

GENERAL AND THEORETICAL CHEMISTRY

INVESTIGATION OF COMPLEX FORMATION BETWEEN COPPER(II) IONS AND POLYDENTATE PYRAZOLE-CONTAINING LIGANDS

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Complex formation of copper(II) ions with ligands containing two pyrazole cycles joined by a linker comprising one, two or three donor oxygen atoms was investigated by spectrophotometric methods. It is established, that complexes of 1:1 composition are formed, the values of stability constant decreases with increase of number of oxygen atoms in the linker between the heterocycles.

Keywords: pyrazole; stability constants; copper; complexes

STUDY OF INTERACTION BETWEEN MONOALKYLUREAS AND GLYOXAL. NITRATION OF THEIR CONDENSATION PRODUCTS

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Results of experimental study on monoalkylureas condensation with glyoxal, and nitration of the products are presented.

Keywords: monoalkylureas; glyoxal; nitration; condensation

SYNTHESIS AND PROPERTIES OF 2,4,6,8,10,12-HEXACIANOETHYL-2,4,6,8,10,12-HEXAAZATETRACYCLO[5.5.0.0^{3,11}.0^{5,9}]DODECANE

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Hexacianoethyl derivative of hexaisovurcitane was prepared for the first time and reaction conditions were investigated.

Keywords: Hexacianoethyl derivative; hexaisovurcitane; synthesis

STUDY OF 2,4,6,8,10,12-HEXABENZYL-2,4,6,8,10,12-HEXAIISOVURCITANE REDUCTIVE HYDROGENOLYSIS

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Composition of 2,4,6,8,10,12-hexabenzyl-2,4,6,8,10,12-hexaisovurcitane reductive hydrogenolysis products was investigated using different bromine sources.

Keywords: reductive hydrogenolysis; bromine; hexaisovurcitane

BI-IONIC AND BI-RADICAL RELATIVISTIC SUBFEMTOSECOND QUANTUM FLUCTUATIONS OF NON-EQUILIBRIUM NANOSYSTEMS

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New treatment of the nature of nanosystems non-equilibrium state is proposed. This approach is based on treating the specific subfemtosecond bi-ionic and bi-radical relativistic quantum fluctuations

of non-equilibrium nanosystems as activation effects of internal quantum relativistic charge and spin electron conjugation degrees of freedom at the Fermi level of nanoparticles.

Keywords: nanosystems; relativistic quantum fluctuations; nanoparticles; bi-ionic and bi-radical fluctuations

COPOLYMERIZATION OF LIQUID PYROLYSIS PRODUCTS AND ACRYLIC MONOMERS

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Modified petro-polymeric resins with polar oxygen-containing groups were obtained by condensation of unsaturated components of various pyrolysis fractions with acrylic monomers under the action of titanium tetrachloride – diethylaluminium chloride in 30-54 % yield. The resins obtained are copolymers of unsaturated fractions' components and acrylic monomers, as it was shown by NMR and IR spectroscopy. Modified resins demonstrate good adhesion and elasticity and may be used in paint and varnish industry.

Keywords: petro-polymeric resins; acrylic monomers; titanium tetrachloride; adhesion

HYDROCARBON ADSORPTION FROM GAS AND LIQUID PHASES ON THE SURFACE OF MODIFIED PETRO-POLYMERIC RESINS

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Adsorption kinetics of model hydrocarbons (benzene, toluene, cyclohexane) from gas and liquid phases on the surface of ozonated and maleinized petro-polymeric resins (PPR) was investigated. Dynamic capacity of PPR was determined from the equilibrium kinetic adsorption curves. Kinetic parameters of adsorption – desorption process were determined using zero-, first- and second-order multiparameter problem solution optimization program. Some trends in changes of these parameters depending on the composition of adsorbent-adsorbate system were found. Selectivity of the prepared adsorbents in concurrent liquid phase hydrocarbon adsorption were investigated by NMR ¹H spectroscopy.

Keywords: adsorption kinetics; adsorption curves; dynamic capacity; hydrocarbon adsorption

CONCENTRATION DEPENDENCE OF TWO-COMPONENT SYSTEM PROPERTIES IN PHASE OR CHEMICAL EQUILIBRIUM

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Description of concentration dependence of boiling and crystallization points and concentration chemical equilibrium constants based on the excess function equation was proposed.

Keywords: boiling; crystallization; excess function equation

PRECURSOR SYNTHESIS OF 1H-1,2,3-TRIAZOLE-SUBSTITUTED TETROSE ANALOGS

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Search of facile routes for D,L-carbohydrate modification is continued in this work. Method of triazolic precursors fragments' construction from simple halogenated acetals is presented.

Keywords: carbohydrates; triazoles; acetals; synthesis

SYNTHESIS AND PROPERTIES OF $[\text{La}(\text{OS}(\text{CH}_3)_2)_9][\text{Cr}(\text{NH}_3)_2(\text{NCS})_4] \cdot 4(\text{OS}(\text{CH}_3)_2)$ COMPLEX

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Main synthesis parameters of lanthane complex of tetrakisothiocyanatodiaminechromate(III) and dimethylsulfoxide were investigated. Crystal structure of this compound was obtained for the first time by X-Ray single crystal diffraction method.

Keywords: lanthane; tetrakisothiocyanatodiaminechromate; dimethylsulfoxide; X-Ray single crystal diffraction

ORGANIC DERIVATIVES OF AMMONIUM TETRAISOTHIOCYANATODIAMINECHROMATE(III). PRELIMINARY DATA ON THE STRUCTURE OF $(\text{NH}_4)[\text{Cr}(\text{NH}_3)_2(\text{NCS})_4] \cdot 7(\epsilon\text{-C}_6\text{H}_{11}\text{NO})$

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Analysis of interaction between ammonium tetrakisothiocyanatodiaminechromate(III) and neutral organic ligands was carried out. Crystallographic data of a new complex $(\text{NH}_4)[\text{Cr}(\text{NH}_3)_2(\text{NCS})_4] \cdot 7(\epsilon\text{-C}_6\text{H}_{11}\text{NO})$ are presented.

Keywords: tetrakisothiocyanatodiaminechromate; ligands; crystallographic data; complexes

STUDY OF $[\text{Co}(\text{OC}_2\text{H}_4\text{NH}_2)_3] \cdot 3\text{H}_2\text{O}$ THERMAL DECOMPOSITION

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Thermolysis processes of $[\text{Co}(\text{OC}_2\text{H}_4\text{NH}_2)_3] \cdot 3\text{H}_2\text{O}$ complex in air and helium atmosphere are investigated at 25-600 °C. Thermal decomposition is accompanied by the loss of ligands with the formation of starting salt and its subsequent decomposition with the formation of metal oxide.

Keywords: thermolysis; decomposition; ligands; oxides

CHAIN-AND-HEAT MODEL OF EXPLOSIVE DECOMPOSITION OF HEAVY METAL AZIDES

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In this paper we formulated and analyzed a chain-thermal model of the explosive decomposition of energetic materials. The model investigated the dependence of the critical parameters of initiation of the radiation pulse duration and chain recombination constant. It is shown that for small pulse duration and with relatively small values of the recombination constants the explosion follows a chain mechanism. In case of stationary impact and large values of the recombination constants the thermal mechanism occurs. It is shown that the proposed model can simultaneously explain the lack of temperature dependence of the critical energy density of the initiation of heavy metal azides by pulsed radiation in case of a linear temperature dependence of the critical energy density of the initiation by long pulses of UV radiation.

