

CHEMISTRY OF ENERGETIC MATERIALS

SYNTHESIS OF 4,5-DISUBSTITUTED DERIVATIVES OF IMIDAZOLIDIN-2-ONES BY THE REACTION OF GLYOXAL WITH MONOALKYLUREAS

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The paper reports the results of experimental studies on the condensation of asymmetrically substituted ureas with glyoxal; the antiulcer activity of imidazolidin-2-ones derivatives is studied as well.

Keywords: 4,5-dioctylureido-1-octylimidazolidin-2-one; 4,5-dinonyl-ureido-1-nonylimidazolidin-2-one; glycolurils, antiulcer activity

ALKYLATION OF 4-NITRO-1,2,3-TRIAZOLE WITH *s*-Butyl Alcohol

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*The alkylation of 4-nitro-1,2,3-triazole with *s*-butyl alcohol in concentrated sulfuric acid was first shown to result in a mixture of isomeric *N*-sec-butyl-4-nitro-1,2,3-triazoles with a predominant content of the N_2 -isomer therein. A significant portion of the substitution product at the nitrogen atom N_3 was observed. According to ^1H NMR spectroscopy, the mole ratio of the $N_{(1)}$ -, $N_{(2)}$ - and $N_{(3)}$ -isomers is 3.0:67.4:29.6.*

Keywords: 4-nitro-1,2,3-triazole, *s*-butyl alcohol, alkylation, isomeric *N*-sec-butyl-4-nitro-1,2,3-triazoles.

SPECTRAL CHARACTERISTICS OF THE SALTS OF 1- R_1 -3-NITRO-4- R_2 -5- R_1 ,2,4-TRIAZOLIUMS AND 3-NITRO-1-[1'-(3'-NITRO-4'-METHYL-5'- R_1 ,2',4'-TRIAZOLIUM-1'-YL)- R_1]-3-NITRO-4-METHYL-5- R_1 ,2,4-TRIAZOLIUMS

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The paper provides a comparative analysis of spectral characteristics of the initial 1- R_1 -3-nitro-5- R_1 ,2,4-triazoliums, 3-nitro-1-[1'-(3'-nitro-5'- R_1 ,2',4'-triazole-1'-yl)- R_1]-3-nitro-5- R_1 ,2,4-triazoles, and the products of quaternization thereof: alkyl sulphates, perchlorates, dinitramides of 1- R_1 -3-nitro-4- R_2 -5- R_1 ,2,4-triazoliums and 3-nitro-1-[1'-(3'-nitro-4'-methyl-5'- R_1 ,2',4'-triazolium-1'-yl)- R_1]-3-nitro-4-methyl-5- R_1 ,2,4-triazoliums.

Keywords: nitrotriazolium salts, structure, spectroscopy

STUDY OF THE HEXAACETYLHEXAAZAISOWIRTZITANE NITROLYSIS REACTION

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The paper presents the results of experimental studies of the nitrolysis reaction of hexaacetylhexaazaisowurtzitane. It has been determined that the highest yield and quality of hexanitrazaisowurtzitane are observed when the process is run in the system of nitric acid/ammonium nitrate (9:1) with nitric acid being distilled.

Keywords: hexaacetylhexaazaisowurtzitane, hexanitrohexaazaisowurtzitane, nitrolysis, acetylation, stability, decomposition

PHYSICAL CHEMISTRY OF ENERGETIC MATERIALS

A MOCKUP OF REMOTE EXPLOSIVE DETECTOR BASED ON ISOTOPIC CO₂-LASER

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The paper reports the study results with respect to the possibility of remotely detecting surrogate explosives' vapors by using differential optical absorption spectrometry. The results of laboratory experiments on measuring the transmission of surrogate explosives' vapors in IR range are shown. The scheme of the vapor detector mockup is described. The field test results for the device are presented.

Keywords: surrogate explosives, remote detection, absorption and transmission spectra, laser detection

STUDY AND DEVELOPMENT OF COMPONENTS FOR GAS GENERATING COMPOSITIONS BASED ON UREA NITRODERIVATIVES

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The paper reports the results of experimental studies on developing and investigating energetic condensed systems for non-explosive gas generating compositions of a new generation on the basis of urea nitroderivatives. Thermodynamic calculations of the explosive characteristics of nitro- and dinitrourea derivatives are presented; physicochemical and explosive properties of nitrourea ammonium salt and its compositions with a phlegmatizing agent are studied.

