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A B S T R A C T S

*O.M. TROKHIMENKO***SAMPLE PREPARATION IN ENVIRONMENT OF WATER-SOLUBLE TERTIARY AMINES**

The application of water-soluble tertiary amines was considered for sample preparation at the determination of inorganic constituents of samples with an organic matrix for: dilution of liquid samples, extraction of analytes without the samples mineralization, treatment of residues after wet or dry acid mineralization of samples, samples mineralization under the action of acoustic or electromagnetic fields; fixation of fluorides after acid mineralization of samples. Advantages and disadvantages of sample preparation in an environment of water-soluble tertiary amines and their effect on the results of spectral measurements are discussed.

Key words: sample preparation, water-soluble tertiary amines, samples with organic matrix

*N.N. VERDIEV, U.G. MAGOMEDBEKOV, Z.N. VERDIEVA, P.A. ARBUKHANOVA, P.M. ISAEVA***PHASE EQUILIBRIA IN NaF – KF – BaF₂ – KCaF₃ – K₃FMoO₄ SYSTEM**

The NaF – KF – BaF₂ – KCaF₃ – K₃FMoO₄ pentatope was studied with the differential-thermal method of physical-chemical analysis using General rules of the projective-thermographic method. It was established that in the system there is eutectic crystallizing at 600°C. The concentrations of initial components were determined in a eutectic point.

Key words: multicomponent system, physico-chemical analysis, liquidus, phase transition, eutectic, peritectic, heat accumulator

*O.V. MATVEEVA, N.V. LAKINA, V.Yu. DOLUDA, E.M. SULMAN***ADVANTAGES OF MAGNETIC NANOPARTICLES APPLICATION FOR PEROXIDASE IMMOBILIZATION FOR VITAMIN E PRECURSOR SYNTHESIS**

The present work is devoted to synthesis of new biocatalytic systems based on peroxidase (EC 1.11.07) immobilized on inorganic carriers, SiO₂, Al₂O₃, and magnetic nano particles of γ -Fe₃O₄. The comparison of the activity and stability of biocatalytic systems was carried out in the oxidation process of trimethylphenol to trimethylhydroquinone - the precursor of vitamin E. In this work it was shown that a biocatalyst based on peroxidase immobilized on the magnetic nanoparticles of γ -Fe₃O₄ stabilized by sodium citrate had the most activity and stability.

Key words: 2,3,6-trimethylhydroquinone, magnetic nanoparticles, immobilization, peroxidase

*A.N. GUSEV, V.F. SHUL'GIN, Zh.V. DOBROKHOTOVA, N.N. EFIMOV,
G.G. ALEXANDROV, I.L. EREMENKO***OPTICAL AND MAGNETIC PROPERTIES OF DYSPROSIUM COMPLEX WITH BIS(PYRIDINE-2-IL-1,2,4-TRIAZOLE-3-ILE) METHANE**

The dysprosium (III) complex of [Dy(HL)(L)H₂O]·6H₂O composition where H₂L is bis (pyridine-2-yle-1,2,4-triazole-3-yle) methane was synthesized and studied. Molecular and crystal structures of compound were studied with methods of X-ray structural analysis. Spectra of photoluminescence and magnetic properties of complex were studied.

Key words: dysprosium, molecular structure, luminescence, magnetic properties

*A.A. MUKOVNIN, V.M. TALANOV***MODELING PHASE EQUILIBRIA IN LAVES PHASES**

Within the phenomenological theory of the second-order phase transitions, possible types of phase diagrams are analyzed for the systems described by thermodynamic potential invariant under group of transformations of a tetrahedron. Examples of Laves phases in which considered phase transformations occur are given.

Key words: phase diagram, phase transition, multi critical point, triple point

M.A. RADZIKHOVSKAYA, I.K. GARKUSHIN, E.G. DANILUSHKINA
STUDY OF SECANT TRIANGLES OF LiF-K₂MoO₄-K₂WO₄, LiF-LiKMoO₄-LiKWO₄
FOUR-COMPONENT MUTUAL SYSTEM OF LI,K||F,MoO₄,WO₄

Phase equilibrium states in secant triangles of four-component mutual system of Li,K||F,MoO₄,WO₄ were studied with the methods of differential thermal analysis and X-ray phase analysis. The lack of non-variant points of equilibria was established. The continuous sets of solid solutions of Li₂Mo_xW_{1-x}O₄, LiKMo_xW_{1-x}O₄, K₂Mo_xW_{1-x}O₄ and K₃FMo_xW_{1-x}O₄ are stable and they do not dissociate. The melting temperatures and alloy compositions were revealed on curves of mono variant equilibria in secant triangles of LiF-K₂MoO₄-K₂WO₄ and LiF-LiKMoO₄-LiKWO₄.

