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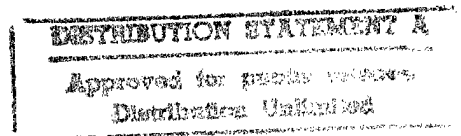
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USSR Report

CHEMISTRY

No. 83



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ADSORPTION

UDC 541.183.26.5; 661.183.123.3

ADSORPTION OF ACID GASES BY MACROPOROUS WEAKLY BASIC ANION-EXCHANGE RESINS WITH VARIOUS FUNCTIONAL GROUPS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 43, No 6, Nov-Dec 81
(manuscript received 14 Aug 80) pp 1027-1033

AVGUL', N. N., ARTYUSHIN, G. A., BELYAKOVA, L. D., VAL'KOVA, A. K.,
VOROB'YEVA, L. D., MUTTIK, G. G. and PLATONOVA, N. P., Institute of
Physical Chemistry, USSR Academy of Sciences, Moscow; Moscow University;
Scientific Research Institute of Plastics, Moscow

[Abstract] A study is presented of the adsorption of CO_2 and SO_2 by macroporous anion-exchange resins containing functional units with different structures, including pyridine nitrogen in conjunction with a tertiary amino group; primary, secondary and tertiary amino groups in various conjunctions; and amino groups in conjunction with a hydroxyl group. The anion-exchange resins studied are weakly basic resins of the vinyl pyridine series and resins based on a macroporous copolymer of styrene and divinylbenzene. Before the measurements were made all samples were converted into the form of a free base and were heated at 80 to 90 °C under a vacuum of 10^{-3} Pa or in a stream of inert gas, resulting in the practically total removal of water from them. Adsorption isotherms were measured by the volumetric method with a static vacuum unit and the differential heats of adsorption were measured with calorimeters. A heat conduction detector with a recorder was used to determine and register the concentration of gases in the stream. The results show that the adsorption of CO_2 and SO_2 by anion-exchange resins depends on the structure of the functional unit. An anion-exchange resin containing a secondary amino group in conjunction with a hydroxyl group in one case has a high adsorption capacity for SO_2 . Weak chemical bonds are formed between adsorbed molecules and the functional groups of anion-exchange resins. In the case of polyfunctional anion-exchange resins adsorption complexes are formed whose strength is determined by the nature of the functional groups in the resins. Figures 5; references 13:
10 Russian, 3 Western.
[93-8831]

URANIUM SORPTION FROM CARBONATE-CONTAINING SOLUTIONS USING INORGANIC
SORBENTS, PART VI: MECHANISM OF URANIUM SORPTION OF METATITANIC ACID

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 8 Feb 81) pp 800-804

NOVIKOV, Yu. P. and KOMAREVSKIY, V. M.

[Abstract] To study the uranium sorption mechanism by sorbents containing titanium dioxide, a finely divided metatitanium acid derived from titanium whiting was combined with carbonate-containing solutions of uranium based on sea water with a uranium 233 concentration of $8 \cdot 10^{-5}$ mol per liter. Kinetic sorption tests were performed under static conditions at temperatures of 14.5, 30.3, 44.6 and 60.7°C, with the solution being mixed constantly. Calculations and results of the experiments are presented. Parameters from formulas based on the results indicate a strong chemical reaction between adsorbed uranium and the sorbent substance, confirming the topochemical nature of uranium sorption on metatitanic acid. The adsorption occurs only on the surface of the sorbent and forms a layer of uranium compounded with the sorbent substance. Figures 3; references 11: 8 Russian, 3 Western.
[103-12131]

AEROSOLS

UDC 541.182.3 : 621.397.6

TELEVISION ANALYZER OF SUBMICRON AEROSOLS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 43, No 6, Nov-Dec 81
(manuscript received 17 Jun 80) pp 1089-1095

MAVLIYEV, R. A., ANKILOV, A. N. and KUTSENOGIY, K. P., Institute of Chemical Kinetics and Combustion, Siberian Division, USSR Academy of Sciences, Novosibirsk

[Abstract] When photoelectric analyzers are used to study aerosols a certain volume of gas with aerosol particles is illuminated by a beam of light and the scattered light is directed by means of an optical system to a photomultiplier tube; in the process the background radiation caused by scattering in the gas and elements of the optical system is also picked up by the tube and this interfering radiation is the main reason for restriction of the minimum size of particles which can be registered. The influence of this interfering radiation on the legitimate signal can be reduced and the minimum size of particles which can be registered can be extended by using a high-sensitivity television camera as a receiver of radiation scattered by the particles. A study is made here of the feasibility of employing this method to study highly-dispersed aerosols. The signal from the photocathode of a television tube is read successively from various independent sections, and the size of these sections is considerably smaller than that of the photocathode. The signal from a particle is concentrated by the optical system in a region of the photocathode measuring from 10 to 100 microns and comparison of signal and noise densities makes it possible to distinguish weaker signals than when a photomultiplier tube is used. In the latter case the signal and noise gathered from the entire area of the photocathode are compared. An estimate is made of the illumination intensity of the volume of gas which is required for the registration of a television camera signal and for isolating the signal from the background radiation. With a gas volume illumination intensity of 10^7 W/m² it is possible to register aerosol particles with a diameter as small as 25 nm when a television camera with a sensitivity of $3 \cdot 10^{-4}$ lx is employed. When using a television tube as the radiation receiver it is possible to increase considerably the maximum concentration of the aerosol studied, in that it becomes possible to study a great number of particles present simultaneously in the gas volume studied. Figures 5; references 10: 9 Russian, 1 Western.
[93-8831]

CAPTURE OF COMPONENTS OF $\text{CH}_4\text{-H}_2\text{S-C}_3\text{H}_8$ and $\text{CH}_4\text{-CO}_2\text{-C}_3\text{H}_8$ GAS MIXTURES BY CRYSTALLIZING AQUEOUS AEROSOL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 5,, No 11, Nov 81
(manuscript received 10 Jul 79) pp 2563-2564

STUPIN, D. Yu. and SELEZNEV, A. P., Leningrad Technological Institute
imeni Lensovet

[Abstract] The purpose of this work was to determine the mutual influence of components on transition to the solid phase under conditions far from equilibrium. The experiments were performed on an installation described in an earlier work at -10°C and 80 atm total gas pressure. The gas mixtures were treated with 50 ml of water in droplet form (mean diameter 100 μm) for 16 hours during one passage of the gas through the loop of the installation. The distribution of components among phases under these conditions is determined by the kinetics of formation of solid phase seeds on the surfaces of the droplets. The results of the experiments showed that when natural gas is treated with supercooled aqueous aerosols such harmful impurities as H_2S and CO_2 cannot be completely removed without large expenditures of valuable hydrocarbon components such as CH_4 and C_3H_8 , while EtSH and CS_2 , rapid aerosol crystallizers, are absorbed quite effectively. References 3: 2 Russian, 1 Western.
[72-6508]

ALKALOIDS

UDC 547.944.1.92

NUCLEAR MAGNETIC RESONANCE STUDY ON ALKALOIDS, PART II: IDENTIFYING CONFIGURATIONS OF ASYMMETRICAL C₁₇ AND C₂ CENTERS IN INDOLINE ALKALOIDS OF AJMALINE TYPE WITH DOUBLE PROTON RESONANCE METHOD

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 81
(manuscript received 11 Mar 81) pp 608-613

YAGUDAYEV, M. R., Order of Labor's Red Banner Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] Double proton resonance of the collapse and Oberhauser intramolecular nuclear effect types was used to examine the indicated alkaloids. Details of molecular structure are portrayed and tabulated for the compounds ajmaline, majoridine, herbamine and vincarine, vincamajin and vincamedine. Herbamine and closely related herbadine showed a nonequivalence of methylene group protons due mainly to the presence in their molecule (and the absence in the other alkaloids) of an OH group at C₃ and it is not dependent on the H₂ orientation. A stereospecific interaction was found through the 4 sigma bond between the protons H_{6alpha} and H_{17alpha}. In ajmaline and majoridine, protons H_{2beta} and H_{17alpha} show an Oberhauser effect of about 10%. Figures 3; references 15: 6 Russian, 9 Western.
[83-12131]

UDC 547.944/945

ALKALOIDS OF HAPLOPHYLLUM FOLIOSUM, PART II

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 81
(manuscript received 19 Mar 81) pp 613-616

AKHMEDZHANOVA, V. I. and BESSONOVA, I. A., Order of Labor's Red Banner Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] From the foliage of *Haplophyllum foliosum*, the authors isolated haplofoline and folifine. Infra-red and ultra-violet spectra indicated similarities to alkaloids of the platidesmine type, while proton magnetic resonance analysis showed a structure identical to myrtopisine.

