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## A B S T R A C T S

*A.V. POLYANSKIY, V.N. BLINICHEV, O.V. CHAGIN***CRITERIA OF EFFICIENCY ESTIMATION OF RECTIFICATION COLUMNS**

This article deals with the efficiency of rectification columns which is often measured by the value of tray efficiency or single height of packing. The analysis of the factors influencing the efficiency of the rectification process was provided. This article shows that the commonly used Murphree efficiency factor in most cases estimates the efficiency trays and packing of the rectification process with a large error.

**Key words:** efficiency, rectification, rectification column

*E.M. RAKHMAN'KO, Yu.V. MATVEIYCHUK***EFFECT OF STERIC ACCESSIBILITY OF EXCHANGE CENTER OF HIGHER QUATERNARY AMMONIUM SALTS AND PLASTICIZER NATURE ON CHARACTERISTICS OF ELECTRODES, REVERSIBLE TO DOUBLE-CHARGED ANIONS**

The effect of the steric accessibility of the exchange center of higher quaternary ammonium salts and plasticizer nature on the selectivity and the limit of detection for film electrodes reversible to hydrophilic double-charged anions was studied. It was established the decrease in selectivity coefficients  $\lg K_{ij}^{\text{Pot}}$  by 2.8–3.8 order of magnitude and low detection limit by 2–3 order of magnitude in the series of QAS:  $\text{TOD} \leq \text{TC} < \text{TL} < \text{TNODA} < \text{TB} < \text{TE} < \text{TM} < \text{DCPBTM}$ . Also, the increase in low detection limit by 1–0.7 order of magnitude in the series of plasticizers:  $\text{DBP} > \text{DDP} > \text{o-NPDE} > \text{1-BN}$  was established. The composition of membranes of ion-selective electrodes was optimized.

**Key words:** quaternary ammonium salts, ion-selective electrodes, low detection limit, selectivity coefficient, double-charged hydrophilic anions

*Yu.E. ROMANENKO, A.A. MERKIN, O.V. LEFEDOVA***ACETONE HYDRATION KINETICS AND EVALUATION OF INPUT OF 2-PROPANOL DEHYDRATION REACTION ON RANEY NICKEL UNDER HYDROGENATION CONDITIONS**

The problem of kinetics of skeletal nickel samples saturation with hydrogen in an aqueous solution of 2-propanol of azeotropic composition was discussed. 2-propanol dehydrogenation and acetone hydrogenation rate constants were calculated. Kinetic model of processes under study was offered.

**Key words:** raney nickel, hydrogen reproduction on catalyst surface, 2-propanol dehydrogenation, acetone hydrogenation, kinetic modeling, 2-propanol aqueous solutions

*S.E. PRATSKOVA, A.G. TYURIN***MODELING OF QUASIBINARIES OF  $\text{Na}^+$ ,  $\text{Ca}^{2+}$  //  $\text{O}^{2-}$ ,  $\text{F}^-$  SYSTEM**

Thermodynamic modeling of phase equilibria of the  $\text{Na}^+$ ,  $\text{Ca}^{2+}$  //  $\text{O}^{2-}$ ,  $\text{F}^-$  system in the frame of the generalized theory of "regular" ionic solutions was carried out. The equations for the activities of the system components were derived. The standard Gibbs energy of the exchange reaction was calculated. The values of the energy parameters of the model were determined and the phase diagrams of the binary systems were constructed.

**Key words:** thermodynamic modeling, phase diagrams,  $\text{Na}^+$ ,  $\text{Ca}^{2+}$  //  $\text{O}^{2-}$ ,  $\text{F}^-$  system

*L.G. ANIKANOVA, N.V. DVORETSKII, Z.G. MALYSHEVA*  
**CATIONIC CONDUCTIVITY IN MIXED POLYFERRITES**

The effect of chemical composition on the cationic conductivity of mixed alkali metals  $\beta''$ -polyferrites was established. Cationic conductivity is determined by the mobility of alkali metal ion in inter-unit space which in turn depends on the ratio of cation radius and width of inter-unit space. The conductivity increases with  $z$ , and at the same  $z$  in the range of 0.28 – 0.4 becomes constant ( $z$  in the formula  $\text{Me}_{2-z}\text{Ad}_z\text{Fe}_{11}\text{O}_{17}$ , where

Me - the basic alkali metal, Ad - introduced alkali metal ion, which has the larger radius (Cs, Rb)) for all samples. This is due to the structural features of polyferrites.

