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A B S T R A C T S

**D.G. MILOSLAVSKIY, E.M. GOTLIB, R.A. AKHMEDYANOVA, A. G. Liakumovich A.G., D.M. PASHIN
ON CARBONATION PROCESS OF EPOXYDIZED VEGETABLE OILS AND STUDYING
PROPERTIES OF OBTAINED CYCLOCARBONATES**

The published data on the synthesis of cyclic carbonates based on epoxydized vegetable oils were generalized. The analysis of influence of pressure, temperature, type and concentration of the catalyst on the carbonation process of various vegetable oils was carried out. The methods of evaluating the characteristics of the obtained cyclic carbonates were analyzed. The data on carbonation of the epoxydized rapeseed oil are presented.

Key words: cyclic carbonate, epoxydized vegetable oil, carbon dioxide, quaternary ammonium salts, tetra-butylammonium bromide

**O.V. MATVEEVA, N.V. LAKINA, V.Yu. DOLUDA, E.M. SULMAN
FEATURES OF ENZYMATIC TRANSESTERIFICATION REACTION IN SUPERCRITICAL
CARBON DIOXIDE**

The article gives an overview of the application of different lipases in a supercritical solvent medium to produce biofuel in a transesterification reaction of triglycerides, ethyl acetate, ethylbehenate, butyl, vinyl acetate as well as the esterification of lauric acid, acetic acid. The effect of pressure, temperature, catalyst concentration and the substrate in the above processes in supercritical media was analyzed.

Key words: lipase, transesterification, biodiesel, supercritical fluids

**A.O. ROMANOVSKAYA, G.R. BEREZINA
SYNTHESIS AND PHYSICO-CHEMICAL PROPERTIES OF MACROHETEROCYCLIC
COMPOUNDS WITH FRAGMENTS OF CYCLOPENTA [cd] PHENALENE AND THIADIAZOLE**

Arylendiamines, macroheterocyclic compounds and zinc-based arylendiamine with 3,5-diamino-1,2,4-thiadiazole were synthesized by reaction of 2,7-dihydro-7-imino-(7E)-1H-cyclopenta[cd]phenalene-5-diamine with 3,5-diamino-1,2,4-thiadiazole and 2,5-diamino-1,3,4-thiadiazole. The data of IR- and electronic spectroscopy are presented.

Key words: cyclopenta [cd] phenalen, diamines, thiadiazole, synthesis, investigation, spectroscopy, macroheterocyclic compounds

**M.S. FILATOV, T.V. KUDAYAROVA, E.A. DANILOVA, M.K. ISLYAIKIN
SYNTHESIS OF MACROHETEROCYCLIC COMPOUND BASED
ON BIS(5-AMINO-1,2,4-TRIAZOLE-3-IL)METANE**

A new expanded macroheterocyclic compound of AABAAB-type was synthesized by condensation of bis(5-amino-1,2,4-triazole-3-yl)methane (part AA) with phthalonitrile (part B). The compound was characterized by mass-spectrometry (MS FAB), IR, UV-vis and ¹H and ¹³C NMR spectroscopy data. Its spacial structure was studied by DFT/B3LYP/6-31G(d,p) method. The most stable configurations were revealed. The aromaticity of various conjugation contours derived from macrocyclic system was estimated using NICS criterion.

Key words: macroheterocyclic compounds, bis(5-amino-1,2,4-triazole-3-yl)methane, phthalonitrile, expanded macrocycles, DFT quantum chemistry calculations, NICS criterion.

**V.A. IONOVA, A.V. VELIKORODOV, E.A. MELENT'EVA, N.N. STEPKINA, M.A. MOKLYAK
SYNTHESIS OF SCHIFF BASES WITH PHENYL CARBAMATE FRAGMENT
AND SPIROCOMPOUNDS WITH 4-OXOTHIAZOLIDINE CYCLE**

By reaction of equimolar amounts of benzyl-N-(4-aminophenyl)carbamate with isatine in water at room temperature and stirring for 8 hours and indan-11H [1,2-b] quinoxaline-11-one in refluxing ethanol for 6 h in the presence of catalytic amount of glacial acetic acid the corresponding Schiff base with carbamate function were obtained. By boiling of imines with mercaptoacetic acid in water azaheterocycles were prepared with thiazolidinone moiety. The structure of the novel compounds was confirmed by IR, ¹H NMR, ¹³C spectroscopy, mass-spectrometry, and elemental analysis.