Nortraveoline was also identified. This was the first isolation of myrtopside from Haplophyllum plants. References 10: 6 Russian, 4 Western.
[83-12131]

UDC 547.994/945

ALKALOIDS OF PETILUM RADDEANA, PART II: STRUCTURE OF PETIZINE AND PETIZININE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 81
(manuscript received 20 Mar 81) pp 616-619

NAKHATOV, I., NABIYEV, A. and SHAKIROV, R., Order of Labor's Red Banner
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[Abstract] Bulbs of *R. raddeana* were gathered in June 1980 at Sayvan, Turkmen SSR, at the end of vegetation. After removal of imperialine, the mother liquor was dissolved in chloroform, then separated on the basis of basicity using an acetate buffer solution, acetic and sulfuric acid. The processes yielded the alkaloids imperialine, imperialon, peimisine, petiline, petilidine, and new bases petisine and petisinine. Molecular structures of petizine, petiline and petisinine are presented. Procedures used are described in an experimental section. References 12: 7 Russian, 5 Western.
[83-12131]

UDC 547.944/945

STRUCTURE OF NITRAMINE AND ISONITRAMINE, NEW TYPES OF ALKALOIDS FROM PLANTS OF SPECIES NITRARIA

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 81
(manuscript received 27 Mar 81) pp 623-629

IBRAGIMOV, A. A., OSMANOV, Z., TASHKHODZHAYEV, B., ABDULLAYEV, N. D., YAGUDAYEV, M. R. and YUNUSOV, S. Yu., Order of Labor's Red Banner
Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] Nitramine (I) was isolated from *Nitraria schoberi* by catalytic dehydrogenation; isonitramine (II), later isolated from *N. sibirica*, was found to have the same composition ($C_{10}H_{19}NO$) and skeleton, but differed in molecule stereochemistry. ^{13}C nuclear magnetic resonance showed the absence of a methyl group and the presence of a quaternary spirocarbon atom, a single methine group bonded to hydroxyl, and 8 methylene groups,

2 of which were bonded to nitrogen atom. I and II have the structure 2-azaspiro (5,5)undecane-7-ol. Infra-red spectroscopy, multifrequency resonance and structural X-rays aided in establishing them as diastereomers with respect to the asymmetric C₇ atom. Procedures are described in an experimental section. Figures 2; references 5: 3 Russian, 2 Western. [83-12131]

ANALYTICAL CHEMISTRY

UDC 546.821:542.61:535.243

STUDY OF COMPLEX FORMATION AND EXTRACTION IN TITANIUM (IV)-2,7-DICHLOROCHROMOTROPIC ACID-TETRAPHENYL PHOSPHONIUM SYSTEM

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 24, No 11, Nov 81 (manuscript received 28 Mar 80) pp 1452-1453

KOSTYRKINA, T. D., BABENKO, A. S. and DANILOV, I. P., Chair of Analytical Chemistry, Khar'kov Polytechnical Institute imeni V. I. Lenin

[Abstract] Preliminary studies had shown that titanium (IV) complexes with 2,7-dichlorochromotropic acid (DCA) in presence of tetraphenylphosphonium bromide (TPP) can be easily extracted with nitromethane or butyl alcohol. In the present study optimal conditions for this process were determined. Maximum extraction of titanium complexed with DCA is achieved at pH 2.0-3.4, using a 20 excess of DCA and 120 excess of TPP. The complex was found to consist of the following ratio of components: Ti:DCA:TPP = 1:2:4. Figures 3; references 5 (Russian). [80-7813]

SECOND ALL-UNION CONFERENCE ON AUTOMATION OF ANALYSIS OF CHEMICAL COMPOSITION OF A SUBSTANCE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 81 pp 41-42

DUBOSSARSKAYA, V. Ya., candidate of technical sciences, KROTOVA, N. B., candidate of chemical sciences, and KUDRYAVTSEVA, T. V., candidate of physical and mathematical sciences

[Abstract] A report is presented on the findings of the Second All-Union Conference on Automation of the Analysis of the Chemical Composition of a Substance, held in December 1980 in Moscow, at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy and organized by this institute, the USSR Academy of Sciences Science Council on Analytical Chemistry and the Ministry of Instrument Making, Automation Equipment and

Control Systems Science and Engineering Council. The conference's participants numbered 453. In the 10th Five-Year Plan period more than 60 automated systems for analytical testing were created in nonferrous metallurgy. About 20 of these systems have been developed in ferrous metallurgy. Automation is well under way in the chemical and petrochemical industry and in geology. In ferrous and nonferrous metallurgy quantitative laboratories have been set up, furnished with emission and x-ray spectrum fluorescent quantometers and with a pneumatic tube conveyor system for delivering samples from the shop to the laboratory. X-ray spectrum analysis has been automated by the creation of an analytical complex containing a spectrometer and a minicomputer which automatically converts measured intensities of spectrum lines into concentrations and controls the automatic operation of the spectrometer. X-ray spectrum analytical complexes of the SRM-18 (KRF-18) type controlled by minicomputers are being used in ferrous and nonferrous metallurgy for controlling the composition of steel in the melting process, for example. Such complexes are used in the production of welding materials to reduce the loss of expensive materials and to increase productivity to 100 specimens in a 6-hour work shift. Multicollector magnetic mass spectrometers of the MKh-1214 and MKh-1215 types have been developed to monitor technological processes in metallurgy and chemical production. These instruments make it possible to measure continuously the concentration of hydrogen, carbon monoxide, carbon dioxide, nitrogen, oxygen and argon in the gas mixture of a production process line. These instruments are linked with computers with printers for the measurement results. More than 14,000 analyses of various types are made in the USSR's chemical industry by means of chromatographic methods. The "Tsvet 1000" model which appeared in 1980 is the first digital chromatograph with local controls. In the area of automation of optical analysis instruments an advance is represented by the FP-101 3-channel flame photometer for determining the content of sodium, potassium, lithium and calcium in agricultural products. Electrochemical methods of analyzing liquid media are under intense development, especially with regard to the automation of instruments implementing the differential pulsed mode and the mode of linear-sweep inversion voltammetry, making possible high-level analysis characteristics. Chemical testing of the water heat transfer agent of the power plants of thermal power stations is being arranged for on the basis of automatic systems for monitoring the water's composition, which are based on electrochemical methods of analysis, including the use of ion-selective electrodes. The majority of speakers at the conference noted that a lack of standard equipment for preparing assays and for weighing samples makes it impossible to guarantee the accuracy characteristics of analytical instruments and in a number of cases even the reliability of the results obtained. Key trends for the 11th Five-Year Plan period include the creation of ASAK's [automated analytical testing systems]. The improvement of assay preparation is a priority.

[88-8831]

UDC 546.268.1 + 547.495.2/.4) : 543.42.062

SPECTROPHOTOMETRIC DETERMINATION OF CYANACETYLUREA IN INDUSTRIAL PRODUCT

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 15, No 12, Dec 81
(manuscript received 9 Jul 80) pp 97-99

TETENCHUK, K. P. and BELOUSOVA, G. M., Scientific Research Institute of
Chemico-Pharmaceuticals, Novokuznetsk

[Abstract] As a substitute for the present tedious method of assay of commercial cyanacetylurea (CAU) which requires two titrations. The authors suggest use of a spectrophotometric assay. Spectral characteristics of cyanacetylurea were determined and it was found that in solution in water, spirits and other solvents CAU does not absorb ultra-violet light. After treatment of CAU with a 40% caustic soda solution, cyclization occurs with formation of a sodium salt of 4-amino-2,6-dioxypyrimidine which does exhibit (in aqueous-alkaline solution) a characteristic absorption at 266 nm, and hence can be assayed. The procedure was checked against the previously employed one and found to be suitable for industrial application. It is being used at the Anzhero-Sudzhensk Chemico-pharmaceutical plant.

References 2 (Russian).

[102-12131]

UDC 615.214.22 : 547,891.2 ,074 : 547.42.062

USING SPECTROPHOTOMETRIC ANALYSIS IN MONITORING NOZEPAM PRODUCTION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 15, No 12, Dec 81
(manuscript received 18 Dec 80) pp 99-102

TETENCHUK, K. P., BELOUSOVA, G. M., PROSHCHINA, N. N. and LYUSTIK, A. A.,
Scientific Research Institute of Chemico-Pharmaceuticals, Novokuznetsk

[Abstract] Quantitative determination is described of 5-chloro-3-phenyl-anthranyl, 2-amino-5-chlorobenzophenone, and a sin-oxime of 2-amino-5-chlorobenzophenone in the commercial product, and the first two compounds in the basic solution and the reacting mass. A differential spectrophotometric process was developed and tested for each of the compounds. The method excludes interference of one compound when the quantity of one of the others is being measured. Details of the test reactions are described.

Figures 3; references 3 (Russian).

[102-12131]

COMPLEX FORMATION OF LEAD WITH CARBOXYARSENATO

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 15 Dec 80) pp 3217-3220

MAGARAMOV, M. N. and TATAYEV, O. A., Dagestan State University
imeni V. I. Lenin

[Abstract] Results are presented from a study of the chemism of complex formations of lead (II) with carboxyarsenato. The initial solution of lead nitrate was prepared from chemically pure $Pb(NO_3)_2$, the concentration established gravimetrically. The standard solution of carboxyarsenato was prepared from the disodium salt. The pH required was created by an acetate buffer solution, 0.1 mol HNO_3 and 0.1 mol $NaOH$. Carboxyarsenato forms a colored complex compound with lead (II) with two overlapping maxima of absorption spectra at 610 and 660 nm. The low pH of complex formation results from the specifics of the structure of the reagent. Figures 4; references 6: 5 Russian, 1 Western.
[70-6508]

COMPLEX COMPOUNDS OF URANYLCHLORIDE WITH DIMETHYLFORMAMIDE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 23 Oct 80) pp 3315-3320

KOBETS, L. V., DIK, T. A., SAVCHENKO, L. P. and UMREYKO, D. S.

