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А B S T R A C T S

*O.N. SHCHERBININA, S.S. POPOVA*

**REGULARITIES OF ELECTROCHEMICAL FORMING ALLOYS ON COPPER ELECTRODE AT CATHODE TREATMENT IN WATER SOLUTIONS OF BISMUTH AND LEAD SALTS**

Thin film electrodes Bi – Cu, Bi – Pb, Bi – Pb – Cu, Ca – Cu, Ca – Pb, Bi – Cu – Ca were obtained with the electrochemical cathode intrusion. Diffusive-kinetic characteristics of these electrodes were calculated. Their phase composition was determined by X-ray structural analysis. The penetration depth of metals into substrate metal was established. The stability of forming phases was determined. The influence of preliminary treatment of a working solution (Bi-salt) on kinetics of incorporation process was studied  $\phi$ e constant magnetic field.

**Key words:** copper and lead alloys with calcium and bismuth, incorporation, phase composition, kinetics, diffusion

*M.G. ABBASOV*

**Ln(III) (Y,La,Ce,Nd,Sm,Er) COMPLEXES WITH HYDROGENATED SCHIFF BASES**

The new complexes of Ln(III) with Schiff bases which are derivatives of 2-hydroxynaphtaldehyde and  $\beta$ -ethanol-amine, bromosalicylaldehyde and  $\beta$ -alanine and their analogues reduced on azomethine group - N-(2-hydroxy-naphtylmethyl)- $\beta$ -hydroxyethylamine (HL<sup>2</sup>) and N-(2-hydroxy-5-bromobenzyl)-  $\beta$ -alanine (HL<sup>4</sup>) were synthesized. The obtained complexes were investigated by means of elemental analysis, IR-and electronic spectrometry, thermogravimetry and magnitochemistry. The data comparison of the physico-chemical analyses showed the following composition of received coordination compounds: Ln(L<sup>1</sup>)<sub>2</sub>(X)<sub>1,2</sub>(H<sub>2</sub>O)<sub>n</sub> (where X-CH<sub>3</sub>COO<sup>-</sup>, (NO<sub>3</sub>)<sup>-</sup>, (SO<sub>4</sub>)<sup>2-</sup>, n-2,3).

**Key words:** hydroxybenzylamines, azomethine group, hydrogenated ligands, lanthanide complexes

*S.D. PADALKA, F.A. KOLOKOLOV, D.V. KOLECHKO, V.T. PANYUSHKIN*

**LUMINESCENCE OF COORDINATION COMPOUNDS OF EUROPIUM (III) AND TERBIUM (III) WITH 2,4-DIMETHOXYBENZOIC ACID**

Spectral-luminescent properties of complex compounds of Europium (III) and Terbium (III) with 2,4-dimethoxybenzoic acid were investigated. The compound [TbL<sub>3</sub>(H<sub>2</sub>O)<sub>2</sub>] $\cdot$ 6H<sub>2</sub>O was established to have the most intensive luminescence.

**Key words:** lanthanides, luminescence, coordination compounds, 2,4-dimethoxybenzoic acid, luminescent materials

*G.V. LEONTIEVA, M.YU. SILUYANOVA, V.V. VOL`KHIN*

**STRUVITE SOLUBILITY AND SOLID PHASE COMPOSITION OF PRODUCTS OF ITS INTERACTION WITH COPPER IONS AT DIFFERENT pH**

The struvite solubility as a pH function was determined from the analysis of thermodynamic equilibria taking into account the different ion forms in aqueous solutions. The minimum struvite solubility was near the pH of 10. A precepitation of new crystal phases was considered as a result in the struvite solubility increase at the pH decrease. The reactions between struvite and the copper ions are accompanied with the magnesium-copper ion exchange on the base of dittmarite phase and the bobierite precipitation at low the copper/phosphate ratios and the libethenite precipitation at high ratios.

**Key words:** struvite, solubility, ditmarite, bobierite, libethenite, magnesium ions, copper ions, ion exchange, phase transitions

*A.A. BOGOMAZOVA, S.S. ZLOTSKIY*

**CONDENSATION OF CATECHOLS WITH SUBSTITUTED GEM.-DICHLOROCYCLOPROPANES**

The alkylation of catechols with the substituted gem.-dichlorocyclopropanes was studied. The spiro[1,3-benzodioxolan-2,1'-cyclopropanes] were established to form as a result of condensation. Compounds

containing two substituents at C<sup>2</sup>-atom of the cyclopropane ring - 2-phenyl-2-methyl- and 2-vinyl-2-methyl-gem.-dichlorocyclopropanes do not react with catechols under these conditions.

