

CONTENTS

REVIEWS

- Latypova F.N., Vildanov F.Sh., Chanyshev R.R., Zlotsky S.S.**
Chemistry of cyclic acetals and their analogues in works of scientific school of D.L. Rakhmankulov.....3
- Sentyurin E.G., Mekalina I.V., Aiyzatulina M.K., Bogatov V.A.**
Acrylate high heat resistant organic glasses. Experience of application. Prospects.....22

CHEMISTRY

(inorganic, organic, analytical, physical, colloid
and high-molecular compounds)

- Chebotaryov A.N., Raboshvil E.V., Efimova I.S.**
Spectrophotometric determination of selenium in food and pharmaceuticals with application of 4-sulfo-2 (4'-sulfonaphthaline-1'-azo) naphthol-125
- Abrosimov V.K., Zhabanov Yu.A., Krasnov A.V., Ivanov E.V.**
Molecular structure of methyl-*N*-substituted chiral glycolurils on results of DFT quantum chemical calculations29
- Mezhevoiy I.N., Badelin V.G., Tyunina E.Yu.**
Enthalpic characteristics of cysteine dissolution in aqueous solutions of sodium dodecyl sulfate33
- Platonova D.S., Adeeva L.N.**
Chemical composition and acid-base properties of humic acids extracted from sapropel of Omsk region35
- Zyablitskaya V.A., Smagin V.P.**
Interaction copper trifluoroacetate and quercetine in butanol-1-ethylacetate solvent.....38

CHEMICAL TECHNOLOGY

(inorganic and organic substances.
Theoretical fundamentals)

- Shabelskaya N.P., Shilkina L.A., Talanov M.V., Ulyanov A.K.**
Research of processes of spinel formation at decomposition of salts
in $Ni_xCu_{1-x}Fe_{2x}Cr_{2(1-x)}O_4$ ($x=0.0, 0.3, 1.0$) system.....45
- Matveiychuk Yu.V., Vizgunov K.A.**
Effect of reactants mixing order on thermal decomposition of basic nickel (II) sulfate and carbonate48
- Mirzoeva A.A., Agaeva S.A.**
Electrochemical separation of selenium from tellurium admixtures at processing of chemical plant
sludges54
- Butrim S.M., Litvyak V.V., Butrim N.S., Bildyukevich T.D., Alekseenko M.S.**
Obtaining and studying properties of acid- hydrolyzed potato starch58
- Nagornov R.S., Razgovorov P.B., Smirnova E.A., Razgovorova M.P.**
Comparative analysis of natural aluminosilicates action in relation to attendant ingredients of linseed oil63
- Dmitrieva A.D., Kuzmenko V.A., Odintsova L.S., Odintsova O.I.**
Synthesis and using of silver nanoparticles for producing of textile materials with bactericidal properties.....67
- Misbakhov R.Sh., Mizonov V.E.**
Cell model of phase transformation in spherical droplet at cooling71

Lipin A.G., Lipin A.A., Shibashov A.V.	
Mathematical modeling polyacrylamide prepolymer drying at conductive heat supply	74
Fedosov S.V., Blinichev V.N., Maslennikov V.A., Osadchiy Yu.P., Markelov A.V.	
Mechanism of blocking polymeric membranes at separation of used engine oils	79
Tangyarikov N.S., Turabzhanov S.M., Ikromov A., Musulmanov N.H.	
Catalysts for vapor-phase vinyl acetate synthesis	82

ECOLOGICAL PROBLEMS
OF CHEMISTRY AND CHEMICAL TECHNOLOGY

Movsum-zade E.M., Nikitina A.A., Belyaeva A.S.	
Environmentally safe method of acid tar processing - waste of oil production	84

A B S T R A C T S

F.N. LATYPOVA, F.Sh. VILDANOV, R.R. CHANY SHEV, S.S. ZLOTSKY
CHEMISTRY OF CYCLIC ACETALS AND THEIR ANALOGUES IN WORKS
OF SCIENTIFIC SCHOOL OF D.L. RAKHMANKULOV

The main achievements of scientific school of D. L. Rakhmankulov in the field of theoretical, experimental and applied chemistry which activity is more than 40 years are presented. The detailed analysis of works of D.L. Rakhmankulov and his disciples in the field of synthesis of 1,3-diheterocycloalkanes is carried out. The most important results of the works devoted to chemistry homolytic, heterolytic, etc. reactions of cyclic acetals are presented. The main results of practical use of the received technological methods and receptions in science and the industry are given.

