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V.V. VINOGRADOV, G.A. DYSHINA, A.V. VINOGRADOV, A.V. AGAFONOV
ALUMINA-ENTRAPPED BOVINE SERUM ALBUMIN: SOL-GEL SYNTHESIS, PROPERTIES,
THERMAL STABILITY

The present work describes for the first time the thermal stabilization effect of bio molecules entrapped into a ceramic matrix unlike silica-based. Given study devotes to study of the structural evolution of sol-gel matrix based on alumina in the presence of a model protein, bovine serum albumin (BSA). The sol-gel matrixes were produced via hydrolysis of aluminum isopropoxide at different pH values to prepare matrixes with different textural properties. Nitric acid, acetic acid and ultrasound treatment were used for peptizing. The structural evolution of the matrixes with entrapped protein was investigated using a complementary set of techniques including XRD analysis, FTIR, DLS, AFM, and N₂ sorption. Samples with different textural characteristics and particle size were obtained. Using the results of differential scanning calorimetry (DSC) the 26°C high-temperature shift for denaturation temperature of free protein was shown as compared to entrapped one into alumina sol-gel matrix.

Key words: sol-gel, alumina, bio molecules, entrapment, thermal stability

S.A. ZNOIYKO, V.E. MAIYZLISH, G.P. SHAPOSHNIKOV, I.G. ABRAMOV
SYNTHESIS AND INVESTIGATION OF MIXED-SUBSTITUTED PHTHALOCYANINES WITH
BENZOTRYAZOLYL FRAGMENTS

In article results of work on synthesis and research of physical and chemical properties of mixed-substituted phthalocyanines with benzotriazolyl fragments are generalized.

Key words: phthalocyanines, synthesis, absorption electronic spectra, mesomorphism, thermo-oxidative destruction

YA.O. MEZHUEV, YU.V. KORSHAK, M.I. SHTILMAN, A.I. PISKARYOVA, T.A. GREBENEVA, I.V. SOLOVYOVA
SYNTHESIS AND DECARBOXYLATION OF (POLY)ANTHRANILIC ACID

The method of synthesis of polyanthranilic acid was described and the structure of polyanthranilic acid was characterized by means of IR spectroscopy method. The decarboxylation of polyanthranilic acid under conditions of thermolysis at 200°C was shown by means of IR spectroscopy method and gravimetric analysis.

Key words: (poly)anthranilic acid, decarboxylation, IR spectroscopy

I.V. BURLOVA, T.M. KISELEVA, I.N. KLABUKOVA, M.V. GULYONOVA, N.B. MELNIKOVA
ROLE OF LEWIS ACIDS IN REGULATION OF SELECTIVITY OF BETULIN OXIDATION IN ACIDIC
AND ALKALINE AQUEOUS-ACETONE MEDIUM

The influence of Lewis acids (CoCl₂, NiCl₂, Cr(Ac)₃ and Al₂(SO₄)₃) on the selectivity of the oxidation of betulin in alkaline and in acidic aqueous-acetone medium was studied at 15 - 25 °C. The oxidation by K₂Cr₂O₇ - H₂SO₄ system in the presence of Al³⁺ proceeds with 100 % selectivity to betulonic acid. The oxidation of betulin in alkaline medium by "nickel peroxide" -xNiO₂ · yNi(OH)₂ or by sodium hypochlorite in the presence of Lewis acids such as CoCl₂, NiCl₂, Cr(Ac)₃ results in the oxidation products on isopropylidene fragment.

Key words: oxidation, betulin, betulonic acid, Lewis acid

A.A. BAKANOVA, S.V. BAIYKOV, V.V. SOSNINA, G.G. KRASOVSKAYA, A.F. BETNEV, E.R. KOFANOV
SYNTHESIS OF PHENYLCYCLOALKYLAMINOCARBOXYLIC ACIDS CONTAINING IMID CYCLE

The synthesis scheme of aminocarboxylic acids containing cycloalkyl, phenyl and imide cycles is presented.