**Key words:** alkylation, catechols, gem-dichlorocyclopropanes

*I.A. VIKHROV, A.V. SMIRNOV, M.V. DOROGOV*

#### **SYNTHESIS OF NEW SULPHAMIDE DERIVATIVES OF IMIDAZO[2,1-B]THIAZOLES AND IMIDAZO[2,1-B][1,3,4]THIADIAZOLES SERIES**

The interaction of some alkyl-imidazothia (dia) zoles with chlorosulphonic acid was investigated. On the base of received sulphochlorides a series of new sulphamide derivatives of imidazothia(dia)zoles was synthesized.

**Key words:** imidazo[2,1-b]thiazole, imidazo[2,1-b][1,3,4]thiadiazole, chlorosulphonic acid, sulphamide

*A.N. KAZAKOVA, S.S. ZLOTSKIY*

#### **REACTION OF PHENOLS WITH SUBSTITUTED GEM.-DICHLOROCYCLOPROPANES**

The 1,1-dichloro-2-chloromethylcyclopropane reacts with phenols under the conditions of inter-phase catalysis forming the 2-(aryloxymethyl)-gem.-dichlorocyclopropanes and 1,1-bis(aryloxy)-2-methylene-cyclopropanes. The last compounds are prevails at the use of dimethyl sulfoxide as a solvent. The microwave radiation allows to reduce a reaction time from 5 to 1 hour and to change the regioselectivity of process. As a result of the interaction of phenols with 1,1,2-trichloro-2-(chloromethyl) cyclopropanes in dimethyl sulfoxide the 1,1-bis(aryloxy)-2-chloromethylencyclopropanes were obtained in form a mixture of cis- and trans-isomers.

**Key words:** *o*-alkylation, gem.-dichlorocyclopropanes, microwave radiation

*T.A. BOBOVA, A.A. SHETNEV, M.S. CHERKALIN, A.V. KOLOBOV, V.V. PLAKHTINSKIY*

#### **ALKYLATION OF 4-R-SUBSTITUTED-2H-PHTHALAZINE-1-ONES**

By the interaction of 4-R-substituted-2H-phthalazine-1-ones with alkylating agents of different activity the seires of new derivatives of NH ftalazinona was synthesized.

**Key words:** phthalazine derivatives, N-alkylation

*A.A. SHETNEV, E.S. KULESHOVA, A.V. KOLOBOV, T.A. BOBOVA,*

*K.L. OVCHINNIKOV, V.V. PLAKHTINSKIY*

#### **FRIEDEL-KRAFTS ALCYLATION OF BENZENE AND ITS DERIVATIVES BY 4-CYCLO-HEXENE-1,2-DICARBOXYLIC ACIDS**

The influence of reagents structure on the reaction stereoselectivity of benzene alkylation by 4-cyclohexene-1,2-dicarboxylic was studied.

**Key words:** alkylation, 4-cyclohexene-1,2-dicarboxylic acids, stereoselectivity

*I.V. BURLOVA, N.B. MELNIKOVA, I.N. KLABUKOVA, A.N. KISLITSIN*

#### **CONTROLLED SYNTHESIS OF BETULONIC ALDEHYDE WITH OXIDATION OF BETULIN ON SILICA GEL**

The betulin oxidation by the K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> – H<sub>2</sub>SO<sub>4</sub> in aqueous- acetone medium on solid substrate: silica gel, zeolites and alumina at -10 – 25 °C was studied. The oxidation in the SiO<sub>2</sub> presence proceeds with the 100 % selectivity to betulonic aldehyde at 10 – 25 °C.

