

## A B S T R A C T S

*A.N. KAZAKOVA, S.S. ZLOTSKIY***O-ALKYLATION OF ALCOHOLS AND PHENOLS WITH HALOGENMETHYL-GEM-DICHLOROCYCLOPROPANES**

As a result of the o-alkylation of alcohols and phenols with halogenmethyl-gem.-dichlorocyclopropanes the alkoxy- and aryl oxymethyl-gem.-dichlorocyclopropanes have been obtained. Microwave radiation increases a yield and reduces the reaction time of the phenols o-alkylation.

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

*Z.A. TEMERDASHEV, D.N. KONSHINA, E.Yu. LOGACHEVA, V.V. KONSHIN***SORPTION PROPERTIES OF CELLULOSE FILTERS WITH CHEMICALLY-IMMOBILIZED THIOSEMICARBAZIDE**

The synthesis of thin layer cellulose sorbents containing chemically-immobilized thiosemicarbazide has been carried out. The possibility of use of the received sorbent for concentrating the cobalt (II) followed by its X-ray fluorescence spectroscopy determination in a concentrate has been established. Physical and chemical parameters of cobalt sorption process have been determined.

**Key words:** cellulose, thiosemicarbazone groups, sorption concentrating, cobalt (II), X-ray fluorescence determination

*D.A. FILIMONOV, M.I. BAZANOV***INFLUENCE OF INTRA-CYCLE AND PERIPHERAL SUBSTITUTION IN COBALTPORPHYRINS ON THEIR ELECTROCHEMICAL AND ELECTRO-CATALYTIC PROPERTIES IN ALKALINE SOLUTION**

The redox behavior of some cobalt complexes of porphyrines has been studied by cyclic voltammetry method in alkaline solution. The influence of intra-cycle and peripheral substitution in cobalt-porphyrines on their electrochemical and electro-catalytic properties has been shown.

**Key words:** tetraphenylporphyrin, electrochemical transformations, cyclic voltammetry method, macroheterocyclic complexes, molecular oxygen

*A.M. EFREMOV, A.V. YUDINA, V.I. SVETTSOV***ELECTRO-PHYSICAL PLASMA PARAMETERS OF DIRECT CURRENT GLOW DISCHARGE IN HCl/Ar MIXTURE**

The model-based analysis of the influence of the initial HCl/Ar mixture composition on the steady-state plasma parameters (reduced electric field strength, electron energy distribution, and rate constants for electron impact processes) and densities of charged particles under the direct current glow discharge conditions was carried out.

**Key words:** plasma, modelling, rate, density

*A.V. POLISHCHUK, E.T. KARASEVA, T.B. EMELINA, V.E. KARASEV***PHOTOCHEMICAL BEHAVIOR OF MONO- AND DIFLUOROQUINOLONES IN AQUEOUS SOLUTIONS**

The photochemical behavior of some antibiotics of quinolone class has been studied at the action of UV-irradiation ( $\lambda = 254$  nm). Maxima of bands of absorption spectra and luminescence ones, Stokes shift magnitudes and lifetimes of singlet excited state have been studied. Based on experimental data and quantum-chemical calculations the conclusion has been made on complex character of UV irradiation action on fluoroquinolones including photo-protolytic inter transformations and photo destruction of compounds.

**Key words:** fluoroquinolones, luminescence, photochemistry, Mulliken's overlap population, photodecomposition, electron density transfer, Mulliken's charges on atoms

*A.A. AMINDZHANOV, S.M. SAFARMAMADOV, MAKHMUD MUKHAMED MASHALI,  
Yu.F. BAKHODUROV*

**COMPLEX COMPOUNDS OF RHENIUM (V) WITH 1-ETHYL-MERCAPTOIMIDAZOLE**

Optimal conditions of synthesis of rhenium (V) complex compound with the 1-ethyl-2-mercaptoimidazole have been determined. Mono, di and tetra-substituted complexes have been established to form dependently on ratio of initial reagents. It has been shown that the sulphur atom of 1-ethyl-2-mercaptoimidazole molecule participates in coordination with the rhenium (V). The process of interaction of tetra-substituted complex with water has been studied.

**Key words:** synthesis, rhenium (V), 1-ethyl-2-mercaptoimidazole, coordination, IR spectra

*Yu.G. BOGDANOVA, V.D. DOLZHIKOVA, I.M. KARZOV, A.Yu. ALENTIEV*

**PREDICTION OF MICRO-PLASTICS STRENGTH PROPERTIES ON BASE OF DETERMINATION OF ADHESION WORK IN «POLYMER-LIQUID» MODEL SYSTEMS**

A new approach for the prediction of the micro-plastics strength properties based on the determination of the adhesion work in the model systems polymer-liquid using the contact angle data has been proposed. The correlation between the adhesion calculated work to model liquids and the tensile strength of micro-plastics has been found.