Keywords: chain-thermal model; explosive decomposition; energetic materials; heavy metal azides

METHODS OF SILVER AZIDE STABILITY CONTROL

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A method of stability control of the of silver azide crystals, which are explosive substances unstable to the external energy shocks. One of the ways is growing the crystals of silver azide in a weak electric ($10^{-1} \div 10^{-6}$ V/cm) or magnetic (0,01÷0,09 T) fields. In this case we obtain monodisperse crystals of silver azide with classified cut, low impurity content ($\approx 30\%$), stable to external energetic influences during the warranty period of storage (at least 6 months). The second method allows you to manage the explosion of silver azide sensitivity of the weak non-contact electric field ($100 \div 10^6$ V/cm). It is shown that the weak non-contact electric field may be regarded as a tool to manage the process of decomposition of energetic materials.

Keywords: silver azide; explosive substances; monodisperse crystals; sensitivity

PHOTOSTIMULATED CONVERSION IN THALLIUM - CADMIUM AZIDES HETEROGENEOUS SYSTEMS

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Creation of $TlN_3(A)-Cd$ systems leads to the expansion of the spectral sensitivity of thallium azide along with the increase of the photolysis rate and $TlN_3(A)$ self-absorption photocurrent. Treatment of the systems with the light $\lambda = 410$ nm in the range of intensities ($I=8,56 \cdot 10^{13} \dots 1,27 \cdot 10^{15}$ $cm^{-2} \cdot c^{-1}$) leads to an increase in the photolysis rate. The model of $TlN_3(A)-Cd$ systems' photolysis was proposed as a result of current-voltage characteristics, contact photo-EMF, potential difference analysis and the diagram of the energy bands was composed.

Keywords: thallium azide; photolysis; photocurrent; current-voltage characteristics

THERMODYNAMIC PROPERTIES OF BISMUTH PIROSTANNATE

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Compound $Bi_2Sn_2O_7$ was obtained by the solid-phase synthesis method. Its thermodynamic properties (ΔH_{298}^0 , S_{298}^0 , $C_{p,298}^0$, ΔH and ΔS of melting, coefficients in the heat capacity equation, $C_p(T)$ at $T > T_m$) were calculated using semi-empirical methods. In addition, the temperature dependence of heat capacity is determined by differential scanning calorimetry. Comparison of experimental and calculated results was carried out.

Keywords: solid-phase synthesis; thermodynamic properties; semi-empirical methods; differential scanning calorimetry

PHASE COMPOSITION OF IRON-COBALT NANOPOWDERS

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Determination of iron-cobalt nanopowders phase composition was carried out. Phase composition and dispersion structure of the samples was examined by wide-angle X-ray crystallography. The results of phase analysis of the studied samples showed a relatively high stability of the system to oxidation and a complex form of the phase diagram at low temperatures.

Keywords: iron; cobalt; nanopowders; X-ray crystallography

REACTIVITY OF 2-HYDROXYCYCLOHEXANONE TOWARDS KUMILPEROXIDE RADICAL

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The partial rate constant of α -CH bond interaction with 2-hydroxycyclohexanone was determined using the small additives method at 348 K; $k_p^n = 41,7 \pm 0,3$ l/(mol·s).

Keywords: rate constant; 2-hydroxycyclohexanone; small additives method; kumilperoxide

SUBSTRATE EFFECT ON THE EXOTHERMIC REACTION DURING THE PETN INITIATION BY LASER PULSES ACCOUNTING THE THERMOELASTIC STRESSES

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A numerical simulation of pentaerythritol tetranitrate (PETN) initiation by a laser pulse was carried out. The thermoelasticity equation system was solved for a glass plate - PETN system. The melting of PETN, the dependence of the activation energy of the exothermic reaction on the elastic stresses and the influence of the laser pulse duration were taken into account. Calculations showed that the glass plate lowers the threshold of PETN laser pulse initiation. This is due to the fact that the glass plate in the first place prevents the evaporation of PETN, and secondly, when passing through the plate - PETN interface thermoelastic stress wave affects the speed of the exothermic reaction.

Keywords: pentaerythritol tetranitrate; laser pulse; thermoelasticity; activation energy

X-RAY STUDY OF HEAVY METAL TETRATHIOCIANATOMERKURATES(II) OF DIMETHYLSULFOXIDE (DMSO) AND DIMETHYLFORMAMIDE (DMF)

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Heavy metal tetrathiocyanatomercurates(II) of DMSO and DMF were investigated by X-ray diffraction methods. The individuality of the complexes and their isostructure were confirmed by X-Ray phase analysis. X-Ray characteristics and diffraction patterns of the substances are presented. The composition of coordination compounds was determined.

Keywords: tetrathiocyanatomercurates; X-ray diffraction; diffraction patterns; coordination compounds

INVESTIGATION OF HYDROGEN INCLUSION INTO THE MAGNESIUM ALLOY AZ31 USING ELECTROCHEMICAL IMPEDANCE METHOD

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The paper presents the results of alloy AZ31 hydrogen saturation from an alkaline electrolyte study by electrochemical impedance. Use of compact electrode allows a detailed theoretical analysis of the travel time impedance. It was found that the saturation significantly alters the impedance locus in only 30 minutes (at a current density -5mA). The analysis of hodograph changes are in agreement with the polarization studies, which provided the equivalent circuit, which is also good agreement with the experiment.

Keywords: alloys; hydrogen saturation; alkaline electrolyte; electrochemical impedance

O THE SPIN NATURE OF PARTICLE FORMATION AND PRECIPITATION IN AQUEOUS SYSTEMS

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For the first time it was experimentally shown that water hardness salts, as well as asphaltenes from petroleum-like systems (crude oil, residual oil, bitumen, shale tar extracts, peat, etc.), are molecules with unpaired electrons, i.e. have spin nature. ESR spectra (electron spin resonance) of precipitates (water hardness salts) are similar to those of the rocks cores and other inorganic objects of the earth's surface, the number of unpaired electrons being close to Avogadro number. LPCS (laser photon correlation spectroscopy) method showed that precipitation associates, containing unpaired electrons, according to the ESR, are distributed in size, and the method is sensitive enough to monitor the sedimentation dynamics. The methods complement each other and the results are absolutely consistent.

Keywords: water hardness salts; asphaltenes; spin; electron spin resonance

SPIN ASPECTS IN THE NATURE OF CEMENT HARDENING

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For the first time it was experimentally demonstrated that spin-based reactions along with the ionic mechanism reactions occur during the process of cement hardening. All of cement systems (source of raw materials, clinker, cement) have spin properties. The concentration of particles with open spin-orbitals is about 10^{19} - 10^{23} spin/g, and their concentration falls during the cement hardening, which reflects its spin nature. All these experiments lead to a great solution of a number of discussions on cement hardening. Such an approach is consistent with the theoretical foundations of quantum (spin) chemistry.

Keywords: spin-based reactions; cement hardening; clinker; raw materials

EFFECT OF ϵ -CL-20 SOLUBILITY ON THE CE DETONATION CHARACTERISTICS

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The solubility of ϵ -CL-20 in a number of nitro compounds was determined. It was found that partial dissolution of the ϵ -CL-20 in one of the components of the composite explosive (CE) leads to a decrease in its detonation rate.