Key words: secant triangle, four-component mutual system, eutectic, continuous sets of solid solutions, mono variant curves of equilibria, non-variant points of equilibria

V.A. POSTNOV, M.K. KORSKOV, M.V. DOROGOV, M.Yu. SOLOVYOV
SYNTHESIS OF SULFONAMIDE DERIVATIVES OF 5-ARYL-OXAZOLE-2-CARBOXAMIDE

The method of multistep synthesis of previously undeclared sulfonamide derivatives of 5-aryl-oxazole-2-carboxamides was developed. The substances obtained correspond to requirements for potentially biologically active compounds for biological screening.

Key words: oxazole-2-carboxamides, sulfochlorination, oxazole sulfonamide derivatives

E.A. STREL'TSOVA, A.A. GROSUL
ADSORPTION OF TWEENS (-20, -40) FROM BINARY WATER SOLUTIONS WITH SODIUM DODECYL SULFATE ON PARAFFIN SURFACE

The adsorption of Tweens (Tween-20, Tween-40) from binary water solutions of different composition with sodium dodecyl sulfate (DDSN) on the low energy surface of paraffin was investigated. It was shown that under the adsorption of Tweens and DDSN from binary solutions by paraffin a synergistic effect is observed at the formation of mixed adsorption layer on the solid surface. According to Rosen's approach the composition of mixed adsorption layer and the parameters of the intermolecular interactions between the molecules Tweens and DDSN were calculated.

Key words: adsorption, surfactant, paraffin

S.V. SHILOVA, A.N. BEZRUKOV, A.Ya. TRET'YAKOVA, V.P. BARABANOV
ASSOCIATION OF SODIUM DODECYL SULFATE WITH CATIONIC POLYELECTROLYTE IN AQUEOUS-ETHANOL SOLUTIONS

The association process of the cationic polyelectrolyte (poly-N-benzyl-N,N,N-dimethylmetacryloiloxyethylammonium chloride) and the anionic surfactant (sodium dodecyl sulfate) was studied with the methods of surfactant-selective potentiometry and spectrophotometry in aqueous ethanol media. The paper provides the analysis of the influence of a mixed "water-alcohol" solvent composition on the parameters of surfactant binding by the polyelectrolyte and the conditions for phase separation in the system.

Key words: cationic polyelectrolyte, sodium dodecyl sulfate, polymer-colloid complex, mixed solvent

A.S. KUZNETSOVA, E.A. DANILOVA, M.K. ISLYAIKIN
STRUCTURE PECULIARITIES OF 3,5-DIAMINO-1,2,4-THIADIAZOLE BY DFT METHOD

Quantum chemistry calculations of 3,5-diamino-1,2,4-thiadiazole, its stereo isomers and tautomers as well as transition states of intramolecular conversions were carried out at the level of density functional theory using B3LYP5 hybrid functional and Dunning-type correlation-consistent basis set cc-pVTZ (DFT/B3LYP5/cc-pVTZ). This compound was established to be a non-rigid one.

Key words: S,N-substituted heterocycle, diaminothiadiazole, transition state, tautomerism, activation barrier, functional density theory

D.A. SHUTOV, E.S. BOBKOVA, V.V. RYBKIN
COMPARATIVE PARAMETERS OF PLASMACHEMICAL DESTRUCTION OF ANIONIC SURFACTANTS, SULFONOL AND SODIUM LAURYL SULFATE, UNDER ACTION OF CONTACT GLOW DISCHARGE IN AIR

In this work the kinetics of the plasma-chemical destruction and product formation in the water solution of anionic surfactants, sulfonol and sodium lauryl sulfate, were studied under the action of an atmospheric pressure DC discharge in air. Surfactants destruction regularities were established in the range of treatment time

of 30-600 s, discharge current in the range of 20-100 mA and solution concentrations in the range of 0.005-10 g/L. For the solution concentration of 0.005 g/L the kinetic regularities of hydrogen peroxide, sulfate and nitrate ions, and formaldehyde formation were established.

