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## A B S T R A C T S

*A.A. ILYIN, D.V. BABAIYKIN, N.N. SMIRNOV, A.P. ILYIN*

**PROBLEMS OF LOW-TEMPERATURE CONVERSION OF CARBON MONOXIDE WITH WATER VAPOR AT AMMONIA PRODUCTION**

The review of conventional and developing methods of steam reforming processes carrying out of carbon monoxide conversion is given for the ammonia production. Peculiarities of application of low temperature catalysts were considered for processes intensification. The comparative analysis of production methods of CO conversion catalysts was carried out. Ways of process improvement of low temperature conversion of carbon monoxide with water vapor are discussed.

**Key words:** conversion, carbon monoxide, catalyst, activity, selectivity, mechanochemical synthesis

*V.S. VASIN, T.YU. KOLDAEVA, V.P. PEREVALOV*

**FEATURES OF DIAZOTIZATION OF DERIVATIVES OF 6-AMINO-7-CHLORO-2-(2-HYDROXYPHENYL)-2H-BENZOTRIAZOLE-4-CARBOXYLIC ACID**

The features of diazotization of derivatives of 6-amino-7-chloro-2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid were studied. By means of further transformations of synthesized diazo compounds the new derivatives of 2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid were obtained.

**Key words:** 2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid, diazotization, nitration, diazo compounds transformations

*N.M. REPKIN, T.N. NESTEROVA, E.V. GOLOVIN, S.V. LEVANOVA, YU. A. DRUZHININA*

**IDENTIFICATION OF THERMAL DECOMPOSITION PRODUCTS OF SOME ALKYLPHENOLS**

The identification of products of thermal decomposition of 4-tert-butylphenol and 2,6-di-tert-butyl-4-methylphenol was carried out using chemical methods and chromatography-mass spectrometry.

**Key words:** alkylphenols, chromatography-mass spectrometry, identification

*L.A. KOCHERGINA, E.A. KHOKHLOVA, O.M. DROBILOVA*

**THERMOCHEMICAL STUDY OF COMPLEXATION REACTIONS OF COBALT (II) ION WITH L-SERINE IN AQUEOUS SOLUTION**

Heats of reactions of complex formation of L-serine with doubly charged ion cobalt were determined by calorimetric method. Heat effects of the interaction of the amino acid solution with a solution of cobalt (II) and the corresponding heat of dilution of a solution of cobalt nitrate were measured at temperatures of 288.15 to 298.15 K, 308.15 K and at ionic strengths of 0.25, 0.50 and 0.75 on background of  $\text{KNO}_3$ . The standard thermodynamic characteristics of complex formation were calculated. Standard enthalpies of formation of the mono-, bis- and tris-coordinated complexes of cobalt (II) in aqueous solution were determined.

**Key words:** thermodynamics, amino acid, solutions, L-serine, complexes, calorimeter

*A.L. TARAN, T.I. PYNKOVA, Yu.A. TARAN*

**APPROACH TO ESTIMATION OF KINETIC PARAMETERS OF SELF-DISPERSION PROCESS**

In given study the possibility of applying the formal analogy theory of processes with the structure rearrangement for determining the self-dispersion parameters: the critical radius and the critical surface tension as well as for the study of dynamics of emulsion formation.

**Key words:** emulsion, dispersion, surface tension, critical radius, formal analogy, nucleation rate, growth rate

*M.M. MATAEV, D.ZH. NUKETAeva, N.A. ZHUMANOVA, N.O. MYRZAKHMETOVA, B.M. BUTIN,  
M.R. ABDRAIMOVA*

**HEAT CAPACITY AND THERMODYNAMIC FUNCTIONS OF NEODYMIUM AND SAMARIUM  
BISMUTHITES**

Heat capacities of  $\text{RCaBiO}_4$  (R-REE) were measured by means of the method of dynamic calorimetry in a temperature range of 298.15-673 K. Equations describing  $C_p^0 \sim f(T)$  dependencies were obtained.  $C_p^0(T), H^0(298,15), S^0(T), \Phi(T)$  thermodynamic functions were calculated.