[Abstract] The authors analyzed the spectra in normal coordinates and related the oscillating frequencies, types of oscillations for coordination compounds of uranylchloride with dimethylformamide, finding that an additional complex of the composition $UO_2Cl_2 \cdot 2DMFA$ can be separated from an acetone medium. The purpose of this work was therefore physical and chemical study of the possible complexes of anhydrous uranylchloride with dimethylformamide obtained by crystallization from acetone. It was established that the complex with the ratio $UO_2Cl_2 \cdot DMFA = 1:1$ was formed with a stability constant of $3.5 \cdot 10^2$; however the compound could not be produced in the solid phase. Other complexes were produced in the solid phase and subjected to differential thermal analysis. The basic differences in these curves were observed in the 20 to 150°C range, with endothermic effects observed in the curves of $UO_2Cl_2 \cdot 2DMFA \cdot H_2O$, $UO_2Cl_2 \cdot 2DMFA$ and $UO_2Cl_2 \cdot 3DMFA$ at 130, 126 and 110°C, corresponding to the melting points of the substances. For $UO_2Cl_2 \cdot 3DMFA$ the melting effect is superimposed with the effect of removal of the DMFA molecule. Figures 2; references 6: 1 Russian, 5 Western.
[70-6508]

MANIFESTATION OF UNEQUAL ARM LENGTHS OF URANYL IONS IN LUMINESCENT AND OSCILLATING SPECTRA OF URANYLSULFATES AND MOLYBDATES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 5 Jan 81) pp 3321-3328

SEREZHKIN, V. N., SEREZHKINA, L. B., FAKEYEVA, O. A. and OLIKOV, I. I.,
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[Abstract] This study was undertaken to determine how the nonuniformity of uranyl ions established by x-ray studies of uranyl molybdate and sulfate is manifested in the luminescent and oscillating spectra of these compounds. IR absorption spectra were recorded from specimens prepared as tablets with KBr or suspensions in vaseline oil. Raman spectra were recorded using a helium-neon laser spectrometer. Luminescent spectra were recorded at 77 K using a mercury-quartz lamp as the excitation source. The data indicate the possibility of detecting nonuniform arm lengths in uranyl ions by analysis of the luminescent and oscillating spectra. However a final answer to this question requires comparison of the spectroscopic and structural characteristics of a broader range of compounds with asymmetrical uranium-oxygen bonds in the uranyl ions. Figures 3; references 21: 10 Russian, 11 Western.
[70-6508]

UDC 542.61 : 546.799.5 + 546.791.6 + 546.799.4

EXTRACTION OF AMERICIUM (III), URANIUM (VI) AND PLUTONIUM (IV) FROM NITRIC ACID SOLUTIONS USING POLY(2-ETHYL HEXYL)-PHOSPHONITRILIC ACID

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 16 Dec 80) pp 805-809

ROZEN, A. M., VOLK, V. I., NIKOLOTOVA, Z. I., KARTASHEVA, N. A. and
BARABASH, A. I.

[Abstract] Poly(2-ethylhexyl)-phosphonitrilic acid--P2EHPNA--is one of the polyalkylphosphoric acids used to extract metals. Americium (III), uranium (VI) and plutonium (IV)--typical representatives of the actinide metals--were used to study extraction equilibria with P2EHPNA, at the corresponding degrees of oxidation, valence, of the metals. P2EHPNA extracted trivalent actinides (e.g., Am) by ion exchange to form metal complexes and was more effective than another extractant di-(2-ethylhexyl)-phosphoric acid--D2EHPA. This was explained in that the polymeric structure of P2EHPNA is linear in contrast to the cyclic structure of D2EHPA, and the extraction by it has a polydentate character. Extraction of the four- and six-valent actinides (Pu and U), (where the cation-exchange and solvation components are comparable) with P2EHPNA varies little from that with D2EHPA. Figures 5; references 9: 7 Russian, 2 Western.
[103-12131]

CHEMICAL FORMS OF IODINE IN NUCLEAR POWER PLANT WASTE

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 3 Feb 81) pp 933-926

KUZNETSOV, Yu. V. and SUKHODOLOV, G. M. (deceased), YELIZAROVA, A. N.
and CHVATOV, V. N.

[Abstract] Chemical forms of iodine were studied in radioactive wastes from an "RBMK" reactor using thin layer ascending chromatography on aluminum oxide sorbents, and a 6 mol/liter solvent of ammonia and acetone. To determine elementary forms of iodine, a model system of extraction by organic solvents was used involving carbon tetrachloride and thiosulfate. Results showed that iodine 131 tracer behavior during extraction was determined by the form of stable iodine present. The amount of volatile iodine was determined by air evaporation. Alkaline and acid vat residues were concentrated 50-100 times and analyzed using thin-layer chromatography. Model tests showed that I^- , IO_3^- , and IO_5^- content was stable during concentration. The basic substance found was iodide, totaling 80-98%; contour waters contained the highest iodate concentration at 15-20%, while acid trap waters barely registered iodate. IO_4^- was not found. The content of volatile iodine compounds increased significantly as the acidity of wastes grew. Figures 1; references 7: 4 Russian, 3 Western.
[103-12131]

CLATHRATE AND NON-CLATHRATE COMPOUNDS IN WATER-HEXAMETHYLPHOSPHOROTRIAMIDE SYSTEM

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 55, No 11, Nov 81
(manuscript received 23 Jun 80) pp 2807-2811

KESSLER, Yu. M., ABAKUMOVA, N. A., SHAMONOV, I. I., SARKISOV, L. S. and VOROB'YEV, A. F., Moscow Chemical Machinebuilding Institute

[Abstract] The fluidity structure of a water-hexamethylphosphorotriamide system was studied on the basis of heat values obtained through differential thermic analysis. The solvent was purified by recrystallization, vacuum distilling in a 1/10 solution over KOH, followed by further standing over CaO and double distilled in vacuo. It was found that heating and cooling, with long periods at a set temperature, had little effect on the mixture. A working mixture was accepted when no exoeffect appeared after a cooling and heating cycle. A diagram of the liquidity of the H_2O -HMFT system was analyzed, using heating curves based on a method described elsewhere (Tsurinov, et al., 1956). Distribution of isothermic endoeffects at

various (below-zero) temperatures and molar content of HMFT is tabulated; curves of stable phases and of liquidity of the system are plotted. Incongruently-melting compounds and a congruently melting compound, $\text{HMFT} \cdot 3\text{H}_2\text{O}$, exist. Figures 5; references 11: 10 Russian, 1 English. [65-12131]

UDC 543.422

OSCILLATORY SPECTRA OF ACETYLMETHYLPHOSPHINES -d_0 , -d_3 , -d_6 , -d_9

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 55, No 11, Nov 81
(manuscript received 29 Dec 80) pp 2981-2982

KURAMSHINA, G. M., PETROV, A. K., KHAYKIN, L. S., UL'YANOVA, O. D. and
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imeni M. V. Lomonosov

[Abstract] Oscillatory spectroscopy was used to study acetylmethylphosphine (I) and 3 deuterium analogs of it, viz., $(\text{D}_3\text{C}(\text{O})\text{P}(\text{CH}_3)_2$ (II), $\text{CH}_3\text{C}(\text{O})\text{P}(\text{CD}_3)_2$ (III) and $\text{CD}_3\text{C}(\text{O})\text{P}(\text{CD}_3)_2$ (IV). Of these, II and IV had been prepared for the first time. Infra-red and Raman effect spectra were taken of crystalline phases, and Raman effect spectra of liquid phases of the substances. Analysis of results showed that the number of spectral light bands did not surpass theoretical expectations, and in crystallization no bands were lost. Within the limits of the infra-red and Raman effect spectroscopy, the four compounds apparently exist with a single durable conformation. Figures 2; references 3: 2 Russian, 1 English. [65-12131]

CATALYSIS

UDC: 547.678.3

CONVERSION OF 2,4,5,7-TETRANITROFLUORENONE IN HEXAMETHYLPHOSPHOROTRIAMIDE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 11, Nov 81
(manuscript received 9 Apr 81) pp 2456-2457

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[Abstract] It was found that when 2,4,5,7-tetranitrofluorenone (I) was dissolved in hexamethylphosphorotriamide (HMPTA), 4-hydroxy-2,5,7-trinitrofluorenone (II) is formed. The reaction of replacement of one nitro group in compound (I) by an OH group occurs at room temperature in 6 to 8 days. The source of the OH group is apparently water contained in the HMPTA. The position of the OH group of 4-hydroxy-2,5,7-trinitrofluorenone was established by IR and PMR spectroscopy.
[69-6508]

UDC 547.313 + 546.183 + 620.197 + 577.1

CATALYTIC PROPERTIES OF ORGANIC PHOSPHITES CONTAINING SULFUR

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 2, 1981 pp 51-52

ZUL'FUGAROVA, L. Sh., MAMEDOVA, P. S., TEPLYAKOVA, G. V., MUNSHIYEVA, M. K.
and TURABOVA, A. S., Institute of Inorganic and Physical Chemistry,
AzSSR Academy of Sciences

[Abstract] A sulfur-containing phosphite of p-tertiary butylphenol, obtained by condensation, was tested in several reactions: as an electron-donor additive in a propylene dimerization reaction in a homogeneous, complex catalyst system; as a corrosion inhibitor for an aluminum alloy in an alkaline medium; and as an inhibitor in a process where its effect on oxidation restoration processes was shown to retard tumor growth in animals. In the first test, the organophosphorus ligand markedly changed isomer composition and increased dimer yield, but the catalytic system decomposed

at temperatures above 40°C. In the second test, the compound protected the tested aluminum alloy from corrosion to a degree of 90%. It was also effective in retarding tumor growth in mice and rats. References 8 (Russian). [63-12131]

UDC: 546.982+547 .449

SYNTHESIS, PROPERTIES AND THERMOGRAPHIC STUDY OF CARBONYL-CONTAINING COMPLEXES OF Pd(I) WITH SUBSTITUTED PHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 9 Oct 80) pp 2536-2541

LINEV, V. P., TEMKIN, O. N., POLOVNYAK, V. K., BRUK, L. G. and
ROMANOV, G. V., Kazan' Chemical-Technological Institute imeni S. N. Kirov

[Abstract] Complex compounds of Pd(I) have interesting catalytic properties. Carbonyl-containing complexes are unusual from the standpoint of their structure and the coordination of the carbonyl groups. The stability of these compounds is determined largely by the nature of the ligand surroundings. Substitution of ligands in aqueous solutions of Pd complexes with chlorine or bromine was used to synthesize complexes of Pd(I) with tertiary phosphines. The synthesized compounds, carefully purified and dried in argon, are quite stable in the solid stage, but in benzene, acetone, ethanol and other organic solvents they slowly disproportionate to form metallic Pd in colloidal form. The half life is 2 to 4 hours under these conditions. The IR spectra of the compounds produced are studied. It was established oscillographically that a potassium complex produced by dissolving $\text{Pd}_2(\text{CO})_2\text{Cl}_4$ in 98% acetic acid saturated with KCl has two reduction potentials close to the reduction potentials of complexes synthesized earlier. The stages of thermal decomposition of the complexes are described. A derivatographic method demonstrates that during this thermal decomposition a process of isomerization occurs leading to the loss of one CO molecule with subsequent rapid decomposition to metallic palladium. Figures 1; references 11: 5 Russian, 6 Western.
[68-6508]

CHEMICAL INDUSTRY

POSSIBILITIES AND PROSPECTS OF ARTIFICIAL FIBERS SURVEYED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Jan 82 p 1

[Article by Ye. Leont'yeva]

[Text] It would not be difficult for us to recall the time when natural fabrics gathered dust in the storewindows, ignored by uninterested customers. Advertising organizations and the trend-setters did everything they could to attract our attention to these fabrics, which had lost their earlier freshness. A serious competitor to natural fabrics had appeared--synthetic fabrics, bright and practical. But the synthetic boom went as it came, and this was unavoidable, because concurrently with their advantages, synthetics did reveal their disadvantages to us.