**Key words:** work of adhesion, contact angle method, micro plastics, polyolefin ketones, epoxy resins, carbon fibers, tensile strength

*N.N. SMIRNOVA, A.Yu. KULAGINA, Yu. A. FEDOTOV*

**EFFECT OF TEMPERATURE ON COMPLEXATION OF SULFONATE-CONTAINING POLYPHENYLENPHTHALAMIDES AND POLY-N-(2-AMINOETHYL) ACRYLAMIDE IN AQUEOUS MEDIA**

Effect of temperature on the complexation of poly-N-(2-aminoethyl) acrylamide with sulfonate-containing polyphenylenphthalamides in aqueous media has been studied. The values of effective constants of binding ( $K_b$ ) in terms of functional groups of interacting polyelectrolytes have been determined. The temperature rise as well as the poly-base ionization constant and  $K_{cb}$  decrease for inter-polymer reactions under study has been shown to result in the enhancement of hydrophobic interactions in forming inter-poly-electrolyte complexes.

**Key words:** sulphonate-containing polyphenylenphthalamides, inter-polymer reactions, binding constants, inter-poly-electrolyte complexes

*G.G. SAVEL'EV, T.A. YURMAZOVA, N.B. SHAKHOVA*

**As<sup>3+</sup>, As<sup>5+</sup>, Cr<sup>6+</sup>, Ni<sup>2+</sup> ION SORPTION FROM WATER SOLUTIONS ON SURFACE OF NANO-SIZE FIBROUS ALUMINUM OXYHYDROXIDE**

Sorption isotherms of As<sup>3+</sup>, As<sup>5+</sup>, Cr<sup>6+</sup>, Ni<sup>2+</sup> ions on the surface of nano-size fibrous aluminum oxyhydroxide have been obtained. Maximum adsorption capacity and adsorption constants have been determined. The change in solution pH and surface modification of nano-size fibrous aluminum oxyhydroxide has been shown to result in the increase of adsorption properties.

**Key words:** adsorption, aluminum oxyhydroxide, sorption isotherms, nano-powder

*A.I. SAMATADZE, P.V. SURIKOV, L.B. KANDYRIN, V.N. KULEZNEV*

**PECULARITIES OF RHEOLOGICAL BEHAVIOR OF EMULSIONS AND SUSPENSIONS BASED ON EPOXY OLIGOMER**

The rheological properties of emulsions based on the epoxy oligomer of ED-20 trade mark have been studied. The accomplishing two possible ways of changing the emulsions viscosity in which the viscosity of dispersed phase is essentially less than the viscosity of dispersed media has been considered: 1) the viscosity increases with increase in the concentration of the dispersed phase, 2) the decrease in viscosity with increasing the concentration of the dispersed phase. The comparison of rheological behavior of emulsions and suspensions on the base of the epoxy oligomer of ED-20 trade mark has been carried out.

**Key words:** oligomers, epoxy resin, emulsions, suspensions, rheology

**T.A. ZHUKOVA, N.V. BELOVA, V.V. SLIZNEV, N.P. KUZMINA, G.V. GIRICHEV**  
**STUDY OF IR SPECTRA OF ALUMINUM, GALLIUM AND INDIUM**  
**DIPIVALOYLMETHANATES**

Infrared spectra of aluminum, gallium and indium dipivaloylmethanates were obtained in the range of 400-4000  $\text{cm}^{-1}$ . For the assignment of spectra the DFT(B3LYP) quantum chemical calculations with double- $\xi$  basis sets supplemented by polarized functions and effective core pseudopotentials for inner shells of Ga and In have been carried out. The assignment of experimental bands has been carried out on the base of the analysis of the natural vibrational coordinate contributions to vibrational modes. The experimental and calculated spectra are quite similar. The most intensive IR vibrational modes are specified by natural coordinates connected with the ligand geometry distortions. The some differences of spectra have been observed in the range of 400-600  $\text{cm}^{-1}$  where the bands connected with the M-O valency vibration manifested. Good agreement experimental and calculated spectra allows supposing that aluminum; gallium and indium dipivaloylmethanates have a similar structure of crystal phase with molecule symmetry close to  $D_3$ .

