

CONTENTS

REVIEWS

**Razgovorov P.B.**

Creation of inorganic compositions on base of modified water-soluble silicates..... 3

CHEMISTRY

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

**Yurovskiy A.M., Tarasov A.V., Moskvichev Yu.A.**

Synthesis and some chemical properties of novel 3(4)(bromoacetyl)benzenesulfonylamides of different structure..... 15

**Vasin V.S., Koldaeva T.Yu., Perevalov V.P.**

Synthesis of derivatives of 2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid containing sulphonamide group in phenyl fragment ..... 19

**Zalov A.Z., Verdizade N.A., Abaskulieva U.B.**

Extraction-photometric determination of titanium (IV) with thiophenol hydroxyhalogen derivatives and aminophenols..... 23

**Kondratieva A.O., Krasnoshchyokov A.V., Ermakov A.I.**

Quantum-chemical calculations of Gibbs energy of reactions proceeding at interaction of methane with chlorine at temperatures range from 298 to 1300 K ..... 29

**Kozhevnikova N.S., Uritskaya A.A.**

*One-pot* synthesis of nanocrystalline mercury sulfide- $\alpha$ -HgS in aqueous solutions of sodium thiosulfate ..... 33

**Kochetova L.B., Kalinina N.V., Klyuev M.V.**

Quantum chemical simulation of solvation influence on kinetics of reductive acylation..... 38

**Mezhuev Ya.O., Korshak Yu.V., Shtilman M.I., Piskareva A.I.**

Activation parameters of single-electron transfer from pyrrole molecule to persulfate ion..... 42

**Mezhuev Ya.O., Korshak Yu.V., Shtilman M.I., Piskareva A.I.**

Activation parameters of single-electron transfer from 2-methoxyaniline (*o*-anizidine) molecule to persulfate ion ..... 45

**Rybina G.V., Meshechkina A.E., Mel'nik L.V., Srednev S.S., Moskvichev Yu.A.**

Kinetics of cyclopentene epoxidation by cumene hydroperoxide ..... 48

**Mirzoev R.S., Ligidov M.Kh., El'mesova R.M., Kyarov A.A., Shetov R.A.**

$\text{Na}_2\text{MoO}_4$ - $\text{Cs}_2\text{MoO}_4$ - $\text{H}_2\text{O}$  system at 25°C ..... 52

**Ulitin N.V., Deberdeev R.Ya., Deberdeev T.R.**

Kinetics of butyl-acrylate radical polymerization proceeding at conditions of reversible chain transfer using trithiocarbonates ..... 57

CHEMICAL TECHNOLOGY

(inorganic and organic substances.  
Theoretical fundamentals)

**Ilyin A.A., Rumyantsev R.N., Dubova I.A., Ilyin A.P.**

Synthesis and catalytic properties of cobalt ferrite in decomposition reaction of nitrogen(I) oxide ..... 62

**Solodov M.S., Solodov A.S., Soboleva E.S., Koshel S.G.**

Regularities of galvanostatic synthesis of doped polyaniline ..... 64

**Inasaridze L.N., Balmasov A.V.**

Effect of macroheterocyclic compounds on photoelectrochemical properties of titanium dioxide films fabricated in ethylene glycol solutions..... 67

