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(inorganic, organic, analytical, physical, colloid  
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## A B S T R A C T S

*A.A. STEPACHEVA, L.Zh. NIKOSHVILI, E.M. SULMAN*

**ACTIVE CENTERS FORMATION INVESTIGATION OF PALLADIUM-CONTAINING NANOSTRUCTURED SYSTEMS IN FATTY ACIDS HYDRODEOXYGENATION PROCESS FOR SECOND GENERATION BIODIESEL PRODUCTION**

The physicochemical investigation of palladium nanoparticles supported on polymeric matrix of hypercrosslinked polystyrene was carried out. The influence of structure and state of synthesized catalytic systems on the fatty acids hydrodeoxygenation process was studied.

**Key words:** hydroxygenation, palladium, nano particles

*O.V. ZAKHAROV, D.V. FILIPPOV, A.A. KOMAROV, A.I. KRASNOV, A.A. MERKIN*

**SOLVENT COMPOSITION INFLUENCE ON KINETIC PARAMETERS OF REACTION OF 4-NITROTOLUENE LIQUID-PHASE HYDROGENATION**

The solvent composition influence on 4-nitrotoluene liquid-phase hydrogenation kinetic parameters and quantitative ratios of the hydrogen adsorptive states was investigated at hydrogen elevated pressures. Amounts of the absorbed hydrogen, and also observed initial rates of reaction and rate constants in a field of the first order on compound being hydrogenated were determined. To reveal the interrelation between parameters of the hydrogen adsorptive states and solvents physicochemical parameters the skeletal nickel potentiometric titration was carried out in a mixed solvent of ethanol and water with the different content of organic component.

**Key words:** solvent, 4-nitrotoluene, skeletal nickel, hydrogenation, hydrogen individual forms

*A.E. KISELEV, L.S. KUDIN, A.P. ILYIN*

**THERMODYNAMICS OF SUBLIMATION OF  $K_2O$  FROM  $K_2O \cdot nFe_2O_3$  MECHANO-ACTIVATED SYSTEM**

The results of mass spectrometry study of potassium oxide sublimation from the  $K_2O \cdot nFe_2O_3$  system prepared by the mechanical activation method (MAM) as a base of catalyst, are presented. The vapor pressures over the samples of different compositions were measured and the enthalpies of sublimation of the samples in a form of  $K_2O$  were determined.

**Key words:** sublimation enthalpy, mass-spectrometry, vapor composition, mechanical-chemical activation,  $K_2O \cdot nFe_2O_3$

*N.A. NESTEROVA, E.F. PANARIN, I.I. GAVRILOVA*

**KINETIC FEATURES OF HOMOPOLYMERIZATION OF N-VINYLFORAMIDE (IN WATER AND IN BULK)**

The kinetics of N-vinylformamide polymerization in a water and in a bulk with the use of azobisisobutyric acid dinitrile and hydrogen peroxide as initiators was studied by dilatometry. The orders of the reaction with respect to monomer and initiator were determined. Rate constants of polymerization reaction and activation energies were calculated.

**Key words:** N-vinylformamide, polymerization kinetics

*V.S. OSIPCHIK, I.Yu. GORBUNOVA, N.V. KOSTROMINA, Yu.V. OLIKHOVA, D.M. BUIY*

**STUDY OF EPOXY OLIGOMERS CURING PROCESSES**

At the present work the processes of epoxy oligomer curing were studied and the activation energy was determined by the rotational viscosimetry. The applicability of different methods to describe dependency of viscosity on the curing time of epoxy compositions was shown.

**Key words:** epoxy oligomers, curing, gel formation

**D.F. GRISHIN, N.B. VALETOVA, I.D. GRISHIN**  
**COMPOSITIONS ON BASE OF NICKEL AND BENZYL CHLORIDE AS INITIATORS**  
**AND REGULATORS OF RADICAL POLYMERIZATION OF METHYLMETHACRYLATE**

Peculiarities of methylmethacrylate polymerization were studied in the presence of nickel-containing catalysts (nickel dibromide bis (threephenyl phosphine, nickel dibromide) and benzyl chloride as initiator as well as with the use of polymethylmethacrylate as initiator synthesized on the  $(PPh_3)_2NiBr_2/Zn/C_6H_5CH_2Cl$  system. The influence of concentration of initiating system was estimated on the polymerization kinetics and on the molecular-mass parameters of polymers. The polymer synthesized with participation of nickel complexes was shown to have the reaction site and it can be with the initiator for the processes of radical polymerization.