Keywords: nitro compounds; solubility; composite explosive; detonation rate

THERMOLYSIS OF CERIUM GROUP OCTA(E-CAPROLACTAM) LANTHANIDE(III) HEXA(ISOTHIOCYANATO)CHROMATE(III) DOUBLE COMPLEX SALTS

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Thermal decomposition processes of the complexes $[LnL_8][Cr(NCS)_6]$ ($Ln=La^{3+}$, Ce^{3+} , Pr^{3+} , Nd^{3+} , Sm^{3+} , Eu^{3+}) are studied by thermogravimetric, IR spectroscopic, X-ray diffraction and mass spectrometric analysis.

Keywords: thermal decomposition; complexes; thermogravimetry; X-ray diffraction

APPLIED CHEMISTRY. ANALYSIS

SYNTHESIS AND PHYSICAL-CHEMICAL PROPERTIES OF IRON(III) HYDROXY- AND HYDROCARBONATES

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Iron(III) hydroxy- and hydrocarbonates, in particular nanosized α -FeOOH and $(NH_4)_2[Fe_2(OH)_4(CO_3)_2] \cdot H_2O$, were obtained, which was confirmed by chemical, thermogravimetry, infrared spectroscopy and X-ray analysis.

Keywords: iron; hydrocarbonates; thermogravimetry; infrared spectroscopy

STUDY OF DEPOSITION AND OXIDATION OF IRON(II) COMPOUNDS IN CARBONATE-HYDROCARBONATE SOLUTIONS

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Precipitation in $FeSO_4 - (NH_4)_2CO_3 - H_2O$, $FeSO_4 - NH_4HCO_3 - H_2O$ systems, as well as the oxidation of products by oxygen were investigated by potentiometric titration. The assumptions about the structure of the complex ion formed during the oxidation products of systems in saturated carbonate-bicarbonate solutions are made. Complexes of iron(III), containing carbonate ligands were obtained. The optimum conditions for the complex formation were determined.

Keywords: precipitation; oxidation; potentiometric titration; carbonate ligands

STUDY OF THE USE OF LIQUID PHASE PYROLYSIS PRODUCTS OF BROWN COAL AS AN ALTERNATIVE ORGANIC RAW MATERIALS

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The study of fractional composition and properties of brown coal liquid-phase pyrolysis products, which is an alternative to traditional organic raw materials was carried out. The feasibility of motor fuel production, that is more efficient and environmentally friendly way to use brown coal, rather than burning, was estimated.

Keywords: fractional composition; brown coal; pyrolysis; motor fuel production

EFFECT OF NEW AVC ACTIVATING AGENT ON RUBBER PROPERTIES

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Investigation of the influence of complex AVC activating agent on the properties of rubber compounds for textile cord rubber-coating. It is shown that the introduction of AVC allows a partial replacement of zinc oxide, while ensuring satisfactory rubber properties.

Keywords: activating agent; rubber; textile cord; rubber properties

IMPROVED CYCLONE CONSTRUCTION FOR CLEANING INDUSTRIAL GASES FROM DISPERSED IMPURITIES

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Design of the improved cyclone for cleaning of industrial gases from dispersed impurities is presented. The peculiarity of the developed design is the introduction of the ultrasound vibrations source - a high-performance piezoelectric oscillating system with disk radiator. The experimental results showed high efficiency of the cyclone, which provides up to 99,5% of aerosol particles precipitation.

Keywords: cyclone; industrial gases; ultrasound vibrations; aerosol particles

KINETICS OF REVERSIBLE ALUMINUM REDUCTION IN XYLENE-DURENE ELECTROLYTE

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Studies of the kinetics of electrochemical reduction and dissolution of aluminum from xylene-durene electrolyte were carried out using the measurement of potentiodynamic polarization curves

(PC) and recording the electrode potential changes. The changes of the potential of aluminized platinum electrode in open-circuit shows the reversibility of the aluminum electroreduction process in the investigated electrolyte. The method of determining the current efficiency was developed on the basis of the experimental cyclic volt-ampere curves and optimal conditions for aluminum electroreduction from xylene-durene electrolyte were proposed.

Keywords: electrochemical reduction; kinetics; aluminum; xylene-durene electrolyte

ELECTROCHEMICAL PURIFICATION OF STAINLESS STEEL SCRAP

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The possibility of electrochemical stainless steel scrap purification from radioactive contamination is shown. It was found that for pipes of the cold thread reactor cooling system purification occurs during one electrolysis cycle of the cathodic process in a solution of 40 g/dm³ sodium chloride for 20...30 min at current density 100...130 mA/cm². Samples of tubes are cleaned from 4000 to 20...10 β-particles/cm² min.

Keywords: stainless steel scrap; purification; radioactive contamination; electrolysis

DETECTION OF WEAK REFLEXES IN X-RAY ANALYSIS OF HETEROPHASE SYSTEMS

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The paper shows the possibility of an integrated approach to the mathematical treatment of diffraction patterns of powdered quartz, including the stage of smoothing, baseline accounting, resolution of overlapping signals and quantitative determination of reflex parameters. The method for adjusting the height and half-width of signals after smoothing was developed. Stages of smoothing, baseline accounting and signal parameter determination were carried out using the Assayer program.

Keywords: diffraction patterns; smoothing; resolution of overlapping signals; reflex parameters

ANALYSIS OF RAPID CALCULATION METHODS OF CONDENSED CHNO EXPLOSIVES DETONATION VELOCITY

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The analysis of six rapid methods for calculating the detonation rate after Eisenstadt, Kamletu and Jacobs, Krivchenko, Rotsteynu, Wu Ksiongu and Pepekinu was carried out. Analysis of these methods allowed to identify which of them can be most effectively applied for the calculation of detonation rate of condensed CHNO explosives, and what input parameters are used for each of them. The article details the calculation algorithms and the relative mean-squared deviations for each method.

Keywords: detonation rate; explosives; calculation algorithms

STRIPPING VOLTAMMETRY OF COPPER-CADMIUM BINARY SYSTEM

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Electrochemical behavior of copper and cadmium in sulfuric acid background electrolyte was evaluated by stripping voltammetry. It was shown that the joint electrodeposition of copper and cadmium on the surface of graphite or glassy-carbon electrodes is accompanied by the formation of intermetallic phases of different composition, which leads to the appearance of additional peaks in the anodic current-voltage curves. The influence of substrate type, the sequence of introduction and the relative concentrations of copper and cadmium ions on of additional peak current was investigated.

Keywords: copper; cadmium; electrodeposition; intermetallic phases

CYCLIC VOLTAMMETRY OF ANILINE ON GLASSY-CARBON ELECTRODE

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The possibility of aniline determination using cyclic voltammetry at electrochemically modified glassy-carbon electrodes is evaluated. The effect of the linear potential sweep rate and surface area of electrochemically modified electrodes on aniline determination sensitivity was investigated.

Keywords: cyclic voltammetry; glassy-carbon electrodes; aniline; sensitivity

THERMAL ANALYSIS OF COBALT (II) AND NICKEL (II) COMPLEXES WITH DIMETHYLSULFOXIDE AND REYNEKAT-ION

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Tetraizothiocyanatodiamminchromate(III) complexes of cobalt (II) and nickel (II) with dimethylsulfoxide (DMSO) were investigated by thermal analysis in air. The products of decomposition and oxidation of substances were detected by XPA. Particle sizes of bimetallic oxide powders were measured.