Key words: aminocarboxylic acid, imides, cycloalkylcarboxylic acids

O.M.TROKHIMENKO, D.S. BOIYCHENKO
DETERMINATION WITH CATALYTIC SPECTROPHOTOMETRIC IRON(III)-NITRITO-THIOCIANATE
METHOD OF TOTAL IODINE IN SAMPLES WITH ORGANIC MATRIX

The combination of dry(potassium hydroxyde) high temperature mineralization of samples with the organic matrix followed by determination of total iodine in the iodide form was carried out using the catalytic spectrophotometric iron(III)-nitrito-thiocyanate method and using the analysis of standard sample of dry milk and samples of fresh milk as example.

Key words: total iodine, iodide, sample preparing, analysis kinetic method

V.Yu. GUSEV, V.N. VAULINA, A.V. RADUSHEV
COMPLEXATION OF COPPER(II) IONS WITH 2',2'-DIHEXYLBENZOHYDRAZIDE

The complexation of copper (II) ions with 2',2'-dihexylbenzohydrazide was studied. Composition and structure of complexes formed the pH-region of their existing and their stability constants were determined. The data obtained were compared with the data for copper(II)-complex with 2',2'-diethylbenzohydrazide.

Key words: 2',2'-dihexylbenzohydrazide, copper (II), complexation

I.N. MEZHEVOIY, V.G. BADELIN
**INFLUENCE OF STRUCTURE OF SIDE RADICALS OF L-ALANINE, L-SERINE AND L-ASPARAGINE
ON INTERACTION ENTHALPIC CHARACTERISTICS IN WATER SOLUTIONS OF POLYOLS**

The integral enthalpies of dissolution $\Delta_{s,01}H^m$ of L-alanine, L-serine and L-asparagine in mixtures of water with glycerol, ethylene glycol, and 1,2-propylene glycol under the concentration of organic solvents up to 0.42 mole fraction were measured by means of calorimetry. The standard values of the dissolution enthalpies ($\Delta_{s,01}H^0$) and transfer enthalpies ($\Delta_{tr}H^0$) of amino acids from water to the mixed solvent were calculated. The data obtained were interpreted from the viewpoint of prevalence of different types of interactions in the solutions and influence of the cosolvents nature on the thermochemical characteristics of amino acid dissolution.

Key words: amino acids, polyols, dissolution enthalpies, solutions

D.A. FILIMONOV, I.V. TURCHANINOVA, M.I. BAZANOV, S.V. EFIMOVA, O.I. KOIFMAN
**ELECTROCHEMICAL PROPERTIES OF TETRA-2,3-PYRIDINOPORFIRAZINE AND ITS ACETOAMIDE-
SUBSTITUTED METAL COMPLEXES**

The investigation of electrochemical and electrocatalytic properties of derivatives of pyridinoporfirazine was carried out using the cyclic voltammetry method. The values of redox potentials associated with the process of transformation of metal central ion and organic ligand were obtained and the calculation the effective number of electrons was carried out. The electrocatalytic activity of the compounds in the reaction of reduction of molecular oxygen in alkaline solution was evaluated

Key words: voltammetry, porphyrines, electro reduction, molecular oxygen

U.G. MAGOMEDBEKOV, U.G. GASANGADZHIEVA, Kh.M. GASANOVA, N.Kh. MAGOMEDBEKOV
**PARAMETRIZATION OF TIME SERIES OBTAINED AT HOMOGENEOUS OXIDATION OF GLUTATHI-
ONE IN OSCILLATORY MODE BY METHOD OF FLICKER-NOISE SPECTROSCOPY**

The results of describing the dynamics of the process of glutathione oxidation in the presence of oxygenated complexes of iron (II) with dimethylglyoxime and cytosine in an oscillatory mode obtained by the methods of flicker-noise spectroscopy are given. The time series was obtained to represent with the set of own parameters that shows on the possibility of parameterization of the measured signals.