And so we returned our affections to staple and viscose fabrics (referred to as artificial fabrics) because they come from wood, a natural material with which we are familiar, though we do know that the outlays on such fabrics are great: Four cubic meters of wood are used for every ton of fiber. Moreover the harmfulness of this production operation is also a serious obstacle, since sizeable assets must be invested into environmental protection. Thus given all of their merits, viscose fabrics, which are once again dear to our hearts, are too costly to nature and, in the final analysis, to ourselves. This is why we are finding less and less silk and staple in the world market while synthetics are becoming more and more abundant. Moreover chemists are doing everything they can to impart the merits of natural materials to synthetics, and they have been successful in many ways.

For the moment our country is planning to produce as much artificial fiber as synthetic fiber: The ratio should be 42.5 to 57.5 percent by the end of the five-year plan. But unfortunately the plan for production of artificial fibers has not been satisfied for a succession of many years. Because of problems encountered by the "Soyuzkhimvolokno" Association, the USSR Ministry of Light Industry was unable to complete the silk fabric production plan for the first half of last year. The shortfall--almost 30 million square meters--was carried over to the second half of the year. But alas, the slack never was picked up. For this same reason the sewing and the textile-haberdashery sectors suffered losses as well--now in terms of consumer goods. To put it more accurately, it is the consumer who loses out.

What explanation do executives of "Soyuzkhimvolokno" offer for this state of affairs? Only one--a shortage of raw material. True, suppliers are letting the fiber-makers down, and very seriously. Last year they fell short in their deliveries by more

than 49,000 tons of viscose cellulose and more than 60,000 tons of caustic soda. Much finished product could have been obtained from this raw material. It has been estimated that 10,000 tons of soda not delivered means 16.4 million dresses not sewn.

An extremely noticeable disproportion evolved in recent years between development of viscose fiber production and development of the raw material base for such production. In typical fashion, the chemists are the ones who complain most of all about the shortage of caustic soda, but it is the Ministry of Chemical Industry that furnishes this product, and therefore it has the means for correcting this disproportion.

But though they are an important contributor to the shortfall, raw materials are far from the sole cause. Development of fiber production is also bogged down because the proportion of worn and obsolete equipment is very high. Almost half of the equipment has already been working 25 years and longer. The energy and heat consumption of the production operations is very high. The amount of raw materials consumed by different enterprises varies considerably. This is especially true of scarce materials such as cellulose, caustic soda, sulfuric acid and caprolactam. This means that there are unutilized internal reserves that await their implementation.

The "Soyuzkhimvolokno" Association could also do a great deal to improve fiber quality and assortment. Let us begin at least with viscose cord. World production of such cord for tire industry has already decreased to naught. And this is understandable, because it is heavy, it is not very strong, and it cannot compete in any way with second-generation and, all the more so, third-generation synthetic cord. And yet, we are still producing just as much as synthetic cord. Imagine then, how many consumer goods we could make from the wood that is wasted on this low-quality product!

While it has long been time to shut down viscose cord production, silk production should be allowed to develop. This is something workers in light industry are hoping for very much. They have many complaints about the quality of the silk they receive: nonuniform dyeing and presence of a large number of defects that make it hard for the machines to handle the thread. True, PNSh (continuous thread-making) machines are coming to the rescue, but unfortunately their development has dragged on for many years, and the deadlines for their introduction leave much to be desired. For practical purposes only one enterprise has been re-equipped thus far--the one in Cherkassy.

One more important factor should be noted. Textiles, and especially those intended for manufacture of linens, require thin threads--from No 90 to No 120. But the chemists do not seem to be in any hurry: They are still working their way up to No 75. Planning based on production volume had its effect.

Staple fiber experienced a rebirth in 1970. To put it more accurately, this was no longer staple fiber but a replacement--viscose high-modulus fiber, which is twice as strong as its predecessor and which is not inferior to cotton in this respect. It quickly won over the world market. Better hygienic characteristics than synthetic fiber and greater strength promoted faster growth in the demand for it. The new fiber is used in clothing and in fabric, mixed with cotton and wool. In short, its prospects for the future are enormous. The one unfortunate thing is that construction of the second generation of our country's sole production operation is behind schedule.

The one thing that should be fading into the past is what the history of the sector began with. I am referring to copper-ammonium fiber, which almost no country is producing today--it is not strong enough, and any production operation associated with the use of copper is very harmful. Nevertheless such shops still exist in the Ministry of Chemical Industry. They have been dragging out a miserable existence for decades. And throughout all of this time, scientists of all three sector institutes have paid hardly any attention to them.

On the whole, the prospects for fibers made from natural materials are presently such that the demand of light industry will not be satisfied in the near future. Moreover light industry is still furnishing enterprises of "Soyuzkhimvolokno" with natural fabrics--coarse calico, baize, chiffon, cotton, hemp and jute--for filtration of chemical solutions and packaging of finished products. And this is outright waste. True, between 1975 and 1980 the association did reduce its consumption of natural filtering materials by a fourth--from 12 to 9 million square meters. But consumption still remains enormous. Fiber production requires three successive filtrations of solutions. But the chemists have just barely learned how to replace natural fabrics in the first filtration step, the roughest. The fact is that research chemists who had sought a synthetic substitute for a long time jointly with the All-Union Scientific Research Institute of Nonwoven Fabrics (VNIINTM) have not been able to solve this problem completely yet. The nonwoven cloth they have proposed is not suited to fine cleaning, and its production has been set up at only one small enterprise in the local industry of Bezhetsk. Organizing widespread production of nonwoven fabrics for filtration is one of the pressing tasks. Otherwise it would be impossible to withdraw millions of square meters of natural fabrics from this area of use.

Great also is the consumption of hemp and jute: Each year "Soyuzkhimvolokno" uses 8 million square meters for packaging purposes. The plan is to replace these materials by synthetics beginning in 1982. Will we be able to do this? Only if production of an inexpensive and dependable substitute is organized.

As we can see, the analysis shows that besides the raw materials, there are other things with which scientists, specialists and executives of artificial fiber enterprises and of the sector as a whole must concern themselves if we are to decrease the gap between supply and demand as quickly as possible.

11004

CSO: 1841/91

FILLERS SOUGHT FOR 'NORPLAST' PLASTIC

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Jan 82 p 2

[Article by A. Kirichenko: "Polymers With Fillers"]

[Text] Familiar to Muskovites as the Kuskovskiy Chemical Plant--one of the capital's oldest enterprises famous for the fact that the outstanding Russian chemist Dmitriy Ivanovich Mendeleev worked in its shops, this plant recently acquired a new name--the "Norplast" Scientific-Production Association. The All-Union Scientific Research Institute of Composite (Filled) Polymers (VNIikompozit) stands next door. The enterprise is working in close contact with the scientists. Jointly with colleagues of the USSR Academy of Sciences Institute of Chemical Physics (scientific director, Academician N. Yenikolopov), workers of the VNIikompozit have created a new, promising material--norplast. By successfully combining polymers with inorganic fillers they opened up a way for significantly economizing on the required raw material--petroleum.

A. Zharov, director of the VNIikompozit Division of Filled Material Processing and Application, placed a brown bucket on his desk.

"This bucket is made from norplast," said Aleksandr Ivanovich. "It is made of equal parts of polyethylene and an inorganic filler--tufa."

Norplast can be used to make tubes and tanks for domestic chemistry, various parts for electrical engineering industry and consumer goods. Norplast may be dyed any required color, and it is easily metal-plated.

V. Sheludyakov, chief of the experimental section, led me up some metal staircases paralleling the production flow. While Valeriy Dmitrievich's facility is designed to carry on the process in gas phase, a special solution is used in another experimental facility under N. Shugayev's command. At the moment it is too early to conclude which way of making norplast is best; the search is still on. But the first way seems to be more economical thus far.

It should be added here that the scientists are thinking about utilizing various industrial wastes, to include cotton combings, grape processing products and lignin. Tons upon tons of these materials are presently being dumped. But after a little processing, all of these wastes could become excellent fillers for polymers. The resulting materials are distinguished by lightness and strength. Scientists of the

VNIkompozit have already tested some organic fillers. The time has now come to process these "wastes." But the "Norplast" Scientific-Production Association naturally cannot do the job alone. It is now time for action by all 60 of the scientific institutions and industrial enterprises working on the specific-purpose "Filled Polymers" program of the USSR State Committee for Science and Technology.