**Key words:** (poly)ferrite, cation conductivity, solid electrolyte

***D.L. KOTOVA, T.A. KRYSANOVA, DO THI LONG, S.Yu. VASILYEVA***  
**INTERACTION OF PHENYLALANINE AND HISTIDINE ON EQUILIBRIUM  
CHARACTERISTICS OF ADSORPTION OF AMINO ACIDS ON CLINOPTILOLITE**

Parameters of the equilibrium sorption of phenylalanine and histidine on clinoptilolite from aqueous solutions containing the individual amino acids and their mixtures were presented. The contribution of exchange and non-exchange components in the adsorption capacity of clinoptilolite was determined. It was found that the interfacial distribution of amino acids is determined by the ratio of CHis / CPhe and manifested in sorption equilibrium characteristics. The maximum degree of extraction of histidine is achieved at the ratio of CHis / CPhe equals to 1: 3.

**Key words:** clinoptilolite, sorption, aminoacids

***R.Sh. VALIEV, L.N. OLSHANSKAYA***  
**SOME PHYSIOLOGICAL ASPECTS OF PHYTOEXTRACTION OF HEAVY METALS**

Mechanisms of ions intake into cells and carrier proteins of heavy metals are described. Classification of heavy metals on their biological role in the biosphere was carried out. Some information on the features of metals in body cells is given.

**Key words:** phytoextraction, heavy metals, plant cell, chelator, chaperons

***N.F. KOSENKO, N.V. FILATOVA, Yu.V. PIMKOV***  
**KINETICS OF SOLID-STATE MULLITE SYNTHESIS FROM ACTIVATED PRECURSORS**

The solid-state synthesis kinetics of the mullite  $3Al_2O_3 \cdot 2SiO_2$  from aluminium hydroxide and metasilicic acid was studied. Hydrated oxides obtained in an active form as a result of a mechanical activation or co-precipitation (precursors) were subjected to a high-temperature treatment. The reaction rate was described by the kinetic first-order equation. Effective rate constants and energy activation were determined. The positive action of mullite seed crystals on the product accumulation was confirmed.

**Key words:** mullite, solid-state synthesis, kinetics, precursors, mechanical activation, co-precipitation, seed crystals

***N.P. SHABELSKAYA, S.I. SULIMA, E.V. SULIMA, A.I. VLASENKO***  
**STUDY OF SYNTHESIS FEATURES OF NANOCRYSTALLINE ZINC FERRITE**

In work the process of formation of nanocrystal zinc ferrite was studied. The samples obtained were characterized with XPS, BET and SEM. The received samples have the developed surface. The average size of crystallites determined by Debye-Scherrer equation was 3 nm.

**Key words:** spinels, ferrites, Debye- Scherrer equation

***L.N. MOROZOV, Yu.L. PAVLOV, E.S. TIMOSHIN, O.Yu. ALEKPEROV***  
**OXIDIZING REACTIVATION OF COPPER CATALYST FOR METHANOL SYNTHESIS**

The change in phase composition and catalytic properties of a copper-containing catalyst for methanol synthesis which was deactivated under industrial operation was studied at its redox treatment. The possibility of catalyst partial reactivation was shown. Conditions of reactivation were chosen at the increase in catalyst running time.

**Key words:** methanol synthesis, deactivation, catalyst reactivation

***M.A. MATYUSHIN, T.F. YUDINA, T.V. ERSHOVA***  
**DEVELOPMENT OF DIRECT METHOD OF TITANIUM SILVERING**

The applicability of the dielectrics activation method to the problem solution of preliminary preparation of titanium before the deposition of metallic coatings was shown. The advantages over used in industry methods were focused. The optimum composition of the modifying solution and operation were defined.

**Key words:** titanium, chemical silvering

***R.F. SHEKHANOV, S.N. GRIDCHIN, A.V. BALMASOV***  
**ELECTRODEPOSITION OF ZINC-NICKEL ALLOYS FROM ALKALINE COMPLEX  
ELECTROLYTES**

Electrodeposition processes of zinc-nickel alloys from alkaline triethanolamine electrolytes were investigated. The possibility to obtain the good-quality electroplating was shown at current densities from 0.5 to 5.0 A/dm<sup>2</sup>.

**Key words:** coatings, galvanic alloys, nickel, zinc

***A.V. KOLESNIKOV***  
**CATHODIC AND ANODIC PROCESSES IN SOLUTIONS OF ZINC SULFATE IN PRESENCE  
OF SURFACTANTS**

We investigated the cathodic and anodic processes in solutions of zinc sulfate in the presence of a surfactant and the background solution of sodium sulfate over a wide potential range. It was shown that anionic surfactants increase the anode current and the cation ones decrease. An explanation for the increase in the magnitude of the anode current in presence of anionic surfactants and reduction in the presence of cation-active surfactant was done. Experimental data and thermodynamic calculations has shown that the reason for the lack of influence of surfactants on the magnitude of the cathode current for the background electrolyte solution of sodium sulfate is probably associated with the processes of sulfate reduction.