Key words: glutathione oxidation, flicker-noise spectroscopy, parameterization

E.A. KURGANOVA, Yu.B. RUMYANTSEVA, A.A. IVANOVA, V.V. PLAKHTINSKIY, G.N. KOSHEL
**QUANTUM-CHEMICAL CALCULATIONS OF LIQUID-PHASE OXIDATION REACTIONS
OF ETHYLBENZENE AND ISOPROPYLBENZENE TO HYDROPEROXIDES IN PRESENCE
OF PHTHALIMIDE CATALYSTS**

With the quantum-chemical method PM6 the energy difference between the singly-occupied molecular orbital of the substrate and the radical catalyst $-\Delta E_{ozmo}$ was calculated. The correlation of ΔE_{ozmo} with the values of initial oxidation rate (W_o) of ethylbenzene and isopropylbenzene and the values of rate constants of hydrogen atom abstraction from N-hydroxyphthalimid molecule were established.

Key words: quantum-chemical calculations, liquid phase oxidation, isopropylbenzene, ethylbenzene, N-hydroxyphthalimid

A.S. KONOVALOV, S.N. GOLUBEV, A.N. IVANOV, D.A. SHUTOV, S.A. SMIRNOV, V.V. RYBKIN
PARAMETERS OF LOW PRESSURE PLASMA WITH LIQUID CATHODE IN AIR ATMOSPHERE

The properties of the liquid water cathode glow discharge in air in the pressures range of 76-760 torr were studied. The electric field strength, cathode voltage drop, effective emission coefficient of the electrons, current density, emission intensity of some N_2 ($C^3\Pi_u \rightarrow B^3\Pi_g$) and NO ($A^2\Sigma^+ \rightarrow X^2\Sigma$) bands were measured. On the base of the obtained experimental data the reduced electric field strength, effective vibrational temperature of N_2 ($C^3\Pi_u$), NO ($A^2\Sigma^+$) and rotational temperature of N_2 ($C^3\Pi_u$) were determined.

Key words: low pressure plasma with liquid cathode, emission spectrometry, vibrational and gas temperature, reduced electric field strength

E.S. BOBKOVA, Ya.V. KHODOR, V.V. RYBKIN
**WATER MOLECULE INFLUENCE ON ELECTRON PARAMETERS IN NON-EQUILIBRIUM
OXYGEN PLASMA**

The results of calculations of electron energy function distributions, kinetic and transport parameters of electrons are considered for non-equilibrium oxygen plasma with addition of water molecules. Additives of water molecules were shown to influence strongly on electron parameters in the range of reduced electric field strengths E/N of (1-8) 10^{-16} V cm² though than E/N is less than the influence degree is more. The increase in water content results in the decrease in rate constants of processes with electron participation, in their average energy and drift velocity.

Key words: plasma, oxygen, water, electron energy function distribution, electron kinetic parameters

G.O. EREMEEVA, E.P. SUROVOYI
THERMOSTIMULATED TRANSFORMATIONS IN NANO-SCALE SIZE INDIUM LAYERS

Depending on the indium films (2 – 147 nm) thick, temperature (473 – 873 K) and time of thermal treatment (0 – 120 min) the kinetic curves of the transformation degree were established to describe satisfactorily in the frame of linear, inverse logarithmic, parabolic, or logarithmic laws. Contact difference of potentials for In, In₂O₃ layers and photoelectromotive force for In-In₂O₃ – systems were measured. The diagram of energetic bands for In-In₂O₃ system was built. The model of In films transformation including the steps of oxygen adsorption, charge carrier redistribution in the In – In₂O₃ contact field and indium (III) oxide formation was proposed.