Key words: plasma, liquid cathode, sulfonol, sodium lauryl sulfate, destruction kinetics, products formation

O.A. PETROV, G.V. OSIPOVA, V.E. MAIYZLISH, A.V. RODIONOV
STABILITY OF NITRO-SUBSTITUTED TETRAKIS(TERT-BUTYL)PHTHALOCYANINE
IN SYSTEM OF NITROGEN-CONTAINING BASE-DIMETHYLSULFOXIDE

The state of tetrakis(3-nitro-5-tert-butyl) phthalocyanine and tetrakis(4-nitro-5-tert-butyl) phthalocyanine in dimethylsulfoxide media was studied. A high stability of proton transfer complexes was found. Tetrakis(4-nitro-5-tert-butyl) phthalocyanine- dimethylsulfoxide complex in strong base media was shown to be more stable than tetrakis(3-nitro-5-tert-butyl) phthalocyanine – dimethylsulfoxide complex which are kinetically unstable. The influence of nature of cyclic and acyclic nitro-containing bases on destruction process of proton-transfer complex of tetrakis(3-nitro-5-tert-butyl) phthalocyanine was established.

Key words: tetrakis(3-nitro-5-tert-butyl) phthalocyanine, tetrakis(4-nitro-5-tert-butyl) phthalocyanine, acid-base interaction, proton-transfer complex, kinetic stability, nitrogen-containing base, dimethylsulfoxide

K.A. DZHBAAI, T.G. SHIKOVA, V.A. TITOV, Yu.N. LARINA
MODIFICATION AND DESTRUCTION OF ARAMID FILM IN NON-EQUILIBRIUM OXYGEN
AND ARGON PLASMAS

Processes of plasma modification and destruction of "Rusar" aramid films have been studied. The films were treated in argon and oxygen low-pressure direct current discharges at pressures of 30 and 150 Pa and discharge currents of 20 and 50 mA. Mass loss rates and rates of gas products formation were measured. Surface wettability, chemical composition and topography were characterized using water and glycerol contact angle measurements, X-ray photoelectron spectroscopy and atomic-force microscopy. Plasma treatment in oxygen plasma was shown to be an effective method for increasing surface wettability, oxygen content in thin surface layer and surface roughness. These effects are less after the treatment in argon plasma.

Key words: aramid film, plasma, modification, etching, kinetics, oxygen, argon

T.Yu. OSADCHAYA, A.A. FEDOROVA, D.A. PROZOROV, O.V. LEFEDOVA
KINETICS PECULIARITIES OF HYDROGENATION REACTION OF 4-NITROTOLUENE
ON RANEY NICKEL IN NON-STATIONARY CONDITIONS

Based on the results of the kinetic studies the parameters of hydrogenation reactions of 4-nitrotoluene on Raney nickel catalyst were determined in aqueous solutions of 2-propanol at different initial concentrations of compound being hydrogenated. The change in an initial concentration of 4-nitrotoluene influenced on the observed kinetic regularities, on usage degree of catalyst surface and on the excess adsorptions of compounds being hydrogenated. The rate of the hydrogenation of 4-nitrotoluene on the surface of the catalyst was shown to depend on adsorption and solvation interactions in the liquid volume.

Key words: 4-nitrotoluene, skeletal nickel catalyst, 2-propanol, adsorption, desorption

A.A. MERKIN, Yu.E. ROMANENKO, O.V. LEFEDOVA
ADSORBED HYDROGEN ROLE IN LIQUID PHASE HYDROGENATION REACTIONS
OF COMPOUNDS CONTAINING NITRO GROUP OR A "CARBON-CARBON" BOND
ON NICKEL CATALYSTS

The kinetics of the hydrogenation reaction of sodium 4-nitrophenate and sodium maleate in 0.01 M aqueous solution of sodium hydroxide was experimentally investigated. The reaction rate is proportional to the adsorption of hydrogenated compounds and hydrogen rate reproduction corresponds to the observed rate at low concentrations. That eliminates the catalyst surface oxidation. At contrary increasing concentration of active compound and hydrogenated oxidation catalyst surface raises the adsorbed hydrogen filling degree. It was found that the highest reactivity with nitro group in 0.01M aqueous sodium hydroxide solution has hydrogen form characterized by a mean value of the adsorption heat. The hydrogenation of the double bond "carbon-carbon" was more reactive with active hydrogen characterized by a low surface energy.

Key words: nickel catalyst, sodium hydroxide, sodium maleate, sodium 4-nitrophenate, adsorbed hydrogen, catalyst without hydrogen, heat of adsorption, oxidation, hydrogenation, catalyst deactivation

V.A. GOLUBEV, D.V. IVLEV, M.Yu. NIKIFOROV, V.K. ABROSIMOV
METHOD OF CALCULATION OF GAS SOLUBILITY IN WATER-SALT SYSTEMS AT VARIOUS TEMPERATURES AND PRESSURES

Method for calculating the gas solubility in water and water-salt systems at different temperatures and pressures was developed. The method is based on the combination of Redlich-Kwong-Soave (RKS) equation of state and the modified Debye-Huckel equation to take into account the electrostatic contribution to the activity coefficient of non-electrolyte in salt solution. The solubilities of CO₂ and CH₄ were calculated in water and aqueous-salt (NaCl, KCl) systems at T = 313–393 K and P= 0.4–2.0 MPa. Results obtained agree well with the experimental data.