Key words: organic synthesis, cyclic acetals, carbenes, interphase catalysis, radical isomerization, ion-radicals, olefins, glycols, aldehydes

E.G. Sentyurin, I.V. MEKALINA, M.K. AIYZATULINA, V.A. BOGATOV
ACRYLATE HIGH HEAT RESISTANT ORGANIC GLASSES.
EXPERIENCE OF APPLICATION. PROSPECTS

The comparative analysis of properties of fluorineacrylate organic glasses and new types of organic glasses with sparse-cross-linked structure is given. Virtues of organic glasses obtaining by method of oriented extraction were described.

Key words: fluorineacrylate organic glasses, operation, softening temperature, working temperature, impact elasticity, tensile strength, cross-linking agents

A.N. CHEBOTARYOV, E.V. RABOSHVIL, I.S. EFIMOVA
SPECTROPHOTOMETRIC DETERMINATION OF SELENIUM IN FOOD AND PHARMA-
CEUTICALS WITH APPLICATION OF 4-SULFO-2 (4'-SULFONAPHTHALINE-1'-AZO)-
NAPHTHOL-1

A new analytical form was proposed for the spectrophotometric determination of selenium in the form of Se(VI) in food and pharmaceuticals based on the redox interaction of Se(VI) with azodye 4-sulfo-2 (4'-sulфонафталин-1'-азо) нафтол-1. The technique is simple in execution, expressive, reproducible and highly selective. The main elements responsible for macro and micro composition of analyzed samples do not interfere with the selenium determination.

Key words: selenium, carmoisine, redox interaction, spectrophotometry

V.K. ABROSIMOV, Yu.A. ZHABANOV, A.V. KRASNOV, E.V. IVANOV
MOLECULAR STRUCTURE OF METHYL-N-SUBSTITUTED CHIRAL GLYCOLURILS
ON RESULTS OF DFT QUANTUM CHEMICAL CALCULATIONS

The structural parameters of molecules of the chiral (with the enantiomer ratio of 1:1) 2-monomethyl-, 2,6-dimethyl-, and 2,4,6-trimethylglycolurils were computed by the high-level method of the density functional theory (DFT). The melting point and the molar heat of fusion process for each of the specified glycolurils were estimated by the method of differential scanning calorimetry.

Key words: methyl-N-substituted glycoluril, structure-molecular parameters, melting point, fusion heat

I.N. MEZHEVOIY, V.G. BADELIN, E.Yu. TYUNINA
ENTHALPIC CHARACTERISTICS OF CYSTEINE DISSOLUTION IN AQUEOUS SOLUTIONS
OF SODIUM DODECYL SULFATE

Enthalpies of dissolution, $\Delta_{\text{sol}}H^m$, of L-cysteine in aqueous sodium dodecyl sulfate solutions were measured at changes in its concentration up to 0.05 mol/kg of solvent with calorimetric method. Standard disso-

lution enthalpies values ($\Delta_{\text{sol}}H^0$) and enthalpic pair coefficients of interaction, h_{xy} , between amino acids and sodium dodecyl sulfate in water were determined at 298.15 K. The results obtained are discussed in terms of different types of interactions in the solutions and influences of solutes nature on the thermochemical characteristics of dissolution of amino acids (L-cysteine, L-alanine, L-serine).

Key words: amino acids, sodium dodecylsulfate, dissolution enthalpy, solutions, calorimetry

D.S. PLATONOVA, L.N. ADEEVA

CHEMICAL COMPOSITION AND ACID-BASE PROPERTIES OF HUMIC ACIDS EXTRACTED FROM SAPROPEL OF OMSK REGION

With the elemental, CHNS - and X-ray fluorescence analysis the chemical composition of humic acids isolated from sapropel was investigated. The acid-base properties of humic acids were determined by potentiometric titration. The number of carboxyl and hydroxyl groups in humic acid, the values of the constants of dissociation of the functional groups determining the sorption properties of the extracted humic acids was established.