**Key words:** oxidation, betulin, betulonic aldehyde, silica, potassium dichromate

*E.G. KHOMUTOVA, O.I. OSTANINA, V.A. ZAGORODNIKOVA, S.A. ZAGORODNIKOVA*

#### **DETERMINATION OF RHODIUM MICROCONCENTRATION WITH CATALYTIC METHOD IN FLOW-INJECTION SYSTEM**

The method based on catalytic action of rhodium on an oxydation reaction of sulfarsazen by periodate in flow-injection system was proposed. The range of rhodium concentration is from 0.5×10<sup>-2</sup> µg/ml up to 10×10<sup>-2</sup> µg/ml. The validity of the developed method is confirmed by determination of rhodium in model solutions by «introduce-found» method and in State Standard Samples.

**Key words:** rhodium, catalytic method, flow-injection system

*Yu.G. KHABAROV, N.D. KAMAKINA, D.E. LAKHMANOV*

#### **EFFECT OF REACTION CONDITIONS OF NITROSING ON PHENOL DETERMINATION**

The photometric method was developed for phenol determining in aqueous media. The method based on the reaction of phenol with nitrous acid as result of which the product is formed having the absorption band with maximum at 400 nm in the alkaline medium. The optimal conditions for the analysis carrying out were determined. The method allows to determine the phenol concentration in the range of 0.3...8.0 mg/l. The analysis duration is 15 min.

**Key words:** phenol, photometry, nitrosing

*K.F. HALITOV, A.V. TANEVA, A.A. KARTASHOVA, V.F. NOVIKOV*

#### **ESTIMATION OF ARSENIC-ORGANIC SORBENTS SELECTIVITY ON BASE OF CHROMATOGRAPHIC FACTORS OF POLARITY**

The research of selective properties a number of arsenic-organic sorbents having electron **donor** and acceptor centers in a molecule structure was carried out. The selective properties of the investigated compounds were estimated on the base of chromatographic factors of polarity and triangular system of coordinates. The separation selectivity of polar sorbats on arsenic-organic sorbents was shown to determine pre-eminently by the presence of polar functional groups and it depends on a structure of the substitutes at arsenic atoms in a side chain of molecule.

**Key words:** selective properties, arsenic-organic sorbents, chromatographic factor of polarity

*O.V. IL'INA, A.V. TANEVA, A.A. KARTASHOVA, V.F. NOVIKOV*

#### **GAS CHROMATOGRAPHIC PROPERTIES OF 10-ALKYL (ARYL) PHENOXYARSINES**

In this work the sorption properties of 10-alkyl (aryl) phenoxyarsines were investigated at their intermolecular interaction with sorbents of various polarities by the methods of gas chromatography. The change in chain length of alkyl substitutes at arsenic atom were shown to not practically influence on sorption properties of 10-alkyl (aryl) phenoxyarsines. Thus, the replacement of alkyl substitutes on phenyl or methyl ones results in the increase in retention indexes of standard sorbats.

**Key words:** gas chromatography, sorption property, logarithmic retention index, intermolecular interaction

*K.S. LAZAREV, A.S. GORBACHEV, S.V. KOVALEV, A.V. ERLIKH, M.A. RYABINSKIY*

#### **ELECTROSMOTIC PERMEABILITY OF REVERSE OSMOTIC MEMBRANES IN WATER SULFATE-CONTAINING SOLUTIONS**

In the work the design of experimental set-up and a separating cell is given, and kinetic characteristics of electro baro membrane separation were investigated. The method of carrying out the experimental studies was developed on a determination of electro osmotic permeability.

**Key words:** electro osmotic permeability, solution, reverse osmotic membrane

*G.I. EGOROV, D.M. MAKAROV*

#### **INFLUENCE OF PRESSURE ON EXCESS THERMODYNAMIC CHARACTERISTICS OF ETHYLENE GLYCOL + DIMETHYLSULFOXIDE MIXTURE IN TEMPERATURE RANGE OF 298.15-323.15 K**

Excess molar volumes  $V_m^E$ , changes in the thermodynamic characteristics such as excess molar Gibbs energy  $\Delta_{p_o \rightarrow p} G_m^E$ , excess molar entropy  $\Delta_{p_o \rightarrow p} S_m^E$  and excess molar enthalpy  $\Delta_{p_o \rightarrow p} H_m^E$  of ethylene glycol - dimethylsulfoxide mixture were calculated in the temperature range of 298.15-323.15 K and pressure range of 0.1-100 MPa. The values of  $V_m^E$  were discovered to be the negative ones at all mixture compositions and at all ranges of pressure and temperature. Concentration dependences of  $\Delta_{p_o \rightarrow p} G_m^E$ ,  $\Delta_{p_o \rightarrow p} S_m^E$  and  $\Delta_{p_o \rightarrow p} H_m^E$  are characterized with the presence of extremes. The change in the excess molar Gibbs energy is determined by the entropy contribution. The exothermic minimum is observed on the concentration dependence of  $\Delta_{p_o \rightarrow p} H_m^E$  in the range of small amounts of dimethylsulfoxide. The entropy change in this extremum shows the system or-

dering. The pressure rise was found to result in the decrease of mixing exothermicity of dimethylsulfoxide and ethylene glycol.