Key words: Redlich-Kwong-Soave state equation, solubility, gas, water, electrolyte

S.A. SILKIN, A.V. GOTELYAK, V.V. DANIL'SHUK, A.I. DIKUSAR
ELECTRO DEPOSITION OF Co-W COVERS FROM GLUCONATE ELECTROLYTE IN HULL'CELL WITH ROTATING CYLINDRICAL ELECTRODE

Dependencies of current yield and element ratios for cover at electro-deposition of Co-W alloys from gluconate electrolyte (pH=6.5) were studied by applying the Hull'cell with rotating cylindrical electrode. At experiments the current density of primary distribution, hydrodynamic conditions and degree of electrolyte operation were variable parameters. Forming cover composition defines with electro deposition from appropriate gluconate Co and W complexes (Co:W=1:1). At long operation of electrolyte the increase in W-content in alloy and the decrease in current yield are observed.

Key words: alloy electrodeposition, induced co-deposition, electrolytic Co-W coatings, gluconate electrolyte, rotating cylinder Hull cell (RCHC)

A.V. CHESHKOVA, S.Yu. SHIBASHOVA, V.A. KOZLOV
USING ULTRASOUND AND HYDROFERMENTATIVE PROCESSING FOR GRANULAR MASH PRODUCTION

On the basis of the physical and chemical analysis data we revealed the composition of enzymes which provide a deep conversion of structure of forming polysaccharides (pectins and hemicellulose), destruction of starched grains at saturation of grain mash by sugars. We estimated the depth of change of semiproducts technological properties depending on processing modes.

Key words: ferment, ultrasound, biopolymer, process

Yu.M. ARTEMKINA, V.I. ERMAKOV, L.V. KOVALENKO, E.N. KOROTKOVA, A.G. POLIVANOVA, V.V. SHCHERBAKOV
PECULIARITIES OF ELECTROMAGNETIC ENERGY ABSORPTION OF WATER SOLUTIONS AT FREQUENCY OF 2455 MHz. I. ELECTROLYTE SOLUTIONS

The analysis of high-frequency conductivity of electrolyte solutions was carried out. At a frequency of 2455 MHz the limit high-frequency conductivity and high-frequency conductivity was shown to decrease in the increase of concentration of solutions and variously change with temperature growth: limit high-frequency conductivity is increased, and high-frequency conductivity is decreased. The rate of high-frequency heating the concentrated solutions of electrolytes was determined at a frequency of 2455 MHz.

Key words: high frequency conductivity, electrolyte solutions, high frequency heating

A.L. SLONOV, A.T. TSUROVA, I.V. MUSOV, S.I. PAKHOMOV, S.Yu. KHASHIROVA, M.KH. LIGIDOV
RHEOLOGICAL AND THERMAL PROPERTIES OF NANOCOMPOSITES BASED ON POLYETHYLENE TEREPHTHALATE AND ORGANOCCLAY

The plasticizing action of organoclay on polyethylene terephthalate (PET) was established due to the good dispersion and existence of low-molecular modifier. The change in a supramolecular structure of PET due to appearance of crystallization centres was shown by the methods of differential-scanning calorimetry. The presence of incompatible PA-6 results in the increase in crystallization rate and homogeneity of crystal structure. The formation of intercalated structure for PET/organoclay composition was established by thermogravimetric method whereas an entry of PET macro molecules into organoclay layers is impeded.

Key words: polyethylene terephthalate, lamellar silicate, organo modifying, organoclay, rheological properties

S.V. RYBIN, S.A. FOFANOV, E.L. KRYSOVA, E.P. GRISHINA
POSSIBILITIES OF CHLORIDE-CONTAINING ELECTROLYTES AT THREE-STEP ETCHING
OF RECRYSTALIZED ALUMINUM FOIL

The influence of electrolyte components and polarization modes on regularities of hydrochloric acid electro chemical etching of SG-S (TOYO ALUMINIUM, Japan) aluminum foil available to tunnel etching was studied with the method of chrono potentiometry. The influence of inhibiting components (AlCl_3 , $\text{Al}_2(\text{SO}_4)_3$), current density and temperature on origination growth of tunnel pittings and on possibility accomplishing the foil etching process to three-steps was shown. The first two steps are the tunnels formation of high density. The third step is the tunnel broadening up to required diameter. Proposed method gives the increase in specific capacity of anodized foil up to 75%.