Keywords: nitrourea, burning rate, gas capacity, shock and friction sensitivity, low-temperature gas generator, splitting of marble blocks.

STUDY INTO THE BURNING PROCESS OF NITROUREA DERIVATIVES-BASED SUBSTANCES

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The results of bench-scale tests to study the burning processes of nitrourea derivatives and compositions thereof are reported. The high-energy materials have been classified to burning rate.

Keywords: explosive burning, phlegmatized composition, nitrourea, nitramino hydroxamic acid, nitrosemicarbazide

STUDY INTO THE BURNING PROCESSES OF NITROUREA AMMONIUM SALT UNDER BENCH-SCALE TESTS

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The results of bench-scale and quarry tests to study the burning processes of nitrourea ammonium salt and a non-explosive gas generating composition based thereon are reported.

Keywords: burning rate, gas capacity, nitrourea ammonium salt, low-temperature gas generator.

CUMULATIVE SYNTHESIS USING COMPOSITE EXPLOSIVE MATERIALS

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A composite explosive has been developed, to the formulation of which a mixture of powdered tungsten and carbon was introduced with a volume ratio of 1 to 1. Using hollow charges, tungsten carbide was synthesized in the cumulative jet. Characteristics of the product synthesized are provided.

Keywords: composite explosive, hollow charge, synthesis in cumulative jet, tungsten carbide

STUDY OF COMBUSTION AND THERMAL DECOMPOSITION OF ENERGETIC CONDENSED SYSTEMS BASED ON THE MIXED OXIDIZER AMMONIUM NITRATE/AMMONIUM PERCHLORATE

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The study results of the combustion and thermal decomposition of energetic condensed systems based on the mixed oxidizer ammonium nitrate/ammonium perchlorate (AN/AP) are reported herein. It was shown that with the AP content of 30-40 mass%, there are observed sharp changes in the combustion and thermal decomposition parameters of the systems under consideration, which is apparently due to the presence of the ammonium nitrate molten layer on the burning surface and the interaction of components in the condensed phase.

Keywords: ammonium nitrate, ammonium perchlorate, burning rate, thermal decomposition

THE OXIDATION STUDY OF METAL AND NONMETALS POWDERS IN AIR ENVIRONMENT

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The study results of the oxidation of different nature powders in an air environment by thermal methods are presented in the paper. The thermal effects during the oxidation of powders to a temperature of 550 °C were determined; a comparison of the powders by thermal oxidation effects was made.

Keywords: ultradispersed powders, microdispersed powders, oxidation, thermal effects

THE EFFECT OF ANTICAKING AGENTS UPON DECOMPOSITION PROCESS OF N-BENZYL MORPHOLINE OXALATE

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The effect of various anticaking agents upon the thermal stability of N-benzylmorpholine oxalate has been studied. An express-method to estimate the effect of anticaking agents upon the thermal stability is suggested.

Keywords: anticaking agent, thermostability, kinetic parameters

STUDY OF THE ϵ -CL-20 SOLUBILITY IN TNT

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The temperature dependence of the ϵ -CL-20 solubility in TNT and of solution heat was determined by the refractometry method within the temperature range of 80 to 120°C. DSC has revealed an additional water absorption in the system, which is connected with the solvation of CL-20 molecules in a solution. The solvates density was ascertained.

Keywords: ϵ -CL-20, TNT, solubility, solvation

EXPLOSIVE CHARACTERISTICS OF DINITROUREA SALTS

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Explosive and initiating properties of the dipotassium salt of sym-dinitrourea have been studied. The findings are explained from the viewpoint of the molecular-kinetic detonation model [2]. Possibilities of applying the sym-dinitrourea salts for anti-terrorism purposes are discussed.

Keywords: sym-dinitrourea salts, molecular-kinetic detonation model

THE EXTENT OF CONVERSION OF ENERGETIC POTENTIAL OF AN EXPLOSIVE INTO THE PROPELLING ABILITY OF DETONATION PRODUCTS

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An analysis of the extent of conversion of energetic potential of an explosive into the propelling action of detonation products is presented in the work, and the possibility of improving the propelling ability due to a better usage of the energy reserve of an aluminized explosive is shown.