Key words: benzyl-N-(4-aminophenyl)carbamate, heterocyclic ketones, condensation reactions, spiroheterocyclic compounds, 4-oxothiazolidinederivatives

T.K. ISKAKOVA, A.E. MALMAKOVA, K.D. PRALIEV, T.M. SEIYLKHAVOV
SYNTHESIS OF NOVEL 3,7-DISUBSTITUTED 3,7-DIAZABICYCLO[3.3.1]NONAN-9-ONES
AND SOME ITS DERIVATIVES

Novel 3,7-disubstituted 3,7-diazabicyclo[3.3.1]nonan-9-ones were obtained by double Mannich condensation and the corresponding 3,7-diazabicyclo[3.3.1]nonanes were synthesized via Huan-Minlong reduction of the last. On the basis of NMR spectra analysis synthesized 3,7-diazabicyclo[3.3.1]nonan-9-ones and 3,7-diazabicyclo[3.3.1]nonanes were established to exist in «chair-chair» conformation.

Key words: 3,7-diazabicyclo[3.3.1]nonan-9-ones, bispydines, stereo chemistry

P.A. NIKITINA, E.V. FROLOVA, V.P. PEREVALOV, I.I. TKACH
SYNTHESIS OF FLUORO-CONTAINING DERIVATIVES OF 2-(2,4-DIHYDROXYPHENYL)-1-
HYDROXYIMIDAZOLES

O-Alkylation of 2,4-dihydroxybenzaldehyde was studied. In order to confirm the structure of products of O-alkylation 3 new coumarin derivatives were obtained. 4 New 1-hydroxyimidazoles were synthesized starting with benzyloxyderivatives of 2,4-dihydroxybenzaldehyde.

Key words: 1-hydroxyimidazoles, coumarins, 2,4-dihydroxybenzaldehyde, o-alkylation

A.Yu. TROKHIMENKO, O.A. ZAPOROZHETS
IODOMETRIC SOLID-SPECTROPHOTOMETRIC DETERMINATION OF CAPTOPRIL
IN PHARMACEUTICAL DRUGS

The method for solid-iodometric spectrophotometric determination of captopril in pharmaceutical preparations was proposed. Captopril is oxidized by iodine. Excess of iodine is extracted on to polyurethane foam and spectrophotometric is detected on the surface of the sorbent. The linearity of the calibration curve is observed up to a concentration of captopril of 40 $\mu\text{mol/l}$. Detection limit, calculated by 3σ -criterion, is 0.9 $\mu\text{mol/l}$. Filling substances in quantities exceeding their content in the drug formulations of captopril does not affect on the determination.

Key words: iodometry, solid phase spectrophotometry, captopril, polyurethane foam

T.S. CHMILENKO, L.A. IVANITSA, T.V. KRUTOGOLOVA, F.A. CHMILENKO
VALIDATION CHARACTERISTICS OF METHODS FOR DETERMINATION OF GUANIDINE ANTI-
SEPTICS

Spectrophotometric techniques for content control of polyhexamethyleneguanidine chloride (0.25-2.50 $\mu\text{g/ml}$) and chlorhexidine (0.5-2.5 $\mu\text{g/ml}$) in drugs were developed. The determination is based on the formation of ternary complex of guanidine compounds with aluminum and salicylfluorone at pH of 4.6. Check of the applicability of techniques was carried out on the basis of validation of the parameters of linearity, repeatability, reproducibility and accuracy.

Key words: polyhexamethyleneguanidine chloride, chlorhexidine, salicylfluorone, spectrophotometry, validation

O.A. SEMENOVA, A.M. EFREMOV, S.M. BARINOV, V.I. SVETTSOV
KINETICS AND CONCENTRATIONS OF NEUTRAL PARTICLES IN METHANE DC GLOW
DISCHARGE PLASMA

The research of the steady-state plasma parameters and composition under the conditions of CH_4 direct current glow discharge ($p = 40\text{--}200$ Pa, $i = 30\text{--}70$ mA) was performed. The data on both reduced electric field and electron density were obtained. The analysis of formation and decay reaction kinetics for neutral species was carried out.

Key words: methane, rate constant, ionization, dissociation

A.V. DUNAEV, S.A. PIVOVARENOK, S.P. KAPINOS, D.B. MURIN
EFFECT OF TEMPERATURE ON ETCHING RATE AND SURFACE QUALITY OF GaAs
AT PROCESSING IN PLASMA HCl-Ar, HCl-Cl₂, AND HCl-H₂

The study of the temperature effect on the etching rate of GaAs in mixtures of HCl/Ar, HCl/H₂, HCl/Cl₂ was carried out. The effective activation energies of the etching process in mixtures of HCl/Ar, HCl/H₂, HCl/Cl₂ were found. The values of the activation energies for all gases are typical for the reactions limited by adsorption-desorption processes on the surface of the material. It is shown that the optimum combination of etching rate and surface roughness is attained in a mixture of HCl/Ar. In mixtures with H₂ etching rate is too small for a good quality surface, and in mixtures with Cl₂ surface roughness exceeds the allowable value.