Keywords: Tetraizothiocyanatodiamminchromate; cobalt; nickel; dimethylsulfoxide

DETERMINATION OF CORROSION EFFECTIVE ACTIVATION ENERGY

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Effective activation energies of steel dissolution process, indicating the diffusion controlled process were determined. It was shown that in all investigated solutions low-carbon steel corrosion proceeds via oxygen depolarization and diffusion of dissolved oxygen is the rate-limiting step.

Keywords: activation energies; steel; diffusion; oxygen depolarization

DIELECTRIC PROPERTIES OF PVDF-POLIAMIDBENZIMIDAZOLE COMPOSITE MATERIAL

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A new composite material based on a mixture of polyvinylidene fluoride (PVDF) / polyamidbenzimidazole (PABI) and piezoceramics NTSTS-1 as a filler was obtained. The dielectric properties of 0-3 connectivity type composite materials were studied. A high dielectric constant of a composite material in electric fields at low frequencies was found.

Keywords: composite materials; polyvinylidene fluoride; polyamidbenzimidazole; dielectric properties

MIXING STUDY OF COMPOSITIONS COMPONENTS IN PADDLE MIXERS

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The mixing process of the components in the paddle mixer was investigated. The influence of shaft speed of the mixing device on the power consumption of mixer drive. The technological parameters of mixing were determined. The method for determining the drag coefficients of the agitated media in a mixer with a blade and frame agitators was developed.

Keywords: mixing; paddle mixer; frame agitators; technological parameters

EXPERIMENTAL STUDY OF EMULGATION IN ROTARY PULSATING APPARATUS

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The process of low-concentration emulsion preparation in rotary pulsating apparatus was studied. The fractional composition of the obtained emulsions are presented.

Keywords: emulsion; rotary pulsating apparatus; fractional composition

IMPROVING THE WATER RESISTANCE OF BASALT FIBER INSULATION MATERIALS

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The effect of silicone water repellents on water-resistance of basalt compositions. It was shown that water-repellent aqueous emulsion "Penta-814", with its high efficiency, is still inferior to silicone fluids HSL-10 and HSL-11, which increase water resistance of products at much lower concentrations in the material.

Keywords: silicone water repellents; basalt; silicone fluids; water resistance

PREPARATION OF AgI NANOPARTICLES

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We have investigated the influence of crystallization temperature and the concentration of halide ions on the size of AgI nanoparticles, formed in aqueous gelatin solution during the reaction of AgNO₃ and KI solutions. A comparison of particle size measured by transmission electron microscopy, light scattering and X-ray small-angle scattering was carried out. The influence of particle size on the position of the exciton peak of optical absorption is evaluated. It was shown that increasing the size of nanoparticles leads to a gradual shift of the peak to longer wavelengths, up to the peak characteristic for bulk crystals of AgI, in excess of 150 nm.

Keywords: crystallization; nanoparticles; light scattering; transmission electron microscopy

PROSPECTS OF SAFETY MARGIN IN POWER AND PRODUCTIVITY IN THE TECHNOLOGY OF HYDROXYLAMINE SULPHATE SYNTHESIS IN CAPROLACTAM PRODUCTION AT OAO "AZOT"

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Ways to reduce the economic costs in the preparation of hydroxylamine in the production of caprolactam are proposed. Preliminary conclusions on the improvement of production hydroxylamine, which reflect the cost savings and increased output of finished product in the production of caprolactam are made.

Keywords: economic costs; hydroxylamine; caprolactam; production

PHOTOMETRIC STUDY OF 3-PHENYL-5,5-PENTAMETHYLENE-4-IZOXAZOLONE OXIME COMPLEXES WITH COBALT(II)

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Ability of 3-phenyl-5,5-pentamethylene-4-izoxazolone Kim oxime to form complexes with cobalt (II) chloride in ethanol was studied using the spectrophotometric method. It was experimentally proved that in ethanol the oxime complex with cobalt (II) is formed in the presence of concentrated ammonia solution.

Keywords: izoxazolone; oximes; cobalt; spectrophotometric method

SYNTHESIS AND PROPERTIES OF ϵ -CAPROLACTAM COMPLEX with LANTHANUM(III) TETRAIODOMERKURATE(II)

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Complex of ϵ -caprolactam with lanthanum (III) tetraiodomerkurate(II) was obtained. Infrared spectroscopic and gravimetric studies were carried out, the solubility in water and organic solvents was qualitatively determined.

Keywords: caprolactam; lanthanum; Infrared spectroscopy; gravimetric studies

CAUSES OF CHEMICAL NICKEL PLATING SOLUTIONS "DECOMPOSITION"

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The process of Ni-P coatings growth in "stable" chemical nickel plating solution and a "decomposing" solution containing a sufficient number of metallic phase particles was studied. It was found spheroids elongated in the plane of the substrate are formed in normal conditions on the surface of the coating. Increasing the temperature and decreasing the concentration of nickel ions leads to the normal growth mechanism implementation. In case of a considerable nickel ions' concentration decrease globular dendrites form, poorly linked with the substrate surface, causing a catastrophic increase in the concentration of metal particles in the solution which leads to its "decomposition".

Keywords: coatings; nickel plating solution; decomposition; nickel

DICYCLOPENTADIENE POLYMERIZATION USING THE COMPLEX CATALYST

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Patterns of dicyclopentadiene polymerization under the action of $(C_2H_5)_2AlCl+TiCl_4$ catalytic system in toluene solution we studied. It was found that the reaction is greatly influenced by way of dispensing the monomer in a reactor. It is shown that the effective value of the observed polymerization rate constants, as well as heat release depend on the composition of the catalyst complex. It was found that the microstructure of the polymer chain formed are due to the accession of a new monomer molecule to one of the double bonds. Proportion of microstructures formed by the metathesis reaction depends on the method of monomer dosing into the reactor, and the ratio of the the catalytic system components.

Keywords: dicyclopentadiene; polymerization; toluene; polymerization rate constants

STUDY OF A NEW OXIDATIVE NEUTRALIZATION METHOD OF GRANOSAN PESTICIDE

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Liquid-phase neutralization under the action of electrochemically generated oxidant of mercury-organic Granosan pesticide was investigated. It was found that organic fragments' degradation products are low-toxic compounds. Mercury ions formed during the process of degradation are reduced at the cathode to a 99% degree.

Keywords: Liquid-phase neutralization; Granosan; degradation; electrochemically generated oxidants

PREPARATION AND MIXING OF COMPONENTS TO RECEIVE GRANULAR COMPOSITIONS

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The process of heating and drying of granular materials under constant temperature conditions are investigated. The effect of temperature and coolant flow on the kinetics of drying of the components of composite compositions is considered. The process of mixing the components in the periodic mode is studied. The study identified technological modes of drying and mixing. The method for determining moisture content of granular material, its rate of drying and quality of the mixtures of composite materials is developed.

Keywords: granular materials; kinetics of drying; modes of drying; mixing

ANALYSIS OF CAUSES FOR LATER APPEARANCE OF ETTRINGITE IN CEMENT STONE

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The causes and mechanisms of ettringite formation in cement stone are considered. It is shown that the main cause of late ettringite crystallization is the change in $\text{Ca}(\text{OH})_2$ concentration in pore fluid of the cement.

Keywords: ettringite; cement; pore fluid; crystallization

LABORATORY SYSTEMS BASED ON ELECTROCHEMICAL ANALYSIS METHODS

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The paper examines the experience of Tomsk Polytechnic University in solving the important task of the laboratory supplement for conducting classes on the main sections of natural sciences, their computerization, improving the quality of theoretical material learning and expanding the practical skills for laboratory work of students.