**Alekseeva O.V., Bagrovskaya N.A., Pukhovskaya S.G., Vershinina I.A.**

Composites of water-soluble polymers with porphyrin zinc complex..... 71

<b>Rozentsvet V.A., Kozlov V.G., Korovina N.A.</b> Cationic polymerization of 1,3-pentadiene under action of modified titanium catalysts.....	75
<b>Nguyen Thi Thu Ha, Merkin A.A., Lefedova O.V.</b> Kinetic features of azoxybenzene hydrogenation in aqueous 2-propanol solutions on skeletal nickel with additives of acid and base.....	79
<b>Aliyev A.M., Gasanov E.A., Sarydzhanov A.A.</b> Kinetics of partial oxidation reaction of n-butene to methylethylketone on zeolite canay modified by copper and palladium cations.....	81
<b>Gavrilova A.O., Vasiliev D.M., Kuznetsov V.B., Kuvshinova S.A., Koifman O.I.</b> Study of influence of light-thermo ageing on polyvinylchloride film properties modified with multi layers carbon nanotubes .....	85
<b>Gryaznov P.I., Foss T.R., Zaiyduullin I.M., Khusnutdinov I.Sh., Zabbarov R.R., Lutfullin M.F.</b> Modifying additives to road bitumen binders.....	89
<b>Golounin A.V., Zakharova O.V.</b> Fuel compositions with iron-containing additives .....	91
<b>Yelin N.N., Mizonov V.E., Driganovich I.I.</b> Cell model of processes of ion exchange in apparatus with immovable bed of ionite .....	93
<b>Mitrofanov A.V., Ogurtzov A.V., Magnitskiy V.A., Mizonov V.E., Ovchinnikov L.N.</b> Mathematical model of continuous fluidized bed.....	96
<b>Kapranova A.B., Zaitsev A.I., Ganin A.V., Vasiliev A.M.</b> Deformative model of powder vertical motion in centrifugal deaerator.....	99
<b>Kapranova A.B., Zaitsev A.I., Ganin A.V., Vasiliev A.M.</b> Investigation of three-dimensional field of velocities at powder motion in centrifugal deaerator .....	102
<b>Inyushkin N.V., Yugaiy F.S., Gil'vanova Z.R., Titov A.G., Ermakov S.A.</b> Study of sodium percarbonate crystals precipitation in electro cyclone .....	104
<b>Alekseeva O.V., Bagrovskaya N.A., Noskov A.V., Kuznetsov V.V.</b> Structural and adsorption properties of polystyrene modified with fullerene .....	108
<b>Muravyov I.A., Krotova M.N., Vasiliev A.A., Firsova V.A., Odintsova O.I.</b> Studies of influence of surfactants on state of dispersible dyes in dye bath.....	112

#### ECOLOGICAL PROBLEMS OF CHEMISTRY AND CHEMICAL TECHNOLOGY

<b>Minaevskaya L.V., Shchegolikhina N.A.</b> Lignin as sorbent at purification of industrial sewage .....	114
--	-----

#### SCIENTIFIC AND METHODOLOGICAL PROBLEMS

<b>Grigoriev A.N., Eryomina E.A., Kazin P.E., <u>Tretyakov Yu.D.</u></b> Control system of knowledges on inorganic chemistry at chemistry department of moscow state lomonosov university.....	117
<b>Martynova T.V.</b> Experience of independent student work during study of general and inorganic chemistry at MSTU "MAMI".....	119
<b>Zaben'kina E.O., Artamonova I.V.</b> Innovative educational technology in educational process for training of bachelors of engineering and technical profile.....	123
<b>Kuzurman V.A., Zadorozhnyiy I.V., Kukhtin B.A.</b> Use of innovative educational technologies in multilevel system of chemical education at university.....	126

#### CHRONICLE

<b>Zaikov G.E., Zimina L.A., Artsis M.I., Madyuskina L.L.</b> Sixth international conference "Polymer time and composites" (Top-6) .....	130
---	-----

## A B S T R A C T S

*P.B. RAZGOVOROV***CREATION OF INORGANIC COMPOSITIONS ON BASE OF MODIFIED WATER-SOLUBLE SILICATES**

The actuality of studies of water-soluble silicate systems modified by inorganic additives is shown. Throughout last half a century the analysis of works of the domestic and foreign scientists studying questions of creation of new composite materials on the base of liquid glasses for the chemical industry and building industry is presented.

**Key words:** water-soluble silicates, liquid glasses, inorganic additives

*A.M. YUROVSKIY, A.V. TARASOV, YU.A. MOSKVICHEV***SYNTHESIS AND SOME CHEMICAL PROPERTIES OF NOVEL 3(4)(BROMOACETYL)BENZENESULFONYLAMIDES OF DIFFERENT STRUCTURE**

This paper describes some features of interaction 3(4)(bromoacetyl)benzenesulfonyl chlorides with various amines. The general method of synthesis of the novel 3(4)(bromoacetyl)benzenesulfonylamides was proposed. Availability of utilization of 3(4)(bromoacetyl)benzenesulfonylamides for preparation the different heterocyclic compounds by example of reaction with thiourea was shown.