Key words: plasma, etching, hydrogen chloride, argon, hydrogen, surface quality

D.V. BATOV

ENTHALPIES OF MICROEMULSIONS FORMATION AND MICROEMULSIFICATION OF O-XYLENE IN SYSTEM WATER - O-XYLENE - TRITON X-100

The relationship between the enthalpy of microemulsion formation from the pure components and the enthalpy of oil microemulsification in an aqueous solution of surfactant was found using thermochemical cycle. The obtained relations were used for determination of the enthalpy characteristics of water microemulsion - o-xylene - Triton X-100 at temperatures of 288.15, 298.15 and 308.15 K. Concentrations of microemulsion components were 39.92, 2.00, and 58.08 percents, respectively. It was shown that the microemulsions formation of the type o/w of the pure components can be either endothermic or exothermic. The microemulsion formation in this case is determined by the entropy change of the system.

Key words: microemulsion, water, o-xylene, Triton X-100, propanol, calorimetry, microemulsion formation entropy, microemulsion enthalpy

**Z.N. VERDIEVA, A.B. ALKHAISOV, U.G. MAGOMEDBEKOV, N. N. VERDIEV
HEAT- ACCUMULATING MIXTURES FROM FLUORIDES OF LITHIUM, SODIUM,
MAGNESIUM AND STRONTIUM**

The four-component system Li, Na, Mg, Sr/F was studied by the differential and thermal method of the physical and chemical analysis. Volumes of crystallization of initial components and compound (NaMgF_3) of congruent melting were limited. It was established that in a system two fourfold eutectic points are realized which are crystallized at 600 and 636 °C, with enthalpies of phase transitions of 590, 458 J/g, respectively which can be used as heat-accumulating materials.

Key words: eutectic, congruent compounds, enthalpies of phase transitions, renewable heat-accumulating materials

**A.S. SODATDINOVA, S.M. SAFARMAMADOV, A.A. AMINDJANOV, K.S. MABATKADAMOVA
COMPLEXATION OF SILVER (I) WITH 1-FORMYL AND 1- ACETYL-3-THIOSEMICARBAZID IN
AQUEOUS SOLUTION AT 273-328 K**

By potentiometric titration a complexation of silver with 1-formyl and 1- acetyl-3-thiosemicarbazid was studied in an aqueous solution at 273-328 K. It was established that at the interaction of silver with 1-formil and 1 - acetyl-3-thiosemicarbazid three complexes are formed. The total and stepwise stability constants of complexes were calculated. Depending on the ligand nature the stability of thermodynamic complexes of silver(I) with thiosemicarbazid and its acyl derivatives was established to change in the following series: TSC > 1-f-3-TSC > 1>3-TSC.

Key words: complexation, silver, 1-formyl-3-thiosemicarbazid, 1 -acetyl-3-thiosemicarbazid

**E.N. KOROTKOVA, A.G. POLIVANOVA, L.V. KOVALENKO, Yu.M. ARTEMKINA, V.V. SHCHERBAKOV
PECULIARITIES OF ABSORPTION OF ELECTROMAGNETIC ENERGY WITH WATER
SOLUTIONS AT FREQUENCY OF 2455 MHZ. II. NONELECTROLYTES SOLUTIONS**

The analysis of high-frequency conductivity of water solutions of acetone, acetonitrile, dimethylformamide and a dimethyl sulfoxide was carried out. At increase in a concentration of a non-electrolyte the limit high-frequency conductivity passes through a minimum and high-frequency conductivity at a frequency of 2455 MHz and heating rate at this frequency – through a maximum. The limit high-frequency conductivity was established to increase, and high-frequency conductivity at a frequency of 2455 MHz to decreases with temperature growth.