**Key words:** heat capacity, calorimeter, bismuthite

*E.V. CHERKASOVA, YU.R. GINIYATULLINA, T.G. CHERKASOVA, E.S. TATARINOVA*  
**STUDY OF INTERACTION OF CADMIUM (II) AND LUTETIUM (III) SALTS WITH POTASIAM  
HEXA (ISOTHIOCYANATE) CHROMATE (III) IN WATER SOLUTIONS**

The interaction of  $\text{K}_3[\text{Cr}(\text{NCS})_6]$  anion complex with salts of cadmium (II), lutetium (III) and  $\epsilon$ -caprolactam was studied. Obtained results are considered from viewpoint of the concept of «hard-soft acids and bases»

**Key words:** double complex salts, chromium, cadmium, lutetium,  $\epsilon$ -caprolactam

*YA.O. MEZHUEV, YU.V. KORSHAK, M.I. SHTILMAN, I.V. SOLOVYOVA, M.A. SALOP*  
**KINETICS OF OXIDATIVE POLYMERIZATION OF ANILINE IN AQUEOUS SOLUTIONS  
OF POLYVINYL ALCOHOL**

The effect of polyvinyl alcohol on the rate constants and the activation energies was determined for the steps of oxidative polymerization of aniline in aqueous solutions induced by ammonium persulfate.

**Key words:** polyaniline, aniline, kinetics, polyvinyl alcohol, rate constant, activation energy

*N.KH. RUSTAMOV, G.G. ABBASOVA*  
**SYNTHESIS AND INVESTIGATION OF COORDINATION COMPOUNDS OF MANGANESE(II)  
WITH 1,10-PHENANTHROLINE AND DINITROBENZOLAZOSALICYLIC ACID**

The heteroligand complexes of manganese (II) with 1,10-phenanthroline and chromogen organic reagent - dinitrobenzolazosalicylic acid were synthesized. Conditions of formation and extraction and composition of complexes were established by spectrophotometric method. Complexes were studied with chemical analysis, IR-spectroscopy, thermogravimetric method and X-ray.

**Key words:** manganese, complexation, synthesis, spectrophotometry

*A.V. KOMIN, A.S. VYSOKOVSKIY, I.S. KOROTNEVA*  
**ON SOLUBILITY OF SURFACE-ACTIVE COPOLYMERS OF METHACRYLIC ACID AND  
PIPERYLENE IN ORGANIC ENVIRONMENT**

Solubility parameters of copolymers of methacrylic acid and piperylene, some organic solvents, and values of probable solubility of copolymer of methacrylic acid and piperylene in organic environment were calculated. The solubility of copolymers of methacrylic acid and piperylene was determined in organic solvents and their mixtures.

**Key words:** copolymers of methacrylic acid and piperylene, surface-active copolymers, solubility, solubility parameter, organic solvent

*N.V. ULITIN, R.YA. DEBERDEEV, R.R. NABIEV, K.A. TERESHCHENKO, A.A. BERLIN*  
**SOLUTION OF INVERSE KINETIC PROBLEM FOR FAST POLYMERIZATION PROCESSES.  
PROCESS OF BUTYL RUBBER PRODUCTION**

In the frame of process description of butyl rubber obtaining the mathematic model was developed for copolymerization of isobutylene with isoprene in methylchloride. The inverse kinetic task was solved on determination of unknown rate constants of elementary reactions. The model adequacy was shown by means of comparison of model and experimental values of molecular-mass parameters of product.

**Key words:** butyl rubber, modeling, inverse kinetic task

*L.N. ADEEVA, T.A. DIDENKO, V.V. NIKITINA, T.V. LUKISHA, N.N. STRUNINA*  
**SORPTION LEACHING RARE EARTH METALS FROM SECONDARY RAW MATERIALS**

The possibility of extraction of rare earth metals by sorption leaching of poor raw material for example, the ash of sapropel non-hydrolyzable residue, was shown. Complete factorial experiment  $2^3$  on establishment of influence of temperature, acidity and process duration on leaching degree of yttrium, lanthanum and cerium,

and their sum was carried out. For sorption leaching the Purolite C100-H cation-exchange resin was applied. Sorption characteristics of this cation-exchange resin for lanthanum (III) example were previously established.

**Key words:** rare earth metals, sorption leaching, cation-exchange resin, sulfonic acid groups

*M.T. MASHAROV, N.V. UTEV, A.B. SHEIN*

#### **IMPEDANCE OF MNSI-ELECTRODE IN SODIUM HYDROXIDE SOLUTION**

The results of investigation of anodic behaviour of MnSi in NaOH solution at the potentials from corrosion potential up to oxygen evolution potential are presented. Impedance spectra in passive region are described taking into consideration the presence of double-layer passivating oxide film of metal component of alloy on electrode surface. Equivalent electric circuits for the different ranges of electrode potential were proposed.