Key words: indium, indium (III) oxide, nano-scale size films, optical properties, thermal transformation

A.A. KHRAMOV, S.V. GUROV, O.L. KOZINA, Yu.L. GUNKO, M.G. MIKHALENKO
**MATHEMATICAL SIMULATION OF DISCHARGE OF NICKEL-IRON ACCUMULATOR
WITH DIFFERENT CONSTRUCTIONS OF ELECTRODES**

Results of computer simulation of discharge of nickel-iron accumulator with different positive and negative constructions of electrodes are given.

Key words: lamellar iron electrode, extruded iron electrode, lamellar oxide nickel electrode, metal-ceramic oxide nickel electrode, model, discharge, specific capacitance

V.V. EGOROV, E.N. LAZAREVA, L.N. OLSHANSKAYA
**ELECTRODES FOR NICKEL – CADMIUM AND NICKEL - IRON ACCUMULATORS BASED
ON GALVANIC SLUDGE**

Results on extraction of nickel hydroxide from the nickel containing galvanic sludge and its use as a positive electrode of a nickel-cadmium accumulator are presented.

Key words: galvanic sludge, nickel hydroxide, accumulator electrode

O.G. KHELEVINA, A.S. MALYSOVA
LOW TEMPERATURE VULCANIZATION OF LIQUID POLYDIMETHYLSILOXANEDIOLS

Kinetics of vulcanization of liquid low-molecular siloxan rubbers with the end silanol groups (polydimethylsiloxanediole) was studied in the presence of tin-organic catalysts. The structuring reaction of rubbers is described with the first order kinetic equation. The apparent rate constants as well as activation energies were calculated at the temperature of 20 – 40°C. Considerations on reaction mechanism were delivered.

Key words: polydimethylsiloxanedioles, kinetics, vulcanization

V.I. CHURSIN
OBTAINING AND PROPERTIES WATER-DILUTED EPOXIDE COMPOSITION

Components for obtaining a water diluted composition on the base of epoxide resins ED-20 were chosen. The influence of type and quantity of emulgator and the stabilizer on properties of composition was investigated. Possibility of composition application for tanning technology was shown.

Key words: epoxide resin, emulsifier, stabilizer, composition

T.E. ABRAMOVA, I.A. BAZHENOV, N.S. MINEEVA, B.S. TUROV
CHEMICAL MODIFICATION OF OLIGOBUTADIENES OF DIFFERENT MICROSTRUCTURE

The process of modifying with organic hydroperoxides epoxidation followed by amination of oligobutadienes of different microstructure was studied. The possibility of introducing into the molecular chain of oligobutadienes of different microstructure the amino groups with the interaction of synthesized epoxyoligomers with diethanolamine and morpholine in the amounts providing the solubility of polyfunctional oligomers in waterway was shown. The properties of epoxydized oligodienes and of products of their modification with amines were studied.

Key words: oligobutadiene, epoxydation, hydroperoxide, amination, molecular weight, viscosity

A.N. REZNIKOV, V.A. OSYANIN, Yu.N. KLIMCHKIN
**ENANTIOSELECTIVE CATALYSIS BY NICKEL (II) COMPLEXES IN SYNTHESIS
OF (4R)-4-[4-METHOXY-3-(CYCLOPENTHYLOXY)PHENYL]PYRROLIDINE-2-ONE**

The enantioselective synthesis of (4R)-4-[4-methoxy-3-(cyclopenthyloxy) phenyl]pyrrolidine-2-one (antidepressant (R)-rolipram) was carried out via the use of Ni-catalyzed asymmetric Michael addition of dimethyl malonate to

nitroalkene. In the presence of 0.2 mol. % chiral diamine complexes the addition product nitroester was obtained with > 96 % enantioselectivity. Following hydrogenation-cyclization, hydrolysis and decarboxylation of nitroester result in the enantiomerically pure (R)-rolipram.