Keywords: electrochemical analysis; complexes; equipment

EXPERIENCE IN USING INFORMATION TECHNOLOGY TO IMPROVE TEACHING OF CHEMICAL-TECHNOLOGICAL DISCIPLINES

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The possibilities of practical use of information technology as a tool to improve chemical education are discussed. Using FrontPage and Flash software electronic manuals for the lecture courses on basic inorganic synthesis are designed.

Keywords: FrontPage; Flash; lecture courses; education

PREPARATION AND INVESTIGATION OF PROPERTIES OF CARBON ULTRAMICROPOROUS MATERIALS FOR GAS SEPARATION

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Carbon molecular sieves (CMS) are used for gas separation (O_2 , N_2 from the air, hydrogen, CO from synthesis gas) and as catalyst carriers. In order to prepare the CMS understanding of the peculiarities of their texture formation is needed. Carbon ultramicroporous materials from anthracite, with varying burn degrees activated by thermal method in air were studied. The structure and elemental composition of CMS were studied using a scanning electron microscope and energy dispersive analyzer. To study the porosity sorption of benzene, water and methanol was used. According to IR spectroscopy, removal of aliphatic and formation of oxygen, mainly OH groups occurs during the oxidation.

Keywords: carbon molecular sieves; gas separation; anthracite; IR spectroscopy

REGULARITIES OF STYRENE POLYMERIZATION AND COPOLYMERIZATION BY TITANIUM TETRACHLORIDE

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Patterns of cationic polymerization and copolymerization of styrene under the influence of $TiCl_4$ in toluene are studied. The rate of styrene polymerization, as well as its copolymerization with indene, obeys the first order kinetic equation, and only with the almost complete exhaustion of monomer reaction order increases. The values of copolymerization constants indicate that the indene is a more active copolymerization monomer, and styrene does not form a homopolymer in the system studied.

Keywords: cationic polymerization; copolymerization; styrene; indene

INVESTIGATION OF PLATINUM-BISMUTH ELECTROOXIDATION ON GRAPHITE ELECTRODES

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The process of binary platinum-bismuth electrolytic sludge electrooxidation is studied. It was shown that the electrolytic sludge contains bismuth and some of intermetallic compounds of platinum - bismuth: Pt_2Bi_3 ; $PtBi$; $PtBi_2$. Current-voltage curves reflect the processes of selective dissolution of bismuth of these phase structures. Current-voltage curves of electrochemical sludge platinum - bismuth are poorly resolved anodic peaks. Therefore, to obtain reliable results and to analyze the current-voltage curves mathematical method for separation of overlapping signals - the method of signal dividing was used.

Keywords: platinum; bismuth; electrooxidation; intermetallic compounds

DICYCLOPENTADIENE FRACTIONS OLIGOMERIZATION, USING TITANIUM MONOALKOXYTRICHLORIDES AS CATALYSTS

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The work is devoted to the research of liquid pyrolysis products with a high content of cyclopentadiene oligomerization using titanium monoalkoxytrichloride catalytic systems. Light petroleum resins obtained have improved performance characteristics. The influence of the alkoxide substituent, on the yield of petroleum resins is studied.

Keywords: pyrolysis; cyclopentadiene; oligomerization; monoalkoxytrichloride catalytic systems

STUDY OF THERMOPHYSICAL PROPERTIES OF INORGANIC PIGMENTS AND POLYMER FILMS WITH THERMOCHROMIC PROPERTIES

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Thermochemical analysis methods and nondestructive testing by means of thermo-chemical reversible and irreversible indicators give qualitative and quantitative assessment of materials and products. In order to determine the thermophysical characteristics of materials stationary and nonstationary methods based on the theory of heat conduction, as well as physical and chemical methods were used. The variety of practical requirements for thermophysical properties of surface materials requires continuous improvement in production and creation of new compositions specifically for industrial facilities.

Keywords: thermochemical analysis; nondestructive testing; nonstationary methods; thermophysical properties

SORPTION-COLORIMETRIC AND TEST DETERMINATION OF MANGANESE(II), COBALT(II), NICKEL(II) AND COPPER(II) IN NATURAL WATERS

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Selectivity of carboxyl macrocellular cation exchanger KB-2E towards manganese (II), cobalt (II), nickel (II), copper (II) ions was studied. In order to improve the selectivity and sensitivity of ions determination in natural water by colorimetric method their concentration on the Na-form of cation exchanger KB-2E-7 and conduction of analytical reactions on the surface of the sorbent solid phase was suggested. The scheme allows to control the analysis of Mn^{2+} , Co^{2+} , Ni^{2+} , Cu^{2+} ions at the MAC level and below.

Keywords: cation exchangers; manganese; sensitivity; selectivity

SURFACE PHENOMENA. BINARY COMPOUNDS

PECULIARITIES OF NANOSIZE MoO₃FILMS INTERACTION WITH AMMONIA

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Under the 5 min action of gaseous ammonia on MoO₃ (d = 8-130 nm) film decrease in absorbance at $\lambda = 350$ nm and $\lambda = 870$ nm was observed and absorption band edge shifts to $\lambda = 320$ nm. Continued interaction of MoO₃ films with ammonia for 5 min leads to an increase, and within 10 minutes to a decrease of optical density in the range of $\lambda = 400 \dots 1100$ nm with a maximum at $\lambda = 870$ nm. The mechanism of MoO₃ films transformation includes the formation of $[(V_a)^{++} e]$ u $[(e (V_a)^{++} e)]$ centers, the dissociation of ammonia, the interaction of centers with nitrogen and hydrogen atoms.

Keywords: ammonia; absorption bands; films; mechanism

PECULIARITIES OF NANOSIZE WO₃FILMS INTERACTION WITH AMMONIA

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The methods of optical spectroscopy and gravimetry revealed that the interaction of nanoscale films of tungsten oxide (VI) (d = 2-180 nm) with gaseous ammonia leads to a decrease in optical density in the range of $\lambda = 300 - 450$ nm with a peak at $\lambda = 350$ nm shifts the edge of absorption band of WO₃ films to $\lambda = 320$ nm. Kinetic laws and the basic causes of the observed effects were determined. The mechanism of WO₃ films transformation includes the formation of $[(V_a)^{++} e]$ centers, the dissociation of ammonia, the interaction of centers with nitrogen atoms.

Keywords: ammonia; absorption bands; films; mechanism

PHOTOSTIMULATED TRANSFORMATIONS IN NANOSCALE PbO - Pb SYSTEMS

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Optical spectroscopy techniques revealed that irradiation with light in the range of $\lambda = 360 - 750$ nm and intensity $I = 1,8 \cdot 10^{15} - 7,0 \cdot 10^{15}$ quants $cm^{-2} \cdot s^{-1}$ for $\tau = 1 - 160$ minutes in atmospheric conditions lead oxide formed during the preparation of nanoscale films of lead (d = 10 - 140 nm) is reduced. The contact potential difference for the films of Pb, PbO and photo-EMF of Pb - PbO systems was measured. The model, comprising the steps of generation and redistribution of nonequilibrium charge carriers in the contact field of Pb - PbO systems, formation of lead oxide photolysis products was proposed.