**Key words:** nonelectrolytes mixture, ethylene glycol, dimethylsulfoxide, high pressure, excess molar volume, excess thermodynamic characteristics

**L.B. KOCHETOVA, N.V. KALININA, L.V. KURITSIN, T.P. KUSTOVA, N.R. ISHKULOVA**  
**INFLUENCE OF MEDIUM AND STRUCTURE OF BENZOIC ACID PHENYL ESTERS**  
**ON AMMONIA ACYLATION RATE**

Kinetics of ammonia reactions with seven nitro-substituted benzoic acid phenyl esters was investigated in water mixtures with 2-propanol and 1,4-dioxane. Quantum chemical modeling of ammonia solvate complexes with components of the solvents was carried out. The reactions potential energy surfaces were calculated. The reactions were established to occur on the  $S_N2$ -mechanism in a gaseous phase and in a solvent. In aqueous dioxane the ammonia hydrates were shown to be the main reactive particles whereas in aqueous 2-propanol the solvate complexes with alcohol played an active role in acylation together with hydrates.

**Key words:** acylation kinetics, ammonia, complex esters, water-1,4-dioxane, quantum chemical calculations, reaction mechanisms

**S.A. SILKIN, V.I. PETRENKO, A.I. DIKUSAR**  
**SURFACE WEAKENING CHROMIUM ELECTROLYTIC COATINGS AFTER**  
**ITS ANODIC DISSOLUTION IN CHLORIDE AND NITRATE SOLUTIONS**

The anodic dissolution of chromium electrolytic coatings in electrolytes for electrochemical machining (ECM) (chlorides and nitrates) is accompanied by the surface weakening. The weakening level as well as the number of cracks and roughness of surfaces are determined by thickness of dissolved layer and heat surface evolving.

**Key words:** chromium plating, anodic dissolution, electrochemical machining, hardening coatings, microhardness, thermokinetic phenomena, rotating disk electrode

**V.E. SEMENOV, A.V. BALMASOV**  
**SILVER AND STERLING SILVER PASSIVATION WITH SULFUR-CONTAINING INHIBITOR**

The electrochemical behaviour of silver and sterling silver was investigated in solutions containing organic compound with two sulfide groups. At treatment of silver and sterling silver in the studied medium passivating layers providing protection against a darkening were established to formed on its surface.

**Key words:** silver, passivation, corrosion, darkening

**M.E. SOLOVIEV, A.B. RAUKHVARGER, D.V. LYUBIMOV**  
**QUANTUM-CHEMICAL ESTIMATION OF ELASTIC PROPERTIES OF NAPHTHALENE**  
**MOLECULE AT STRETCHING**

The quantum-chemical method DFT B3LYP/6-31G\* was used for calculation of deformational curves of naphthalene molecule at stretching up to destruction for two directions corresponding to two types of structure of nanotubes: "armchair" and "zig-zag". The equilibrium distribution of states on vibrational energy levels was calculated for different temperatures.

**Key words:** nanotubes, naphthalene, deformation, quantum-chemical calculation, vibrations, destruction

**I.G. ZHIKHAREVA, V.V. SHMIDT, N.I. DUBENSKIY, D.A. ZHURAVSKIY**  
**STRUCTURE OF ELECTROLYTIC MAGNETIC ALLOYS OF COBALT-NICKEL-MANGANESE**

The structural factors influencing greatly on the coercive force ( $H_c$ ) of electrochemical alloy of Co-Ni-Mn were studied with the scanning probe atomic force microscopy, scanning electron microscopy, X-ray microanalyzer and X-ray analysis. The coatings with a predominance of  $\alpha$ -Co phase were shown to possess the maximum coercive power. The high concentration of amorphous phase of  $\text{Co}(\text{OH})_2$  leads to the decrease in  $H_c$  by a factor of 2.5. The presence of free phase of manganese increases the ferromagnetic properties of the coating due to the formation of structures with low-defect crystal lattice of  $\alpha$ -Mn.