Keywords: explosives, forms of explosion performance, explosion thermodynamics, propelling ability, detonation

THE SHOCK-WAVE GENERATION OF HIGHLY DISPERSED LIQUID-DROPLET AEROSOLS

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The paper presents the results of study of the formation of a highly dispersed aerosol using the model of explosion-type atomizer based on a hydrodynamic shock tube. The role of cavitation in generating the highly dispersed liquid-droplet aerosol is shown. A mathematical model describing the genesis processes of the aerosol cloud is suggested.

Keywords: liquid-droplet aerosol, cavitation, size distribution, evaporation

DEPENDENCE OF THE 1,4-DIALKYL-3-NITRO-5-R-1,2,4-TRIAZOLIUM SALTS SENSITIVITY TO MECHANICAL IMPACTS ON ANIONS AND ALKYL SUBSTITUENTS AT THE CYCLIC CARBON ATOM C₅ AND NITROGEN ATOMS OF THE HETEROCYCLE

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The paper presents the results of study of the dependence of the 1,4-dialkyl-3-nitro-5-R-1,2,4-triazolium salts sensitivity to mechanical impacts on anions and alkyl substituents at the cyclic carbon atom C₅ and at nitrogen atoms of the heterocycle. A comparative analysis of the mechanical impact sensitivity of the nitrotriazolium salts and the nearest analogs known has been made.

Keywords: nitrotriazolium salts, sensitivity, dinitramide, perchlorate, alkyl sulphate, permanganate

DYNAMICS AND INTERACTION OF NANO-SIZED METAL POWDERS IN VISCOUS MEDIA

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The motion of nano-sized Al, Ti, Zn, Fe, Cu and Ni powders and mixtures thereof in a nitro compounds-plasticized *tetrazole* polymer has experimentally been studied. For each metal, the following parameters were determined: the velocity V of small agglomerates and the distance L_{MIN} corresponding to the start of the motion. These parameters were plotted versus the physical and electrochemical characteristics ρ and $\Delta\epsilon^\circ$. The effect of *nanometals* upon characteristics of energetic condensed systems was discussed.

Keywords: nanometals; energetic condensed systems

THE EFFECT OF NANOSIZED BIMETALLIC PARTICLES ON COMPOSITE PROPELLANT BURNING CHARACTERISTICS

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The effect of *bimetallic* particles of nanosized aluminum upon the linear burning rate of a composite solid propellant with an "active" binder was experimentally studied. To compare the results of gravimetric studies with those of experiments on burning, the projective technique "black box" was employed.

Keywords: nanometals, bimetallic particles, energetic condensed systems

THERMAL STABILITY OF BIS(NITROSEMICARBAZONE)GLYOXAL SALTS

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The thermal decomposition process of the hydrazinium, ammonium, and potassium salts of bis(nitrosemicarbazone)glyoxal was studied. The kinetic parameters were determined, and a possible mechanism of the thermal decomposition was suggested.

Keywords: hydrazinium/ammonium/potassium salts, bis(nitrosemicarbazone)glyoxal, thermal decomposition mechanism

STUDY INTO THE CHEMICAL STABILITY OF HEMs WITH DIFFERENT LOTS OF ALUMINUM NANOPOWDER

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The thermal stability of HEM compositions based on «Alex» nanoaluminum was studied. The use of nanoaluminum in certain civil and military-oriented applications was shown to be limited because of the absence of the possibility for long-term storage due to its high catalytic interaction with the other components.

Keywords: energetic materials, nanoaluminum, chemical stability.

GAS EVOLUTION KINETICS UNDER ACCELERATED THERMAL AGEING OF HIGH-ENERGETIC CONDENSED SYSTEMS BASED ON AZOLE BINDER

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The thermal stability of energetic condensed systems (ECSs) based on azole binder has been studied by the ampule-chromatographic analysis at various temperatures. The energy of activation has been determined to calculate the gas evolution rate during the storage and exploitation of ECSs.

Keywords: thermal stability, activation energy, ampule-chromatographic technique

QUANTITATIVE ANALYSIS AND PREDICTION OF THE COMPONENTS' PROPERTIES OF ENERGETIC CONDENSED SYSTEMS-HIGH EXPLOSIVES

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Properties of a variety of high explosives were analyzed using the linear regression analysis and neural networks, to build a prediction mathematical model capable of approximating the properties of interest.