**Key words:** 2-aminothiazoles, amines, sulphobenzoic acids, sulfonamide, thiourea, phenacyl bromide

*V.S. VASIN, T.YU. KOLDAEVA, V.P. PEREVALOV***SYNTHESIS OF DERIVATIVES OF 2-(2-HYDROXYPHENYL)-2H-BENZOTRIAZOLE-4-CARBOXYLIC ACID CONTAINING SULPHONAMIDE GROUP IN PHENYL FRAGMENT**

The synthesis method of derivatives of 2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid containing sulphonamide group was developed on the base of 3,5-diamino-4-chlorobenzoic acid and N-phenylamide of 3-amino-4-hydroxybenzenesulphonic acid. N-phenylamide of 3-amino-4-hydroxybenzene-sulphonic acid was synthesized from o-nitrochlorobenzene-p-sulphonic acid.

**Key words:** 2-(2-hydroxyphenyl)-2H-benzotriazole-4-carboxylic acid, N-phenylamide of 3-amino-4-hydroxybenzenesulphonic acid, oxidative cyclization, organic ligands

*A.Z. ZALOV, N.A. VERDIZADE, U.B. ABASKULIEVA***EXTRACTION-PHOTOMETRIC DETERMINATION OF TITANIUM (IV) WITH THIOPHENOL HYDROXYHALOGEN DERIVATIVES AND AMINOPHENOLS**

The interaction of titanium ions with 2-hydroxy-5-halogenderivatives of thiophenol in the presence of aminophenols was studied. The action of aminophenols on hydroxy halogen thio phenolate of titanium (pH 3.1-5.6) forms a yellow compound, which is extracted well by halogen-containing solvents. The chloroform and ethylene dichloride was the best among all tested extractants. Absorption curves of chloroform extracts were obtained in the range of 300–550 nm. The chloroform extract of hydroxyhalogenthiofenolate complex of titanium by aminophenols has absorption maximum at 450–460 nm ( $\epsilon = (2.6-3.3) \cdot 10^4$ ). The composition of the complexes was determined by various spectrophotometric methods.

**Key words:** titanium, aminophenols, different ligands complexes, functional-analytical groups, light absorption

*A.O. KONDRATIEVA, A.V. KRASNOSHCHYOKOV, A.I. ERMAKOV***QUANTUM-CHEMICAL CALCULATIONS OF GIBBS ENERGY OF REACTIONS PROCEEDING AT INTERACTION OF OF METHANE WITH CHLORINE AT TEMPERATURES RANGE FROM 298 TO 1300 K**

The Gibbs energies of 27 reactions which accompany the interaction of methane and chlorine were calculated with quantum-chemically at temperatures from 298 to 1300 K. The reliability of results was confirmed. Impossible, possible, and proceeding reactions were revealed. It was shown that the proceeding both radical and molecular reactions is the thermodynamically probable.

**Key words:** quantum-chemical calculations, methane, chlorine, Gibbs energy, radical and molecular reactions

*N.S. KOZHEVNIKOVA, A.A. URITSKAYA***ONE-POT SYNTHESIS OF NANOCRYSTALLINE MERCURY SULFIDE  $\alpha$ -HgS IN AQUEOUS SOLUTIONS OF SODIUM THIOSULFATE**

One-pot synthesis was applied for direct obtaining the mercuric sulfide  $\alpha$ -HgS with trigonal (sp. gr. P3<sub>2</sub>21) structure in the nano crystalline state with an average particle size of powder less than 20 nm. The method of thermodynamic

study of reaction of HgS obtaining in the system " $\text{Hg}^{2+} - \text{Na}_2\text{S}_2\text{O}_3 - \text{H}_2\text{O}$ " was proposed. The constant of hydrolysis of sodium thiosulfate  $\text{p}K_{\text{C}} = 30.7$  was experimentally determined in this system.