Keywords: optical spectroscopy; lead oxide; contact potential; photolysis

PHOTOCHEMICAL TRANSFORMATIONS IN NANOSCALE LAYERS OF WO₃

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Irradiation of WO₃ films (d = 7-160 nm) with light ($\lambda = 320$ nm, $I = (1,5 - 7) \cdot 10^{15}$ quants cm⁻² s⁻¹), leads to the formation of absorption band at $\lambda = 850$ nm along with a shift of the absorption band edge to shorter wavelengths. The edge of the own absorption band of WO₃ films ($\lambda = 320$ nm) was determined. The transformation degree of WO₃ films increases with increasing the light intensity and irradiation time (1-140 min.), as well as with decreasing film thickness in atmospheric conditions. The mechanism of photochemical conversion of WO₃ films, including the generation of electron-hole pairs, recombination of nonequilibrium carriers, the formation of [(V_a)⁺⁺ e] centers and the excretion of photolysis products was proposed.

Keywords: optical spectroscopy; lead oxide; contact potential; photolysis

SENSOR STRUCTURES BASED ON OXIDE FILMS WITH AN ORDERED MESODEFECT ARRANGEMENT

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Tantalum oxide films containing extensive mesodeflects (faults) were obtained by electrochemical anodization with subsequent deformation of the bend at a certain radius. The dependences of the average width of cracks and the average concentration of elongation are determined. Changes in the electrical capacitance of the adsorption and desorption of water vapor for the samples with different amount of strain are studied. These film structures with adjustable parameters mesodeflects can be used as a sensitive layer, such as humidity sensors.

Keywords: tantalum oxide; films; mesodeflects; electrochemical anodization

THERMAL TRANSFORMATIONS OF PRE-ACTIVATED NANOSIZE MOLYBDENUM (VI)OXIDE LAYERS

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Regularities of processes in nanoscale MoO₃ layers of various thicknesses (subjected to pre-activation), depending on temperature and time of heat exposure were spectrophotometrically studied. It was found that the thermal transformation rate of MoO₃ layers increases with increasing the temperature and decreasing the thickness of the samples. A model of thermal transformation in the MoO₃ layers, including the formation of the center - anion vacancy with one trapped electron [(V_a)⁺⁺ e], its transformation to the center [(e V_a)⁺⁺ e] on capturing the second electron, thermal ionization of [(e V_a)⁺⁺ e] center, accompanied by a transition of electrons into the conduction band and the interaction with Mo⁶⁺.

Keywords: nanoscale layers; spectrophotometry; thermal transformation; thermal ionization

FORMATION OF ALUMINUM OXIDE ALUMINUM SYSTEMS BY HEAT TREATMENT OF NANOSIZE ALUMINUM LAYERS

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Spectrophotometric, gravimetric, and microscopic techniques revealed that as a result of heat treatment at temperatures 373-600 K for 1 to 140 minutes under atmospheric conditions the thickness, weight and the absorption and reflection of aluminum films ($d = 2-200$ nm) undergo significant changes. It is shown that the kinetic curves of the degree of transformation, changing the thickness and mass of the samples are satisfactorily described within the logarithmic law. It was found that changes in the absorption spectra, the thickness and mass of aluminum films are associated with the formation of aluminum oxide on the surface.

Keywords: heat treatment; aluminum films; spectrophotometry; gravimetry

COMPARATIVE ANALYSIS OF ANODIC ALUMINA

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It was found that anodizing electrolyte based on oxalic acid passes through three stages. The results of analysis of anodic films of aluminum, obtained in sulfuric acid electrolytes are presented. It is shown that the content of water and structural anions in the films are interrelated variables. Electronic images of some anodic films re presented.

Keywords: anodizing electrolyte; oxalic acid; aluminum; sulfuric acid

CORROSION-ELECTROCHEMICAL BEHAVIOR OF Mn_5Si_3 , Mn_5Ge_3 and $Mn_5(Ge_{1-x}Si_x)_3$ IN SULFURIC ACID ELECTROLYTE

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The paper presents the results of studies of corrosion-electrochemical behavior Mn_5Si_3 , Mn_5Ge_3 , as well as compounds $Mn_5(Ge_{1-x}Si_x)_3$ in sulfuric acid electrolyte. It is shown that the anodic stability of manganese germanide in sulfuric acid electrolyte is much lower than that of manganese silicide, which is associated with a lower resistance of Ge in comparison with Si, and better solubility of germanium oxides. Compounds $Mn_5(Ge_{1-x}Si_x)_3$ are characterized by complex electrochemical behavior, their analysis should take into account internal factors such as the composition of the surface layers and the emergence of bonding in the Ge-Si compounds.

Keywords: corrosion; electrochemical behavior; manganese silicide; manganese germanide

EFFECT OF METAL OXIDES AND CHLORIDES ON ENERGY RELEASE PARAMETERS OF AMMONIUM NITRATE ENERGETIC MATERIALS

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The article presents the results of investigations of the influence of oxides and metal chlorides on the parameters of combustion and thermal decomposition of energetic condensed systems based on chlorine-free oxidizer - ammonium nitrate.

Keywords: oxides; metal chlorides; combustion; thermal decomposition

INVESTIGATION OF SURFACE PROPERTIES OF ALKALINE-EARTH METALS AND MAGNESIUM OXIDES AND FLUORIDES

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The surface properties of alkaline-earth metals and magnesium oxides and fluorides are investigated. It is shown that pH determination can be used to monitor the state of the surface of magnesium fluoride, namely the content of oxygen impurities in it.

Keywords: alkaline-earth metals; magnesium oxides; fluorides; surface

EFFECT OF CYCLIC NITRAMINES PARTICLE SURFACE MODIFICATION ON THE COMBUSTION OF METALLIZED ENERGETIC CONDENSED SYSTEMS

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The effect of modifying the surface of particles on the burning rate of metallized ECS. It is shown that modification reduces the rate of combustion of metallized ECS.

Keywords: surface; burning rate; rate of combustion; ECS

DISPERSITY OF SUBMICRON AEROSOL METHOD OF DETERMINATION BY SPECTRAL TRANSPARENCY

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A new method for determining the dispersion of submicron aerosols and experimental measurement complex for its implementation is proposed. An algorithm for solving an inverse ill-posed problem using parameterization was designed.

Keywords: dispersion; aerosols; parameterization; determination

COMPACTING, SINTERING AND ELECTRICAL PROPERTIES OF NANOCRYSTALLINE NICKEL AND COBALT

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The behavior of nanostructured transition metals nickel and cobalt during compaction and sintering was studied. The electrophysical properties of compact nanocrystalline metals were

investigated, the analogy between the cleanness of the surface and electrical properties of these materials was noted.

Keywords: nanostructure; nickel; cobalt; electrophysical properties

INFLUENCE OF CALCINATION TEMPERATURE AND ORDER OF COMPONENT APPLICATION ON THE ACTIVITY OF NiO-V₂O₅-MoO₃/γ-Al₂O₃ HYDROCARBON PROCESSING CATALYST

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Pulse method was used to study the effect of calcination temperature and the order of components application on the activity of 5% NiO-5% V₂O₅-10% MoO₃/γ-Al₂O₃ catalyst in the reactions of toluene and thiophene hydrodesulfurization. The highest levels of activity were achieved when the catalyst calcination temperature was 500 °C, and the order of application of active components was as follows: 1) V; 2) Mo; 3) Ni.

