Summaries

UDC 546.62:544.778.4:542.943:543.573

Korshunov A.V.

INFLUENCE OF SIZES AND STRUCTURE OF ALUMINUM POWDER PARTICLES ON MECHANISMS OF THEIR OXIDATION AT HEATING IN THE AIR

The mechanisms of oxidation process of aluminum coarse-dispersion and nanopowders in the air at linearly growing temperature and in isothermal conditions have been studied. Dependence of oxidation process behavior mode and product phase composition on dispersity and sample particle structure is shown. The influence of thermogravimetric conditions on thermal conditions of process behavior is examined, its kinetic parameters are determined. The kinetic parameters of oxidation reaction were modeled subject to the function of particle size distribution; difference in particle structure of nanodispersed and micron fraction of electroexplosive aluminum powder is shown.

UDC 666.263:666.9.015:55 (075.8)

Vereschagin V.I., Rikhvanov L.P., Sarkisov Yu.S., Asoskov Yu.F., Smirnov A.P.

SYNERGETIC PRINCIPLES OF PRODUCING POLYFUNCTIONAL CONSTRUCTIONAL AND COMPOSITE MATERIALS

Various aspects of applying geological and geochemical knowledge to the development of technologies of man-made materials with predetermined properties have been examined for development of A.E. Fersman and form positions of synergy. It is shown that mechanisms of physical and chemical processes determining initiation and evolution of geological object structures have a great trans-disciplinary potential at solution of industrial activity technogenesis problems.

UDC 546.33'47'244:536.6+537.226.33

Rustembekov K.T., Dyusekeeva A.T., Sharipova Z.M., Zhumadilov E.K.

X-RAY, THERMODYNAMIC AND ELECTROPHYSICAL PROPERTIES OF DOUBLE SODIUM-ZINC TELLURITE

Sodium-zinc tellurite has been synthesized for the first time from oxides of tellurium (IV), zinc and sodium carbonate by solid-phase method. Type of crystal system and parameters of connection unit cell were determined by the method of X-ray analysis. Isobaric heat capacity, on the basis of which the dependence equations $C_p^0 \sim f(T)$ were selected and thermodynamic functions were determined, was studied by the method of dynamic calorimetry in the range of 298,15...673 K. Inductive capacity and resistivity of sodium-zinc tellurite were studied.

UDC 546.236:536.6+537.226.33

Rustembekov K.T., Dyusekeeva A.T.

CALORIMETRY AND ELECTROPHYSICAL PROPERTIES OF SELENATE $Na_2Cd(SeO_4)_2$

Sodium-cadmium selenate $Na_2Cd(SeO_4)_2$ has been synthesized from carbonates of sodium, cadmium and selenium acid by liquid-phase method. It was determined by the X-ray method that the compound is crystallized in rhombic system. In the range of 298,15...673 K the compound heat capacity was measured and it was found out that at 423 K a sharp abnormal step connected, probably, with phase transition of the second order was observed on dependence diagram $C_p^0 \sim f(T)$. Investigation of temperature dependence of selenate inductive capacity and electrical conduction in the range of 298,15...673 K showed that the compound possesses semiconductor and ferroelectric properties.

UDC 542.87:543.062

Antonova S.G., Noskova G.N., Kolpakova N.A.

SELENIUM DETERMINATION BY THE METHOD OF CATHODIC STRIPPING VOLTAMMETRY

The investigations for determining Se (IV) by the method of cathodic stripping voltammetry with application of silver modified electrode at ultraviolet irradiation of the analyzed solution and electrode system have been carried out. The method of Se (IV) determination against the background of 0,75 M of formic acid was developed and optimal conditions of measurings: deposition potential – 0,0 V; deposition time – 30...90 s, rate of potential change – 50 mV/s were selected. Use of ultraviolet irradiation and formic acid as a base electrolyte allowed excluding the necessity of applying inert gas for deoxygenation as well as increasing considerably sensitivity of determining microelement to 0,03 mkg/l that gave a possibility of estimating selenium natural content in various objects (water, food, plants).

UDC 536.46:546.07

Sviderskiy A.K.