Keywords: mathematical modeling, neural networks, high-energy compositions, explosives, properties prediction

LABORATORY METHODS TO STUDY THE OXIDATION PROCESS OF ULTRA-DISPERSED METAL POWDERS

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The paper discusses the possibilities of thermogravimetric studies to determine dominant factors that influence the oxidation processes of ultra-dispersed metal powders. A graphical method for calculating optimal ratios of the energetic condensed systems components is suggested.

Keywords: nanometals, TGA methods, energetic condensed systems

CONVERSION OF PLANT RAW MATERIALS

TOWARDS THE BIOLOGICAL DIGESTION OF THE RUSSIAN MISCANTHUS

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In consequence of investigations, microbial complexes isolated from natural habitats with extreme conditions have been screened for the capability of hydrolyzing cellulose. Active enrichment cultures have been obtained which function stably for long, and are able to decompose a broad spectrum of cellulose-containing substrates. These microbial complexes are suitable for isolating pure cultures of cellulolytic microorganisms. Different cellulose sources were shown to give rise to different complexes of microorganisms. The paper reports the outcomes of the study into enzymatic hydrolysis using the Miscanthus enzyme complex Cellolux-A and Miscanthus chemical treatment products.

Keywords: microorganisms, cellulolytics, salt lakes, enrichment cultures, enzymatic hydrolysis, reducing agents, Miscanthus, Cellolux-A

MISCANTHUS PROPERTIES AFTER TREATMENT IN AN AUTOCLAVE-2009

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The results of studying the Russian Miscanthus properties using an autoclave-2009 are reported herein. After treatment in the autoclave-2009 and alkali wash, Miscanthus was found to represent a fibrous product having properties similar to pulp. The reactivity to fermentation of Miscanthus samples after autoclaving and to different treatment techniques, as compared to the original feedstock, was determined.

Keywords: Miscanthus, autoclave, pulp, enzymatic hydrolysis, Cellolux-A

SYNTHESIS OF NITROCARBAMATE 1,7,7-TRIMETHYLBICYCLO[2.2.1]HEPTAN-2-YL AND POTASSIUM SALT THEREOF BY THE REACTION OF BORNEOL WITH DINITROUREA

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By the reaction between N,N'-dinitrourea and borneol, the nitrocarbamate 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl and potassium salt thereof was first synthesized.

Keywords: N,N'-dinitrourea; borneol; nitrocarbamate 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl; potassium salt of nitrocarbamate 1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl; derivatives of bicyclic terpene alcohol; nitrocarbamoyl borneol

SEARCH FOR AN ACCESSIBLE METHOD FOR THE SYNTHESIS OF OSELTAMIVIR PHOSPHATE

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Consideration was given to the well-known methods for the synthesis of oseltamivir phosphate. Methods based on (-) shikimic acid have been recognized to be the most accessible. Options of the oseltamivir synthesis via the O-trimesylate of shikimic acid ethyl ester were experimentally tested. Main regularities of the process were determined, and the product was obtained in 16.9% yield.

Keywords: oseltamivir phosphate, ethyl (3R,4R,5S)-4-acetamido-5-amino-3-(1-ethylpropoxy)cyclohex-1-ene-1-carboxylate, shikimic acid, aziridine formation.

WAYS OF COMPLETE AND ECO-FRIENDLY CONVERSION OF RENEWABLE PLANT RAW MATERIAL

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As a consequence of studies by IPCET SB RAS staff scientists, the promising outlook of utilizing Russian species of non-wood raw material as both cellulose sources for further modification and substrates for enzymatic hydrolysis has been shown. A.E. Favorsky IriCh staff scientists have retrieved the first systematized information on regularities of thermocatalytic hydrolysis, alcoholysis, and hydrogenolysis of hydrolytic lignin and found approaches to the conversion of lignin into biofuel precursors.

Keywords: plant raw material, cellulose, chemical modification, enzymatic hydrolysis, hydrolytic lignin, thermocatalytic hydrolysis, alcoholysis, hydrogenolysis, biofuel precursors

EXTRACTION OF ARABINO GALACTAN FROM SIBERIAN LARCH SAWDUST IN A ROTARY-PULSED APPARATUS

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The extraction of arabinogalactan from Siberian larch sawdust in a rotary-pulsed apparatus was studied. The use of a rotary-pulsed apparatus was shown to allow reducing the time for extracting the desired product and obtain arabinogalactan of high quality.