Keywords: pulse method; calcination temperature; toluene; thiophene

SYNTHESIS AND STABILIZATION OF ULTRAFINE SILVER AND COPPER PARTICLES OBTAINED BY CHEMICAL REDUCTION

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This work is devoted to the development of methods of synthesis of ultrafine silver and copper particles by chemical reduction from their salts' solutions. Stabilization of metal particles in the solution provide high-molecular compounds, which are able to effectively prevent the aggregation of particles in solution. These ultra-fine systems were studied by electron microscopy, X-ray and spectrophotometric analysis.

Keywords: synthesis; silver; copper; reduction

STRUCTURE AND STATE OF THE SURFACE OF TIN(IV) NANOOXIDES, OBTAINED BY MICROWAVE HEATING OF HYDRATED TIN(II) OXIDE

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Synthesis of tin(IV) nanooxides with the size of coherent scattering of 9 nm was carried out in the microwave field. Its structure and surface morphology was studied. It is shown that the surface of SnO₂ has Lewis acid properties with a high concentration of coordinationally unsaturated tin(IV).

Keywords: nanooxides; tin; surface morphology; microwave field

STUDY OF HYPOPHOSPHOROUS ACID THERMAL STABILITY

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An order of the disproportionation reaction of 1, the reaction rate constant of $1.96 \cdot 10^{-5} \text{ s}^{-1}$ were determined. The activation energy of H_3PO_2 disproportionation increases from 88 to 138 kJ / mol because of phosphine oxidation.

Keywords: disproportionation; hypophosphorous acid; reaction rate constant; activation energy

PRODUCT COMPOSITION ON THE SURFACE OF RED PHOSPHORUS

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Composition of thermal destruction products on the surface of red phosphorus was determined. Temperature ranges of phosphine release and decomposition of oxidation products - H_3PO_2 and H_3PO_3 are found.

Keywords: thermal destruction; red phosphorus; phosphine; oxidation

NATURAL COMPOUNDS. BIOLOGICALLY ACTIVE SUBSTANCES

STUDY OF KINETIC REGULARITIES OF LIGNOCELLULOSE MATERIAL ACYLATION WITH BENZOIC ACID IN THE PRESENCE OF TRIFLUOROACETIC ACID AND THIONYL CHLORIDE

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The acylation of aspen wood by benzoic acid in the presence of trifluoroacetic acid and thionyl chloride is investigated. The kinetic regularities acylation reaction are studied. Thermodynamic parameters of acylation reaction and activation energy of the process are determined.

Keywords: acylation; benzoic acid; trifluoroacetic acid; thionyl chloride

STUDY OF LIGNOCELLULOSE MATERIAL ACYLATION BY ϵ -AMINOCAPROIC ACID IN THE PRESENCE OF THIONYL CHLORIDE AND TRIFLUOROACETIC ACID

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The interaction of prehydrolyzed aspen wood (lignocellulose material) with ϵ -aminocaproic acid in the presence of thionyl chloride and trifluoroacetic acid was carried out. A study of kinetic regularities of this reaction was performed.

Keywords: acylation; aminocaproic acid; trifluoroacetic acid; thionyl chloride

STUDY OF LARCHWOOD STRUCTURE BY DYNAMIC MECHANICAL ANALYSIS

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The structure of larch wood by dynamic mechanical analysis was studied. The behavior of wood components during heating is discussed.

Keywords: larchwood; dynamic mechanical analysis; wood components

STUDY OF BINDERS FORMATION DURING THE MANUFACTURE OF BOARD MATERIALS FROM MODIFIED LARCHWOOD

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The possibility of binders formation from larch wood modified by explosive autohydrolysis was evaluated by dynamic mechanical analysis method.

Keywords: larchwood; explosive autohydrolysis; dynamic mechanical analysis; board materials

MODIFICATION OF PINE WOOD INDUSTRIAL WASTES BY DICHLORODIMETHYLSILANE

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Modification of pine wood industrial wastes by dichlorodimethylsilane was studied. The influence of pre-treatment and conditions of chemical modification on the mass increase and the content of bound silicon was investigated.

Keywords: pine wood; wastes; dichlorodimethylsilane; chemical modification

IDENTIFICATION AND PHYSICAL AND CHEMICAL PROPERTIES OF LIGNOSULPHONATES IN SOLUTIONS

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Patterns of associative and dissociative as well as acid-base reactions of technical, high and low molecular weight lignosulfonate were identified as a result of complex physico-chemical studies. It was found that the increase of lignosulfonates molecular weights and their concentrations in solutions lead to association processes developing, which intensify with increasing acidity, with subsequent localization of the functional groups in the internal structure of macro-formations, which complicates their dissociation, hydrolysis, and increases the surface activity.

Keywords: lignosulfonate; molecular weights; dissociation; hydrolysis

POLYMERIC AFFINIC TYPE ADSORBENTS IN THE STUDY OF PHYSIOLOGICALLY ACTIVE SUBSTANCES. XXVI. STUDY OF MEDICINES CONTAINING GINKGO BILOBA EXTRACT BY NON-CLASSICAL AFFINITY CHROMATOGRAPHY

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Affinic adsorbent, containing flavonoid extract of Ginkgo biloba (EGb 761) as a modifying ligand was designed for the first time. The following substances were identified in two flavonoid fractions obtained: isoramnetine, kaempherol (first fraction), quercetine (second fraction), which is in agreement with the literature data.

Keywords: Affinic adsorbent; Ginkgo biloba; flavonoids; kaempherol

DESIGN OF PLANT CELLS AND TISSUE CULTURE IMMOBILIZATION TECHNOLOGY ON NANOSTRUCTURED CELLULOSE MEDIA IN VITRO

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New approaches to the intensification of traditional labor-intensive in vitro methods of cells and tissues cultivation are designed.

Keywords: cells; tissues; cultivation; intensification

APPLICATION OF NANOADSORBENTS IN THE PROCESS OF BIOCHEMICAL BUCKTHORN VINEGAR PURIFICATION

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In this work, the technology and modes of use of nanoadsorbents for the preconditioning of sea buckthorn juice, and biochemical vinegar preparation using acetic acid bacteria Acetobacter aceti and purification methods of the vinegar are designed.

Keywords: nanoadsorbents; preconditioning; sea buckthorn; vinegar preparation

HYDROGEL BASED ON L-CYSTEINE AND SILVER NITRATE AS A BASIS FOR THE NEW MEDICAL PRODUCTS PREPARATION

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New low concentration thixotropic hydrogel based on aqueous solutions of cysteine and silver nitrate was obtained. The effect of various electrolytes on the properties and structure of the hydrogel is evaluated. A comparison of antibacterial properties of the hydrogel and its components on a widespread pathogens was carried out. The compatibility of the resulting hydrogel with a number of antibiotics was studied.

Keywords: hydrogel; cysteine; silver nitrate; electrolytes

PROCESSING OF MISCANTHUS CHINESE

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The results of chemical biomass processing of non-wood raw materials - Miscanthus Chinese are presented. The main physico-chemical properties of the fibrous product, and cellulose from Miscanthus Chinese depending on the method of processing are determined. The relative reactivity of chemical processing products in enzymatic hydrolysis was estimated.

Keywords: Miscanthus Chinese; biomass processing; cellulose; hydrolysis

SOME PHYSICO-CHEMICAL CHARACTERISTICS OF HUMIC-LIKE ACID FROM MUMIE

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A comparative analysis of data on elemental composition (by energy dispersive X-ray spectroscopy) and modern basic physico-chemical methods (¹³C NMR, IR spectroscopy) was performed for the first time in this work.