REACTIONS OF ALUMINOTHERMIC REDUCTION OF CHROME OXIDE (III) IN CONDITIONS OF AUTOWAVE SYNTHESIS

Reactions of aluminothermic reduction of chrome oxide in conditions self-propagating high-temperature synthesis at various agent ratios have been studied. It was shown that chromium-aluminum thermit burns according to a complex mechanism and end product is formed by passing several serial transformations.

UDC 661.48+621.36

Kladiev S.N., Dementiev Yu.N., Zaripova L.F., Pischulin V.P.

INFLUENCE OF LIQUID-PHASE AGENT PRELIMINARY HEATING ON FLUORITE DECOMPOSITION PROCESS

Influence of process parameters on the process of sulfuric acid decomposition of fluorite concentrate (calcium fluoride) in rotary drum-type furnace has been studied in industrial conditions. An electrode heater construction was developed. The equations of fluorite decomposition degree dependence on furnace load, agent ratio, sulfuric acid temperature, the first and the second areas of heating furnace chamber were obtained. It was determined that the preliminary heating of sulfuric acid promotes the increase of fluorite decomposition degree, reduction of sulfuric acid excess, decrease of power consumptions, decrease of the apparatus corrosion.

UDC 546.93:546.06

Zherin I.I., Zyubanova V.V., Ostvald R.V., Shagalov V.V.

STUDYING THE KINETICS OF METAL IRIDIUM INTERACTION WITH FLUORO-OXIDIZERS ON THE BASIS OF BROMINE TRIFLUORIDE

The conditions and behavior of metal iridium interaction process with solution of potassium tetra-fluoro-bromate in bromine trifluoride and in melt of potassium tetra-fluoro-bromate have been described.

UDC 66.011.001.57:66.0 (075.8)

Krivopustov S.I., Pischulin V.P.
ANALYSIS OF EXTRACTION COLUMN WORKING CAPACITY

The reasons of deflections of extraction equipment operation from regulation norms have been studied; defects at maintenance of the studied equipment have been analyzed. Characteristics of often repeated defects at operation of the combined extraction column of the original construction were determined. Deviations were classified, concordance coefficients were determined; the main factors influencing the extraction process were ascertained. Diagnostic procedure of equipment operation was developed. The equipment quality level per the examined period of time was calculated. The technique of statistical data processing by questionnaire method by sampling facts influencing the extraction process was proposed. The diagnostic technique of extractor operation was developed.

UDC 541.138.2

Kolpakov G.N., Kolpakova N.A., Kuzov V.A., Khvostov V.I.
REMOVAL OF TIGHTLY FIXED RADIOACTIVE DEPOSITS BY ELECTROLYSIS

The possibility of clarifying the stainless steel scrap of reactor cooling circuit operating at high temperatures («hot» leg) from radioactive contamination by electrolysis was shown. It was ascertained that for tubes of «hot» leg of reactor cooling system the clarification is carried out in stages by wetting cleanable part in base electrolyte and further electrolysis at each stage. The processing is carried out firstly in solution of 140 g/dm^3 NaCl, and then in solution of 3% HNO_3. The tube samples are clarified from radioactive contamination with 10^4 β-particles/(cm^2·min) to background level.

UDC 542.65

Guzeeva T.I., Guzeev V.V., Leonova L.A., Lelyuk O.A., Krikunenko A.S., Shatokhina Yu.V.
OBTAINING HYDROXYAPATITE POWDER AT LIQUID-PHASE SYNTHESIS

The method of synthesizing hydroxyapatite powders by precipitation from water solutions of calcium and phosphorous salts using EDTA has been developed. It was ascertained by the method of X-ray fluorescence analysis that introduction of complexing agent into solution results in formation hydroxyapatite with the ratio Ca/P, close to 1,67.

UDC 548.31;54.062;546.02

Golovanova O.A.
PATHOGENIC MINERAL FORMATION IN HUMAN BODY

On the basis of generalization of extensive experimental and theoretical material a complex of problems connected with features of genesis of renal, biliary, dental calculus and sialolith the main pathogenic formations in human body has been considered. Differences in composition of pathogenic biological matrices (bile, oral liquid) from those being in norm were determined and bindings between characteristics of lithogenesis media and phase composition of pathogenic formations were ascertained. It was shown that pathogenic phase formation in human body is very unbalanced.