Keywords: arabinogalactan, rotary-pulsed apparatus, extraction

STUDY OF THE CHEMICAL COMPOSITION OF AQUEOUS OAT STRAW (AVENA SATIVA L) EXTRACT AND INVESTIGATION OF GROWTH-REGULATING PROPERTIES THEREOF

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The paper reports the results of determining the chemical composition of the aqueous oat straw extract and study results for the growth-regulating activity of the extract towards the most important agricultural structures.

Keywords: oat straw, aqueous extract, chemical composition, growth-stimulating activity

FERMENTATION OF NONTARGET HYDROLYZATES USING SACCHAROMYCES CEREVISIAE (Y-1693 STRAIN)

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The consequences of fermentation of the synthetic glucose-ammonium medium and nontarget Miscanthus sinensis hydrolyzates using the yeast Saccharomyces cerevisiae (Y-1693 strain) are reported.

Keywords: bioethanol, yeast, fermentation, nutrient medium, hydrolyzate

THE EFFICIENCY STUDY OF A ROTARY-PULSED APPARATUS DURING EXTRACTION OF LIGNIN FROM NON-WOOD VEGETABLE MATTER

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A mathematical model to calculate the kinetics of the extraction process of substances from porous particles is described. Experimental results for the extraction of lignin from Miscanthus-derived lignocellulosic material in a stirrer-equipped, bulk-capacity tank and using a rotary-pulsed apparatus are presented. A comparison of the model and experimental data is made.

Keywords: extraction, rotary-pulsed apparatus, lignocellulosic feedstock, pulp, Miscanthus

STUDY OF THE MISCANTHUS SINENSIS PULP BLEACHING PROCESS

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The paper reports experimental results of bleaching the dilute nitric acid pulp using a pilot setup. The effects of temperature, bleaching time, and oxidant type/concentration upon the main characteristics of the bleached pulp are studied.

Keywords: bleaching, pulp, Miscanthus, hydrogen peroxide

THE USE OF MULTI-ENZYMATIC COMPOSITIONS FOR HYDROLYSIS OF NON-CONVENTIONAL CELLULOSE-CONTAINING FEEDSTOCK

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The results of study on the enzymatic hydrolysis of the Russian Miscanthus using multi-enzymatic compositions are reported.

Keywords: enzymatic hydrolysis, reducing agents, Miscanthus, multi-enzymatic compositions

CELLULOSE AND LIGNIN DERIVED HYDROTROPICALLY FROM MISCANTHUS

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The process of obtaining cellulose and lignin from Miscanthus by the hydrotropic method using the preliminary stage of prehydrolysis has been studied. The main characteristics of the cellulose derived, depending on delignification conditions, are provided. The hydrotropic lignin from Miscanthus is characterized.

Keywords: hydrotropic cooking, Miscanthus, lignocellulose, pulp, bleached pulp, hydrotropic lignin.

ABOUT CAVITATION GRINDING OF SOLID DISPERSE MATERIALS

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In article conditions at which occurs effective cavitation grinding of solid disperse materials are considered. It is shown, that crushing of particles probably only in that case when the relationship of the sizes a cavitation bubble and a particle is in a certain range.

Keywords: cavitation, grinding, disperse materials.

PRETREATMENT OF MISCANTHUS SINENSIS UNDER HYDRO-THERMOBARIC EXPLOSION IN NEUTRAL ENVIRONMENT

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The results of experimental studies on pretreatment of the Russian Miscanthus by the hydro-thermobaric explosion in a neutral environment are presented in the paper. Dependences of the change in the composition of the resultant liquid and solid phases on experimental conditions, i.e. pressure, temperature, duration, modulus, are revealed.

Keywords: hydro-thermobaric explosion, Miscanthus, cellulose, lignin, hydrolysis

ANTI-FUNGI EFFECT OF WATER EXTRACTS OF SOME MEDICAL PLANTS ON ALTERNARIA ALTERNATA, WHICH CAUSE BROWN LEAF SPOTS ON STEVIA REBAUDIANA BERTONI

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It was studied anti-fungal effect of water extracts of three medical plants against growing of mycelium and growth of the spores of Alternaria alternata, isolated from infected leaves of Stevia. In the research were used extracts from Urtica dioica, Thymus vulgaris and Achillea millefolium plants. The experiment was made by the method sowing of spore suspension on nutrition medium with included water extracts with different concentrations of the medical plants (0.5 g/100 ml, 1.0 g/100 ml, 1.5 g/100 ml, 2.0 g /100 ml). The aim of the study was to test inhibition effect of the three medical plants with proven anti fungal effect and to evaluate their potential to inhibit Alternaria alternata grow, which cause leaf spots on Stevia. Results from the study can be used for the following conclusions: The extract of Urtica dioica shows very strong inhibition effect on growing of the mycelium and germination of the spores of the pathogen (98-100 %). The water extract of Thymus vulgaris shows average anti fungal effect (68-75 % inhibition of mycelium grow). Achillea millefolium does not effect on mycelium grow.