Key words: (R)-rolipram, enantioselective synthesis, Michael addition, transition metal catalysis

I.A. NOVAKOV, O.M. NOVOPOL'TSEVA, Yu.D. SOLOVYOVA, A.V. KUCHIN, I.Yu. CHUKICHEVA
ASSESSMENT OF STABILIZING ACTION OF TERPENOPHENOLS ON THERMOOXIDATIVE DESTRUCTION OF RUBBER MIXTURES ON BASE OF BUTADIYEN-STYRENE RUBBERS

The action of terpenophenol compounds as antiagers in rubber mixtures on the base of butadiyen-styrene rubbers of general purpose was studied. The application possibility of terpenephenols as bifunctional additive in rubber mixtures with low building tack was shown

Key words: anti-ageing agent, building tack, terpenephenols

Ya.V. CHISTYAKOV, A.A. MAKHNIN, A.V. NEVSKY
MATHEMATIC MODEL FOR DETERMINATION OF PARAMETERS OF CENTRIFUGAL INERTIAL DUST CATCHER

The paper presents the study of the gas-dynamic process of fine-dispersed dust separation in a centrifugal inertial dust catcher carried out by methods of computing experiment. Mathematic modeling was carried out for the problem set up as a two-dimensional axially symmetric one, by particle-in-cell method. With the help of the developed program the computing experiments were performed.

Key words: mathematic model, centrifugal inertial dust catcher, parameters calculation

V.K. LEONTIEV, M.A. BARASHEVA
CALCULATION OF GAS-LIQUID EJECTION DEVICE FOR PROCESS OF ABSORPTION

The description of the principle of operation of the gas-liquid ejection device with gas dispersion was presented. The method of calculating the diameter of the gas-liquid ejection devices for process of absorption was proposed.

Key words: gas-liquid ejection device, absorption process, dispersion, calculation method, the number of transfer units, transfer units height

A.A. VESHCHEV, A.E. SOKOLOV, A.O. PANKRATOVSKIY
EXPERIMENTAL INVESTIGATION OF PROCESS OF METAL CORD SEPARATION FROM FRAGMENTS OF UTILIZABLE WORN TYRES BY METHOD OF CONTINUOUS ROLLING

The experimental and calculated data on the process of separation of metal cord from the fragments of worn tyres by a method of continuous rolling on a rolling machine are presented.

Key words: rolling, roll machine, metal cord

V.A. BADOEV, M.Yu. TARSHIS, A.I. ZAIYTSEV
MATHEMATICAL MODEL OF GRINDING OF OLD ASFALT CONCRETE IN BOLL MILL

The model of grinding the old asphalt concrete in a boll mill with use of functions of crushing is presented. The results of numerical calculations were compared with experiment.

Key words: grinding, asphalt concrete, mathematical model, boll mill

M.Yu. TARSHIS, M.V. VOLKOV, A.I. ZAITSEV
ON CALCULATION OF GRAIN MATERIALS DRUM MIXERS WITH ADDITIONAL WORKING ELEMENTS

The theoretical bases on calculation of the drum mixer with additional mixing blades are given. The data of experiments on research of influence of blades parameters on mixture homogeneity were compared with results of calculations.

Key words: mixer, drum, calculation, homogeneity

O.Yu. SOLOVYOVA, D.V. OVSYANNIKOVA, I.S. KAMENSKIY
STUDY OF EFFICIENCY OF EPOXY RESIN ACTION IN COMPOSITES BASED ON NITRILE BUTADIENE RUBBER AND SILICATE FILLER

Effect of epoxy resin on the rheometrical characteristics of the blends and stress-strain properties of sulfuric vulcanizates based on nitrile butadiene rubber and silicate filler were investigated. It was shown that the process of cross-linking in inductive period is suppressed with the resin. At the same time the main period starts earlier, but on the initial stage it proceeds with lower rate. The character of resin effect on the stress-strain properties is largely defines by composition of vulcanization group.