**Key words:** manganese, silicide, anodic dissolution, passivation, impedance

*M.F. BUTMAN, N.L. OVCHINNIKOV, V.V. ARBUZNIKOV, A.V. AGAFONOV*

#### **ACTIVATED SYNTHESIS OF Al-PILLARED MONTMORILLONITE**

A number of physical treatments - hydrothermal, ultrasonics and microwave irradiation – were used to activate the synthesis of Al-pillared montmorillonite on the step of intercalation of polyhydroxy aluminum cations. Textural and adsorption properties of the materials were characterized using X-ray diffraction, differential thermal analysis, infrared spectroscopy, photometry, scanning electron microscopy and nitrogen adsorption-desorption. Regardless of the processing the pillared montmorillonite is characterized by a narrow unimodal pore-sizes distribution. Specific surface area equal to  $S_{\text{BET}} = 172.4 \text{ m}^2/\text{g}$ , total pore volume- $V_{\text{total}} = 0.31 \text{ cm}^3/\text{g}$ , and average pore size was-  $D_{\text{average}} = 7.1 \text{ nm}$  were observed to be maximal for the samples treated by the microwave irradiation.

**Key words:** lamellar aluminum silicates, intercalation, aluminum polyhydrocomplex, pillared montmorillonite

*N.V. FILATOVA, YU.V. PIMKOV, N.F. KOSENKO*

#### **DEVELOPMENT OF COMPOSITION OF FIBROUS MATERIAL USING WASTE PRODUCTS OF REFRACTORY HEAT ISOLATION**

The method of the refractory wastes utilization of mullite- siliceous fibers in a composition of lamellar structures in which there is a composite binder interlayer between two layers of a commercial roll material consisting of a phosphate binder matrix and a filling agent as disagglomerated fibers wastes was proposed. The optimal composition was selected for a fibrous composite material on the base of MKRR-130 and MKRRC-150 fibers and alumina-boron-phosphate binder and alumina-chromium-phosphate binder. Its volume weight, bending strength, and heat conductivity were determined.

**Key words:** fibrous composite material, mullite-siliceous fiber, phosphate binders, heat-insulating materials, fibers wastes

*N.V. VERESHCHAGINA, G.B. ZAKHAROV, T.N. ANTONOVA, I.G. ABRAMOV*

#### **LIQUID-PHASE HYDROGENATION OF CYCLO OLEFINS**

Regularities of hydration of some cycloolefins were studied as well as unsaturated oxygen-containing alicyclic compounds with hydrogen in the presence of palladium catalysts (1% of Pd/C) suspended in liquid phase. Thin composite layers of an amorphous carbon-palladium provide nano-scale size of metal particles (20-900 nm). Process parameters were estimated depending on parameters of its implementation. The reactivity of double bonds of compounds under hydration was compared.

**Key words:** liquid-phase hydrogenation, cyclooctadiene, unsaturated alicyclic oxygen-containing compounds, nano catalysts

*G.M. GONCHAROV, A.A. LOMOV, I.S. GUDANOV, YU.B. LAVRENTIEV, P.P. YURYGIN*

#### **NUMERICAL STUDY OF FORM-FORMATION PROCESS AT TUBULAR PRODUCTS EXTRUSION FROM RUBBER MIXTURES**

Main features of coextrusion technology of ring profiles from rubber mixtures are presented. The numerical calculation method of hydrodynamics of the stratified flow process of viscoelastic fluids was proposed. The problem of determining the dimensional parameters of the aggregated polymer products including was solved taking into account post-extrusion swelling.

**Key words:** coextrusion, rubber mixtures, extrusion head, cable insulation

*E.I. SIPKINA, O.V. LEBEDEVA, YU.N. POZHIDAEV, M.A. POKROVSKAYA, T.V. RASKULOVA,  
V.I. DUDAREV*

#### **NEW SORBENTS FOR PLATINUM (IV) EXTRACTION ON BASE OF COMPOSITE MATERIALS**

New sorption materials on the base of organic silicone monomers and copolymers of 1-(vinylxyethoxy)-propylene oxide-2,3 with vinyl chloride were obtained by a method of zol-gel synthesis. Structure formation of sorbents is the result of formation of semi-interpenetrating grids. Sorption materials are characterized by high chemical and thermal stability and show the sorption ability with respect to platinum (IV) ions in acid solutions.