Key words: humic acid sapropel, CHNS-analysis, X-ray fluorescence analysis, potentiometric titration, acid-base properties

V.A. ZYABLITSKAYA, V.P. SMAGIN

INTERACTION COPPER TRIFLUOROACETATE AND QUERCETINE IN BUTANOL-1-ETHYLACETATE SOLVENT

The interaction of copper trifluoroacetate with quercetin in systems $(\text{CF}_3\text{COO})_2\text{Cu} - \text{Q}_r - \text{P}$, where Q_r - Quercetin, P - Ethyl Acetate (EA) (1 vol.% BS - EA), (4 vol.% BS - EA) (20 vol.% BS - EA) (50 vol.% BS - EA) Butanol - 1 (BS) was studied. The ratios of Cu (II) : Q, and stability constants were determined with the methods of saturation of optical densities, isomolar series of Asmus and Benesi-Hildebrand. At the increase in butanol-1 content in mixed solvent the processes were registered which are competitive to complexation. They are connected with the limited solubility and redox decomposition of complex compounds.

Key words: complexation, copper trifluoroacetate, flavonoids, quercetin, low polar organic media

N.P. SHABELSKAYA, L.A. SHILKINA, M.V. TALANOV, A.K. ULYANOV

RESEARCH OF PROCESSES OF SPINEL FORMATION AT DECOMPOSITION OF SALTS IN $\text{Ni}_x\text{Cu}_{1-x}\text{Fe}_{2x}\text{Cr}_{2(1-x)}\text{O}_4$ ($x=0.0, 0.3, 1.0$) SYSTEM

In the work, on the basis of studying processes of a phase formation during the reaction of decomposition of nitrates of nickel (II), copper (II), chrome (III), iron (III) corresponding to a ratio of transitional metals in solid solution $\text{Ni}_x\text{Cu}_{1-x}\text{Fe}_{2x}\text{Cr}_{2(1-x)}\text{O}_4$ with the parameter of structure of $x=0.0; 0.3; 1.0$, it was established that for the structures containing cations of Ni^{2+} and Fe^{3+} completeness of course of process is higher. The obtained data can be used for a choice of conditions of synthesis of the Cr-containing spinels. It was assumed on stabilizing influence of cations distribution on lattice point on spinel formation process in complex solid solution.

Key words: ferrite, chromites, complex oxide compounds synthesis

Yu.V. MATVEIYCHUK, K.A. VIZGUNOV

EFFECT OF REACTANTS MIXING ORDER ON THERMAL DECOMPOSITION OF BASIC NICKEL (II) SULFATE AND CARBONATE

Effect of the reactants mixing order ($\text{NaOH} \rightarrow \text{NiSO}_4$ or $\text{NiSO}_4 \rightarrow \text{NaOH}$) on the composition and thermal decomposition of the basic nickel (II) carbonate and sulfate was studied with the FT-IR spectrometry and TG/DTA-analysis.

Key words: basic sulphates and carbonates of nickel (II), TG/DTA-analysis, FT-IR spectrometry

A.A. MIRZOEVA, S.A. AGAEVA

ELECTROCHEMICAL SEPARATION OF SELENIUM FROM TELLURIUM ADMIXTURES AT PROCESSING OF CHEMICAL PLANT SLUDGES

The researches of electrochemical refining of technical selenium obtained at the processing sulfuric sludges of chemical and pulp-paper productions were presented. The method was developed for electrochemi-

cal separation of selenium and tellurium providing the transformation of selenium into solution and its subsequent deposition with obtaining of elementary selenium containing not more than $5 \cdot 10^{-5}\%$ of tellurium.

Key words: selenium, tellurium, sulfuric sludge, electrochemical refining, electrolyte, current density, concentration, temperature, duration

S.M. BUTRIM, V.V. LITVYAK, N.S. BUTRIM, T.D. BILDYUKEVICH, M.S. ALEKSEENKO
OBTAINING AND STUDYING PROPERTIES OF ACID- HYDROLYZED POTATO STARCH

Positive results on obtaining the potato starch hydrolyzed by acid were received at reaction carrying out in 38% of starched suspension with the use of 0.5 N solution of hydrochloric acid at temperature of 50°C within 4–6 hours, thus conditional viscosity of pastes were 6% 11.8–13.2 sec. It was shown, that acid-hydrolyzed starch remains granular structure and degree of crystallinity is decreased. It was established, that with increase in acid concentration and reaction temperature the yield and ash of the modified starch is decreased.

