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A B S T R A C T S

*N.M. IMASHEVA, V.A. IONOVA***N-ARYLCARBAMATES AND THEIR DERIVATIVES IN SYNTHESIS OF HETEROCYCLIC COMPOUNDS**

This review gives an overview of the advances in the use of some N-aryl carbamates derivatives for the synthesis of various nitrogen-, oxygen- and sulfur-containing heterocyclic compounds.

Key words: aromatic N-substituted carbamates, nitrogenous heterocycles, oxygen- and sulfur-containing heterocycles, heterocyclization reactions

*E.V. MOROZOVA, I.E. YAKUNINA, K.I. KOBRAKOV, I.V. BLOKHIN, A.N. SHUMSKIY, Yu.M. ATROSHCHENKO***ANIONIC ADDUCTS OF 2-HYDROXY-3,5-DINITROPYRIDINE IN MANNICH CONDENSATION**

The derivatives of 1,5-dinitro-3,7-diazabicyclo[3.3.1]nonane-2-ones were synthesized by Mannich condensation of anionic adducts of 2-hydroxy-3,5-dinitropyridine. The structure of obtained compounds was proved by NMR ¹H spectroscopy.

Key words: 3,7-diazabicyclo[3.3.1]nonane-2-ones, 2-hydroxy-3,5-dinitropyridine, Mannich reaction

*Yu.B. RUMYANTSEVA, E.A. KURGANOVA, G.N. KOSHEL, A.S. FROLOV, D.A. SHABALINA, N.E. SKOTNIKOVA***SYNTHESES ON BASE OF HYDROPEROXIDE OF ISOPROPYLTOLUENE**

A generalized scheme was given for transformation of the p-isopropyltoluene in a process of its liquid-phase oxidation. The opportunity of highly selective receipt was proved for cresol and acetone, dimethyltolylcarbinol and isopropenyltoluene -valuable products of organic synthesis obtained by the decomposition of the tertiary hydroperoxide of isopropyltoluene.

Key words: liquid phase oxidation, isopropyltoluene, hydroperoxide, cresol, isopropenyltoluene

*G.Z. RASKIL'DINA, A.M. SULEYMANOVA, A.N. KAZAKOVA, N.G. GRIGOR'EVA, B.I. KUTEPOV, S.S. ZLOTSKIY***CATALYTIC SYNTHESIS OF ALKOXYNORBORNANES**

The interaction of norbornene with alcohols was studied in the presence of H-beta appropriate zeolite catalyst proceeding with formation of appropriate ethers.

Key words: norbornene, zeolite, dimers, ethers

*I.G. YANKINA, L.M. MALUKA***METROLOGICAL FOUNDATION OF REDOX-POTENTIOMETRIC METHOD OF VANADIUM DETERMINATION IN CRUDE OIL AND IN PRODUCTS OF ITS PROCESSING**

Metrological research of a redox-potentiometric method of vanadium determination in an oil and oil products on compliance to requirements of intra laboratory control in a field of confirmation of compliance to the established metrological characteristics was carried out. Accuracy indicators (accuracy and precision) and repeatability (convergence) of results of the analysis were estimated, and also stability control by a method of control cards of Shukhart was accomplished.

Key words: metrological study, accuracy, correctness, precision, stability, Shuhard control cards

*A.A. BOBROVNIKOVA, T.G. CHERKASOVA***THERMAL ANALYSIS OF TETRA (ISOTHIOCYANATO) DIAMINECHROMATE(III) OF DINITRATOTETRA (HEXAMETHYLPHOSPHORTRIAMIDE) OF LANTHANUM (III)**

Coordination compound of [LaL₄(NO₃)₂][Cr(NH₃)₂(NCS)₄] structure where L = OP(NMe₂)₃ was synthesized and its thermal stability was studied in an air and inert atmosphere.

Key words: rare-earth elements, hexamethylphosphortriamide, thermo gravimetric analysis

I.A. KUZ'MINA, V.A. SHARNIN, K.I. KUZ'MINA

THERMODYNAMICS OF SOLVATION OF SILVER (I) ION IN METHANOL-ACETONITRILE MIXED SOLVENTS

Influence of methanol-acetonitrile mixed solvent composition ($\chi_{AN} = 0.0\div 1.0$ mol. fraction) was studied on thermodynamics of silver ion (I) solvation. The replacement of MeOH by AN was established to result in an enhancement of Ag^+ solvation due to energetic changes in solution. The analysis of thermodynamic characteristics of Ag^+ transfer from MeOH into AN allows to assume that changes in a solvation state of Ag^+ are almost completed at the concentration of acetonitrile more than 0.4 mol. fraction.