11004

CSO: 1841/91

UZBEK CHEMISTS PLEDGE MORE FERTILIZER

Tashkent PRAVDA VOSTOKA in Russian 13 Dec 81 p 1

[Article: "In the Uzbek SSR Communist Party Central Committee: On the Socialist Pledges of Enterprise Collectives of the Republic's Chemical Industry Concerning a Worthy Welcome to the 60th Anniversary of the USSR and Early Fulfillment of the 1982 Assignment for Production of Mineral Fertilizers and Chemical Plant Protection Resources"]

[Excerpts] In 11 months of the present year the mineral fertilizer production plan was surpassed by 72,000 tons at the "Navoiyazot" Production Association, by 56,000 tons at the Chirchik "Elektrokhimprom" Production Association, by 11,000 tons at the Fergana "Azot" Production Association, by 55,000 tons at the Almalyk Chemical Plant and by 10,000 tons at the Kokand Superphosphate Plant.

The republic's chemists have pledged to surpass the 1982 plan by 225,000 tons of mineral fertilizers by improving organization and ideological-political work, by broadening the socialist competition, by implementing organization and technical measures, by introducing and assimilating new output capacities ahead of schedule, by introducing the achievements of science and the best methods into production, and by reducing consumption of raw materials and intermediate products. Individual contributions to this total are to be as follows:

"Navoiyazot" Production Association	75,000 tons
Chirchik "Elektrokhimprom" Production Association	40,000 tons
Fergana "Azot" Production Association	10,000 tons
Almalyk Chemical Plant	80,000 tons
Samarkand Chemical Plant	10,000 tons
Kokand Superphosphate Plant	10,000 tons

A decision was also made to surpass the production plan for chemical plant protection resources by 220 tons. Contributions to this total are as follows:

Fergana "Azot" Production Association	150 tons of magnesium chlorate defoliant
Navoi Electrochemical Plant	50 tons of cotaran 20 tons of akreks

By hastening assimilation of new sulfuric acid production capacities at the Almalyk Chemical Plant and of ammonium production capacities at the Fergana "Azot" Production Association, chemists have pledged to produce an additional 40,000 tons of sulfuric acid and 10,000 tons of ammonium at these enterprises, and in this way satisfy the socialist pledges of producing 40,000 tons of mineral fertilizers.

Striving to make a worthy contribution to the national task of achieving high results in agriculture in 1982, they will supply 150,000 tons of mineral fertilizer more than planned to the kolkhozes and sovkhoses prior to 1 August--that is, at the best time from an agrotechnical standpoint.

The Uzbek SSR Communist Party Central Committee approved the socialist pledges of the collectives of the Chirchik "Elektrokhimprom" Production Association, the "Navoiyazot" Production Association, the Fergana "Azot" Production Association, the Almalyk and Samarkand chemical plants, the Kokand Superphosphate Plant and the Navoi Electrochemical Plant concerning a worthy welcome to the 60th anniversary of the USSR and early fulfillment of the 1982 assignment for production of mineral fertilizers and chemical plant protection resources.

The directors and secretaries of the party organizations of the "Elektrokhimprom" and "Navoiyazot" production associations, the Fergana "Azot" Production Association, the Almalyk Chemical Plant, the Samarkand Chemical Plant, the Kokand Superphosphate Plant and the Navoi Electrochemical Plant were instructed to ensure fulfillment of the 1982 plans and satisfaction of the adopted socialist pledges by making fuller use of the available production capacities, by hastening assimilation of new production operations, by reducing consumption of raw materials and intermediate products, and by maintaining a thrifty attitude toward energy resources.

The Uzbek SSR Ministry of Power and Electrification and the "Soyuzuzbekgazprom" All-Union Production Association have pledged to keep enterprises producing mineral fertilizers and plant protection resources continually supplied with enough electric and thermal power and gas to satisfy the required production volume and the adopted socialist pledges. The administration of the Central Asian Railway was asked to allocate rolling stock regularly and promptly in response to requests by enterprises for the purposes of delivering raw materials and shipping out finished products. The Uzbek SSR Gossnab was instructed to supply material-technical resources and raw materials on priority to enterprises producing mineral fertilizers and plant protection resources.

The corresponding recommendations were made to the republic's Gosplan, the Ministry of Construction Materials Industry, the Uzbek SSR Ministry of Construction and the Ministry of Installation and Special Construction Work, and the "Sredazkhimremstroy-montazh" Trust, which are all doing work in support of enterprises producing mineral fertilizers.

The Uzbek SSR State Committee for Labor and Social Problems was asked to supply personnel on priority to operating and newly assimilated output capacities, as requested by enterprises producing mineral fertilizers and plant protection resources.

The Uzbek SSR Komsomol Central Committee was ordered to ensure active participation by Komsomol members and young people in the construction, reconstruction and

assimilation of output capacities at enterprises producing mineral fertilizers and chemical plant protection resources, sending young people to these facilities on Komsomol passes.

The republic's Ministry of Trade, the Samarkandskaya Ferganskaya and Bukharskaya oblast executive committees, the Administration of Workers' Supply of the Navoi Mining and Metallurgical Combine and enterprise executives were ordered to improve public dining services for laborers, turning special attention to providing hot food in the evening and night shifts, to supply the required assortment of goods to the dining halls, and to ensure their sensible use.

11004

CSO: 1841/91

BRIEFS

FERTILIZER, CHEMICAL, PETROCHEMICAL CONSTRUCTION--The rate of development of enterprises in mineral fertilizer, chemical and petrochemical industry remains high in this year's plans. Enterprises of this sort are to be built in Permskaya, Gor'kovskaya, Kemerovskaya, Novgorodskaya, Dzhabul'skaya, Murmanskaya, Chelyabinskaya and many other oblasts. In the second year of the five-year plan the production capacities will increase by 1.5 million tons for ammonia, 3.1 million tons for mineral fertilizers, 150,000 tons for synthetic resins and plastics, and 5.5 million tons for petroleum refining. [By V. Isayev, first deputy director, CPSU Central Committee Construction Section] [Excerpt] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Jan 82 p 2] 11004

AMMONIA COMPLEX--Mineral fertilizer production will increase this year by 1.5 times over last year's figures at the Rustavi Chemical Plant. The second generation of a complex of ammonia shops with an output capacity of 200,000 tons per year has gone into operation here. This great labor victory was won owing to competition based on the "worker's relay" principle. Specialists from Baku, Dnepropetrovsk, Sverdlovsk, Kaliningrad and Severodonetsk were a big help to the republic's builders and installers at the new facility. Rustavi chemists, who are now laboring under the slogan "Sixty Shock Labor Weeks in Honor of the 60th Anniversary of the USSR," pledged to raise the output of this new facility of "big chemistry" to its planned capacity. [By G. Namtalashvili, Rustavi] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Jan 82 p 1] 11004

TIRE PLANT FINISHED--The "Chimkentshina" Association, presently under construction, will satisfy the demand of Kazakhstan and the Central Asian republics for "footwear" for the principal forms of wheeled transportation. The last of four production complexes specializing in tires for motor vehicles and agricultural machinery went into operation yesterday. This concludes construction of the first generation of this petrochemical giant. On the outskirts of the oblast center, where there had been nothing but desert before, there now stands a town of several dozen hectares housing representatives of a new profession of Kazakhstan industry--tire manufacturers. Competition according to the "worker's relay" principle made it possible to erect almost a hundred engineering structures on a tight schedule. Moscow and Leningrad planners prepared the technical documents and transportation workers delivered freight to the construction site on priority. Witnessing such support, the builders placed their reserves in action as well: They began performing all of the principal operations by the flowline method. This made it possible for each construction unit to make the construction site ready for other units without delay. As a result the builders were able to use their working time more effectively and to finish production facilities and public buildings on schedule. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Jan 82 p 1] 11004

GRODNO FERTILIZER PRODUCTION EXPANDS--Chemists of the Grodno "Azot" Association have surpassed the mineral fertilizer production plan by 10 tons for the first time. The high rhythm they achieved in the first days of the year is not declining. This year the enterprise will be expanded significantly: There are plans for building an ammonia production operation, high-capacity catalytic units and a centralized equipment repair base. A major social program will be implemented as well. All of this will help Grodno chemists to satisfy their high socialist pledges. They have decided to complete the annual mineral fertilizer production plan by 25 December and to surpass the plan by 9,000 tons. [By K. Nikolayev, Grodno] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jan 82 p 1] 11004

AMMONIA PIPELINE--The Tol'yatti-Odessa ammonia pipeline is a huge national economic complex intended for transportation and storage of highly valuable mineral fertilizers for the country's agriculture. Fifteen pumping and thirty distributing stations have been built along the route of the ammonia pipeline. The underground transportation mains are operated, monitored and controlled from a single centralized computer console. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jan 82 p 2] 11004

PROTEIN-VITAMIN CONCENTRATES--Since the beginning of the five-year plan, the country's microbiological industry has produced a million tons of protein-vitamin concentrates. The millionth ton was produced at the Angarsk Protein-Vitamin Concentrate Plant. This is one of the sector's leading enterprises. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Jan 82 p 1] 11004

NEW MALEIC ANHYDRIDE SHOP--The Novomoskovsk Organic Synthesis Plant has begun mass production of maleic anhydride. Chemists at many enterprises are awaiting this product: It is broadly employed in the production of varnishes, resins and synthetic dyes. It is also used in pharmaceutical industry and in the synthesis of various agricultural preparations. The automation level of the new shop is the highest at the plant. All production operations are controlled from a central console. Two production lines are operating in the shop at the moment. After all four are placed into operation as planned, the Novomoskovsk Plant will become the largest in the country, exceeding the capacity of the present operation in Tambov by a factor of three. [By M. Mulina, Tul'skaya Oblast] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Jan 82 p 2] 11004

CSO: 1841/91

UDC 667.4:338

CHEMICAL FIBERS AND THEIR ROLE IN CHEMIZATION OF NATIONAL ECONOMY

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 81 pp 4-5

SMIRNOV, V. S.