**Key words:** structure, atomic force microscopy, coatings, phase composition, nanostructure, magnetic properties, alloys

*P.B. RAZGOVOROV, S.V. SITANOV*  
**TREATMENT CONDITIONS OF SODIUM SILICATE SOLUTIONS WITH CARBAMIDE  
MODIFYING AGENT**

The influence of the treatment duration and modifier concentration on the thermomechanical and strength properties of the interaction product of soluble sodium silicate and carbamide at 70°C was investigated. Molecular weight of agglomerates in such systems was determined. The behavior of films which were obtained by means of putting on substrate of reacting mass followed by its curing was studied.

**Key words:** sodium silicate, carbamide, modified product, molecular weight, thermomechanical curves

*E.F. VOZNESENSKIY*  
**GEOMETRICAL MODELLING KERATIN FIBER STRUCTURE**

For the purpose of generalisation of data on the keratin supermolecular structure the construction of geometrical model with a scale observance between structures of different levels was offered. At modeling the features of fibrous structure in para- and ortho-cortex were taken into consideration. The model can be the base at modelling structural changes of wool and various physical and chemical processes at a manufacture and modification of natural wool fibers.

**Key words:** geometrical modeling, structure, keratin, fibril, wool

*Kh.I. TESHAEV, D.T. BOBOKALONOV, A.S. DZHONMURODOV, Z.K. MUKHIDINOV,  
G.F. KASYMOVA, L.S. LIU*  
**PECTIN/ZEIN GELS FOR ENCAPSULATION OF DRUGS AND FOOD INGREDIENTS**

Complexes with encapsulated drugs were obtained on the base of low-methylated pectins and corn zein. The nature of bio polymers, their ratio and two-valency metals presence have shown to influence on the process of complex formation and on the degree of their saturation. Pectins of high molecular mass are able to form the stable hydrogel complexes with the effective capture of low-molecular ingredients. The results of kinetic studies demonstrate the ability of such system to protect encapsulated substances from premature releasing in a stomach physiological medium.

**Key words:** pectin, zein, hydrogel, pectin-zein complexes, encapsulation

*O.V. GORNUKHINA, N.E. KULYASHOVA, I.A. VERSHININA*  
**POLYPROPYLENE MATERIALS CHEMICALLY MODIFIED WITH ANTIMICROBIC  
SUBSTANCES**

In order to provide the antimicrobial activity to polypropylene materials the silver ions were immobilized on material surface preliminary activated with a chemical method. Materials obtained possess with wide spectrum of antimicrobial action.

**Key words:** polypropylene, chemical modification, antimicrobial substances

*A.V. KOMIN, E.Yu. DUROSOVA, O.K. SHVETSOV, A.I. MARININ*  
**SYNTHESIS AND SOME PROPERTIES OF COPOLYMERS ON BASE OF METHACRYLIC  
ACID AND 1,3-PENTADIENE**

The influence of monomeric mixture composition on kinetics, stability and some properties of latexes of copolymers of methacrylic acid and 1,3-pentadiene, and, also, water-alkaline solutions of obtained copolymers was studied. It was shown, that technological conditions of synthesis allow to receive latexes of copolymers with sufficiently high conversion of monomers as a polymeric base of water-soluble anionactive polyelectrolytes.

**Key words:** anionactive polyelectrolytes, non-emulsion polymerization, latexes, methacrylic acid copolymers

*V.V. EREMKIN, I.V. GUSENKO, A.V. NAGAENKO, A.E. PANICH, V.G. SMOTRAKOV,  
S.I. SHEVTSOVA, L.A. SHILKINA*  
**INFLUENCE OF MECHANICAL ACTIVATION ON PRODUCTION TECHNOLOGY OF LEAD  
ZIRCONATE-TITANATE PIEZOELECTRIC CERAMICS**

The influence of mechanical activation of initial oxide mixtures on the synthesis conditions and on degree of powder dispersivity, on sintering parameters and on micro structure of piezoelectric ceramics

$\text{Pb}_{0.975}\text{Ca}_{0.01}\text{Ba}_{0.01}\text{Sr}_{0.005}(\text{Ti}_{0.48}\text{Zr}_{0.52})\text{O}_3$  was studied. The dependence of piezoelectric constant  $d_{31}$  on the temperature of sintering was obtained.