Key words: high-frequency conductivity, acetone, acetonitrile, dimethylformamide, dimethyl sulfoxide, high-frequency heating

**S.V. SHILOVA, T.S. FALALEEVA, O.A. ZINUROVA, A.Ya. TRET'YAKOVA, V.P. BARABANOV
STUDY OF EFFECT OF BUTANOL-1 ON MICELLIZATION OF SODIUM DODECYL SULFATE
IN AQUEOUS SOLUTIONS BY FLUORESCENCE SPECTROSCOPY**

The effect of additives of butanol-1 on micellization of sodium dodecyl sulfate in an aqueous solution was studied by fluorescence spectroscopy using pyrene as a fluorescent probe. The critical micelle concentration of the surfactant was established to decrease in increasing content of alcohol. On the basis of data on fluorescence quenching hexadecylpyridinium bromide micelle quantitative parameters - the number of aggregation, the radius of the micelles, the area of hydrophilic groups and the critical packing parameter were calculated. Spherical mixed micelles with size smaller than in water were shown to form in the presence of 1-butanol in aqueous solutions of sodium dodecyl.

Key words: micelle formation, sodium dodecyl sulphate, butanol-1, micelle formation critical concentration, pyrene

D.V. BYKOVSKIY, G.V. SHATALOV, N.Ya. MOKSHINA, V.A. KUZNETSOV, T.N. POYARKOVA
**EXTRACTION OF METHIONINE IN TWO-PHASE WATER-SALT SYSTEMS WITH CYCLIC
POLY-N-VINYLAMID**

The extraction of essential amino acid - methionine from water-salt solutions of poly-N-vinylpyrrolidone and poly-N-vinylcaprolactam with different molecular weight values was studied. The degree of extraction and distribution coefficients of methionine in two-phase systems, optimal conditions of extraction was calculated.

Key words: poly-N-vinylpyrrolidone and poly-N-vinylcaprolactam, methionine, extraction

M.V. VASYOKHA, N.M. PUTINTSEV, D.A. TESLYUK, Yu.A. SEL'KINA
**RESEARCH OF PEPTIZATION PROCESS OF FERROUS CAKE - WASTE OF COPPER-NICKEL PRO-
DUCTION**

The explanation of the peptization mechanism of iron (III) hydroxide pulp was given. The explanation of reasons why treatment with peptizator can remove the kinetic barrier and enable the conversion of ferrous cake of copper-nickel production without the use of autoclave was proposed.

Key words: ferrous cake, peptization, kinetic barrier, thermal analysis

R.N. RUMYANTSEV, A.A. ILYIN, A.P. ILYIN, A.B. ZHUKOV, A.A. MEZENTSEVA
MECHANOCHEMICAL SYNTHESIS AND THERMAL DECOMPOSITION OF IRON (II) OXALATE

Mechanochemical synthesis and thermal decomposition of $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ in an oxidizing, inert, and reducing environment were studied by X-ray, differential thermal, FTIR and mass-spectroscopic methods of analysis. The composition of escaping gas products was studied as well.

Key words: mechanochemical synthesis, iron oxalate (II), iron oxides, thermal decomposition

O. OKIL, I.N. GANIEV, Kh.M. NAZAROV, A.E. BERDIEV
**ANODIC BEHAVIOR OF ANTIMONY-DOPED ALLOY AK12 IN MEDIUM
OF NaCl ELECTROLYTE**

The results of experimental study of the effect of antimony on anode behavior of AK12 alloy were presented in a medium of the sodium chloride electrolyte. The addition of antimony was shown to reduce the corrosion rate of the initial alloy AK12 by a factor 3. With the increase in the concentration of chloride ions in the NaCl electrolyte pitting corrosion potentials are shifted in the negative region and the corrosion rate is increased.

Key words: alloy AK12, antimony, free corrosion potential, NaCl electrolyte, corrosion rate, pitting corrosion potential

A.S. TIMIN, E.V. RUMYANTSEV
**BILIRUBIN SORBENT BASED ON MESO POROUS SILICA MODIFIED BY AMINO GROUPS
AND ALBUMINE**

The organic-inorganic composites based on silica containing bovine serum albumin (BSA) were synthesized by sol-gel method. The 3-amino-propyl-trimethoxysilane was used for silica surface modification. Transmission electron microscopy and nitrogen adsorption-desorption analysis were used for characterization of the obtained materials. The modified silica materials were shown to be characterized by more adsorption ability as compared with non-modified silica. BSA introduction results in the increase in an adsorption by a factor 2-3.

Key words: bilirubin, sol-gel method, surface-structure characteristics, IR-spectroscopy, adsorption, bovine serum albumin, 3-amino-propyl-trimethoxysilane

A.S. FEDORINOV, M.V. VINOKUROV, A.A. VASILIEV, S.V. TIMOFEEVA, O.I. ODINTSOVA
**POLYORGANOSILOXANE APPLICATION FOR OBTAINING MATERIALS
OF LOWER FIRE HAZARD**

The possibility of using of polyorganosiloxane produced by Dow Corning Company for the flame-retardant finishing of textile materials was studied. The influence of activating additions of encapsulated Freon 23 (CHF_3) and fine carbon on thermal characteristics of cotton and cellulose-polyester fabrics was studied. The composition of fire protection composition was optimized.