Key words: potato starch, hydrochloric and sulfuric acids, hydrolysis, viscosity

R.S. NAGORNOV, P.B. RAZGOVOROV, E.A. SMIRNOVA, M.P. RAZGOVOROVA
COMPARATIVE ANALYSIS OF NATURAL ALUMINOSILICATES ACTION IN RELATION TO ATTENDANT INGREDIENTS OF LINSEED OIL

The estimation of extraction efficiency of some attendant ingredients of linseed oil with the use of aluminosilicate materials of different composition was carried out. The free fatty acids, peroxy compounds and the pigment complex components of oil was establishes to adsorb most actively during 1–3 hours at a consumption of the natural material up to 1 wt.%. The results reached with the introduction of elutriated samples of blue and black clay to the linseed oil are explained from the standpoint of the acid-base properties of the surface of their particles.

Key words: linseed oil, attendant ingredients, free fatty acids, peroxides, pigment complex components, natural aluminosilicate materials

A.D. DMITRIEVA, V.A. KUZMENKO, L.S. ODINTSOVA, O.I. ODINTSOVA
SYNTHESIS AND USING OF SILVER NANOPARTICLES FOR PRODUCING OF TEXTILE MATERIALS WITH BACTERICIDAL PROPERTIES

During the research the silver nanoparticles synthesis was carried out in aqueous medium by means of different reducing agents at the use of synthetic polyelectrolytes as stabilizer agents of heterogeneous system. Spectrophotometric method was used to identify silver nanoparticles size into colloidal solution and to study their stability. The antimicrobial properties of silver nanoparticles synthesized at different conditions as well as their composites with known antimicrobial and natural bactericides were studied.

Key words: silver nanoparticles, stabilization, synthetic polyelectrolyte, antibacterial textile finishing

R.Sh. MISBAKHOV, V.E. MIZONOV
CELL MODEL OF PHASE TRANSFORMATION IN SPHERICAL DROPLET AT COOLING

A non-linear cell mathematical model of evolution of temperature and phase composition distribution in a solidifying at cooling spherical liquid droplet was proposed. Some examples of the process numerical modeling are presented. The model of a droplet as a thermally thin body was shown to give the considerable miscalculation in calculation of the solidification time.

Key words: spherical droplet, cooling, phase composition, cell model, state vector, heat conduction matrix, phase transformation

A.G. LIPIN, A.A. LIPIN, A.V. SHIBASHOV
MATHEMATICAL MODELING POLYACRYLAMIDE PREPOLYMER DRYING AT CONDUCTIVE HEAT SUPPLY

The second step of polyacrylamide two steps synthesis, on which prepolymer postpolymerization is combined with drying of the product was considered. The mathematical model which allows predicting rational technological parameters of the drying process was offered. The comparison of experimental data with the results of numerical experiments was accomplished.

Key words: acrylamide, polyacrylamide, polymerization, prepolymer, drying, combined process, mathematical model

S.V. FEDOSOV, V.N. BLINICHEV, V.A. MASLENNIKOV, Yu.P. OSADCHIY, A.V. MARKELOV
**MECHANISM OF BLOCKING POLYMERIC MEMBRANES AT SEPARATION
OF USED ENGINE OILS**

Results of experimental study of formation process of particles deposits are presented at purification of used engine oils by tube membranes "Vladipor" with material of an active layer from Teflon, polysulfon, polyvinylchloride and modified polyvinylchloride.

Key words: membrane separation, used engine oil, pore blocking scheme

N.S. TANGYARIKOV, S.M. TURABZHANOV, A. IKROMOV, N.H. MUSULMANOV
CATALYSTS FOR VAPOR-PHASE VINYL ACETATE SYNTHESIS

For the synthesis of vinyl acetate from acetylene, the catalysts based on compounds of cadmium, zinc, bismuth and aluminum were proposed. It was shown that on the synthesis step the optimal ratio of $C_2H_2:CH_3COOH$ was 5–6 mols. It was found that the time of the catalyst operation before regeneration was 200 hours.

Key words: vinyl acetate, vapor-phase synthesis

E.M. MOVSUM-ZADE, A.A. NIKITINA, A.S. BELYAEVA
**ENVIRONMENTALLY SAFE METHOD OF ACID TAR PROCESSING - WASTE
OF OIL PRODUCTION**

The methods of processing of the acid tar - large-scale waste of mineral oils production were described in details. A new method of processing the acid tar for receiving a prospective agent for the oil industry was proposed. The data on test of its functional properties are presented.

Key words: acid tar, waste, recycling, mineral oils