[Abstract] The increasing role of textile fibers in worldwide production was discussed with respect to increasing the output of chemical fibers and primarily of synthetic fibers. The production of chemical fibers and thread in 1978 worldwide and in the USSR was compared and were broken down into artificial and synthetic. The maximum increase was in production of viscous fibers, comprising 48.2 percent of the total output, and of capron fibers, comprising 26,6 percent of the total output and polyester fibers, comprising 10.0 percent of the total output. The use of chemical fibers produces a considerable saving dependent on the designation of the articles of goods produced, the composition of the mixtures of chemical and natural fibers and the ratio of components in them. The saving due to capital investments, costs and numbers of planning-production personnel was compared for the 10th and 11th Five-Year Plans. The output of products with the State-Emblem of Quality was increased from 2.6 percent to 22.6 percent by introducing a complex system of quality control of chemical fibers.
[86-6521]

UDC: 662.749.351:66.048.6

DEVELOPING TECHNOLOGY FOR PRODUCING PURE AROMATIC C_6-C_7 HYDROCARBONS BY COMBINED PROCESSING OF COAL RAW MATERIAL WITH BENZENE USING PHYSICAL AND CHEMICAL METHODS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 19 Mar 80) pp 2469-2476

MIROSHNICHENKO, A. A.

[Abstract] There is a great interest in development of a technology for production of pure C_6-C_7 aromatic hydrocarbons, eliminating the formation

of secondary sulfur compounds and other production wastes from coal. For this purpose studies were performed on the possibility of joint deep purification of benzene and toluene to remove paraffins, naphthenes, olefins and carbon disulfide by extraction distillation. The possibility was shown of creating basically new technological systems for production of benzene for synthesis and toluene for nitration based on physical-chemical methods of separation without the use of chemical methods of purifying the raw materials. The systems suggested call for combined processing of high-sulfur raw materials with benzene, with separation of all thiophene and methyl thiophenes. As a result of the studies the distribution of saturated hydrocarbons among the pure products of simple fractional distillation was calculated. Basic technological plans are developed for combined treatment of raw coal tar benzene. The benzothiophene is purified to remove paraffins, naphthenes, olefins and carbon disulfide by fractional distillation with subsequent separation of thiophene and methyl thiophenes also by fractional distillation with highly selective mixed extraction agents. The yield of pure aromatic C_6-C_7 hydrocarbons is 96.4%. Figures 3; references 16: 14 Russian, 2 Western.

[72-6508]

COAL GASIFICATION

UDC 662.74.002.5.001.8

ATTEMPTED USE OF REVERSIBLE GAS REFRIGERATORS

Moscow KOKS I KHIMIYA in Russian No 1, Jan 82 pp 40-41

SHISHKIN, Yu. I., All-Union Coal-Tar Chemical Station, and ANIKIN, G. Ya., MNK [expansion unknown, possibly Magnitogorsk Metallurgical Combine]

[Abstract] Soviet coal-tar chemical enterprises achieve primary cooling of coke gas in pipe gas refrigerators and direct-action coolers; refrigerators with surface cooling are preferred. A variation of the pipe gas refrigerator is one with reversible action: it has greater cooling surface and other design advantages, and it is possible to use the physical heat of coking gas and condensing tar for dissolving accumulating naphthalene deposits on outer pipe surfaces. This article describes many years use of the reversible units at the coal tar chemical facilities of MMK. Technical specifications are tabulated. Cooling tubes with nominal 270 mm diameter, aluminum protective covers and hot-plate zinc coating to prevent corrosion are used. Flow direction was reversed during every work shift. The method provided the necessary cooling level of 30-32° C, it was simple and self-regulating to a high degree, and required no steam cleaning during operation. [100-12131]

UDC 662.749.363.1

OBTAINING HIGH GRADE ANTHRACENE BY FRACTIONAL EXTRACTION

Moscow KOKS I KHIMIYA in Russian No 1, Jan 82 pp 34-37

LITVINENKO, M. S., OL'SHANSKAYA, S. N., ROK, A. A., KUZNETSOVA, L. S. and DAVIDYAN, D. N., Scientific Research Institute of Coal Chemistry [UKhIN]

[Abstract] Fractional extraction has been producing 98-99% anthracene by use of various pairs of solvent-extractors--white spirit and acetamide, white spirit and pyridine, white spirit and aqueous acetone, etc. The present article describes results of use of white spirit plus an aqueous

solution of dimethylacetamide (DMAA) obtain highgrade anthracene. Two steps are involved: preliminary enrichment of the raw material with white alcohol, followed by fractional extraction of the semi-enriched product with the solvent pair (white spirit, water and dimethylacetamide). Search for the optimal materials in the second step are described. A mathematical model was constructed to establish the dependence between the quantity of dimethylacetamide in white alcohol and the amount of water in the DMAA, and other features of the final product in relation to the precise technical procedure used. Experiments were used to determine the effectiveness of product: white alcohol: DMAA in the ratio 1 : 10,8 : 3.2, with 6 degrees of contact and temperature of 90-95°. A 99% pure product was obtained under optimal conditions when the raw material anthracene had a technical product of 93-95%. Figures 2; references 6 (Russian).
[100-12131]

COMBUSTION

UDC 661.7:614.845

FIRE-EXTINGUISHING MATERIALS FOR SOME CHLOROORGANIC SUBSTANCES

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 6, Nov-Dec 81 pp 57-58

DENISENKO, I. S., VYBORNOV, Yu. E., PODGAYNYY, V. P. and VOLOSHANENKO, A. I.

[Abstract] The nature of interaction of flammable chloroorganic substances with water-foam and powder fire extinguishing materials was investigated and the flash point and ignition temperature were determined to find effective fire-extinguishing compositions for developing firefighting measures at chemical enterprises. Air-mechanical foam based on PO-1 foaming agent and compact water cause discharge and foaming phenomena of hot products due to intensified vapor and gas formation and also due to the exothermic effect of interaction of incomplete combustion products and hydrogen chloride with the water-foam substances. Finely sprayed water and a powder composition of PSB-Z brand are effective in extinguishing burning n-chlorobenzene-sulfochloride, o-nitrochlorobenzene and 4,4¹-dichlorodiphenylsulfone. Sprayed water and powder composition P-1A are effective in extinguishing burning benzoyl chloride. The sprayer flow and the location of its arrangement should be selected so that the cloud of powder covers the entire volume of flame of the burning product. The calculated extinguishing time should not be less than 30 seconds. Personnel must use oxygen masks to extinguish benzoyl chloride.

[89-6521]

UDC 541.124.2+547.261

LOWER LIMIT OF SELF-IGNITION OF MIXTURES OF MONOSILANE AND OXYGEN

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 34, No 11, Nov 81
(manuscript received 19 Jul 80) pp 909-913

ARUTYUNYAN, S. A. and SARKISYAN, E. N., Institute of Chemical Physics,
Armenian SSR Academy of Sciences, Yerevan

[Abstract] Monosilane, a highly flammable substance, has been used increasingly in recent years in technological processes. Here a quantitative

study is made of the lower limit of self-ignition of mixtures of monosilane and molecular oxygen with the ultimate goal of establishing the scientific fundamentals for inhibiting this process. Monosilane and oxygen purified by 3-time fractional distillation were used in the experiments. The purity of the reactants was not less than 99.95 percent, checked chromatographically. The individual components and reaction mixtures were collected and stored in glass flasks below atmospheric pressure. The reaction mixture was put into a small-capacity graduated overflow vessel in which the pressure was automatically recorded, and then into a temperature-controlled cylindrical reactor 40 mm in diameter and 200 mm long. The moment of ignition was recorded both from the glow and the sudden change in pressure in the reactor. The ignition limit was determined with accuracy of ± 0.05 torr. A quantitative determination of the products was made chromatographically. Temperature dependences of the lower limit of ignition of undiluted mixtures of monosilane and oxygen were obtained with various contents of the combustible material and oxidizer over the temperature range of 147 to 257 °C. It was demonstrated that enriching the mixture with monosilane results in expansion of the ignition region in the low-pressure direction. This indicates that the monosilane takes part in the chain branching event. It is shown that the energy for activation of the branching event in the combustion of monosilane in an atmosphere of oxygen is in the range of 25.2 to 33.6 kJ/mole. The condition for the limit is represented by the equation $2K_{\text{razv}}[\text{SiH}_4] = K_{\text{get}}$, where K_{razv} is the branching rate constant and K_{get} is the heterogeneous decomposition rate constant for the active center participating in the branching event. Experiments conducted under static conditions showed that the burnup increases with an increase in the content of monosilane in the mixture and with an increase in temperature and the initial pressure of the reacting mixture in the reactor. In lean mixtures with about 18 percent SiH_4 1.35 mole of oxygen is consumed per mole of monosilane, whereas in richer mixtures with 25 percent SiH_4 the ratio of consumed reactants is approximately 1.1. Figures 3; references 15: 7 Russian, 8 Western.

[94-8831]

UDC 536.46

REACTION OF METHANE WITH CHLORINE UNDER COMBUSTION CONDITIONS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
 IM. D. I. MENDELEYEVA in Russian Vol 26, No 6, Nov-Dec 81
 (manuscript received 13 Nov 80) pp 715-717

STEBLEV, A. V.