**Key words:** infrared spectra,  $\beta$ -diketonates, tris-dipivaloylmethanate of aluminium, tris-dipivaloylmethanate of gallium, tris-dipivaloylmethanate of indium, vibrational frequencies

**R.N. RUMYANTSEV, A.A. ILYIN, A.P. ILYIN, S.P. PANKRATOVA**  
**MECHANO-CHEMICAL SYNTHESIS OF IRON OXIDE FROM CAST IRON SCRAP**

With the methods of X-ray phase and X-ray structural analysis the process of mechanochemical oxidation of cast iron scrap of SCh 12-28 trade mark has been studied for obtaining the iron oxide. With the method of the differential dissolution the iron oxidation number has been established. Kinetic features of  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  formation have been investigated at mechano-activation of cast iron.

**Key words:** mechano-chemistry, oxidation, iron oxide, cast iron

**A.G. DEMAKHIN, S.V. AKCHURIN, A.V. SHANTROKHA, S.P. MUSHTAKOVA**  
**PHYSICAL-CHEMICAL BASES OF OBTAINING IODINE CONCENTRATE**

Physical-chemical bases of the iodine extraction from different natural brines have been developed. This process bases on the method of liquid-phases emulsion membrane extraction with using quaternary ammonium compounds as an extractant. The factors influencing on process of the iodine extraction have been studied. The possibility of process organizing on principle of closed cycle has been revealed.

**Key words:** iodine, liquid-phases emulsion membrane extraction, quaternary ammonium salts, organic solvent, underground water

**S.V. LANOVETSKIY, D.I. ZYKOV, V.Z. POIYLOV, O.K. KOSVINTSEV**  
**INFLUENCE STUDY OF SYNTHESIS CONDITIONS ON MAGNESIUM HYDROXIDE**  
**PARTICLE SIZE**

The study of influence of different synthesis conditions of magnesium hydroxide from magnesium salts solutions on particle size has been carried out with the laser analyzer of particles and scanning electron microscopy. The influence of reagents initial concentration, temperature of synthesis, precipitators feed rate, mixing rate and surfactants on particle average size of magnesium hydroxide has been shown.

**Key words:** magnesium hydroxide, magnesium nitrate, particles size, surfactants

**S.M. MASLOBOEVA, G.N. DUBOSHIN, M.P. RYS'KINA**  
**STUDY OF CONDITIONS FOR PRODUCTION OF POTASSIUM**  
**HEPTAFLUORONIObATE  $\text{K}_2\text{NbF}_7$**

Studies of the production of high-quality potassium heptafluoroniobate (PFN) for further sodium-thermal reduction of niobium metal powders have been carried out. The governing condition of mono-phase precipitated product obtaining has been established to be the mole ratio  $m=\text{HF}/\text{Nb}_2\text{O}_5$ . The size of PEN crystals depends on the  $m$  value, time of their ripening under mother solution, and niobium concentration in initial solution. The content of impurity elements in PEN obtained under optimal conditions corresponds to the established technical requirements.

**Key words:** potassium heptafluoroniobate, phase and grain-size composition, optimal conditions, sodium-thermal reduction, niobium metal powders

*E. V. DOGADKINA, M.G. DONTSOV, V.I. PARFENYUK*

### **TITANIUM CHEMICAL POLISHING. I. INFLUENCE OF SOLUTION CONCENTRATION ON PARAMETERS OF CHEMICAL POLISHING PROCESS OF TITANIUM**

The influence of the dissolved titanium concentration on parameters of chemical polishing process of this metal in solutions on the base of acid ammonium fluoride and hydrochloric acid hydroxylamine has been investigated. Electrochemical parameters of the titanium behavior in the solutions under study have been determined by means of methods of a stationary and rotating disk electrode and, also, by the method of EMF of chains without transfer. The content of dissolved titanium ions in solution under study has been shown to act essentially on efficiency of chemical polishing process of the titanium.

**Key words:** chemical polishing, titanium, diffusion currents

*V.E. SEMENOV, A.V. BALMASOV*

### **SILVER PASSIVATION IN SOLUTIONS CONTAINING HETEROCYCLIC COMPOUNDS**

The electrochemical behavior of silver has been investigated in aqueous-amino-alcohol solutions containing benzimidazole and its derivatives. It has been established that at silver treatment in the studied media the passivating layers which provide a protection against darkening are formed. The protective effect increases at replacement of benzimidazole on its sulphur-containing derivative.