Key words: aluminum foil, anodic etching, tunnel etching, hydrochloric acid etching, chronopotentiometry, aluminum capacitors

O.I. NAVOTNYIY, A.A. STEKOL'NIKOV, V.A. RESHETOV, S.B. ROMADENKINA
OBTAINING NEW TYPES OF ISOLATION MASTICS ON BASES OF ASPHALT- RESINOUS
OLYOMERS OBTAINING FROM OIL ASPHALT

The laboratory synthesis of new types of isolation mastics on the basis of mixture of asphalt of deasphaltization of tar by propane with extract of selective purification of oil distillates was carried out. The analysis of their physical-mechanical parameters was accomplished. Methods of modification of obtained mastics with bitumen were given for purposes of their application as isolation materials at overhaul and building of steel main pipelines

Key words: asphalt, deasphaltization of tar by propane, extract of selective purification of distillates, bitumen, reisolation, pipe line, asphalt-resinous oligomer

V.A. KUZMENKO, A.I. RUSANOVA, O.I. ODINTSOVA
SYNTHETIC POLYELECTROLYTES APPLICATION FOR AROMATIC SUBSTANCES
IMMOBILIZATION ON TEXTILES WITH LAYER-BY-LAYER METHOD

The efficiency of fragrant substances immobilization on the cellulose textile materials by means of formation of self-organized layers of polyelectrolytes was evaluated. Fourier Transform Infrared Spectroscopy was used to show the possibility of cellulose film modification by synthetic polyelectrolytes. The influence of polyelectrolytes concentrations in an impregnating bath on the evolution kinetics of fragrant substance from textile material treated with «layer-by-layer» method was studied with gas chromatography.

Key words: synthetic polyelectrolytes, fragrant substances, textile finishing, «layer-by-layer» method

D.V. KIRICHENKO, V.A. TOLKACHEV, D.V. MAIYNIKOV
INFLUENCE OF LONGITUDINAL MIXING ON WASHING EFFICIENCY OF INSOLUBLE
SEDIMENT OBTAINED AFTER LEACHING OF SERPENTINITE IN COLUMN APPARATUS
WITH PULSATION MIXING

The washing process researches of the insoluble sediment obtained after leaching of serpentinite in a column apparatus with pulsating stirring of \varnothing 50 mm and a height of 1.6 m were carried out. The height equivalent to one theoretical step of separation was established to increase from $\frac{1}{4}$ to $\frac{1}{2}$ due to the negative effect of longitudinal mixing in both phases. The best results of the precipitate washing from a chlorine-ion with size of solid material of $-0.3+0.1$ mm were achieved under the pulsation intensity of 700 mm/min.

Key words: pulsating column apparatus, serpentinite, longitudinal mixing, solid phase, disperse phase, vibration amplitude, pulsation intensity, mass transfer

V.N. ISAEV, E.S. SLIVCHENKO, V.N. BLINICHEV
STUDY AND MODELING STRUCTURE OF FLOW IN COOLING JACKET OF REACTORS

The results of the experimental study of the heat carrier movement in a cooling jacket of reactor of smooth type were presented. Mathematical description of flow structure was given and its solution was obtained. Parametric identification of model was carried out.

Key words: study, modeling, flow structure, cooling jacket, reactor

Yu.V. MATVEIYCHUK

**EXTRACTION OF THIOCYANATE COMPLEXES OF ZINC(II) AND COBALT(II)
WITH DIBUTYL-, DIDECYLPHTHALATE, 1-BROMONAPHTHALENE
AND O-NITROPHENYLDECYL ETHER**

The decrease in distribution coefficients (D) of thiocyanates zinc(II) and cobalt(II) in the series: dibutylphthalate(DBP) > didecylphthalate(DDF) > o-nitrophenyldecyl ether (o-NPDE) > 1-bromonaphthalene (1-BN) was established. It was shown that complexes $[\text{Zn}(\text{NCS})_2]^0$ and $[\text{Co}(\text{NCS})_2]^0$ pass into 1-BN and o-NPDE phases, $[\text{Zn}(\text{NCS})_2]^0$, $[\text{Co}(\text{NCS})_2]^0$ complexes and the three- and tetrathiocyanates zinc(II) and cobalt(II) pass into DBP and DDP phase.

Key words: extraction, zinc(II) and cobalt(II) thiocyanates