properties of Portland cement / G.N. SHABANOVA, V.N. SHUMEJKO, D.A. LITVINOV // Visnyk NTU "KhPI". – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 114 – 121. – Bibliogr.: 2 names. – ISSN 2079-0821.

Studies concerning estimation of compatibility of additives-electrolytes with Portland cement as well as efficiency of their application were carried out. Physical and mechanical properties of cement stone with the use of casein and sodium thiosulfate as additives to Portland cement were investigated. Studying Portland cement containing above mentioned additives it is determined that normal consistency of cement past is achieved with reduced water-cement ratio. Experimental data are presented and optimum content for application of given additives improving the Portland cement properties has been ascertained. It is shown that by using the sodium thiosulfate the cement stone was characterized with increased compressive strength. Acceleration of hardening processes to 7 days of curing is observed and a significant increase of strength to 28 days is provided in the presence of small quantities of sodium thiosulfate in Portland cement composition. Besides strength is increased in early stages of hardening due to rising the additive concentration. Casein application permits to use one as a plasticizer which reduces significantly the water-cement ratio, expands the range of technological serviceability, and provides placeability of cementations composition.

Keywords: Portland cement, additives, properties, strength, setting time, water-cement ratio.

To a question about the nature of the relationship of water to calcium hydroxide / V.P. SHAPOREV, I.V. PITAK, M.I. VASILIEV // Visnyk NTU "KhPI". – 2015. – № 50 (1159). – (Series: Khimia, khimichna tekhnolohiya ta ecolohiya). – P. 121 – 127. – Bibliogr.: 5 names. – ISSN 2079-0821.

The processes of preparation of the calcium hydroxide in two ways: slaking excess water to the lime milk, separating the calcium hydroxide paste with subsequent drying; slaked lime to calcium hydroxide, bypassing the stage of milk of lime. The physicochemical properties of the resulting product is defined temperature range in the last stages of the process. When playing process in the laboratory revealed that drying in this temperature range does not allow to obtain a product with a high content of Ca(OH)_2 , although the amount of undesirable impurities is minimized. It was suggested a different nature due to water Ca(OH)_2 prepared in various ways. In order to test hypotheses, experiments were conducted. Was obtained by the activation energy is very close to the value of heat decomposition of Ca(OH)_2 is equal to 125 kJ/mole. IR calcium hydroxide, confirmed the formation of hydrate forms other than Ca(OH)_2 , for example, $\text{Ca(OH)}_2 \cdot n\text{H}_2\text{O}$. The results of these studies showed that calcium hydroxide obtained by drying the paste after its discharge from the milk of lime but physically bound water, there is an adsorption-bound water type $\text{Ca(OH)}_2 \cdot n\text{H}_2\text{O}$, removal takes place in the temperature range 120 – 360 °C

Keywords: calcium hydroxide, drying, paste structure, water, humidity, physical-chemical properties, thermogravimetric curves.

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Technological parameters of obtaining of lightweight expanded clay by extrusion method / L.P. SHCHUKINA, M.I. RYSHCHENKO, L.A. MIKHEENKO, V.V. TSOVMA, K.S. BEZUGLAYA // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ecolohiya). – P. 127 – 133. – Bibliogr.: 5. – ISSN 2079-0821.

The technological parameters of obtaining of lightweight expanded clay on the base clay which slightly expands are worked out. The influence of molding pressure on swelling characteristics of extrusion expanded clay granules at the soft-mud process of mass treatment is defined. It is shown that the extrusion molding method produces expanded clay granules of regular shape. The paper also noted that one of the factors affecting the swelling in the preparation of granules by extrusion, a molding pressure. The optimal regime of burning of clay granules with normative indexes of technical properties is set. The temperature of a thermal treatment, the temperature of blistering, swelling ratio and spacing – it is the main characteristics of swelling clays. In terms of water absorption and frost resistance expanded clay pellets, in the expansion area which are obtained, they are fully consistent with the standard documentation requirements. The very lightweight expanded clay of homogeneous form and different sizes is obtained. Such expanded clay can be used as aggregate for lightweight concretes and in the form of heat-insulating granules which are applied in power effective building.

Keywords: lightweight expanded clay, fusible clay, fuel oil, method of extrusion formation, aggregate for lightweight concretes, heat-insulating granules.

UDC 621.35

New electrode materials for hydrogen economy problems solving / G.G. TULSKIY, M.A. PODUSTOV, I.V. SENKEVICH, A.A. TULSKAYA // Visnyk NTU "KhPI". – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ekologhiya). – P. 134 – 138. – Bibliogr.: 3 names. – ISSN 2079-0821

The choice of anodic material for SO_2 – depolarized hydrogen producing was justified. Gas – diffusion electrode consists of a porous graphite support and the coating materials, which demonstrate catalytic activity in SO_2 oxidation process: active carbon (AC), Pt, RuO_2 , MoO_3 , WO_3 . According to the catalytic activity investigated anode materials can be placed in the following order $\text{Pt} > \text{RuO}_2 > \text{MoO}_3 > \text{WO}_3 > \text{AC}$. The synergistic effect of using the composition Pt + AC supported on graphite-hand basis, compared with the individual Pt and AC was determined. The composition of the active coating of the gas diffusion anode, exhibits high kinetic parameters in a wide range of current densities, and a method of its application were proposed. The durability of anode materials has been tested. The results of kinetic studies confirmed the laboratory cell. The possibility of using sulphur-acid method of producing hydrogen for utilization of SO_2 . It was determined that the specific energy consumption was $2.6 \dots 3.1 \text{ kW} \cdot \text{h} \cdot \text{nm}^3 \text{ H}_2$ at a current density of $500 \dots 1000 \text{ A} \cdot \text{m}^{-2}$. Conducted pilot tests, which proved the feasibility of the depolarization of the anodic process of SO_2 in sulphur-acid method of producing hydrogen.

Keywords: a gas diffusion electrode, active carbon (AC), the depolarization of the anodic process, the sulfur oxide (IV).

UDC 66.095.26 : 547.722

Renewable raw materials and polymers based on them / A.M. KARATEEV, D.A. LITVINOV, A.G. KORIAGIN, O.S. KALKAMANOVA // Visnyk NTU «KhPI». – 2015. – № 50 (1159). – (Series: Khimiya, khimichna tekhnolohiya ta ekologhiya). – P. 139 – 150. – Bibliogr.: 15 names. – ISSN 2079-0821.

This scientific paper is the review paper included in the transactions of the authors that work on the creation of ecologically friendly polymer materials based on furfuryl glycidyl ether (FGE) and its derivatives that are produced from the products of raw material processing. This paper gives new FGE derivatives based on fat acids and pentaphthalic oligoethers, kinetic mechanisms of their synthesis and polymerization mechanisms of FGE and its derivatives in the presence of new complex onium catalysts (COC) are investigated by differential scanning calorimetry (DSC) in a non-isothermal mode. It presents a new conception of the synthesis of linear and cross-linked "nonisocyanate" polyhydroxy urethanes using Diels-Alder reaction based on derivative of the FGE – furfuryl oxypropyl cyclocarbonate. These polymers have thermally reversible properties and, if necessary, they break up into their original components, which makes it possible to use them repeatedly. Also shows physical and mechanical properties of the polymers and coatings based on them and their structure confirmed using the methods of IR and PMR spectroscopy.

Keywords: biomass, ecologically friendly polymer materials, furfuryl glycidyl ether, complex onium catalysts, quaternary ammonium and phosphonium salts, nonisocyanate polyhydroxy urethanes.