**Key words:** nano crystalline  $\alpha$ -HgS, one-pot synthesis, sodium thiosulfate aqueous solution

*L.B. KOCHETOVA, N.V. KALININA, M.V. KLYUEV*  
**QUANTUM CHEMICAL SIMULATION OF SOLVATION INFLUENCE ON KINETICS OF REDUCTIVE ACYLATION**

Quantum chemical simulation of non-specific and specific solvation of reactants and semi-products of reductive acylation reaction of 2,6-dimethylnitrobenzene was carried out. Determinative influence of 2,6-dimethylaniline solvation on the total reaction rate was shown. Orbital control of amine acylation step was established. The conclusion was made that this step is rate determinative at carrying out the reaction in alcohols.

**Key words:** reductive acylation, solvation, quantum chemical simulation

*YA.O. MEZHUEV, YU.V. KORSHAK, M.I. SHTILMAN, A.I. PISKAREVA*  
**ACTIVATION PARAMETERS OF SINGLE-ELECTRON TRANSFER FROM PYRROLE MOLECULE TO PERSULFATE ION**

The kinetics of single-electron transfer from pyrrole molecule to persulfate ion when oxidative polymerization is carried out was studied. The single-electron transfer was shown to be a second order reaction. The kinetic constants and the activation parameters of the process were calculated.

**Key words:** pyrrole, polypyrrole, oxidation

*YA.O. MEZHUEV, YU.V. KORSHAK, M.I. SHTILMAN, A.I. PISKAREVA*  
**ACTIVATION PARAMETERS OF SINGLE-ELECTRON TRANSFER FROM 2-METHOXYANILINE (O-ANIZIDINE) MOLECULE TO PERSULFATE ION**

The kinetics of oxidative polymerization of 2-methoxyaniline with ammonium persulfate in aqueous media was examined by means of potentiometric analysis. The kinetic constants of direct single-electron transfer from o-anizidine molecule to oxidizer were calculated, and the activation parameters of this process were found. The obtained experimental data were compared with basic theoretical results.

**Key words:** 2-methoxyaniline, o-anizidine, oxidation

*G.V. RYBINA, A.E. MESHECHKINA, L.V. MEL'NIK, S.S. SREDNEV, YU.A. MOSKVICHEV*  
**KINETICS OF CYCLOPENTENE EPOXIDATION BY CUMENE HYDROPEROXIDE**

Kinetic regularities of hydroperoxide epoxidation of cyclopentene were studied. The kinetic model of reaction was proposed. The activation energy, the dissociation constant of the intermediate complexes and the reaction rate constants were determined. This model describes adequately the experimental data on the cyclopentene oxidation by cumene hydroperoxide.

**Key words:** cyclopentene, cumene hydroperoxide, oxidation, kinetics, reaction rate constant, dissociation constants, inhibition, kinetic model

*R.S. MIRZOEV, M.KH. LIGIDOV, R.M. EL'MESOVA, A.A. KYAROV, R.A. SHETOV*  
 **$\text{Na}_2\text{MoO}_4\text{-Cs}_2\text{MoO}_4\text{-H}_2\text{O}$  SYSTEM AT 25°C**

Phase formation in the  $\text{Na}_2\text{MoO}_4\text{-Cs}_2\text{MoO}_4\text{-H}_2\text{O}$  system was studied at 25°C. Three incongruently soluble complex phases was shown to form in this system:  $3\text{Na}_2\text{MoO}_4\text{Cs}_2\text{MoO}_4\cdot 18\text{H}_2\text{O}$ ,  $\text{Na}_2\text{MoO}_4\text{Cs}_2\text{MoO}_4\cdot 4\text{H}_2\text{O}$  and  $\text{Na}_2\text{MoO}_4\cdot 3\text{Cs}_2\text{MoO}_4\cdot 12\text{H}_2\text{O}$ . The densities, refractive indexes, and dynamic viscosities of saturated solutions of the system were determined. The double salts mentioned above were isolated and characterized using the chemical analysis, IR spectroscopy and complex thermal analysis.