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

*V.V. POVETKIN, L.N. MAKAROVA*

### **PHASE COMPOSITION AND PROPERTIES OF ZINC – NICKEL ALLOYS FROM TRILONATE SOLUTIONS**

Both chemical and phase composition and some properties (corrosion stability, micro hardness and internal stresses) of zinc - nickel alloys from trilonate electrolyte have been studied.

**Key words:** corrosion stability, micro-hardness, internal stresses, electro deposition, trilonate electrolyte

*E.I. YARMUKHAMEDOVA, Yu.I. PUZIN, Yu.B. MONAKOV*

### **STUDY OF METHYL METHACRYLATE POLYMERIZATION IN 1,3,5-TRIMETHYL-HEXAHYDRO-1,3,5-TRIAZINE PRESENCE**

The influence of 1,3,5-trimethyl-hexahydro-1,3,5-triazine on the radical polymerization of methyl methacrylate has been studied. The kinetic parameters as well as the orders and activation energy of the polymerization have been determined. The triazine has been shown to be the weak chain transfer agent and it interacts with benzoyl peroxide forming the initiating system. It is found that the polymer being synthesized in the presence of 1,3,5-trimethyl-hexahydro-1,3,5-triazine has the higher content of syndio and izo sequences in the macromolecules.

**Key words:** polymerization, methyl methacrylate, bis(N,N-dimethylamino)methane

*N.V. LAKINA, V.YU. DOLUDA, O.V. MATVEEVA, E.M. SULMAN, V.G. MATVEEVA*  
**BIOCATALYTIC METHOD OF TRIMETHYLHYDROQUINONE SYNTHESIS**

A new approach to semi-product synthesis of E-vitamin using the immobilized peroxidase has been proposed. Main methods of trimethylhydroquinone synthesis have been considered and the review of new catalytic methods of its obtaining has been presented. Study results showing the high efficiency of bio-catalytic method of trimethylhydroquinone synthesis using native and immobilized enzyme are given.

**Key words:** trimethylphenol, vitamin E, trimethylhydroquinone, oxidation, enzyme, immobilization, horseradish peroxidase, modification, chitosan, carbodiimide

*I.V. POSTNIKOVA, V.N. BLINICHEV, S.G. FROLOV*

### **CALCULATION OF HYDRO-DYNAMIC CHARACTERISTICS OF TWO-PHASE JETS IN DEVICE OF COMBINED ACTION**

In given article the hydrodynamics of a two-phase jet has been considered in detail. Expressions for determination of velocities of gas and solid phases in horizontal high-speed jet taking into account the involvement of solid material particles from surrounding fluidized bed are given.

**Key words:** fluidized bed, two-phase high-speed jet, hydro-dynamic characteristics

**A.A. LIPIN, Yu.M. BAZAROV, A.G. LIPIN, D.V. KIRILLOV, L.N. MIZEROVSKIY**  
**MODELLING PROCESS OF SOLID-PHASE POSTPOLYMERIZATION OF POLYAMIDE-6**  
**IN BATCH DEVICE**

The mathematical description of the process of solid-phase postpolymerization of polyamide-6 which allows predicting an extent of caprolactam conversion, an average degree of polymerization and the pressure of steam-gaseous phase in the apparatus is given. The comparison of results of theoretical and experimental researches of the process in a batch reactor has been accomplished.

**Key words:** polyamide-6, postpolycondensation, postpolymerization, mathematical modelling, solid-phase process

**A.F. FEDOROVA, E.Yu. SHITS**

**METHODICAL COMPLEX FOR STUDYING CHEMICAL COMPATIBILITY OF BRINE FLUIDS**  
**WITH BRINE PRESSURE MAINTENANCE SYSTEMS**

As a result of accomplished investigations the necessity of carrying out a chemical analysis of brine water and water flooding system has been shown for every putting into operation and operating oilfield for the purpose of reveal or excluding a formation possibility of slightly soluble precipitates at their interaction. The determination method of insoluble and soluble precipitates in a rock-collector has been proposed. That method takes into account a low brine temperature which is characteristic for fields of Republic Sakha (Yakutia).

**Key words:** chemical compatibility, brine water, waterflooding system, formation of insoluble and soluble precipitates

**E.A. MEZINA, I.M. LIPATOVA**

**INFLUENCE OF SUSPENSIONS MECHANICAL ACTIVATION OF MICROCRYSTALLINE CELLULOSE IN CHITOSAN SOLUTIONS ON THEIR REOLOGICAL AND FILM-FORMING PROPERTIES**

The influence mechanoacoustic action realised in rotor-pulse devices on reological and film-forming properties of suspensions of microcrystalline cellulose in solutions chitosan has been investigated. The mechanical activation of suspensions has been established to allow increasing in several times the strength of the films being formed from them.