**Key words:** zol-gel synthesis, organic silicone composites, platinum, sorption capacity, interface distribution coefficients

*D.O. KORPATENKOV, A.A. MERKIN, A.A. KOMAROV, O.V. LEFEDOVA*

#### **SIDE PROCESSES IN REACTIONS OF CATALYTIC HYDROGENATION OF NITROBENZENE AND IT'S SUBSTITUTED ON SKELETAL NICKEL**

The liquid phase catalytic hydrogenation is the efficiency method for obtaining the aromatic amines having a significant practical importance. In given article the kinetics of hydrogenation reactions was considered for nitrobenzene, 2-nitroanizole, 4-nitroaniline in water solutions on the base of 2-propanol on skeletal nickel at different temperatures.

**Key words:** liquid-phase hydrogenation, 2-propanol, dehydration, skeletal nickel, nitrobenzene, 2-nitroanyzole, 4-nitroanyline

*D.F. GRISHIN, I.S. ILYCHEV, N.B. VALETOVA, I.D. GRISHIN*

#### **ALKYL GALIDES IN NICKEL CATALYZED POLYMER SYNTHESIS BASED ON METHYL METHACRYLATE**

The features of the polymerization of methyl methacrylate in the presence of a catalyst composition on the base of dibromide bis(triphenylphosphine)nickel, zinc dust and halogen-containing initiators were investigated. The influence of the structure of the alkyl halide initiators on PMMA yield was estimated. The methods of synthesis of fluorescent block copolymers based on methyl methacrylate and 2,7-diiodine fluorene with nickel complexes were developed.

**Key words:** radical polymerization, nickel complexes, catalysis by metal, methyl methacrylate, fluorescent polymers

*V.A. PANKRATOV, O.A. SDOBNIKOVA, N.S. SHMAKOVA*

#### **SYNTHESIS AND PROPERTIES OF NEW SURFACE-ACTIVE QUATERNARY AMMONIUM SALTS**

A series of new surface-active mono-and bis-quaternary ammonium salts with two hydrophobic radicals was synthesized. Their surface-active and antimicrobial properties were studied. On the base of cellulose esters and polyolefin film polymeric materials were obtained with the use of synthetic additives. The prospect of application these films for food packaging was shown.

**Key words:** surface-active substances, quaternary ammonium salts, ethers and esters of cellulose, polyolefins

*A.S. VYSOKOVSKIY, I.S. KOROTNEVA, A.V. KOMIN, E.A. POLYAKOVA*

#### **BIOCOMPOSITE MATERIAL BASED ON SYNTHETIC LATEXES AND NATURAL POLYSACCHARIDES**

Biocomposite polymeric materials based on aqueous dispersions of polyvinylacetate, carboxyl-containing butadiene-styrene-butylacrylate- methacrylamide graft-copolymer, carboxyl-containing butadiene-methylmethacrylate copolymer and natural macromolecular polysaccharides were developed for the manufacturing decorative elements

**Key words:** synthetic polymer, biocomposite material, viscosity, thickening agent, plasticizer

*E.A. DANILOVA, A.V. TALAKUEVA, R.M. GALIEV, T.V. KUDAYAROVA, M.K. ISLYAIKIN*

#### **IMPROVING TECHNOLOGY OF 2-IMINO-4-THIOBIURET OBTAINING**

Details of earlier patented processing of 2-imino-4-thiobiuret by interaction of dicyanodiamide with sodium thiosulphate in a low acid medium are under consideration.

**Key words:** dicyanodiamide, thiourea, amidinothiourea, 2-imino-4-thiobiuret, synthesis

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

#### **CHITOSAN-FIBROUS MATRIXES FOR PROLONGED EXTRACTION OF LIDOCAINE DRUG**

An influence of receipt method and composition of polymeric textile prolongators based on non-woven fabrics and chitosans with different degree of deacetylation on release rate of lidocaine drug from them was studied.

**Key words:** chitosan, drugs, non-woven material, application, rotor-impulse device

*G.A. ZUEVA, V.A. PADOKHIN, G.N. KOKURINA*

#### **STRUCTURAL MODEL OF HEAT CONDUCTIVITY OF UNLIMITED CYLINDER**

On the base of the solution in the field of Laplace images of heat conductivity problem for the unlimited cylinder at boundary conditions of the third kind the structural model of heat exchange was developed. The model represents visualization of interaction and conversion of heat fluxes, both on boundary, and in a cylinder inside and allows carrying out the identification of heat parameters.