**Key words:** solubility diagram, sodium molybdate, cesium molybdate, aqueous solutions, sodium-cesium double molybdates, thermal stability

*N.V. ULITIN, R.YA. DEBERDEEV, T.R. DEBERDEEV*  
**KINETICS OF BUTYL-ACRYLATE RADICAL POLYMERIZATION PROCEEDING AT CONDITIONS OF REVERSIBLE CHAIN TRANSFER USING TRITHIOCARBONATES**

The kinetics of polybutyl-acrylate obtaining with radical polymerization on mechanism of addition-fragmentation in dibenzyltrithiocarbonate presence was modelled. Model correctness was proved by good correlation of calculated and experimental values of polymer average molecular mass distribution parameters.

**Key words:** modeling, reversible chain transfer, polybutyl acrylate, radical polymerization

*A.A. ILYIN, R.N. RUMYANTSEV, I.A. DUBOVA., A.P. ILYIN*  
**SYNTHESIS AND CATALYTIC PROPERTIES OF COBALT FERRITE IN DECOMPOSITION REACTION OF NITROGEN(I) OXIDE**

For the first time the mechanochemical synthesis of cobalt ferrite was studied. The physical-chemical parameters of the  $\text{CoFe}_2\text{O}_4$  samples were established with the X-ray analysis. The data on the decomposition of nitrogen (I) oxide were obtained on the set-up of flow type in the temperature range of 200-500°C.

**Key words:** mechanochemical synthesis, cobalt ferrite, nitrogen (I) oxide decomposition

*M.S. SOLODOV, A.S. SOLODOV, E.S. SOBOLEVA, S.G. KOSHEL*  
**REGULARITIES OF GALVANOSTATIC SYNTHESIS OF DOPED POLYANILINE**

The study of galvanostatic synthesis of polyaniline doping at various modes was carried out. The effect of current density both on regularities of polymerization of aniline and on the shape of the potential curves was established. It allows determining the optimal conditions for galvanostatic synthesis of polyaniline.

**Key words:** polyaniline, galvanostatic synthesis, voltammograms, induction period, the synthesis mode, current density

*L.N. INASARIDZE, A.V. BALMASOV*

**EFFECT OF MACROHETEROCYCLIC COMPOUNDS ON PHOTOELECTROCHEMICAL PROPERTIES OF TITANIUM DIOXIDE FILMS FABRICATED IN ETHYLENE GLYCOL SOLUTIONS**

The effect of macroheterocyclic compounds on photoelectrochemical properties of oxide layers fabricated by anodic oxidation of metal titanium was studied. The introduction of cobalt phthalocyanine (PcCo) to ethylene glycol solution was shown to provide the formation on the titanium surface the oxide layers with high photo-EMF. The surface layer of titanium dioxide has a nano porous structure and can be used in photo catalysis.

**Key words:** titanium dioxide, anodic oxidation, photo-EMF, phthalocyanine, porphyrin

*O.V. ALEKSEEVA, N.A. BAGROVSKAYA, S.G. PUKHOVSKAYA, I.A. VERSHININA*  
**COMPOSITES OF WATER-SOLUBLE POLYMERS WITH PORPHYRIN ZINC COMPLEX**

Modification of water-soluble ethers of cellulose by zinc complex of 5,10,15,20-tetrakis(4-methylpyridil)porphyrin tetratosylate (ZnTPyP) by immobilization of metal complex into polymer mass in a common solvent was carried out and film materials were obtained. Under transition from water solution of zinc complex of porphyrin to polymeric systems was established to occur the decrease in intensity of analytical absorption band in electronic spectra of ZnTPyP. All modified materials were established to manifest the antibacterial activity.