[Abstract] Combustion chlorination of methane was studied. The products formed depended on the content of methane in the starting reaction mixture: 8% of methane gave primarily CCl_4 in 67.5% yield; an increase in the methane content up to 14% gave CCl_4 and C_2Cl_4 in 58.2 and 23% yields respectively;

with 18.2% of methane in the starting mixture the main product was C_2Cl_4 (79% yield); higher levels of methane led to excessive carbonation. The increasing yield of C_2Cl_4 observed with the increased content of methane in the starting mixture was explained by the fact that the first step in formation of C_2Cl_4 is the recombination of chloromethyl radicals, which is temperature dependent; and it was shown that an increase in methane content raises the combustion temperature from 1085 to 1506°K. Figures 1; references 6 (Russian).
[79-7813]

UDC 614.841.12

INVESTIGATION OF FLEGMATIZATION OF BURNING MIXTURES USING FOAMS OF VARIOUS STRUCTURES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 55, No 11, Nov 81
(manuscript received 12 Dec 80) pp 2979-2981

TSAP, V. N., KOROL'CHENKO, A. Ya., SHAROVARNIKOV, A. F., IVANOV, A. V. and BOBKOV, A. S., Moscow Institute of Fine Chemical Technology

[Abstract] To determine the effects of a foam film on inflammability, a gas mixture (air-ethylene, air-isobutane or air-propane) was exposed to a foam solution. The foam was stabilized by alkyl-sulphates of sodium and high fatty alcohols. Results showed that as the liquid increased in the gaseous mixture, the range of inflammability narrowed. Apparently flegmatization occurred because of the dispersion of the burning mixture by water vapors emitted from the foam film. The addition of high fatty alcohols reduced gas breakdown in the foam by a factor of 5-6. Structural changes were related to diffusion resistance of the foam films, indicating that the films had greater heat durability and resistance to convective heat transfer. Figures 2; references 5: 3 Russian, 2 English.
[65-12131]

UDC: 541.113

THERMODYNAMIC PROPERTIES OF SODIUM PERCHLORATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 10 Sep 80) pp 3200-3203

ZALUKAYEV, V. L., GORBUNOV, V. Ye., SHARPATAYA, G. A., GAVRICHEV, K. S.
and BABAYEVA, V. P., Institute of General and Inorganic Chemistry
imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] A specimen of NaClO_4 obtained by dissolution of sodium carbonate in double distilled perchloric acid (72%) was used to measure the true heat capacity by low temperature calorimetry. The salt was twice recrystallized from water, the sodium perchlorate monohydrate was dehydrated in a vacuum at 150°C to constant mass. Chemical analysis for the perchlorate ion showed that the primary substance was at least 99.9% pure. The figures on heat capacity of sodium perchlorate are over 10% higher than those of an earlier work by Stromme obtained for the $300\text{--}680^\circ \text{K}$ interval by high temperature adiabatic calorimetry. It is possible that the difference is caused by the difference in thermal prehistory of the specimen, Figures 1; references 4: 3 Russian, 1 Western.
[70-6508]

FERTILIZERS

UDC [661.635.213+661.525+661.424.6].002.612.3:541.12.017

SUPERCOOLING OF SALT MELTS FORMED UPON HEATING OF MIXTURE OF
 $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3$ AND $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3\text{-KCl}$ SALTS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 12, Dec 81 pp 740-742

KONONOV, A. V. and MARKOV, S. V.

[Abstract] Experiments were conducted on a mixture of $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3$ and $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3\text{-KCl}$ salts to determine the temperature difference between total melting of the salt mixture upon heating and the crystallization temperature of the melt upon cooling as a function of the time during which the melt was held at elevated temperature. The supercooling temperature of systems containing $\text{NH}_4\text{H}_2\text{PO}_4$ and NH_4NO_3 as initial components was a complex function of the simultaneous effect of several factors. Supercooling the compounds results in crystallization temperature below the melting point of the eutectic in melts whose composition corresponds to that of the most widely used fertilizers. $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3$ and $\text{NH}_4\text{H}_2\text{PO}_4\text{-NH}_4\text{NO}_3\text{-KCl}$ systems were stable upon supercooling and remain stable even with vigorous mixing of the melts. Figures 4; references 7: 5 Russian, 2 Western. [87-6521]

UDC 542.936:661.635.213

DEHYDRATION OF MONOAMMONIUM PHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 12, Dec 81 pp 742-744

RILO, R. P. and KULIKOV, B. A.

[Abstract] The kinetics of dehydration of monoammoniumphosphate was studied in the temperature range of 130-250°C in an electrically heated copper thermostatted unit. The phase composition of the dehydration products and the temperature at which different condensed forms of phosphates begin to form in the unit were determined. First-order kinetic equations were derived to describe the dehydration reaction of monoammonium phosphate.

The rate constants of the dehydration reaction were calculated by a first-order reaction equation and were expressed by straight lines when plotted. The observed activation energy of 21.7 kJ/mole differs from previous values obtained by varying the concentration of condensed phosphates or the total P_2O_5 content. This difference is explained by the difference in the methods of conducting the experiments. Figures 5; references 14: 10 Russian, 1 Polish, 3 Western.
[87-6521]

UDC: 661.635

PREVENTING THICKENING OF SLURRY DURING PRODUCTION OF NITROFOSKA

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 23 Apr 80) pp 2534-2536

IVANOV, Yu. A., DMITREVSKIY, B. A., SUKMANOV, V. Ye., MUSIYENKO, L. I. and GINZBURG, N. A., Novgorod "Azot" Production Association; Leningrad Technological Institute imeni Lensovet

[Abstract] The process of production of nitrofoska by treatment of an apatite concentrate with nitric and sulfuric acids to produce a suspension of calcium sulfate crystals with subsequent neutralization with ammonia, mixing with potassium chloride and drying is described. To prevent thickening of the slurry the process of ammonization is performed with a sudden change in pH, thus avoiding relationships among components in the liquid phase facilitating crystallization of monocalcium phosphate. Calculated and experimental data are presented allowing quantitative estimation of the influence of parameters of the process of the degree of separation of monocalcium phosphate crystals into the solid phase, which can serve as a basis for development of recommendations for regulation of the thickening of ammonia-treated slurries in the production of nitrofoska. Figures 3; references 1 (Russian).
[72-6508]

ION EXCHANGE PHENOMENA

UDC 678.046.01

TRANSPORT KINETICS OF LOW MOLECULAR WEIGHT SUBSTANCES FROM LIQUID PHASE THROUGH PACKED POLYMER FILMS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IM. D. I. MENDELEYEVA in Russian Vol 26, No 6, Nov-Dec 81
(manuscript received 15 Dec 80) pp 717-719

INIKHOV, G. L., GORELENKOV, V. K., SEREBRYANYI, M. S. and
KARTASHOV, E. M.

[Abstract] An attempt was made to describe the kinetics of the transport of low molecular weight substances (LMWS) through packed polymeric films (PPF), with consideration of the adsorption of LMWS on non-permeable filler particles. A three component system was analyzed: LMWS - the polymer matrix PPF - dispersed filler, considering the relationship between the structure of polymeric materials and the content of filler and its physical-chemical properties. With a number of assumptions for the model under discussion, the following formula was derived for the system:

$$D_H = \frac{\delta^2}{6[\tau_3 - \tau \frac{k_{SH} \phi}{C_{max} (1 - \phi)}]}$$

where D_H = diffusion coefficient of LMWS through PPF

δ = thickness of the film

τ = constant characterizing duration of the adsorption process

S_H = sorption capacity of heterogenic inclusions (of the packing material)

ϕ = volume fraction of the packing agent

C_{max} = maximum concentration of LMWS in PPF.

Comparison of the calculated and experimental data showed excellent correlation. Figures 1; references 4: 2 Russian, 2 Western.
[79-7813]

OSMOTIC STABILITY OF AV-17-8 AND AMP IONITES AFTER LONG TERM OPERATION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 27 Mar 80) pp 2566-2568

VOLOKHOVSKAYA, V. N., SOKOLOV, V. V. and TOROCHESNIKOV, N. S.,
All-Union Scientific Research Institute of the Iodobromine Industry

[Abstract] To provide a quantitative estimate of the osmotic stability of ionites, an accelerated test method was utilized consisting of alternation of sorption-desorption cycles under static conditions. Four series of experiments of 10 and 20 sorption cycles each were performed. Estimates were based on the sphericity factor and the change in fractional composition. The grain sizes were determined by visual microscopy. After 20 sorption-desorption cycles AV-17-8 anionite was practically undamaged by the oxidant and desorbing solution. AMP ionite was subject to mechanical fracture. The sphericity factor decreased from 85 to 48.1% after 20 cycles. Figures 2; references 9: 8 Russian, 1 Western.
[72-6508]

CONCENTRATION PROFILES IN HETEROGENEOUS IONITE MEMBRANES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 27 Mar 80) pp 2568-2572

SMIRNOVA, N. M., GLAZKOVA, I. N., GLUKHOVA, L. P., NURZINOV, V. I.,
KOMAROVA, N. I. and KVARATSKHELI, Yu. K., All-Union Scientific Research
Institute of Chemical Technology

[Abstract] One method which can determine location of ions and their concentration in an ion exchange material is x-ray spectral local analysis with an electron probe. Using this method, concentration profiles were produced of ions of uranium and SO_4^{2-} on heterogeneous MKK-1 and MAK-2 membranes in the processes of diffusion and electrodialysis. The concentration distribution of uranium and the cationite membrane during electrodialysis is approximately linear. The curves of distribution of uranium in a strongly basic anionite membrane initially show a form typical for multiple ion systems. As the concentration gradient of the acid across the membrane decreases, the flow of uranium increases sharply and uranium ions fill the membrane phase by layers. Thus, the studies confirm that the method of x-ray spectral local analysis in combination with physical-chemical studies of the properties of ionite membranes is promising, reliable and rapid as a method of investigation of the mechanism of ion transfer in comparison to the use of multiplate devices. Figures 3; references 4 (Russian).
[72-6508]

UDC: 546.631:661.635

PRODUCTION AND INVESTIGATION OF SCANDIUM PHOSPHATE CRYSTALLOHYDRATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 5 May 80) pp 3221-3226

YESHCHENKO, L. S., DVOSKINA, R. N., PECHKOVSKIY, V. V. and STRUGACH, L. S.,
Belorussian Institute of Technology imeni S. M. Kirov