Key words: butadiene-nitrile rubber, silicate filler, curing group, epoxy resin

Yu. V. RUMYANTSEVA, R.E. KUZNETSOV, A.N. MUDROV, T.A. AGEEVA, O.I. KOIFMAN
**INFLUENCE OF MICROWAVE IRRADIATION ON ACRYLAMIDE RADICAL POLYMERIZATION
IN SOLUTION IN MODE OF DYNAMIC POWER**

The influence of the microwave irradiation (MWI) on the acrylamide radical polymerization and the properties of the obtained polymer was shown. The comparative analysis for the production of the polyacrylamide by MWI and thermal heating at the different acrylamide concentrations in solution was performed. On the base of the obtained results the conclusions on the kinetic regularities of the acrylamide radical polymerization in solution at MWI were done. The acrylamide obtaining under MWI action allows decreasing the synthesis time and to obtain a polymer soluble in water.

Key words: polymers, synthesis, molecular mass, kinetics, radical polymerization, microwave irradiation

I.G. PUKHOV, D.N. SMIRNOVA., A.P. ILYIN., N.N. SMIRNOV
**STUDY OF ACID-BASE PROPERTIES OF SURFACE OF CARBON ADSORBENTS
BY POTENTIOMETRIC TITRATION**

The approach to data processing the potentiometric titration of aqueous suspensions of carbon materials, enabling to construct of desorption isotherms of the proton, the pK spectra, determining the point of zero charge, i.e parameters which are a measure of acidic and basic properties of the carbon surface in aqueous solution. The experimental technique and calculation was worked out on the activated carbon BAU and technical carbon P 514.

Key words: adsorbent, carbon material, potentiometric titration, pK spectrum, functional groups, zero charge point

M.V. POSTNOVA, Yu.B. RUMYANTSEVA, N.V. LEBEDEVA, E.A. KURGANOVA, G.N. KOSHEL, N.D. KUKUSHKINA
SYNTHESIS OF 2-HYDROXY-5-BIPHENYL CARBOXYLIC ACID ON BASE OF p-CRESOL

The method of synthesis of 2-hydroxy-5-biphenylcarboxylic acid on the base of p-cresol acceptable for the technical implementation was developed.

Key words: p-cresol, hydroperoxide, selectivity, conversion, 2-hydroxy-5-biphenylcarboxylic acid

I.V. KUZNETSOVA., S.S. KHMELEV
**SYSTEM FORMING ROLE OF LECTURE IN MODERN CONCEPT OF TEACTING INORGANIC CHEMIS-
TRY COURSE**

The system forming role of a lecture has been revealed to be increasing in the modern educational situation. Based on the internal interconnection of concepts, phenomena and properties being studied and skills and abilities being formed the principle how to choose educational material has been proposed. The pedagogical technology of conducting lectures which provides the understanding of discipline and presupposes the lecture text to be given in the form of proofs and instructions and writing by the students there own textbook on inorganic chemistry has been worked out.

Key words: lecture, understanding, own textbook, pedagogical technology

I.V. ARTAMONOVA, E.O. ZABENKINA
**USE OF INNOVATIONAL TECHNOLOGIES AT TRAINING CHEMISTRY OF BACHELORS
IN TECHNICAL COLLEGES**

The technique of use of modern mathematical programs, as innovational technologies is offered during studying the general chemistry in a technical college.

Key words: bachelors training on chemistry, mathematic programs application

S.A. SYRBU, T.P. KUSTOVA, M.V. KLYUEV
**PREPARATION FOR STUDYING GENERAL AND INORGANIC CHEMISTRY IN HIGH SCHOOL
IN ALL-YEAR-ROUND PROFILE SCHOOL «NATURAL SCIENCES FOR INQUISITIVE»
IN IVANOVO STATE UNIVERSITY**

Structure and problems of profile school «Natural Sciences for inguisitive» and its role in pupils' preparation for studying general and inorganic chemistry in Ivanovo State University were considered.

Key words: general and inorganic chemistry, profile school, pupils' preparation for high school