Keywords: Alternaria, water extracts, Thymus vulgaris, Achillea millefolium, Urtica dioica, anti fungal effect, mycelium, spores

CONTENT OF FLAVONOIDS IN AIR PARTS OF AGRIMONIA EUPATORIA L., FILIPENDULA VULGARIS MOENCH, ANTHEMIS ARVENSIS L AND TWO SPECIES OF ARTEMISIA ON REGION OF BULGARIA AND THEIR ACTION AS GROWTH REGULATORS OF PLANTS

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It was examined the quantitative content of flavonoids in the plants: Agrimonia eupatoria L., Filipendula vulgaris Moench, Anthemis arvensis L., Artemisia absinthium L., Artemisia caucasica Willd, collected in region town Shumen, Bulgaria. It was established a high content of flavonoids as the highest is that of Filipendula vulgaris Moench – 29.68 mg/ml air-dry weight. It was examined the influence of water-ethanol extract and fractional extract with a dominative content of flavonoids from Agrimonia eupatoria L on initial rate of growth of germs of beet (Beta vulgaris L.). It was established

increasing of on initial rate of growth as in influence of the summary water-ethanol extract, as if fractional flavonoid extract. This is significant for the great influence as plant stimulators.

Keywords: flavonoids, Filipendula vulgaris Moench, Agrimonia eupatoria L., plant stimulators

EFFECT OF NOURISHING WITH AMMONIUM NITRATE ON SEED MICROFLORA AND INFECTION OF SORGHUM SEEDS WITH SPECIES OF GENUS ALTERNARIA

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Researches were obtained in Agricultural institute – Shumen during 2009-2010. The analyzed seeds of 4 lineages sorghum (sweet sorghum), grown at the fields of the institute, were taken from sorghum species grown with and without nourishing with ammonium nitrate - 150 kg/ha, at the phase of 5-6 leaf. The aim of the study was to determine the effect of nourishing with ammonium nitrate of sorghum on seed microflora and the infection of the seeds with species of genus Alternaria. Standard laboratory methods for analyses were used to determine the overall seed microflora and species of genus Alternaria were isolated from 40 seed samples, made in 6 repetitions. The following conclusions can be made upon the results of the analyses: Nourishing of the analyzed sorghum varieties with ammonium nitrate - 150 kg/ha, at the phase of 5-6 leaf takes effect upon seed microflora as: - Changing composition of seed microflora giving the advantage of species of genres Alternaria, Helminthosporium.- The comparison between the sorts of sorghum grown without manure and that one grown with nitrate feeding shows that there is increasing of the fungus microflora in the samples with nitrate feeding. - Increase the infection of the seeds with species of genus Alternaria, with 7 % to 14 % for different variety of sorghum.

Keywords: sorghum, nourish, ammonium nitrate, seed microflora, Alternaria, Fusarium, Helminthosporium

SUSPENSION SYNTHESIS OF CELLULOSE ETHERS

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The paper reports conditions of the suspension synthesis and characteristics of the cellulose ethers, carboxymethylcellulose and methylcellulose derived from non-wood cellulose-containing feedstock (oat bran coatings and Miscanthus sinensis biomass).

Keywords: carboxymethylcellulose, methylcellulose, cereal husks, Miscanthus, suspension method

MATERIALS FROM MINERAL RESOURCES

MEASUREMENT OF THE EMISSION COEFFICIENT OF THE SURFACE OF CONSTRUCTION AND HEAT INSULATION MATERIALS

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Presented are an experimental setup and a technique to measure the integral emission coefficient of the surface of materials having different thermophysical properties in the temperature range between 100 and 1000 °C by the radiation method using oxide-coated copper plate as a standard specimen.