Key words: textile, flame retardant composition, silicone rubbers, encapsulated freon 23 (CHF_3), fine carbon

A.V. KUNIN, S.A. SMIRNOV, D.N. LAPSHIN
**IMPACT OF INERT ADDITIVES AND QUANTITY OF ENERGY INPUT ON DESINTEGRATION
PROCESS OF AMMONIUM PHOSPHATES**

The research reveals that inert additives such as talc-magnesite, sylvinit, microtalc, halite, dolomite, mica and silicon dioxide have to be used in order to increase in aggregation of ammonium phosphate during its grinding.

Here we show that it is possible to obtain 100.0 and 95.3 % of fine-dispersed powder of ammonium phosphate using a vibration mill if ammonium phosphate is grinded with 10 %wt. of silicon dioxide or 5 %wt. of talc-magnesite, respectively. In order to achieve these results the energy input to the material should be not more than 150 J/g.

Key words: ammonium phosphate, fire extinguishing powder composition, silicon dioxide, ammonium sulphate

A.V. MITROFANOV, V.E. MIZONOV, L.N. OVCHINNIKOV

IDENTIFICATION OF PARAMETERS OF MODEL OF PARTICLES AERODYNAMIC DRAG IN FLUIDIZED BED

The object of the study is to find the dependence of drag force coefficient and the Reynolds number in fluidization process. Some experiments with different types of materials were performed with particles belonging to the Geldart group B, and several experimental results with particles of the Geldart group D were borrowed from literature. The procedure of drag coefficient estimation in gas-solid fluidized bed is discussed. The fitting curve for calculating the drag force coefficient is proposed on the basis of this procedure. The proposed dependence allows predicting fluidized bed expansion which in a good agreement with the experimental data.

Key words: drag force coefficient, Reynolds number, fluidized bed, particle precipitation rate

A.G. LAPTEV, E.A. LAPTEVA

ENERGY MODEL OF DUST COLLECTING FINE-DISPERSE PHASE IN FOAM LAYER

The energy model for wet dust collection of aerosol particles in disk-type gas separators was considered. The theory of turbulent migration of particles was used and expressions for determining gas treatment efficiency in a foam layer on perforated contact devices were obtained. Results of calculation of gas treatment efficiency are given as well as comparison of the results with experimental data.

Key words: turbulent migration, aerosols, barbotage, gas purification, energy model

N.A. MAKAREVICH, N.I. BOGDANOVICH, S.I. TRETIKOV

EXPONENTIAL KINETIC EQUATION FOR PROCESSES OF ADSORPTION, EXTRACTION, DRYING

The exponential equation of diffusive kinetics for extraction of substances from vegetable raw materials with the correction parameter was offered. Algorithms of calculation are considered and the comparative assessment of coefficients of molecular diffusion of process of extraction of birch bark by a traditional method and taking into account interspatial interactions in a system is carried out. With participation of components of vegetable raw materials diffusive kinetic model adjusted for non-ideal interface processes was received.

Key words: drying, adsorption, extraction, diffusion kinetics, modeling

S.S. BUSLAEV, V.I. PARFENYUK

ELECTROCHEMICAL METHOD FOR OBTAINING HIGHLY POROUS ALUMINUM OXIDE

Electrochemical solid-phase synthesis of highly porous aluminum oxide was proposed and was carried out. Peculiarities of obtained structures were studied by transmission electron microscopy and atomic force microscopy under conditions of given process. The process mechanism of porous alumina formation was considered. The estimation of correlating factors of some basic parameters of the process was given.

Key words: porous aluminum oxide, electrochemical synthesis

G.G. MATAFONOVA, N.I. VOROBYEVA, V.B. BATOEV

OXIDATION OF BISPHENOL A IN NATURAL AND WASTE WATER BY ULTRAVIOLET RADIATION OF EXCILAMP

The kinetic regularities of oxidation of a micro pollutant, bisphenol A, in natural and domestic waste water by ultraviolet radiation of KrCl excilamp (222 nm) were studied. Under direct irradiation the generation of hydroxyl radicals was established. The radicals provided an energy-efficient oxidation of bisphenol A with a highest rate in waste water ($k = 0.18 \text{ cm}^2/\text{mJ}$). Addition of hydrogen peroxide did not enhance the oxidation rate.

Key words: micro pollutant, bisphenol A, natural and waste water, oxidation, excilamp, hydrogen peroxide