**Key words:** benzyl chloride, nickel dibromide bis (threephenyl phosphine), nickel dibromide, zinc dust, catalysis, radical polymerization, methylmethacrylate

**Yu.V. RUBLINETSAYA, A.E. GUKIN, V.V. SLEPUSHKIN, E.O. ILINYKH**  
**INVESTIGATION OF FORMATION KINETICS AND DISSOLUTION OF OXIDE LAYERS**  
**ON TIN, LEAD AND THEIR ALLOYS IN PROCESS OF THEIR POLARIZATION IN ALKALINE**  
**SOLUTIONS BY LOCAL ELECTROCHEMICAL ANALYSIS**

On the example of tin, lead and their alloys theoretical bases of local voltammetry of oxide layers forming on the metal surfaces during anodic polarization were considered.

**Key words:** local voltammetry, anodic polarization, anodic current, Folmer-Batler's equation, overpotential, oxide film resistance, exchange current

**V.G. BADELIN, G.N. TARASOVA, E.Yu. TYUNINA**  
**INVESTIGATION OF INTERACTION OF AROMATIC AMINO ACIDS WITH NICOTINIC ACID**  
**AND URACIL IN AQUEOUS SOLUTIONS**

The interaction of L-phenylalanine and L-tryptophan with nicotinic acid and uracil was studied in aqueous solutions at pH of 7.3 by UV-spectroscopy. The stoichiometry and the stability constants of the complexes were determined. The peculiarities of interaction of aromatic amino acids with acid and base ligands were revealed.

**Key words:** L-phenylalanine, L-tryptophan, nicotinic acid, uracil, complexation constants, UV-spectroscopy, aqueous solutions, pH=7.3

**V.O. DOROSHCHUK, M.G. MANDZYUK, N.O. GRITSYK, V.Ya. DEMCHENKO**  
**ATOMIC-ABSORPTION DETERMINATION OF ALUMINUM IN NATURAL WATERS**  
**AFTER PRELIMINARY MICELLAR EXTRACTION CONCENTRATING**

The micellar extraction of aluminum with chromazurol S in the presence of cationic surfactants with was studied. The optimal conditions of quantitative extraction of ternary complexes into surfactant-rich phase were found. The procedure of atomic absorption determination of aluminum in natural waters with preliminary micellar-extraction concentrating was developed.

**Key words:** aluminum, Triton X-114, micellar-extraction concentrating

**S.K. SHARIFOVA**  
**EPOXY ESTERS OF AROMATIC ACIDS**

Mono ethoxy ester of 2- aceto benzoic acid, mono and di ethoxy esters of 2-hydroxy benzoic, 2-hydroxybenzoic, 4-amino-2-hydroxy benzoic and 4-sulfo-2-hydroxybenzoic acids were synthesized under the action of KOH on the mono-and dihydroxy esters at mole ratios of 1:1 and 2:1. The composition and structure of synthesized esters were established. Physical-chemical parameters of synthesized compounds were obtained.

**Key words:** mono-and dihydroxy esters of 2-acetoxybenzoic, 2-hydroxybenzoic, 4-sulfo-2-hydroxybenzoic, 4-amino-2-hydroxybenzoic acids

**O.E. RUVINSKIY, N.S. ABRAMOVA**  
**ELECTROCATALYSIS AND COMPLEX FORMATION IN SYSTEMS «COBALT (II), NICKEL (II) –**  
**ERIOCHROME BLACK T»**

The equilibrium and kinetics of complex formation in the systems «nickel (II) , cobalt (II) – Eriochrome black T» in a near-electrode layer was investigated using of polarographic methods for a dropping

mercury electrode. The total charge of reacting particles was also determined in a near- electrode layer and complex compositions were determined as well. The stability constants of complexes of nickel (II) and cobalt (II) with Eryochrom black T on the surface of the electrodes were calculated by several methods. The electrochemical behavior of systems «nickel (II), cobalt (II) – Eriochrome black T» was studied with the method of adsorption cathodic stripping voltammetry on glassy carbon electrode.