**Key word:** chitosan, microcrystalline cellulose, mechanoacoustic action, rotor-pulse device

**I.P. VERSHININA**

**STUDY OF NON-NEWTONIAN LIQUID DYNAMICS IN ROTATING TUBE**

The current of cellulose nitrate solutions has been studied in tube rotating around an own axes. The comparison of experimental and theoretical results has showed their good agreement. The dependence for determination of resistance coefficients has been obtained for current of non-Newtonian liquid in rotating tube.

**Key words:** non-newtonian liquid, rotating tube, resistance coefficient, pressure losses along the tube

**A.M. SUROVOV, A.G. BUBNOV, N.A. KUVYKIN**

**PECULARITIES OF ECO-ANALYTIC CHECK OF WATER PURIFICATION PROCESS FROM SYNTHETIC SURFACTANTS IN DIELECTRIC BARRIER DISCHARGE**

Opportunities for the most widely used methods of monitoring the concentration of synthetic surface-active substances (SSAS) on the example of sodium laurylsulphate and laurilsulphonata in aqueous solutions treated in the dielectric barrier discharge have been estimated. It has been established that for a check of residual concentrations of SSAS in solutions treated with the dielectric barrier discharge that is for purification process checking it is impossible to use any single method even included in the State Register of methods and tools of measurement.

**Key words:** methods of control, synthetic surface-active substances, dielectric barrier discharge

**I.V. NOVIKOV, V.V. VOLKOV, L.F. NOVIKOVA, V.V. ALEXANDRIYSKIY, V.A. BURMISTROV**  
**INFLUENCE OF 4-AMINOBNZONITRILE ON DIELECTRIC AND OPTIC PROPERTIES**  
**OF LIQUID CRYSTALLINE MIXTURE 807**

The temperature and concentration dependences of static dielectric permeability and refraction indexes of liquid crystalline solutions of 4-aminobenzonitrile in the mesomorphic mixture 807 have been obtained. The

incorporation of polar non-mesogen has been shown to result in the increase in dielectric anisotropy. This effect has been connected with formation of H-complexes of liquid crystal with non-mesogen.

**Key words:** liquid crystals, mesogens, dielectric properties, birefringence

***M.E. GLAZKOVA, T.A. AGEEVA, O.I. NIKOLAEVA, Yu.V. RUMYANTSEVA, O.I. KOIFMAN***  
**INTERACTION OF ZINC COMPLEX OF MESO-TETRAPHENYLPORPHYRIN  
WITH ORGANIC PEROXIDES IN SOLUTION**

Kinetics of oxidation of zinc meso-tetraphenylporphyrin with the organic peroxides in solutions has been studied with spectrophotometrically. For the first time, acylperoxides unlike alkylperoxides has been noted to promote a formation of isoporphyrins. Nature of solvent, ratio of reagents and temperature has been established to influence essentially on the process of metalloporphyrin oxidation.

**Key words:** zinc meso-tetraphenylporphyrin (ZnTPP), organic peroxides, oxidation, isoporphyrin

***E.V. RUMYANTSEV***

**SCIENTIFIC PRINCIPLES OF CONSTRUCTION AND IMPLEMENTATION TECHNIQUE OF COORDINATION CHEMISTRY COURSE FOR STUDENTS TRAINING IN DIRECTION «CHEMISTRY»**

Scientific principles of construction and implementation technique of course «Coordination chemistry» for students training in direction «Chemistry» are considered. The course position in system of modern chemical education and its interconnection with other chemical disciplines is analysed. The version of modular system of course which is given by the author at the Ivanovo State University of Chemistry and Technology is presented. Recommendations on an effective application of scientifically-methodical materials, the informational resources and material baseline are given at conducting lecture, practical and laboratory studies.

**Key words:** coordination chemistry, coordination compounds, training course, lectures, laboratory practical work, teaching technique

***V.V. BUDANOV***

**ON EXPLANATION OF ELECTROCHEMICAL CELL THEORY IN LECTURE COURSE OF PHYSICAL CHEMISTRY**

Explanation methods of the theme “Theory of galvanic cell” in lecture course of physical chemistry for chemical technological specialties of Institutes are considered. New methodological ways allowing matching a volume of educational knowledge and working program of course are proposed.

**Key words:** galvanic element, physical chemistry course, training method