UDC 665.6/.7

Kravtsov A.V., Usheva N.V., Moizes O.E., Kuzmenko E.A., Anufrieva O.V.
ANALYSIS OF PROCESS PARAMETERS INFLUENCE AND OPTIMIZATION OF LOW-TEMPERATURE SEPARATION PROCESSES

In order to determine optimal process conditions of functioning the device of gas condensate complex preparation applying analogue the influence of thermobaric parameters on output and quality of tank gas was studied. Influence of parametric sensitivity on the main indices of low-temperature separation process: tank gas output and dew point temperature by hydrocarbons was studied, the most efficient modes of operation of the device were recommended.

UDC 541.65/.654

Kashapova E.R., Bazyl O.K., Svetlichnyi V.A.
STUDYING THE STRUCTURE INFLUENCE ON PROPERTIES OF SOME MEROCYANINE DYES

Theoretical investigation of influence of polymethine chain length and type of electro-donor and electro-acceptor fragments on spectral-luminescent properties and photophysical processes occurring in merocyanine dyes has been carried out by the method of intermediate neglect of differential overlap. Good agreement of theoretically calculated spectra with the experimental data in nonpolar solvent was obtained. Possible reasons of low quantum yield of fluorescence observed in the experiment were examined. It was shown that rotation around C–C bond of polymethine chain results in decreasing rate constant of radiative decay and increasing rate constants of nonradiative processes.

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

Lesina Yu.A., Tretyakov A.N., Krasnokutkaya E.A.
IODINATION OF AMINO-DERIVANT NITROGEN-CONTAINING HETEROCYCLE UNDER THE ACTION $Me_4N{+}ICl_2^-/AgNO_3$ IN METHANOL

Activity of tetrametylammonium dichloroiodate with silver nitrate in methanol solution for electrophilic iodination of amino-derivant nitrogen-containing heterocycles of the series of pyridine, pyrimidine, quinoline has been studied. Iodination reaction courses at 20 °C providing yields of nitrogen-containing products from 30 to 95 %.

UDC 678:532.7

Dmitrieva Z.T., Bondaletov V.G.
THERMOMECHANICAL BEHAVIOR OF HYDROCARBON GELS OF LITHIUM TETRA-ALKYL-BORATE SOLVATES

Mechanical, thermal and sedimentation stability of permolecular structure of solvate hydrocarbon gels [B (OR)$_4$]L·nXR (X = HNR, OR, HO) depending on chemical nature of solvating agent and mole ratio of complex: solvating agent, concentrations of filler and temperature in conditions of deformation shift have been studied. Mechanism of formation of gel matrix permolecular structure in hydrocarbon solutions of complex lithium tetra-alkyl-borate and their solvates was discussed.

UDC 678.7;542.943.5

Troyan A.A., Bondaletov V.G., Bondaletova L.I.
OZONIZATION OF AROMATIC POLYMERIC PETROLEUM RESINS

Modification of polymeric petroleum resins obtained by catalytic polymerization of styrene fractions of liquid pyrolysis products by ozonization reaction has been considered. Influence of the process technological parameters (temperature, resin solution concentration) on product properties was studied. The obtained modified resins possess the properties allowing using them as film-forming components for paintwork materials.

UDC 678.71

Stankevich V.S., Eremkin S.M., Nesyn G.V.
CATALYST SYSTEM OF OLEFIN POLYMERIZATION ON THE BASIS OF TRANSITION METALS FOR MANUFACTURING TUBE TYPE POLYETHYLENE

In order to evaluate the most perspective methods of polyethylene pipes production the description of catalytic systems applied for olefins polymerization and co-polymerization is presented. The object of the investigation appears to be the transitional metal catalysts including Ziegler-Natta catalysts, chromium-containing oxide catalysts, metallocenes and post-metallocenes. In conclusion it is claimed that the most promising catalysts to produce polyethylene seem to be the metallocenes.