Key words: solvation, Gibbs energy, enthalpy, entropy, methanol-acetonitrile solvents, silver ion (I)

Ya.O. MEZHUEV, Yu.V. KORSHAK, I.S. STRAKHOV, M.I. SHTILMAN

KINETICS OF OXIDATIVE POLYMERIZATION OF N-PHENYL-1,4-PHENYLENE DIAMINE

The kinetics of oxidation of N-phenyl-1,4-phenylene diamine with ammonia peroxydisulfate was studied in an aqueous solution by potentiometric method. The absence of autocatalysis was established. For the first time, the chain mechanism of poly aniline formation was proved.

Key words: polyaniline, oxidative polymerization, N-phenyl-1,4-phenylenediamine, ammonia peroxydisulfate, mechanism

D.B. MURIN, A.M. EFREMOV, V.I. SVETSOV

PROBABILITY OF HETEROGENEOUS RECOMBINATION OF ATOMS IN PLASMA OF HCl MIXTURES WITH INERT AND MOLECULAR GASES

Dependences of the heterogeneous recombination probability of chlorine and hydrogen atoms on the glass in a plasma zone were revealed as a function of the initial composition of HCl mixtures with Ar, He, H₂, Cl₂ and O₂ at the using the combination of methods of plasma diagnostic and modeling.

Key words: plasma, radiation, intensity, excitation, recombination, hydrogen chloride, probability, modeling

V.V. PANTELEEVA, A.B. SHEIN

IMPEDANCE OF ANODIC PROCESSES ON FeSi-ELECTRODE IN SULPHURIC ACID SOLUTION

Electrochemical behavior of FeSi-electrode in 0.5M H₂SO₄ solution at anodic potentials from 0 up to 2.2 V was investigated using impedance spectroscopy method. Impedance spectra were treated taking into consideration the presence of oxide film mainly consisted of SiO₂ on electrode surface. The dependence of equivalent electric circuit parameters on the electrode potential was analyzed. Oxide film thickness was calculated.

Key words: iron silicide, anodic dissolution, passivation, impedance

M.V. VOLODARSKIY, S.V. MAKAROV, A.S. MAKAROVA

INTERACTION OF ACETIC ACID WITH INORGANIC PEROXIDES

Comparative kinetic study of reaction between acetic acid and hydrogen peroxide, urea peroxide, sodium percarbonate or perborate was carried out. The influence of additives of boric acid on the oxidation rate of acetic acid and formation of peracetic acid was studied. A scheme of reactions between peroxides and acetic acid was suggested in the presence of boric acid.

Key words: acetic acid, boric acid, hydrogen peroxide, urea peroxide, perborate, percarbonate

G.I. MALTSEV, V.V. ROMANOVA, V.V. SVIRIDOV, N.E. KRUCHININA

HYDROPHYLIC-HYDROPHOBIC PROPERTIES OF SURFACE-ACTIVE AMINES

Process of micelle formation was studied for (F⁻, BrO₃⁻, Cl⁻, HSO₄⁻, AsO₂⁻, Br⁻, I⁻) salts of surface-active (PAV) quarternary ammonium and pyridine bases, tertiary secondary and primary alkylamines with length of a hydrocarbonic radical (C₈–C₁₈) in water and organic (cyclohexane; benzene; furan; 1,1-dichloroethane; 1,2-dichloroethane; benzonitrile; furfural) phases at temperatures of 298–328 K. Hydrophilic–hydrophobic correlation (GOS), coefficient of hydrophilicity, changes in thermodynamic functions for micelle formation in organic and water phases were calculated. It was established that the micelle formation of investigated alkylamines is spontaneous ($\Delta G_{m(o/w)}^0 < 0$) and exothermic ($\Delta H_{(o/w)}^0 < 0$) process which is accompanied by increase in both absolute value of entropy ($S_{(w)}^0$) and positive values of change in entropy ($\Delta S_{(w)}^0 > 0$) that is it caused by interaction of ionogen groups of PAV with molecules of polar solvent. On the contrary, in an organic phase an entropy ($S_{(o)}^0$) decreases that leads to increase in absolute values of negative value of change in entropy ($\Delta S_{(o)}^0 < 0$). On the base of the revealed characteristics of hydrophilic–hydrophobic properties the classification was proposed for their target application as surface-active reagents.