**Key words:** nickel, cobalt, complexation, equilibrium, electro-reduction, Eriochrome black T

*V.A. ISAEVA, G.I. REPKIN, Zh.F. GESSE, V.A. SHARNIN*

#### **THERMODYNAMIC PARAMETERS OF COMPLEXATION OF SILVER (I) WITH GLYCINATE ION AND ACID-BASE EQUILIBRIA OF LIGAND IN MIXTURES OF WATER WITH ETHANOL AND DIMETHYL SULFOXIDE**

The analysis of experimental data on change in a stability of silver (I) glycinate, change in enthalpies of protonation reactions of glycinate-ion and its complexation with  $\text{Ag}^+$  ion was carried out for water solutions of dimethyl sulfoxide and ethanol. The change in  $\Delta G^\circ$  and  $\Delta H^\circ$  of reaction under consideration was revealed to determine with the enthalpy constituent and it changes for water solutions of ethanol and dimethyl sulfoxide is determined with the enthalpy and entropy constituent, respectively.

**Key words:** silver (I), glycinate-ion, mixed solvent, Gibbs energy, enthalpy, entropy, potentiometry, calorimetry

*M.I. ABDULLIN, A.B. GLAZYRIN, A.A. BASYROV, O.S. KUKOVINETS, G.I. KHAMIDULLINA*  
**EPOXIDATION OF SYNDIOTACTIC 1,2-POLYBUTADIENE WITH PERACIDS**

The epoxidation of syndiotactic 1,2-PB by the action of trifluoroperacetic and meta-chloroperbenzoic acids was studied. At the epoxidation by trifluoroperacetic and meta-chloroperbenzoic acids the oxirane groups was found to form with the participation of the double  $>\text{C}=\text{C}<$  bonds in the main and side chains of macromolecules. The conditions providing the obtaining 1,2-PB epoxidized polymers with a degree of functionalization of 33-35% were revealed.

**Key words:** modification, 1,2-polybutadiene, epoxidation, peracids, metha-chlorperbenzoic acid, trifluoroperacetic acid, functionalization degree

*E.G. KHOMUTOVA, O.I. OSTANINA*

#### **KINETIC CATALYTIC TEST-METHOD OF OSMIUM TRACE DETERMINATION**

The kinetic catalytic test-method of osmium trace determination was proposed. It is based on carrying out the indicator reaction of oxidation of arsenic (III) and neutral red by potassium bromate on a solid carrier. The determination optimum conditions were chosen. The determination is possible in a wide range of concentrations, from 2 to  $2.0 \times 10^{-5}$   $\mu\text{g/ml}$  of osmium. The detection limit is  $5 \times 10^{-6}$   $\mu\text{g/ml}$ , the standard deviation does not exceed  $s_r = 0.25$ . The test-method is selective to most of non-ferrous metals. More than 100- multiple excesses of another platinum metals don't prevent. The validity of the method is confirmed by the "introduced-found" method and by determination results in the State Standard Sample.

**Key words:** test-method, catalytic reaction, osmium determination

*M.G. MANDZYUK, A.O. KUNITSKAYA, S.A. KULICHENKO*

#### **EXTRACTION OF SULFO-AZO DYES INTO MICELLAR PHASES OF CETYLPYRIDINIUM CHLORIDE**

The optimal conditions for obtaining liquid cationic micellar phases modified by electrolyte and salicylic acid were found. The reasonability of using such phases for extraction and determination of anionic forms of food sulfo-azo dyes was shown. The developed procedure for spectrophotometric determination of the orange yellow S and ponceau 4R after micellar extraction into cationic micellar phase was successfully tested at analysis of food.

**Key words:** micellar extraction, cetylpyridinium chloride, preconcentrating, food dyes

*M.G. DONTSOV, A.V. BALMASOV*

#### **LOCAL CURRENTS AT COPPER CHEMICAL POLISHING**

The electrochemical behavior of copper in phosphoric acid solution containing ammonium nitrate was studied. It is shown that at the dissolution of copper due to the concentration difference in different parts of the

surface the local current can flow. Its direction and magnitude depends on the water content in a solution and on the rate of mass transfer processes near the surface.

**Key words:** local current, chemical polishing, copper, phosphoric acid, diffusion EMF

**S.V. FEDOSOV, M.O. BAKANOV, A.V. VOLKOV, A.I. SOKOL'SKIY, Yu.A. SHCHEPOCHKINA**  
**MATHEMATICAL MODEL OF DYNAMICS OF PORE-FORMATION PROCESS AT THERMAL PROCESSING FOAM GLASS CHARGE**

Processes of the formation of porous structure of the foam glass were considered. The mathematical model describing the mechanism of formation of pores in a melt of foam glass charge at thermal processing was proposed. The model describes the dynamics of the process of pore formation and the growth of the radius and the volume of pores.