**Key words:** porphyrins, polymers, extra complexes

*V.A. ROZENTSVET, V.G. KOZLOV, N.A. KOROVINA*  
**CATIONIC POLYMERIZATION OF 1,3-PENTADIENE UNDER ACTION OF MODIFIED TITANIUM CATALYSTS**

The introduction of carboxylic acids into catalytic system based on titanium tetrachloride allows to activate the 1,3-pentadiene cationic polymerization process, to decrease the high molecular weight fraction content in polymer and to exclude the insoluble fraction formation. The carboxylic acid nature variation in catalytic system is not practically influence on unsaturation and microstructure of synthesized polymer.

**Key words:** cationic polymerization, 1,3-pentadiene, titanium tetrachloride, carboxylic acids

*NGUYEN THI THU HA, A.A. MERKIN, O.V. LEFEDOVA*  
**KINETIC FEATURES OF AZOXYBENZENE HYDROGENATION IN AQUEOUS 2-PROPANOL SOLUTIONS ON SKELETAL NICKEL WITH ADDITIVES OF ACID AND BASE**

It was experimentally shown that the addition of sodium hydroxide to aqueous 2-propanol solutions lead to the increase in observed rate of azoxy-group reduction, whereas addition of acetic acid cause its decrease. The change in the reaction rate of azoxybenzen hydrogenation on skeletal nickel in aqueous 2-propanol solutions in the presence of additives was established to agree with the change in limiting adsorption values of atomic adsorbed hydrogen.

**Key words:** azoxybenzene, hydrogenation, skeletal nickel

*A.M. ALIYEV, E.A. GASANOV, A.A. SARYDZHANOV*  
**KINETICS OF PARTIAL OXIDATION REACTION OF N-BUTENE TO METHYLETHYLKETONE ON ZEOLITE CANAY MODIFIED BY COPPER AND PALLADIUM CATIONS**

The kinetics of partial oxidation of n-butene on metal-zeolite catalyst CuPdCaNaY was studied at different temperatures, residence time and partial pressures of reagents. On the base of experimental data the step reaction mechanism was proposed and the kinetic model was developed in the range of stationary activity of catalyst

**Key words:** partial oxidation, n-butene, methylethylketone, mechanism, catalyst, kinetic model

*A.O. GAVRILOVA, D.M. VASILIEV, V.B. KUZNETSOV, S.A. KUVSHINOVA, O.I. KOIFMAN*  
**STUDY OF INFLUENCE OF LIGHT-THERMO AGEING ON POLYVINYLCHLORIDE FILM PROPERTIES MODIFIED WITH MULTI LAYERS CARBON NANOTUBES**

The PVC films modified with multi layers carbon nanotubes were prepared. The extinction coefficient was calculated for films with the different content of carbon nano tubes. The results of physical-mechanical tests before and after light - thermo ageing were presented.

**Key words:** multi layers carbon nano tubes, polyvinylchloride, mass extinction coefficient, light - thermo ageing, physical-mechanical characteristics

**P.I. GRYAZNOV, T.R. FOSS, I.M. ZAIYDULLIN, I.SH. KHUSNUTDINOV, R.R. ZABBAROV, M.F. LUTFULLIN  
MODIFYING ADDITIVES TO ROAD BITUMEN BINDERS**

The oxidized bitumen modification of Kichuysk refinery bitumen by toluenediisocyanate was shown to improve its structural and mechanical properties. The optimal amount of modifying additives was determined with the IR spectroscopy method.

**Key words:** bitumen, modification, structural-mechanical properties

**A.V. GOLOUNIN, O.V. ZAKHAROVA  
FUEL COMPOSITIONS WITH IRON-CONTAINING ADDITIVES**

The influence of metal-organic compounds and iron valency state on the process of A-76 petrol burning in engine with spark ignition was revealed using the iron-containing additives, as an example. In the presence of catalytic amounts of iron compounds was established to decrease the carbon oxide content in engine exhaust fumes. Ferrocene derivatives can be successfully changed by the iron carboxylates with the fat acids. The snuff formation on ignition candells and in exhaust valves of engine is increased with the increase in iron concentration in fuel composition.