Key words: micelle formation, hydrophilic, hydrophobic, surface active, amine, increment, entropy, exothermic

O.I. DAVYDOVA, T.A. TRUSOVA, A.V. AGAFONOV

INFLUENCE OF SURFACE-ACTIVE SUBSTANCES OF DIFFERENT NATURE ON SEDIMENTATION STABILITY AND PROPERTIES OF ELECTORHEOLOGICAL FLUIDS

The effect of small additions (from 1 to 4 wt.%) of surfactants of different nature- oleic acid, succinimide, stearyl methacrylate, sodium dodecyl sulfate- on sedimentation stability of suspensions prepared on the base of titanium dioxide in polydimethylsiloxane was studied. Surfactants introducing was carried out on two schemes: adsorption on powder surface of disperse phase and dispersion in disperse medium. The influence of concentration and introduction method of surfactants on dielectric properties and electro-rheological activity of electro-rheological liquids was considered.

Key words: electro-rheological liquids, surfactants, dielectric properties, sedimentation

N.M. SELIVANOVA, D.V. MAKAROVA, Yu.G. GALYAMETDINOV

EFFECTS OF INFLUENCE OF LONG-CHAIN ALCOHOL ADDITIVES ON SELF-ORGANIZATION PROCESSES OF NON-IONIC SURFACTANT AND LANTHANIDES IONS LUMINESCENCE

The processes of self-organization of decaethylene glycol monododecyl ether ($C_{12}EO_{10}$, where $EO_{10} = -(O-CH_2-CH_2)_{10}$) in the presence of long-chain alcohol additives - decanol $C_{10}H_{21}OH$ in a wide concentration range from 0.2 to 1.5 mol were investigated. The effects of decanol on the adsorption parameters, size and aggregation numbers of micelles were analyzed. According to data on the critical concentration of micelle formation the optimal composition of micelle composition was found for effective solubilization of fluorescent probe based on Tb(III) and Eu(III) chelates.

Key words: non-ionic surfactants, lanthanide ions, decanol, micellar aggregate, micelle critical concentration, luminescence

Yu.V. POLENOV, E.V. EGOROVA, E.V. MAKAROVA

FORMATION OF NICKEL-CONTAINING COATINGS ON CARBON FIBER BY MEANS OF THIOUREA DIOXIDE AS REDUCING AGENT

The possibility of the use of thiourea dioxide for the formation of nickel and nickel-palladium coatings on a carbon fiber was shown. It was found, that in the absence of sensitization and activation stages nickel coating is X-ray amorphous, irregular in thickness and intermittent. At the use of palladium chloride as activating agent the formation of crystal phase of solid solution of nickel-palladium is possibly on the surface of carbon fibre.

Key words: carbon fiber, nickel, palladium, thiourea dioxide, X-ray diffraction, scanning atomic force microscopy

N.E. GORDINA, V.Yu. PROKOF'EV

PREPARATION OF SYNTHETIC LTA ZEOLITE FROM MECHANICALLY ACTIVATED MIXTURES OF METAKAOLIN

Regularities of LTA zeolite synthesis from mixtures of metakaolin, sodium hydroxide and aluminum oxide undergone to dry mechanochemical activation were revealed. The optimal synthesis conditions which provide the product obtained with LTA phase content more than 90% were found. At these conditions the crystallites size was 30-40 nm at the minimum level of defectiveness of around 0.1%.

Key words: metakaolin, zeolite, mechanochemical synthesis, crystal lattice, defectiveness

A.V. TANYGIN, N.A. ZABRODINA, V.Yu. PROKOF'EV, N.E. GORDINA

SORBENTS BASED ON ALUMINUM AND CALCIUM COMPOUNDS FOR GAS PURIFICATION FROM HYDROGEN CHLORIDE

The preparation steps and the main characteristics were studied for sorbents based on aluminum and calcium compounds for purification processes of gases from HCl vapors. Change in phase composition of systems was studied after mechanical activation of mixtures of oxide/hydroxide aluminum and oxide/carbonate calcium. The mechanochemical activation was shown to result in a formation of new phase of tricalcium hydroaluminat only for mixture of CaO and $Al(OH)_3$. Adsorbents obtained from aluminum hydroxide and calcium oxide were shown to have the maximum absorption capacity on HCl vapors.