**Key words:** foamed glass, charge, porosity

**O.V. BABKINA, A.V. ALEKSEENKO, A.L. NEMOIYKINA**  
**OBTAINING MONOFILAMENT FIBER AND GLYCOLIC AND LACTIC ACIDS COPOLYMER (PGLA 94/6) BY EXTRUSION METHOD**

The method the obtaining the glycolic and lactic acids copolymer (PGLA with a ratio glycolide/lactide 94/6 wt.%) by the copolymer polymerization in a multizone extruder with simultaneous preparing the monofilament thread fibre is presented.

**Key words:** biopolymer, fiber, polyglycolid lactide, extrusion technology

**M.A. VELBOIY, L.V. SHARNINA, E.L. VLADIMIRTSEVA, A.I. GRIGORIEVA**  
**DISCOLORATION OF DIRECT DYES SOLUTIONS IN PRESENCE OF INSOLUBLE ALUMINUM SILICATES**

The sorption activity of clay minerals with respect to solutions of direct dyes was evaluated. The possibility of purification of used dyeing solutions by oxidative destruction was investigated.

**Key words:** aluminum silicates, clay minerals, sorption, direct dyes, hydrogen peroxide

**V.N. CHIKANOV, Yu.N. SHALIMOV, V.I. PARFENYUK**  
**STRUCTURAL CHANGES IN BINARY HALIDE SYSTEMS WITH COMMON ANION AND CATIONS OXIDATION LEVEL OF 1+ AND 2+**

In the article the deviations of the experimental liquidus curves from calculated on Schroeder equation liquidus curves were analyzed for binary halide systems with a common anion and oxidation level of cations of 1+ and 2+. The most informative factors affecting the interaction of halides and on the type of fusibility diagrams were determined. With the increase in positive deviations of the experimental liquidus curves from the calculated liquidus curves according to the equation Schroeder there is a transition from the ideal eutectic systems to eutectic systems inclined to the formation of solid solutions, and further to systems containing the limited solid solutions and solid solutions with a minimum at the liquidus curve. The most informative factors affecting the formation of solid solutions are the structure of the crystal lattice of components, electronic configuration and close sizes of cations. With the increase in the negative deviations of the liquidus curves it has a place of transition from the ideal eutectic systems to eutectic systems inclined to a complex formation in the melt, and then to state diagrams with a formation of compounds.

**Key words:** physical-chemical analysis, binary fusibility diagrams, halogens, liquidus curves deviations, cations polarizing action

**T.E. NIKIFOROVA, V.A. KOZLOV, S.V. NATAREEV, E.A. DUBKOVA**  
**INFLUENCE OF PLASMA MODIFYING ON SORPTION PROPERTIES OF FLAX FIBER**

The influence of plasma modifying on sorption properties of short flax fiber with respect to Zn (II) ions was investigated. The modifying a flax fiber by gas-discharge plasma of atmospheric pressure and gas-discharge plasma of low pressure was discovered to result in the increase in a sorption capacity of a natural material and to reduction of sorption equilibrium time in "ZnSO<sub>4</sub> water solution – sorbent" system. It was noticed that modifying effect depends on discharge type.

**Key words:** sorption, plasma, flax fiber

*T.V. SHARIPOV, A.G. MUSTAFIN, R.N. GIMAEV, F.Kh. KUDASHEVA,  
A.D. BADIKOVA, R.N. GALIAKHMETOV*  
**RECYCLING OF SPENT SULFURIC ACID - WASTE OF PRODUCTION  
OF HIGH OCTANE GASOLINE**

Integrated process of waste treatment of spent sulfuric acid (SSA) alkylation waste is represented including its neutralization, extraction separation of organic and inorganic phases and production of ammonium sulfate from the inorganic part. The methods of production of complex fertilizers from SSA were developed, as well as with the use of ammonium sulfate produced from waste. Organic waste residue was used to produce bitumen and fuel compositions, as a reagent for enhanced oil recovery and/or washing agents. A variant of residue's utilization by thermal decomposition was considered.

**Key words:** spent sulfuric acid, extraction, ammonium sulfate, nitrogen fertilizer, fuel composition, bitumen composition, complex fertilizer, recoverable oil, technical carbon, washing agent

*S.V. SMIRNOVA*  
**ESTIMATION OF EFFICIENCY OF SOME STARCH DERIVATIVES AS SIZING COMPONENT  
OF SIZE**

The influence of water-soluble starch ethers on frictional and deformation properties of sized cotton and polyester yarns was investigated. The high efficiency of starch derivatives application was shown as gluing component of size.

