
Summaries

UDC 546.62:544.778.4:544.424.2:544.421:544.421.3

**Korshunov A.V., Golushkova E.B.,
Perevezentseva D.O., Ilyin A.P.**
**MACROKINETICS OF INTERACTION OF ELECTROEXPLOSIVE
ALUMINUM NANOPOWDERS WITH WATER AND WATER
SOLUTIONS**

Physicochemical laws of interaction of aluminum nanopowders obtained by the method of conductor electric blasting with water and sodium hydroxide solutions have been investigated. Kinetic parameters of the reaction were determined; character of their change depending on powder storage time, pH solution and temperature was shown. Peculiarities of influence of reaction temperature condition and pH on degree of aluminum conversion and phase composition of reaction condensed products were stated.

UDC 546.62:544.778.4:544.424.2:544.421:544.421.3

Korshunov A.V., Ilyin A.P.
**INFLUENCE OF OXIDE-HYDROXIDE SHELL STATE
ON REACTIVITY OF ALUMINUM NANOPARTICLES**

Composition and structure of (hydr)oxide shell of electroexplosive aluminum powder particles passivated in the air have been studied. Acid-base properties of (hydr)oxide layer of aluminum particles were examined relative activity of ionic and molecular forms on interface particle shell/solution was estimated on the basis of calculations. Differences of structure of aluminum particle surface layer formed at storage and heating in the air were shown. Influence of powder annealing temperature on kinetic parameters of powder-water interaction process was shown as well.

UDC 546.16

Tolbanova L.O., Mostovschikov A.V., Ilyin A.P.
**STRUCTURAL AND CHEMICAL TRANSFORMATIONS
IN COPPER NANOPOWDERS AT HEATING IN THE AIR**

Processes in copper nanopowders have been investigated using conduction recording at heating in the air, thermal and roentgen-phase analyses. Conduction was measured at continuous stress at a sample equal 20 V. At 250..260 °C abrupt electric current rises was observed. Conduction decreased when being cooled but it was greater than when being heated. At the same time initial oxidation temperature of original copper nanopowder did not increase 190 °C. Presence of two crystalline phases of copper (I) and copper (II) oxides in oxide film composition resulted in chemical dispersion of oxides to clusters and continuity violation of oxide film.

UDC 541.16:182

Ivchenko E.V., An V.V., Ilyin A.P.
**INFLUENCE OF LASER EMISSION AND HEATING IN THE AIR
ON NANOPOWDERS OF IRON, NICKEL AND COPPER**

Influence of laser emission and thermal heating in the air on electroexplosive metal nanopowders has been shown. Original nanopowders and products of their oxidation were studied by the methods of differential-thermal, roentgen-phase and microscopic analyses. To define efficiency of laser emission interaction with nanopowder compact sample the thermosonic method was used. Dependences of emission absorption factors on nanopowder volume weight were obtained. It was stated that after laser emission influence on iron nanopowder sample and its further heating in the air magnetite phase is stabilized as well as hematite phase.

UDC 543.544

Zibarev P.V., Zubkova O.A.
**SURFACE CHEMICAL NATURE, POLARITY AND SELECTIVITY
OF RADIATION-MODIFIED SORBENTS – CONCENTRATES
FOR GAS CHROMATOGRAPHY CONTROL
OVER ENVIRONMENT OBJECTS**

On the basis of data of IR-spectroscopy, elemental analysis and coefficients of conditional chromatographic polarity of Rorschneider the structure of surface and ability to specific interactions sorbate-sorbent of radiation-chemically modified sorbent-concentrates for gas chromatography control of environment objects has been studied.

UDC 66.011

Yuriev E.M., Ivashkina E.N., Kravtsov A.V.
**SIMULATING PROCESSES OF OBTAINING
LINEAR ALKYL BENZENES**

Technological stimulating system which allows carrying out continuous monitoring of linear alkyl benzene production and tracing the change of Pt-dehydrogenation catalyst activity, predicting its life time depending on raw material composition and mode in the reactor of n-paraffin dehydrogenation has been developed. One of the variants of operative device reconstruction at its change to two-reactor operation chart was calculated.

UDC 66.011

Yuriev E.M., Ivashkina E.N., Ivanchina E.D.
**SIMULATING HYDROGENATION PROCESS
OF HIGHER ALKADIENE WITH REGARD
FOR CATALYST SELECTIVE SULFURIZATION**

Thermodynamic and kinetic laws of changing sulfur-containing compounds at catalyst of higher alkadiene hydrogenation have been considered; reaction equilibrium constants have been estimated. Regard of the influence of nickel contact dosed sulfurization in the model allowed determining the amount of sulfur residual depending on temperature in the reactor, hydrogen consumption, raw material humidity. Optimal conditions of industrial process were calculated and profitability of transfer to optimal condition was estimated.