**Key words:** fuel compositions, iron-containing additives, carbon oxide

**N.N. YELIN, V.E. MIZONOV, I.I. DRIGANOVICH  
CELL MODEL OF PROCESSES OF ION EXCHANGE IN APPARATUS WITH IMMOVABLE  
BED OF IONITE**

A cell mathematical model of ion exchange in an apparatus with immovable bed of ionite was proposed. In the model, the ion exchange process consists of penetration of ions into ionite medium and of chemical reaction of ion exchange. The longitudinal movement of solution is described with a matrix of transition probabilities. Some of examples of numerical experiments with the model are presented.

**Key words:** ion exchange, impurity concentration, mass transfer, reaction kinetics, state vector, transition probabilities matrix

**A.V. MITROFANOV, A.V. OGURTZOV, V.A. MAGNITSKIY, V.E. MIZONOV, L.N. OVCHINNIKOV  
MATHEMATICAL MODEL OF CONTINUOUS FLUIDIZED BED**

A cell mathematical model of fluidization particles in continuous operating regime is proposed. The model is based on the theory of Markov chains for the chain with formation and decay of particles. It allows calculating the hold-up versus feed flow rate and particle residence time distribution in the apparatus. Some examples of calculation are presented.

**Key words:** fluidized bed, continuous feed, state vector, transition matrix, residence time distribution

**A.B. KAPRANOVA, A.I. ZAITSEV, A.V. GANIN, A.M. VASILIEV  
DEFORMATIVE MODEL OF POWDER VERTICAL MOTION IN CENTRIFUGAL DEAERATOR**

The description of vertical motion of disperse phase in powder deaeration process in the centrifugal set-up with the curvilinear blades is proposed on the base of heterogeneous system mechanics. The three-dimensional functional dependence for the porosity of the packed material was obtained in the cylindrical coordinate system. The results may be used under the engineering design of centrifugal set-up.

**Key words:** fine material, deaeration, gas and dispersion phases, porosity, heterogeneous system mechanics, centrifugal set-up, curvilinear blade, evolvent, cylindrical coordinates

**A.B. KAPRANOVA, A.I. ZAITSEV, A.V. GANIN, A.M. VASILIEV  
INVESTIGATION OF THREE-DIMENSIONAL FIELD OF VELOCITIES AT POWDER MOTION IN  
CENTRIFUGAL DEAERATOR**

On the base of mechanics of heterogeneous systems the functional dependences for components of motion velocity of disperse phase of fine material were obtained in cylindrical co-ordinates at the powder deaeration process in centrifugal deaerator with the evolvent blades. The results may be used under the estimation of sufficient height of the set-up curvilinear blade.

**Key words:** fine material, deaeration, dispersion media, velocity, porosity, heterogeneous system mechanics, centrifugal set-up, curvilinear blade, evolvent, cylindrical coordinates

**N.V. INYUSHKIN, F.S. YUGAIY, Z.R. GIL'VANOVA, A.G. TITOV, S.A. ERMAKOV  
STUDY OF SODIUM PERCARBONATE CRYSTALS PRECIPITATION IN ELECTRO CYCLONE**

The paper presents results of experimental study on collect degree of finishing product – sodium peroxycarbonate as a function of circular velocity of aerosol movement in curvilinear channel of electro cyclone. The purification degree of exhaust gas was shown to reach the high value (up to 99.9%) in unit of dry purification and exclude the wet step at outlet for plant OAO Perkarbonat.

**Key words:** gas purification, dust entrainment, electrocyclone, cyclone, fluidized bed dryer, persol

**O.V. ALEKSEEVA, N.A. BAGROVSKAYA, A.V. NOSKOV, V.V. KUZNETSOV**  
**STRUCTURAL AND ADSORPTION PROPERTIES OF POLYSTYRENE MODIFIED**  
**WITH FULLERENE**

Atactic polystyrene films modified with small amounts of fullerenes (up to 1 wt. % of C<sub>60</sub>) were obtained. The size of crystalline regions and the persistent length and the Kuhn's segment values for the studied composites were determined by the X-ray diffraction technique. Kinetics of copper ion sorption for the original and modified polystyrene films from aqueous solutions of electrolytes was researched. The efficiency of adsorption for modified polymer was established to increase significantly comparing with the unmodified one.