**Key words:** piezoelectricity, ceramics, solid-state synthesis, high-energy milling, microstructure

*Yu.A. DMITRIEV, A.B. SHIPOVSKAYA, L.Yu. KOSSOVICH*

#### **EFFECT OF SPINNING SOLUTION CHARACTERISTICS AND PARAMETERS OF ELECTROFORMING ON FORMATION RATE AND DIAMETER OF CHITOSAN FIBERS**

Conditions for electroforming the fiber from multicomponent chitosan solutions were determined. The relationship between physico-chemical characteristics (viscosity, specific volume conductivity) of spinning solution, technological parameters (solution volume-flow rate, voltage on capillary nozzle) of electrospinning process, rate of fiber forming and diameter of produced fibers were found.

**Key words:** electroforming, multicomponent chitosan solution, electrospun fiber

*V.V. VLASOV, M.E. SOLOVIYEV*

#### **INCREASE OF STRENGTH AND FRICTION PROPERTIES OF HIGH DENSITY RUBBER**

In given article the version of the increase of physical-mechanical and friction parameters of rubbers filled with metal oxides is considered. Due to the metal oxides such rubbers possess with high density.

**Key words:** rubber, elastomeric compound, filler, friction, yellow lead

*V.P. ZHUKOV, A.E. BAROCHKIN, A.N. BELYAKOV*

#### **STUDY OF HEAT TRANSFER IN MULTI FLOWS HEAT EXCHANGERS**

The mathematical model of heat transfer in multi flows heat exchangers is presented with the system of differential equations, the number of equations in which is equal to the number of heat carriers. The analytical solutions of presented system were obtained for three heat carriers and for four possible variants of combinations of movement directions. The comparison of analytical and numerical solutions was shown.

**Key words:** multiflows heat exchangers, differential equations system, analytical and numerical solutions, matrix formalization

*A.V. SUKHAREV, A.N. LABUTIN, B.A. GOLOVUSHKIN, E.V. EROFEEVA*

#### **QUESTIONS OF CONTROL BY CHEMICAL REACTOR**

The method of synthesis of optimum on speed control system by object of chemical technology was considered. Specific features of object of control were described. The study steps of object investigation were presented. The block scheme and the work algorithm description of a control system was offered.

**Key words:** control system, optimality, speed

*A.A. DIDENKO, A.YU. TROYANKIN, A.M. KATALEVICH, N.V. MENSHUTINA*

#### **COMPARISON OF TWO METHODS OF SUBLIMATION DRYING**

A comparison of two methods of sublimation drying on the specific power consumption was presented. Experiments on modeling material drying are described. The scheme for the recovery of cold air using of which it can reduce the cost of electricity.

**Key words:** atmospheric sublimation drying, refrigerator, recovery, vacuum sublimation drying

*S.P. BOBKOV, A.P. VLASOV, S.M. CHAUSOVA*

#### **STUDY OF AUTOMATED INFORMATION SYSTEMS USING IN CHEMICAL INDUSTRY**

The analysis of foreign and Russian standard designed solutions was carried out. Proposals on the use of multiple-theoretical approach to the analysis of similar systems were given.

**Key words:** chemical-technological system, of automated information system, ERP- system, energy saving, systems general theory

*I.A. SEMENOV, D.N. SVIRIDOV, B.A. ULIYANOV*

#### **CALCULATION OF OPTIMAL PARAMETERS OF ULTRASONIC DISPERSER**

The criterion of erosion activity based on the mathematical model of growth and collapse of cavitation bubble was calculated at various frequencies and amplitudes. The results obtained allow to determine an optimal ultrasonic intensity in water media.

**Key words:** grinding, dispersion, cavitation, ultrasound



*N.V. BRYSENKOVA, Yu.N. SHALIMOV, V.I. PARFENUYK*

#### **HYDROGEN STORAGE ON BASE OF HYDRIDES OF NICKEL AND ALUMINIUM**

Methods of the increase of specific capacity for hydrogen storages on the base of hydrides of nickel and aluminum were considered. Technologies of porous structure obtaining are given. The set-up scheme for uninterrupted power of radioelectronic devices on the base of fuel cells using considered hydrogen storages was presented.