Key words: adsorbent, mechanochemical activation, hydrogen chloride

N.A. SOKOLOVA, A.V. SHEVELEV, V.M. MAKAROV

PRODUCTION AND PROPERTIES OF HARD-MAGNETIC FERRITES FROM ELECTROPLATING SLUDGE

The article presents the study on the factors study promoting the synthesis of magnetic- hard ferrites from electroplating sludge of different composition and from $BaCO_3$ – wastes of electrolytes recovery of alkaline batteries.

Key words: galvanic sludge, barium ferrite, magnetic-hard materials

M.G. DONTSOV, E.V. KUZMICHEVA, V.I. PARFENYUK
COMPOSITION OF SURFACE LAYERS ON VT1-0 TITANIUM BEFORE AND AFTER CHEMICAL POLISHING

The composition of the surface layers formed during the chemical polishing of VT1-0 titanium was studied by X-ray diffraction and infrared spectroscopy. The film after chemical polishing was shown to keep amorphous and it consists of a number of solution components and corrosion products.

Key words: chemical polishing, titanium, surface films, titanium oxide

R.F. SHEKHANOV, S.N. GRIDCHIN, A.V. BALMASOV
ELECTRODEPOSITION OF ZINC-NICKEL ALLOY FROM OXALATE AND PYROPHOSPHATE ELECTROLYTES

Processes of electrodeposition of zinc-nickel alloy from oxalate and pyrophosphate electrolytes were investigated. The possibility of obtaining the good-quality electroplating was shown at current densities from 0.5 to 5.0 A/dm².

Key words: electrodeposition, electrolytes, binary alloys, zinc, nickel, corrosion

A.M. PIMENOVA, E.P. GRISHINA, E.V. BORZOVA, N.O. KUDRYAKOVA
INFLUENCE OF ANION NATURE TO ALUMINIUM FOIL CORROSION IN IMIDAZOLIUM IONIC LIQUIDS AT HIGHER TEMPERATURE

Corrosion and electrochemical behaviour of aluminium foil with natural oxide film was studied in ionic liquids – 1-n-butyl-3-methylimidazolium salts with various anions at 85 °C by means of electrochemical impedance spectroscopy, atomic force microscopy and voltammetry. The corrosion process was shown to proceed on mechanism of pitting formation. Moreover, both passivation and activation of the pittings are possible in depending on anion nature of ionic liquid. Investigated ionic liquids form the series of corrosion activity: BMIImCl >> BMIImOTf > BMIImN(Tf)₂ > BMIImPF₆.

Key words: aluminium, ionic liquid, corrosion, electrochemical impedance spectroscopy

G.S. SAKHATOVA, N.U. ALIEV, M.E. ERMAGANBETOV, M.K. ZHANTASOV
ETHER-ACIDS AS CEMENT SETTING RETARDERS

It is shown that the alkaline salts of acid-ester can be used as surfactant additives for hydrophobic cements, porous and cellular lightweight concrete with improved physical and technical properties of finished products. It is found that ether-acids are high quality cement setting retarders at high temperatures of hardening. Ether-acids production by oxidation of liquid paraffin of Kazakh oil using heterogeneous catalysts can expand natural resource bases of valuable chemical products.

Key words: liquid paraffin, paraffin oxidation, carbonate-, oxy -and ether acids, cement setting retarders, cellular light-weight concretes

A.V. SOROKINA, O.A. FRIDMAN, Yu.T. PANOV
STRESS RELAXATION IN PLASTICS OF CELLULOSE ACETATE

The temperature-time dependences of the stress relaxation of plasticized cellulose acetate, including the mode tension - relaxation at constant deformation - the removal of the load - were investigated. Recommendations are given on correction of manufacturing technology in order to provide dimensional stability and functional reliability.