UDC 66.011

Chekantsev N.V., Kravtsov A.V., Dubrova T.V.
**FORMALIZED MECHANISM OF CHANGING HYDROCARBONS
OF PENTANE-HEXANE FRACTION ON THE SURFACE
OF BIFUNCTIONAL Pt-CATALYSTS OF ISOMERIZATION**

Scheme of possible reactions occurring at platinum-oxide catalyst with medium-temperature isomerization of pentane-hexane fraction SI-2 has been proposed. Calculations carried out using the software kinetic model constructed on the basis of this scheme showed satisfactory convergence with experimental data that confirms adequacy of suggested formalized mechanism to the real process on the surface of catalyst.

UDC 665.64

Sharova E.S., Ivanchina E.D., Kostenko A.V., Faleev S.A.
**TESTING Pt-CATALYSTS OF PETROLEUM REFORMING
PROCESS USING COMPUTER MODELING SYSTEM**

The developed testing methodology is based on processing the results of commercial operation of reforming Pt-catalysts using mathematical models. It gives a possibility of estimating kinetic parameters, predicting selectivity and duration of raw material cycle after catalyst regeneration in commercial operation conditions with regard for hydrocarbon reactivity.

UDC 543.41

Nikitina N.A., Reshetnyak E.A., Gavrilenko N.A.
METROLOGICAL PERFORMANCE OF VISUAL-TESTING
DEFINING OF IRON (II, III) WITH PHENANTROLINE
IMMOBILIZED INTO POLYMETHACRYLATE MATRIX

For technique of visual-testing defining of iron (II,III) using polymethacrylate matrix modified with 1,10-phenantroline the values of lower bound of determined concentrations and detection limit have been estimated. The suggested chemical test-system is characterized by narrow area of solid reaction, its relative width value amounted to 0,1. Test-reaction occurring in polymethacrylate matrix is stable to external actions.

UDC 543.253

Slepchenko G.B., Pikula N.P.
THEORETICAL ESTIMATE OF SYSTEMATIC INACCURACY
IN INVERSE VOLTAMPEROMETRY

Systematic inaccuracy of analytical signal of the determined component has been theoretically estimated using the equations taking into account the influence of electrochemical system resistance and conditions of its recording in the method of inverse voltamperometry. The obtained results of calculation are taken into account at selection of voltamperometry analysis optimal conditions of

UDC 543.08

Romanenko S.V., Shekhovtsova N.S., Karachakov D.M.
DEVELOPMENT OF SIGNAL DIVISION METHOD (SRRM)
FOR RESOLUTION OF OVERLAPPING
INVERSION-VOLTAMPEROMETRY PEAKS

The method of mathematical resolution of compound signals - SRRM suggested earlier has been studied; its limitations connected with possible drift of separating signal parameters have been revealed. New criterion allowing optimizing parameters of separating signal by gradient method was proposed. This method applicability at resolution of compound model and experimental peaks was shown.

UDC 543.552.054.1.241

Vlaskina L.D., Noskova G.N., Kolpakova N.A.
PECULIARITIES OF ARSENIC (III) ELECTROREDUCTION AT
GOLD-CARBON CONTAINING ELECTRODE

Peculiarities of arsenic (III) electroreduction at gold-carbon containing electrode at various backgrounds have been considered. Electroreduction of HAsO_2 s adsorbed particle occurs at potentials of hydrogen ion electroreduction which are not adsorbed at gold. Oxygen adsorbing at gold existing in solution inhibits sorption process of HAsO_2 particles therefore, oxygen should be removed from solution.

UDC 543.253

Slepchenko G.B., Martynyuk O.A., Shelemetieva O.V.
DEVELOPMENT OF TECHNIQUES FOR DETERMINING
VITAMINS OF GROUP B IN BREAST MILK

Techniques of quantitative chemical analysis of breast milk have been developed. It was analyzed for vitamins of group B content by the methods of inversion voltamperometry and high-performance liquid chromatography. Advantages and disadvantages of these techniques and possibilities of their further application in analytical and testing laboratories and medical centers were shown.

UDC 543.544.45

Kuzmina A.G., Gavrilenko M.A.,
Malysheva Zh.V., Ustimenko I.I.
SOLID-PHASE EXTRACTION OF TOCOPHEROL ACETATE
TO SILICA GEL MODIFIED BY NICKEL ACETYLACETONATE

The possibility of tocopherol acetate concentration with other organic molecules to a layer of nickel acetylacetonate engrafted to silica gel has been shown. Optimal conditions of concentration and further desorption were determined. The results of defining vitamin E in multivitamin preparations were given.

UDC 543.544.45

Malysheva Zh.V., Gavrilenko M.A.,
Kuzmina A.G., Ustimenko I.I.
DISSOCIATIVE SORPTION OF ETHANOL ON A CHEMICALLY
SYNTHESIZED LAYER OF NICKEL ACETYLACETONATE

Comparing IR-spectra of surface layers of nickel acetylacetonate obtained by sorption method and method of molecular layering their identity as been proved. It was shown that ethanol sorption to a chemically synthesized layer of nickel acetylacetonate is of partially dissociative character.