**Key words:** starch esters, sizing, frictional and deformation parameters

*E.A. MEZINA, I.M. LIPATOVA*  
**INFLUENCE OF FILLER NATURE AND MECHANICAL ACTIVATION ON STRUCTURE  
OF POLYMER MATRIX IN FILLED CHITOSAN FILMS**

The regularities of the influence of filler nature and mechanical activation of forming suspensions in rotary-pulse machine on physical-mechanical and sorption properties of composite films based on chitosan were studied. The mechanical-acoustic incorporation of fillers was shown to allow increasing in a strength of filled chitosan films more than 4 times.

**Key words:** chitosan, rotary-pulse machine, mechanical-acoustic action, fillers

*S.V. FEDOSOV, M.V. AKULOVA, T.E. SLIZNEVA, A.M. KRASNOV*  
**MECHANICAL AND MAGNETIC ACTIVATION OF WATER SOLUTIONS OF CHEMICAL  
ADDITIVES AS FINE-GRAINED CONCRETE MODIFICATION WAY**

Results of studies of the mechanical and magnetic activation of water and water solutions of chemical additives of wide spectrum of action on the structure and properties of cement compositions are presented. Regularities of increase in strength characteristics and other of quality factors of concrete prepared by the mechanical and magnetic activated water were found as well as peculiarities of hardening the modified concrete.

**Key words:** mechanical activation, magnetic action, compressive strength, water adsorption, superplasticizer, sodium thiosulfate, sodium silicate, thermogravimetric analysis, X-ray analysis, concrete structure

*S.P. BOBKOV, S.S. SMIRNOV, N.R. KOKINA*  
**APPLICATION OF SYSTEM APPROACHES AT TECHNOLOGICAL PROCESSES MODELING**

This article discusses the possibility of a systematic approach to the development of mathematical models of technological processes. The use of multi-level abstraction of elements of complex systems is described. The place of discrete dynamical models in a form of cellular automata was shown in the hierarchy of mathematical models of the basic processes of chemical technology.

**Key words:** systems approach, mathematic simulation, discrete models, cellular automata

*A.V. KUKUSHKIN, Yu.V. SEMENOV, A.N. LABUTIN*  
**VECTOR CONTROL OF WELL-MIXED REACTOR FOR CARRYING OUT REACTIONS  
OF VARIOUS TYPES**

The paper deals with the synthesis of continuous stirred-tank reactor control vector algorithm for series, parallel-series and reversible types of reactions realization. Simulations of the closed-loop system "object - a control unit" were carried out for the purpose of studying functionality of control vector algorithm.

**Key words:** control vector algorithm, continuous stirred-tank reactor, control system synthesis, synergetic approach

*A. V. TVARDOVSKIY, V. V. NABIULIN, A. A. FOMKIN*

#### **MODEL AND EQUATION OF ADSORPTION DEFORMATION OF MICROPOROUS ADSORBENT**

In given article the model and equation of adsorption deformation of microporous adsorbents with the arbitrary bent slit-like micro pores was proposed. The equation allows connecting the deformation value in a single micropore with a size changes in all adsorbent. The values of deformation of all adsorbent were determined on the base of deformation calculation for single miropore. Calilations were compared with experimental data on linear adsorption deformation of microporous adsorbent of AP-B at adsorption of carbon tetrachloride for the wide range of equilibrium pressures.

**Key words:** adsorption, adsorbent, adsorbents linear deformation, dilatometric method, linear deformation

*A. I. OREKHOVA, A. M. KHALEMSKYI, T. M. SHERSTOBITOVA, B. S. KOGAN, A. V. IVANOV*  
**FERNEL - REAGENT-OXIDIZER FOR DISINFECTION AND PURIFIATION  
OF AQUEOUS SOLUTIONS**

Current research studies composition and some physical-chemical properties of FERNEL™ reagent , as well as the reagent tests on industrial wastewaters cleaning from CN<sup>-</sup>, As (III), Cu, Zn, Mn, W. The reagent has a high oxidizing activity due to presence of potassium (sodium) ferrates. Finely dispersed iron (III) oxide is a product of alkali metals ferrates reduction. Its high sorptive power serves to increase in a quality of water cleaning.

**Key words:** ferrates, water purification, sewage sanitation