Key words: plastics, cellulose acetate, plasticization, relaxation, stretching

A.A. IBRAGIMOV, V.P. MESHALKIN, Ya.A. YAGAFAROV, R.R. SHIRIYAZDANOV,
A.R. DAVLETSHIN, M.N. RAKHIMOV
INTENSIFICATION OF N-HEXANE ISOMERIZATION PROCESS BY 2,2- AND 2,3-DIMETHYLBUTANES IN MEDIUM OF ION LIQUID OF BMIM-AL₂Cl₇ COMPOSITION

Results of studies of influence of high branched alkanes on parameters of n-hexane isomerization process were presented in a medium of chlor-aluminate ion liquid possessing super acidic properties. It was established that 2,2-dimethylbutane and 2,3-dimethylbutane are more effective initiators than mono-substituted compounds which were studied by us before. It was shown that 2,2-dimethylbutane promotes more essentially the acceleration of by-reactions of cracking and disproportionation than 2,3-dimethylbutane. Possible mechanism of isomerization of n-hexane is presented for medium of super acidic ionic liquid.

Key words: isomerization, initiator, ionic liquid, di-substituted isomers

S.A. KUZNETSOV, O.N. FEOFANOVA, N.I. KOLTSOV
**SYNTHESIS OF BIODEGRADABLE OLIGOMERS ON BASE OF RAPESEED OIL ESTERS
ON TITANIUM-SILICATE CATALYSTS**

A new method for producing biodegradable oligomers - ethoxylated esters based on vegetable triglycerides (rapeseed oil) and polyethylene glycol PEG-400 was developed using as catalysts mixed titanium -silicates. The method provides sufficient for commercialization of product yield and economically more advantageous conditions of synthesis (decrease in a temperature from 120-140 ° C to 80 ° C) compared to the currently used homogeneous alkaline and acidic catalysts. The possibility of using the obtained esters as lubricants was shown.

Key words: oxyethylated esters, titanium-silicate catalysts, physical properties, operating characteristics, biodegradability, lubricants

D.V. KUDELIN, T.N. NESIOLOVSKAYA, A.B. VETOSHKIN
**FEATURES OF FORMATION OF RUBBERS STRENGTH PROPERTIES IN COMPLEX-STRAINED
STATE IN PRESENCE OF TENSION CONCENTRATOR**

The features of formation of strength properties of rubbers in complex-strained state in the presence of the tension concentrator were investigated. It was shown, that tests at complex-strained conditions result in essential difference in a rubber behavior on the base of crystallizing and amorphous rubbers. Features of rubber destruction were revealed at the studied mode of loading.

Key words: complex-strained condition, tear resistance, rubber diaphragm, spherical indenter

A.B. KAPRANOVA, A.A. PETROV, M.N. BAKIN, A.I. ZAITSEV
**SIMULATION OF FORMATION PROCESS OF CRATER IN LAYER OF GRANULAR MATERIAL
AFTER IMPACT OF SINGLE PARTICLE**

The offered description of process expansion of crater in the layer of bulk material after the impact interaction with a single particle before the decay starting of "crown" of the dispersed material allows to find a function of the height and thickness for its forming spike depending on the varying radius of the crater.

Key words: impact interaction, spherical particle, crater in bulk media, expanding crater radius, spike height and thickness, natural slope angle

A.V. TZYPOV, V.E. MIZONOV, N.N. YELIN
**METHOD OF HYDRAULIC CALCULATION OF THREE-PHASE FLOWS IN WELLS
OF HYDROMINING SYSTEMS**

A mathematical model was proposed for water-air-ore particles movement in a rink channel of slurry pipeline of hydromining well as well as its computer implementation allowing to study the influence of different process parameters on efficiency indicators. Good correlation between calculated data and data of industrial tests was shown. The airlift well operation at given value of airlift flow rate was found to be possible at one, two, or three different regimes the economical characteristics of which differ from each other strongly.

Key words: hydromining well, three-phase mixture, water-ore pulp, gas content, debit

Z.G. MALYSHEVA, T.N. SUDZILOVSKAYA, E.A. SMIRNOVA
SYNTHESIS OF FINE-DISPERSED MAGNESIUM HYDROXIDE

A method of obtaining fine-dispersed magnesium hydroxide from underground brine deposits was developed. The influence of temperature, seed and surfactants on the structure and size of the particles was established.

Key words: magnesium hydroxide, synthesis, underground brines, precipitate filterability