UDC 541.182:546.56:536.66

Mikubaeva E.V., Kobotaeva N.S.,
Skorokhodova T.S., Sirotkina E.E.
STUDYING COPPER NANOPOWDER REACTIVITY IN TEST
REACTIONS BY MICROCALORIMETRIC METHOD

To study reactivity of copper nanopowders obtained by conductor electroblast and mechanical treatment three test reactions have been proposed: interaction with glacial acetic acid with basic copper acetate formation, interaction with acetylacetone with copper acetylacetone formation and interaction with tetraphenylporphyrin with formation of copper tetraphenylporphyrin. Copper nanopowder reactivity was judged by a value of reaction thermal effect which was determined by microcalorimetric method. It was shown that copper nanopowder reactivity depends on a method and conditions of obtaining nanopowders: on medium in which conductor electroblast occurs, duration of mechanical treatment and type of admixture with which copper powder is treated.

UDC 535.37

Mastushkina I.V., Kuznetsova R.T.,
Rud I.V., Artyukhov V.Ya.
SPECTRALLY LUMINESCENT AND BASIC CHARACTERISTICS
OF PYRIDILOXAZOLE DERIVATIVES IN SOLUTIONS AND
SOLID MATRICES

The results of investigations of spectrally luminescent and acid-base properties of methoxysubstituted pyridiloxazoles $4\text{PyOCH}_3\text{PO}$ and $4\text{PyOCH}_3\text{POCH}_2\text{Ph}^+\text{Cl}^-$ at optical excitation in solutions of different acidity and silicate thin films have been discussed. On the basis of comparison of the results of the carried out experiments and quantum-chemical calculation the possibilities of specific interactions of phosphor molecules by one or several from proton acceptor molecule centre (nitrogen atom of pyridine cycle, nitrogen and oxygen atoms of oxazole cycle and methoxy- $(-\text{OCH}_3)$ group) with solvate shell were analyzed. Quantitative features of basicity characterizing efficiency of ion form formation were determined. Mechanisms of interaction of dye molecules with surface of nano-dimensional pores of polymeric silicate matrices were determined.

UDC 547.539.04

Chaykovskiy V.K., Funk A.A., Filimonov, V.D.,
Petrenko T.V., Kets T.S.
ALTERNATIVE METHODS
OF TRIIODINE-CATION GENERATION

At interaction of N,N,N,N-tetraiodoglycoluril or N-iodocetamide with molecular iodine in sulfuric acid cation I_3^+ is generated. Solution of triiodine-cation in H_2SO_4 at 0...3 °C iodates easily deactivated aromatic substrates with good yields of iodinated products in 30...80 min.

UDC 547-304.2:547-304.4:547-302

Gorlushko D.A., Filimonov V.D., Semenischeva N.I.,
Krasnokutskaya E.A., Tretyakov A.N., Bong Seong Go,
Ho Yun Hwang, Eun Hye Cha, Ki-Whan Chi
SIMPLE AND EFFICIENT METHOD
OF DIAZOTIZATION-IODINATION OF AROMATIC AMINES IN
WATER PASTES UNDER THE INFLUENCE OF THE SYSTEMS:
 $\text{NaNO}_2/\text{p-TOLUENESULFONIC ACID}$ AND $\text{NaNO}_2/\text{NaHSO}_4$

New, convenient and efficient method of obtaining aromatic iodides from anilines by the reaction of diazotization-iodination under the influence of $\text{NaNO}_2/\text{KI}/\text{p-TsOH}$ or NaHSO_4 at 20 °C in water paste has been proposed. The developed method meets the requirements of «green chemistry» made to modern chemical processes.

UDC 547.556.7

**Trusova M.E., Postnikov P.S., Krasnokutskaya E.A.,
Filimonov V.D., Ki-Wan Chi**

**NEW APPROACH TO SYNTHESIS OF STABLE
ARYLDIAZONIUM TOsylATES, THEIR STRUCTURE
AND APPLICATION IN ORGANIC SYNTHESIS**

Direct method of synthesis of stable aryldiazonium tosylates has been developed for the first time, structure of the obtained substances has been studied and their high synthetic value has been shown.

UDC 547-304.2:547-304.4:547-302

Trusova M.E.

SYNTHESIS OF AROMATIC POLYIODIDES FROM ANILINES

Convenient method of synthesis of polyiodaromatic compounds through consistent electrophilic iodination of amines and iodine-deamination of amino group has been proposed.

UDC 547.979.733:665.652.86

**Kobotaeva N.S., Skorokhodova T.S.,
Mikubaeva E.V., Sirotkina E.E.**

**CATALYTIC OXIDATION
OF CUMENE BY MOLECULAR
OXYGEN WITH METAL
TETRAPHENYLPORPHIN**

Catalytic oxidation of cumene by molecular oxygen with tetraphenylporphins Co, Cu, Zn, In, Sn, Al has been studied. It was shown that tetraphenylporphines Co, Cu and Zn are very active catalysts as they catalyze decay of cumene hydro peroxide in addition to oxygen activation. Tetraphenylporphins In, Sn, Al are less active in this reaction as they do not catalyze hydro peroxide decay. It was found that catalytic activity of metal tetraphenylporphins changes slope oppositely to their potentials of electrochemical oxidation except tetraphenylporphin Cu.