Keywords: heat transfer, emission coefficient, heat insulation and construction materials, radiation method, absolute black body

DRYING TIME ESTIMATION OF HEAT INSULATION BOARDS FROM MINERAL WOOL

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An experimental calculation technique to estimate the drying time of a wetted, mineral wool carpet, depending on the material parameters (initial average moisture content of the layer, specific load) and a drying agent (temperature, moisture, rate), is suggested which allows the drying chamber dimensions to be calculated for any capacity.

Keywords: drying, wetted material, moisture content, heat insulation boards, density, specific load, air rate, reversion, calculation technique.

EFFECTIVE HEAT INSULATION FOR PIPES

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The paper reports the results of studies on developing mineral-wool laggings that provide effective insulation of pipes and industrial equipment. A process flow diagram for their production is suggested. The heat conductivity coefficient of the products was shown to be dependent on the degree of compaction, and to be optimal at a volume weight between 150 and 180 kg/m³ within exploitation temperature range from 25 to 300°C.

Keywords: heat-insulating mineral-wool laggings, water absorption, hydrophobization, silicone emulsion, heat conductivity, strength

DEVELOPMENT OF MAKEUPS FOR HIGHLY FILLED POLYMER COMPOSITES WITH SPECIFIED PROPERTIES

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Presented are the results of experimental-theoretical studies on developing highly filled polymer composites with specified properties by selecting a base makeup and adjusting it in order to provide certain functional characteristics through the replacement (introduction) of components responsible for them.

Keywords: composite, makeup, filling agent, viscosity, curing, compression strength, adhesion, water absorption

STUDY OF THE POSSIBILITY TO PRODUCE CONTINUOUS FIBERS FROM SYNTHETIC BASALTIC GLASSES

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The results of the experimental studies of physicochemical parameters of basaltic glasses synthesized by the reductive melting of batch from dolerite and limestone and differing in total content of iron (II, III) oxides are presented. The continuous fiberization ability of the melt is shown to diminish as the concentration of the iron oxides is decreased, resulting in the loss of fibers strength.

Keywords: rocks, synthetic basalts, reductive melting, de-ironed melts, crystallization and wetting abilities, fiberization temperature range, fiber strength characteristics.

IMPROVEMENT OF THE WATER-RESISTANCE OF HEAT INSULATION MINERAL-WOOL SHELLS BY BULK HYDROPHOBIZATION

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The paper presents the results of studies on the hydrophobization of heat insulation mineral-wool shells by a silicon emulsion. The bulk hydrophobization of fabricated products was shown to reduce their water absorption.

Keywords: heat insulation mineral-wool shells, sorptive humidification, water absorption, hydrophobization, silicon emulsion

BINDERS FOR HEAT-INSULATING FIBROUS BOARDS

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The results of experimental studies are presented, which showed the possibility of using low-toxic, modified phenolformaldehyde resins and dispersions based on polyvinyl acetate and liquid glass as binders in the manufacturing of heat-insulating basalt-fibrous boards.

Keywords: heat insulation fibrous boards, organic and inorganic binders, density, compression strength

CONVERSION OF REFRACTORY ROCKS INTO MINERAL FIBERS

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A possibility of the conversion of refractory rocks, with a high acidity modulus governing elevated viscosity characteristics of the melt, into mineral continuous and staple fibers is shown.

Keywords: rocks, chemical composition, acidity modulus, meltability, viscosity, crystallization, staple and fine continuous fibers, mineral wool

TECHNOLOGY AND PROPERTIES OF FILAMENT-WOUND PRODUCTS FROM POLYMER COMPOSITES

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A novel technology to manufacture hollow composite rods using the longitudinal-circumferential winding method is described. A model for calculating the schemes of packing longitudinal and cross layers, to optimize the mass-strength characteristics of the products, is suggested. Experimental studies have proved the adequacy of the model and determined mechanical properties of the products.

Keywords: filament composite materials; longitudinal-circumferential winding; reinforcement scheme; three-point bending; longitudinal bending

THE DEACTIVATION OF $TiCl_4$ BY PROPYLENE OXIDE IN BENZENE

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The deactivation of $TiCl_4$ by propylene oxide in benzene has been studied. By means of a NMR 1H - spectroscopy the structure of synthesized titan alkoxides is established. The rate of deactivation stage and thermal effects of reaction of $TiCl_4$ with propylene oxide have been defined by the thermometry.

Key words: petropolymeric resins, catalyst deactivation, epoxy compounds

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