**Key words:** polystyrene, fullerenes, X-ray diffraction, sorption, crystallites, persistent chain

**I.A. MURAVYOV, M.N. KROTOVA, A.A. VASILIEV, V.A. FIRSOVA, O.I. ODINTSOVA**  
**STUDIES OF INFLUENCE OF SURFACTANTS ON STATE OF DISPERSIBLE DYES**  
**IN DYE BATH**

The influence of nonionic, pseudocationic and cationic surfactants on the state of dispersible dyes in dye bath was investigated. The efficiency of application for the solubility increase of dispersible dyes as derivatives of tertiary amines – oxipav A and oxamine-oxide KM-7 was established.

**Key words:** dispersible dyes, solubility, surfactants, adsorption spectra

**L.V. MINAEVSKAYA., N.A. SHCHEGOLIKHINA**  
**LIGNIN AS SORBENT AT PURIFICATION OF INDUSTRIAL SEWAGE**

The article represents researches of static and dynamical sorption processes of petrochemicals and phenols on lignin, which is a by-product of hydrolytic production. The potential possibility of lignin usage as not expensive sorbent was shown for the process of sewage purification with sufficiently high values of purification efficiency.

**Key words:** lignin, sorption, petrochemicals, phenols, purification, sewage

**A.N. GRIGORIEV, E.A. ERYOMINA, P.E. KAZIN, Yu.D. TRETYAKOV**  
**CONTROL SYSTEM OF KNOWLEDGES ON INORGANIC CHEMISTRY AT CHEMISTRY DEPARTMENT**  
**OF MOSCOW STATE LOMONOSOV UNIVERSITY**

The article deals with the development of rating system of student results acting at the Department of Inorganic Chemistry, Chemical Faculty of Moscow State University from 1989. This system helps students to more efficiently distribute their forces during the school year, encourage them to a deeper assimilation of the material. Rating system of students consists of the following main points: working in a workshop, theoretical training, tests, and exams. The resulting grades are derived from the total score (5 - at least 80%, 4 - at least 67%, 3 - not less than 47%).

**Key words:** inorganic chemistry, rating, final grade, exam

**T.V. MARTYNOVA**  
**EXPERIENCE OF INDEPENDENT STUDENT WORK DURING STUDY OF GENERAL AND INORGANIC**  
**CHEMISTRY AT MSTU "MAMI"**

A method of organizing the independent work of students in the study of general chemistry at a technical college is proposed.

**Key words:** bachelor training on chemistry, self-training tasks

**E.O. ZABEN'KINA, I.V. ARTAMONOVA**  
**INNOVATIVE EDUCATIONAL TECHNOLOGY IN EDUCATIONAL PROCESS FOR TRAINING OF**  
**BACHELORS OF ENGINEERING AND TECHNICAL PROFILE**

The innovative learning technologies include interactive learning technologies. We consider the use of information technology training in MathCad environment for computer modeling chemical processes occurring at the dissolution of metal oxides on the base of formal kinetics of heterogeneous reactions.

**Key words:** innovation, computer simulation

**V.A. KUZURMAN, I.V. ZADOROZHNYIY, B.A. KUKHTIN**  
**USE OF INNOVATIVE EDUCATIONAL TECHNOLOGIES IN MULTILEVEL SYSTEM OF CHEMICAL**  
**EDUCATION AT UNIVERSITY**

Through inclusion in the educational process the recommendations of the Bologna Declaration, taking into account the methodology of constructive pedagogy it is necessary to intensify the training using innovative learning technologies to optimize the elements of the educational process on the base of the intensification of training. The enhance of students' cognitive activity is provided with inductive and deductive method of teaching through the introduction of elements in the learning process of constructive pedagogy.

**Key words:** Bologna Declaration, innovative technologies, constructive pedagogy, intensification and optimization of training