Keywords: elemental composition; energy dispersive X-ray spectroscopy; spectroscopy; humic acids

AFFINIC POLYMERIC ADSORBENTS IN THE STUDY OF PHYSIOLOGICALLY ACTIVE SUBSTANCES. XXVII. TO THE PHENOMENON OF CHROMATOGRAPHIC SEPARATION OF KOPEECHNIK PHYTOPREPARATES ON SEPHADEX LH-20 AND ITS CHEMICAL MODIFIED ANALOGUES

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A comparison of Sephadex LH-20 and its chemically modified analog in chromatography of kopeechnik phytopreparates is performed. It was shown that complete elution of active substances can be achieved only using a saturated solution of borax (pH 9.2, Kuznetsov-Halahin eluent) as eluent. It is noted that biologically active substances of the key fraction (oligomeric tannins) in these conditions drastically alter the results of reactions with a FeCl₃ solution (reddish-yellow color) and do not give a positive gelatin probe. Similar results were recorded in the application epoxyzoadsorbent with p-nitroaniline ligand.

Keywords: Sephadex; chromatography; phytopreparates; borax

UTILIZATION OF WHEAT BRAN IN NATURAL AND MODEL EXPERIMENTS

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The action of various chemical bleaches on wheat bran was studied and the unreasonableness of their use was shown. Wheat bran starch enzymatic hydrolysis, followed by fermentation of the hydrolyzate to ethanol is a more promising method of disposal of wheat bran. Rectification yielded 96% ethanol. Mathematical modeling of the periodic rectification process was carried out optimal process parameters were found.

Keywords: bleaches; wheat; enzymatic hydrolysis; ethanol

RYE FLOUR STARCH ENZYMATIC HYDROLYSIS, PREPARATION OF GRANULATED PRODUCT AND PARAMETRIC ANALYSIS OF GRANULATION PROCESS

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The effect of temperature, enzyme dosage and medium genchem@mail.ru acidity on the enzymatic rye flour starch hydrolysis of is investigated. Hydrolyzate granulation was carried out and pellet product with good porosity and brittleness, which have an optimal composition for diet food were prepared. Optimum conditions were found in course of the parametric optimization.

Keywords: starch; hydrolysis; granulation; diet food

SYNTHESIS OF POLYESTERS BASED ON BETULIN AND SOME DICARBOXYLIC ACIDS

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Oligomers (polyesters) containing betulin fragments were synthesized for the first time. Polycondensation was carried out in solution in the presence of acid catalyst and azeotropic distillation of water. The molecular weights of oligomers are 3200 ... 3800, polycondensation degree is 5 ... 7. The dependences of the molecular weights of oligomers from the reaction time were obtained. The structures of compounds obtained were confirmed by analytical methods and IR spectroscopy.

Keywords: polyesters; betulin; polycondensation; molecular weights

ECOLOGY AND RELATED FIELDS

TECHNOLOGICAL ASPECTS OF MUNICIPAL WASTE TREATMENT

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The article deals with issues related to reducing the negative effects of hazardous waste on the environment. The structure and main characteristics of the municipal waste management system in Barnaul is analyzed. A block of technical measures aimed at development of infrastructure for collection, transport, use, disposal and recycling of waste was developed.

Keywords: hazardous waste; waste management system; collection; disposal

USE OF SORBENT BASED ON BENTONITE CLAYS AND SAWDUST FOR REMOVAL OF METAL COMPOUNDS FROM WATER

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The paper considers the treatment of wastewater containing heavy metal ions, using natural materials - bentonite clay and sawdust, as well as the sorbent, produced on their basis. Static and dynamic parameters of treatment were determined, the regeneration method was studied.

Keywords: wastewater; heavy metal ions; bentonite clay; sorbent

PREPARATION OF SORBENT BASED ON MODIFIED BASALT FIBERS AND STUDY OF ITS PROPERTIES FOR REMOVAL OF IRON AND MANGANESE FROM ARTESIAN WATER

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The problem of iron and manganese removal from artesian water by obtaining new materials is considered. Basalt fibers modified by bentonite clay ("Bentosorb") are proposed. Preparation method of a new sorbent, as well as studies of its sorption / ion exchange capacity towards iron and manganese ions are presented. The problems of used material regeneration are considered. In order to assay the adequacy of laboratory tests, testing on real artesian water were carried out. Based on the results obtained, it is possible to discuss the prospects of development of water treatment and purification technologies using filtration materials from modified basalt fibers.

Keywords: manganese removal; artesian water; bentonite clay; sorbent

DESIGN OF RESOURCE-SAVING TECHNOLOGIES IN PRODUCTION SILICONE FLUIDS

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The work deals with the creation of low-waste resource-saving technologies in the production of silicone fluids. Major sources of liquid wastes were determined. The simulation results of vapor-liquid equilibrium in the binary components of water-toluene-alcohol mixture are presented. Conducted thermodynamic-topological analysis and distillation on true boiling point were carried out, the results of which offers basic technological schemes for separation of the reaction mixtures.

Keywords: resource-saving technologies; silicone fluids; liquid wastes; vapor-liquid equilibrium

STUDIES ON SOLVENTS ISOLATION IN THE PRODUCTION OF VITAMINS BY RECTIFICATION AND PERVAPORATION COMBINATION

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The work deals with isolation of solvents generated in the production of synthetic vitamins, by a combination of rectification and membrane separation methods.

Keywords: solvents; vitamins; rectification; membrane separation methods

DESIGN OF TOLUENE-CONTAINING WASTEWATER TREATMENT TECHNOLOGY USING ACTIVATED CHARCOAL

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The process of water purification from toluene using activated carbon was investigated. The dependences of treatment effectiveness at various rates and layer thicknesses were obtained. The mathematical processing of experimental data allows to determine the technological parameters of toluene extraction from water.

Keywords: water purification; toluene; treatment effectiveness; mathematical processing

STRUCTURE OF SURFACE COATINGS ON ALUMINUM AND TITANIUM BY MULTIFRACTAL ANALYSIS

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Multifractal parameterization of the surface structure of porous on aluminum and titanium foils formed by microarc oxidation in different modes was carried out. A number of multifractal characteristics and parameters: D_q - the spectra of generalized entropy dimensions, and the spectra of singularities $f(\alpha)$; effective homogeneity parameters f_q and structure order Δ were calculated. A correlation of some multifractal parameters with physico-chemical properties was found.

Keywords: multifractal parameterization; anodic-oxide layers; aluminum; titanium

PROPERTIES OF SILVER NANOPARTICLES OBTAINED BY REDUCTION FROM SOLUTIONS AND THERMAL DEPOSITION IN VACUUM

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Silver nanoparticles and nanolayers were obtained by reduction from solution and thermal deposition. Nanoparticles and nanolayers of Ag were studied by photometry and transmission electron microscopy. Optical absorption and transmission are analyzed using the Mie theory and the theory of plasma-resonance fluctuations. Values of N_e - an effective concentration of conduction electrons, γ - damping factor of plasmon oscillations, NV - volume of nanoparticles per unit volume of the system were calculated. Values of λ_{max} obtained - the wavelength of maximum absorption and transmission plasmon resonance bands were obtained from optical absorption and transmission spectra. Transmission electron microscopy was used to study the phase composition and morphology of silver particles.

Keywords: silver; nanoparticles; nanolayers; reduction