**Key words:** hydrogen storages, hydrides nickel, aluminum

*B.R. KISELEV, V.P. ZARUBIN, N.V. FILATOVA, N.I. ZAMYATINA*

#### **INFLUENCE OF ARTIFICIAL SERPENTINE POWDERS ON OPERATING CAPACITY OF LUBRICATING COMPOSITION FOR STEEL PAIR OF FRICTION**

Serpentine-like materials were developed and obtained and their properties for applying in tribological system have been examined. Empirical models of the influence of artificial serpentine in lubricating material on the coefficient of sliding friction and steel pair wear resistance were obtained. On the base of that parameters the optimal lubricating composition of lubricate was produced to increase the availability of the tribosystem examined.

**Key words:** friction, lubrication, additive, modifying agent, wear intensity, steel, availability

#### *V.Yu. BRICHKOVA, A.S. BRICHKOV, L.A. EGOROVA, A.V. ZABOLOTSKAYA, V.K. IVANOV* **INVESTIGATION OF FORMATION PROCESSES OF SILICON AND D-METALS OXIDES DOUBLE SYSTEMS**

The maturation processes of film-forming solutions and formation processes of thin-film and dispersed systems of  $\text{SiO}_2\text{-M}_x\text{O}_y$  (where M – Mn, Fe, Co, Ni) obtained by the sol-gel technology were investigated. The influence of metal salt on the hydrolysis degree of tetraethoxysilane and on the viscosity of film-forming solution was studied. The dependence of the optical characteristics of thin films on their composition was found.

**Key words:** sol-gel, NMR  $^{29}\text{Si}$ , films, thermal analysis, porosity, refractive index

*E.A. SMIRNOVA, A.V. SHALINA, A.S. PETROV*

#### **DEVELOPMENT OF COMPOSITION OF DISPERSE SILICA SYSTEMS**

The influence of composition on stability of disperse silica systems on the base of magnesium and aluminum was investigated. The conditions of dispersion process carrying out and optimum composition were determined.

**Key words:** aggregate stability, dispersion composition, magnesium and aluminum silicates

*Yu.B. RUMYANTSEVA, E.A. KURGANOVA, A.A. IVANOVA, G.N. KOSHEL, A.A. ERSHOVA, Yu.M. STRUNOVA*

#### **LIQUID PHASE OXIDATION OF *p*-CYMENE TO HYDROPEROXIDES**

The reaction of liquid-phase oxidation of *p*-cymene to hydroperoxides in the presence of initiator – hydroperoxide of isopropylbenzene and nitrogen-containing catalysts. The selectivity of *p*-cymene hydroperoxide formation was established to be 92-95 % at hydrocarbon conversion of 12-35 % at the *N*-Hydroxyphthalimide application in the temperature range of 80-120 °C.

**Key words:** liquid phase oxidation, *p*-Cymene hydroperoxide, isopropylbenzene hydroperoxide, *N*-hydroxyphthalimid, 4-isopropylbenzoic acid, selectivity, conversion

*N.Ch. MOVSUM-ZADE*

#### **MAIN THERMODYNAMIC PARAMETERS OF INDUSTRIAL METHODS OF ACRYLONITRILE SYNTHESIS**

Main industrial methods of acrylonitrile synthesis were presented. Methods of obtaining the nitriles derivatives are given in literature. In given study calculations of thermodynamic parameters of synthesis reactions of acrylonitrile with quantum-chemical methods are presented.

**Key words:** nitrile derivatives, acrylonitrile obtaining, reaction thermodynamic parameters, quantum chemical calculations

*P.V. DMITRIEV, S.V. DANILOV, S.V. MIKHEEV, M.V. KONTSERENKO, V.A. EFIMOV*  
**ON MEASUREMENT OF TEMPERATURE OF FAST RUNNING PROCESSES**

The method of temperature measurement taking into account of thermal sensor sluggishness of fast running processes was developed. Parameters of thermo sensor were determined. The comparison of calculated and experimental data was carried out.

**Key words:** sluggishness, thermal sensor, approximation, heat transfer, medium temperature, dimensionless temperature