**Key words:** cathode and anode processes, zinc sulphate, surfactants, anode current

***V.V. PANTELEEVA, A.B. SHEIN***  
**ANODIC OXYGEN EVOLUTION ON IRON, COBALT AND NICKEL SILICIDES IN ALKALINE  
ELECTROLYTE**

The kinetics of oxygen evolution reaction on iron, cobalt and nickel monosilicides in (0.1 – 5.0) M NaOH was studied using methods of polarization and impedance measurements. The values of derivatives  $dE/dlgi$ ,  $dlgi/dpH$ ,  $dE/dpH$  were determined. The oxygen evolution on FeSi, CoSi and NiSi electrodes in alkaline solution was established to have regularities which are characteristic to Fe, Co and Ni electrodes, respectively.

**Key words:** oxygen evolution reaction, iron silicide FeSi, cobalt silicide CoSi, nickel silicide NiSi, alkaline electrolyte, impedance

***K.S. CHEMEZOVA, N.M. KHLYNOVA***  
**FORMATION OF ANODE ARSENATE FILM ON SILVER ELECTRODE**

The single current peak is registrated on voltammograms of electro dissolution of precipitates forming on silver electrode into solutions containing arsenate ions. The precipitate amount is proportional to a concentration of arsenate ions in a solution. This amount can be used for ions determination. Optimal conditions for electro deposition and electro dissolution are recommended.

**Key words:** electro deposition, electro dissolution, silver electrode, arsenate film

***I.A. BAZHENOV, T.E. ABRAMOVA, N.S. MINEEVA, M.E. SOLOVYOV,  
A.N. DANILOVA, A.G. RODIONOVA***  
**FILM-FORMING POLYFUNCTIONAL OLIGOBUTADIENES AND LOCAL DYNAMICS  
OF CROSS-LINKED STRUCTURES ON ITS BASE**

The process of film-forming of polyfunctional oligobutadienes of cationic type of different microstructure from organic-film-forming systems in the presence of acid-type hardeners was studied. The method of computer modeling indicates on the impact of cross-linking agents on the type of cross-linking and the flexibility of the polymer chains determining the physical and performance properties of the materials. A scientific approach to the creation of special purpose compositions with an improved combination of properties was proposed.

**Key words:** oligobutadiene, film-forming, acid-type hardeners, molecular dynamics simulation, chain microstructure, molecules local mobility

**Z.A. ASKHABOVA, O.V. KOZLOVA**

**INCREASE IN SORPTION ABILITY OF BACTERICIDAL TEXTILE MATERIALS**

The influence of various factors on the change in the sorption ability of textile material depending on the nature of the material, the composition of biocomposite, type of mineral additives was studied. Possible ways of increase in sorption of the textile materials possessing bactericidal properties were shown.

**Key words:** bactericidal materials, medical textiles, humic compounds, sorption ability

**N.Ya. KUZMENKO, S.N. KUZMENKO, O.V. SKRINNIK, V.V. BUGRYM**

**SYNTHESIS AND PROPERTIES OF INTERACTION PRODUCTS  
OF TRIS[TRI(BUTOXY)TITANATE]BORON AND ALIPHATIC FLUORINATED ALCOHOLS**

Synthesis and properties of products based on tris[[tri(butoxy)titanate]boron with complete or partial substitution of butoxy groups linked with titanium by fluorinated alkoxy group were described. Extracted products were liquid or solid substances which are high soluble in aliphatic-, aromatic- chloraromatic- and chlorinated hydrocarbons, low alcohols, and ketone. Their structure was confirmed by elemental analysis, determination of molecular mass, IR and <sup>1</sup>H NMR spectroscopy.

**Key words:** tris[[tri(butoxy)titanate]boron, interesterification, aliphatic fluorine-containing alcohols, oligomer

**A.M. TSIRLIN, I.A. SUKIN**

**REALIZABILITY FIELD AND AUTOMATIC OPTIMIZATION OF BINARY  
RECTIFICATION COLUMN**

It was shown that the dependence of maximal productivity of binary rectification column on heat consumption taking into account the irreversibility of heat and mass transfer can be characterized with two generalized parameters. The system of automatic supporting of column regime corresponding to its maximum productivity was proposed.

**Key words:** бинарная ректификация, теплоперенос, массоперенос, режим максимальной производительности

**A.B. KAPRANOVA, A.V. GANIN, A.E. LEBEDEV**

**EVALUATION OF PRODUCTIVITY AND POWER OF SCREW FEEDER OF DISPERSE MEDIA**

On the basis of performed mathematical modeling of process of movement and compaction of dispersed material in a horizontal screw the method was proposed of assessing productivity and power of the screw feeder of roller device taking into account the physical and mechanical characteristics deaerated environment and the apparatus parameters.

**Key words:** disperse material, screw feeder, productivity, drive power, pressure backup, roll device, porosity, Lame coefficients