UDC 665.64

Kopytov M.A., Golovko A.K.
BLACK OIL THERMAL CRACKING WITH MAGNETIC FRACTIONS OF ENERGY ASH MICROSPHERES

Transformation of mazut components in the process of thermal cracking at 350...500 °C with magnetic fractions of energy ash microspheres has been studied. It was shown that distillate fraction yield with the specified fractions increases from 4,5 to 25,0 % in comparison with thermal cracking without admixtures depending on temperature.

UDC 665.451.3:665.642: (543.544+543.541)

Antipenko V.R., Melenevskiy V.N.
FLASH PYROLYSIS OF NATIVE ASPHALTITE, ITS RESIN-ASPHALTENE AND OIL COMPONENTS

Asphaltite of Ivanovskoe deposit, Orenburg region and products of its extraction-chromatographic separation (asphaltenes, benzene and alcohol-benzene resins, oils) have been characterized using combinations of flash pyrolysis at temperatures 400 and 650 °C with chromatography-mass spectrometric analysis of the obtained products. It was ascertained that volatile product composition 400 °C is mainly determined by evaporation process, however, even at this temperature features of thermodestruction are observed. Composition of flash pyrolysis products at 650 °C differs considerably from the products obtained at 400 °C. A part of low-molecular homologs increases practically for all types of compounds. For all original samples thermodestruction products at 650 °C are characterized by similar set of compounds including homologs of alkanes, alkene, alkadienes, mono- and polycyclic cycloalkanes, mono-, bi- and tricyclic aromatic hydrocarbons, benzo- and dibenzothiophenes. It confirms the presence of the majority of the listed structural fragments in «bound» form in composition of resin-asphaltene components of native asphaltite.

UDC 665.613:543.42.062

Antipenko V.R., Lukyanov V.I.
DETERMINATION OF SPECIFIC INDEX OF OIL AND OIL FRACTION ABSORPTION IN VISIBLE SPECTRUM

It has been shown that 500 nm is the most suitable value of analytical wave for determining specific index of oil and oil fraction absorption. Some objects obey the law of Bouguer-Lambert- Bert not in the whole range of the studied concentrations. The specific index of absorbing oil and oil residue components increases in the line: oils, petrolenes, resins, asphaltenes and differs considerably in single-type components and fractions obtained from heavy oils and average density oils. It was ascertained that magnitudes of specific value of absorbing oils and oil fractions determined in various solvents differ considerably.

UDC 550.4:665.61

Yanovskaya S.S., Sagachenko T.A.
LOW-MOLECULAR NITROGEN COMPOUNDS IN OILS AND ORGANIC MATTER OF UPPER JURASSIC ROCKS OF WEST SIBERIA

The distribution of low-molecular nitrogen-containing components in oils and dispersed organic matter of rocks from the Upper Jurassic system of West Siberia has been studied. It has been found that their amount in the organic matter of rocks is higher than that in corresponding oils. The low-molecular nitrogen compounds of all samples under study are represented by a mixture of strong and weak bases. They are composited of alkyl- and naphtenoderivatives of quinoline, benzo- and dibenzoquinoline, azapyrene, benzothiazole, thiopheno- and benzothiophenoquinoline, cyclic amides of pyridone type and their hydrated analogues: lactams, quinoline-, benzo-, and dibenzoquinoline carboxylic acids. The nitrogen bases of the dispersed organic matter differ from petroleum bases by an increased amount of weakly basic components and structures with unhindered nitrogen atoms.

UDC 665.61

Sergun V.P., Min R.S., Goncharov I.V.
OIL SULFIDES IN WEST SIBERIA

Distribution, composition and structure of sulfides in oils of the Jurassic-Paleozoic systems of West Siberia differing in sulfur content and geological-geochemical relation have been studied. The dependence of the amount of sulfides and their qualitative composition on the conditions of built-up of the initial organic matter and their thermal maturity has been established. The following sulfides have been identified: tiabi- and tiatricycloalkanes, benzo- and naphtotiacyclanes, and α-n-alkylthiolanes and α-n-alkylthianes were identified.

UDC 027.7:025.17:54(092)(571.16)

Romanova T.A.
LIFETIME PUBLICATIONS OF D.I. MENDELEEV IN COLLECTIONS OF STL TPU. IN COMMEMORATION OF THE 175th ANNIVERSARY OF THE GREAT RUSSIAN SCIENTIST

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