**Key words:** heat conduction, unlimited cylinder, system and structural approach, structural model of heat exchange

*S.P. RUDOBASHTA, M.K. KOSHELEVA, K.E. RAZUMEEV, A.V. PICHUGIN*

#### **CALCULATION OF PROCESS OF GRANULES POLYCAPROAMIDE DRYING**

The factors affecting the intensity of drying the granules polycaproamide were considered. The kinetics of drying that material was shown to limit by internal diffusion resistance. The data on the mass conductivity coefficient of polycaproamide granules were obtained. Zonal method for calculating the drying of the material applied to the fluidized bed was considered. The examples of the device calculation and recommendations on hardware and technology design of process were given.

**Key words:** drying, kinetics, mass transfer, zonal method, fluidized bed, polycaproamide

*V.A. SIRENEK*

#### **METHODS OF RESEARCH OF DIFFUSION PROCESSES IN SOLIDS ON BASE OF WAVE DIFFUSION MODEL**

Mathematical methods (analytical and numerical, deterministic and probabilistic) to study the properties of the wave model of diffusion in applying to the calculation of the relaxation processes of mass transfer were developed.

**Key words:** relaxation nature of mass transfer, effect of "delay" of diffusion fluxes, hyperbolic equation, wave model of diffusion, system of solid-reagent, diffusion zone

*A.V. VOROSHIN, O.V. CHAGIN, V.N. BLINICHEV*

#### **STUDY OF SEPARATION PROCESS OF WATER-ALCOHOL MIXTURE ON RECTIFICATION UNIT OF CONTINUOUSLY WORKING WITH BATCH VORTEX NOZZLE**

This paper presents the results of a study of the distillation process of continuous distillation unit using the device as a mass transfer burst vortex nozzles, well-established in a process of absorption. Studies have shown that the process of rectification using HRP is sufficiently intensive, the effectiveness of which depends significantly on the reflux ratio and the initial concentration. The empirical relationship of efficiency of plate (one packet) depends on the initial concentration of alcohol and on variables on column height of Re criteria on steam and liquid.

**Key words:** distillation, column, packing

*V.P. MESHALKIN, A.A. OBRAZTSOV, S.M. KHODCHENKO, E.A. PANINA*

#### **REDUCING TOPOLOGICAL-HEURISTIC METHOD FOR OPTIMAL PIPELINE MANIFOLD NETWORKS LAYOUT**

High-speed reducing topological-heuristic method for optimal 3D pipeline manifold networks layout was developed. This method is based on the computer-aided procedure for making a topological model of chemical plant space – reduced generic hypothetical constructional graph with nonregular structure and on the computer-aided procedure for Steiner's spanning trees generation on the base of meta-heuristics simulating ant colonies goal-directed behavior for pipeline route direction choice in concerned graph.

**Key words:** hydraulic system, ant algorithms, production rule, pipeline manifold network, topological-heuristic methods, pipeline layout, chemical processes integration, chemical plant

***P.P. KIM, A.M. PETROVSKIY, A.A. PERETRUTOV, M.N. CHUBENKO, V.A. KOMAROV***  
**EQUILIBRIUM PRESSURE OF NITROGEN OXIDES ABOVE NITROSES**

The pressure of nitrogen oxide vapors above nitroses containing 72 - 74 % of H<sub>2</sub>SO<sub>4</sub>, in the temperature range of 293 - 443 K and solution nitrose content of 0.5-4.0% N<sub>2</sub>O<sub>3</sub> was determined. The empirical equation was offered for calculation of vapors pressure.

**Key words:** sulfuric acid, nitrose, fractional pressure, nitrogen oxides, nitric acid

***A.A. BAKANOVA, E.R. KOFANOV, G.G. KRASOVSKAYA, A.A. NAZAROVA, A.F. BETNEV***  
**SYNTHESIS OF 2,4-DINITROPHENYLNORBORNAN CARBOXYLIC ACIDS**  
**CONTAINING IMIDE CYCLE**

The scheme of synthesis of dinitrocarboxylic acids containing norbornane and imide cycles is presented.

**Key words:** nitration, phenylnorbornancarboxylic acid, imides, dinitrocarboxylic acids