[Abstract] A study was made of the process of formation of scandium phosphate under various conditions of synthesis and the products of its dehydration were studied. Scandium orthophosphate dihydrate was obtained by interating a scandium oxide or salt with phosphoric acid, and also by crystallization of amorphous scandium phosphate. The concentration of initial phosphoric acid, pH of the medium, temperature and duration of synthesis were studied. Scandium phosphate was produced under hydrothermal conditions at 70-200°C with an $\text{Sc}_2\text{O}_3:\text{P}_2\text{O}_5$ ratio in the initial mixtures of 1.0-1.05. The oxide or salt of scandium was mixed with the phosphoric acid, placed in an autoclave and held at the required temperature for the required time. The crystalline products produced were separated from the mother liquor, washed with water and dried at 60-70°C. Under all conditions studied, scandium phosphate was produced corresponding to $\text{ScPO}_4 \cdot 2\text{H}_2\text{O}$. Electron microscope studies showed that the specimens of scandium phosphate dihydrate synthesized are well crystallized substances with large (1 to 2 micron) rectangular and trapezoidal crystals along with large quantities of small crystals of various shapes. Anhydrous scandium orthophosphate, produced by heat treatment of the crystallohydrate, is a more monolithic aggregation of crystalline particles of indefinite form at significantly smaller size (0.5-0.6 μm) in comparison to the initial product. Figures 4; references 12: 8 Russian, 4 Western.
[70-6508]

INTERACTIONS IN $\text{Rb}_2\text{O}-\text{P}_2\text{O}_5-\text{H}_2\text{O}$ SYSTEM AT 25°C

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 25 Apr 80) pp 3360-3363

GUDINITSA, E. N., FAKEYEV, A. A. and KHOMUTOVA, T. V., All-Union Scientific Research Institute of Chemical Reagents and Highly Pure Chemical Substances

[Abstract] A study was made of the influence of ammonium monophosphate and rubidium chloride on the solubility of RbH_2PO_4 . The initial substances were 88% orthophosphoric acid, highly purified rubidium carbonate and hydroxide produced by the action of water on metallic rubidium in an atmosphere of purified nitrogen. Solubility was studied in a thermostat which maintained a temperature of $25 \pm 0.1^\circ\text{C}$ in glass vessels with glycerin sealed plugs. The liquid phase and solid residue compositions were established by chemical analysis. A compound with a ratio $\text{Rb}_2\text{O}:\text{P}_2\text{O}_5 = 1:1$ crystallizes over a broad range of concentrations of P_2O_5 , 22.44 to 36.21 mass %. In the area of P_2O_5 concentrations of 39.00 to 57.34 mass %, a compound with the composition $\text{Rb}_2\text{O} \cdot 2\text{P}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$ crystallizes, the solubility of which decreases monotonically as P_2O_5 concentration increases to 52.40 mass %, then increases in the 53.94-57.34 mass % range. The compound produces needle-shaped crystals with square cross section. Figures 1; references 7: 5 Russian, 2 Western.
[70-6508]

UDC 546.799.4

HIGH TEMPERATURE CHEMISTRY OF PLUTONIUM PHOSPHATES, PART I: PLUTONIUM (IV) PHOSPHATE AND ITS BEHAVIOR IN CHLORIDE MELTS

Leningard RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 23 Dec 80) pp 872-874

SKIBA, O. V., KRYUKOVA, A. I., BURNAYEVA, A. A., KAZANTSEV, G. N., KORSHUNOV, I. A. and MOSKVICHEV, Ye. P.

[Abstract] A diphosphate of sodium and plutonium (IV) was produced by slow heating of a mixture of PuO_2 , NaH_2PO_4 and boron oxide B_2O_3 in a ratio of 1 : 3 : 10, to a temperature of 1200°C . That temperature was then maintained for 16 hours. The cooled alloy was cleaned by boiling in a 10% hydrochloric acid solution. The remaining crystalline product, was analyzed chemically and by X-ray, contained 56.7% plutonium by mass in a rhombic syngony. The structure stability and solubility of the plutonium phosphate placed in a NaCl-KCl melt at 700°C , for 6-7 hours in an inert gas atmosphere showed little change. References 4: 3 Russian, 1 Western.
[103-12131]

USE OF HIGH TEMPERATURE CHEMISTRY FOR SEPARATING GASEOUS FISSION PRODUCTS FROM IRRADIATED URANIUM

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 15 Jul 80) pp 930-932

TEPLYKH, V. F., PLATYGINA, Ye. V. and MAKAROV, A. N.

[Abstract] Thermal processing of various irradiated oxides of uranium was shown to produce greater quantities of xenon and krypton than similar processing of UO_2 . This was conditioned by the fact that in a vacuum at temperatures above $1000^\circ C$, uranium oxides lose oxygen and $UO_{2.67}$ becomes $UO_{2.56}$. This effect was observed at $1100-1150^\circ C$, but no more oxygen appeared as the temperature was increased to $1300^\circ C$. Cumulative yields of fission products came through normalizing the relative yield of one of the isotopes with that of another element of the same mass chain. Complete extraction of gaseous fission products from irradiated uranium was achieved by chemical breakdown of the crystalline structure, which occurred between components of the target under set conditions. Details of the experiment are presented. References 8: 2 Russian, 6 Western.
[103-22131]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.241

THIOPHOSPHORYLATED 3-AMINOPYRAZOLINES

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IM. D. I. MENDELEYEVA in Russian Vol 26, No 6, Nov-Dec 81
(manuscript received 24 Apr 81) pp 719-720

GRAPOV, A. F., RAZVODOVSKAYA, L. V., YERIKOVA, M. V.,
NEGREBETSKIY, V. V. and MEL'NIKOV, N. N., All-Union Scientific Research
Institute of Chemical Plant Protective Agents

[Abstract] Thiophosphorylated 3-aminopyrazolines were obtained by reacting phosphorus thioacid chlorides (I) with 3-amino- Δ^2 -pyrazoline hydrochloride (II) at room temperature. The end products could also be obtained by long time refluxing of I and II in chloroform and in presence of triethylamine. The following products were obtained (compound, yield in % and m.p. in °C indicated): 1-(diethoxythiophosphoryl)-3-amino- Δ^2 -pyrazoline, 45.8, 107.5-108.5; 1-ethoxymethoxythiophosphoryl-3-amino- Δ^2 -pyrazoline, 25.4, 97-98; 1-(ethoxymethylthiophosphoryl)-3-amino- Δ^2 -pyrazoline, 43.7, 91.5-92.5; 1-(o-chlorophenoxyethylthiophosphoryl)-3-amino- Δ^2 -pyrazoline, 21, 132-133.5; N'-(p-tolyl)-N''-[1-(diethoxythiophosphoryl)- Δ^2 -pyrazolin-3-yl]urea, 76.1, 168-169.5; and N'-(p-chlorophenyl)-N''-[1-(diethoxythiophosphoryl)- Δ^2 -pyrazolin-3-yl]urea, 73.2, 165-166. References 6; 5 Russian, 1 Western.
[79-7813]

UDC: 547.26'118

INTERACTION OF DIPHENYLPHOSPHINE AND DIPHENYLPHOSPHINIC ACID WITH AZOMETHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 12 Mar 81) pp 2407-2410

PUDOVIK, A. N., ROMANOV, G. V., KARELOV, A. A., STEPANOVA, T. Ya. and POZHIDAYEV, V. M., Institute of Organic and Physical Chemistry
imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences

[Abstract] An attempt was made to study the reaction of dialkylphosphite azomethines by means of UV spectroscopy. To determine the significance

of diphenylphosphinic acid we studied its interaction with azomethines. The kinetics of the reaction of attachment of diphenylphosphinic acid were studied under conditions similar to the kinetics of reaction of diphenylphosphine with the Schiff base. When diphenylphosphinic acid interacts with azomethines, ammonium salts are formed. The slow transfer of the proton from the diphenylphosphinic acid to the nitrogen atom of the azomethine is related to the large negative value of entropy of activation of this process. The reaction of diphenylphosphine with azomethines is catalyzed by diphenylphosphinic acid. References 10: 7 Russian, 3 Western.
[68-6508]

UDC: 547.26'118

SOME EXCHANGE REACTIONS IN SERIES OF THIO DERIVATIVES OF TRIVALENT PHOSPHORUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 15 Jan 81) pp 2410-2413

SINYASHIN, O. G., OFITSEROV, Ye. N., BATYYEVA, E. S. and PUDOVIK, A. N.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov,
Kazan' Affiliate, USSR Academy of Sciences

[Abstract] There is interest in the study of exchange reactions in the series of derivatives of trivalent phosphorus acids containing the P-S-R bond, since they can be successfully used for synthesis of various organophosphorus compounds. We began our work in this area by studying the interaction of trialkyltrithiophosphites with trivalent phosphorus halides and thiophosphoric acid chlorides with amidophosphites. In order to produce dithiophosphorous acid halides we studied the interaction of triethyltrithiophosphite with phosphorus trichloride and tribromide (II, III) in a ratio of 2:1. It could be expected that thiophosphorus acid mono and dichlorides would also easily interact with phosphoric acid amides. However, distillation of the reaction mixture produced only dimethylchlorophosphite. The chloride is apparently unstable and breaks down into a number of products during distillation, including S, S-diethylchlorophosphite. The experimental results thus confirm the ease of the exchange reaction between thiophosphorous acid chlorides and amidophosphites.
[68-6508]

NMR SPECTRAL STUDY OF C-PHOSPHORYLATED CARBAMATE STRUCTURE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 24 Nov 80) pp 2413-2417

TARASOVA, R. I., ZYKOVA, T. V., DVOYNISHNIKOVA, T. A., SALAKHUTDINOV, R. A.
and SINITSYNA, N. I., Kazan' Chemical-Technological Institute
imeni S. M. Kirov

[Abstract] Data are presented on the study of the structure of C-phosphorylated carbamates by ^1H , ^{13}C and ^{31}P NMR spectroscopy. It is found that upon transition from electron donor substituents to electron acceptor substituents there is a regular displacement of the signal of the C' atom in the area of weak fields in one of the compounds studied. It is shown that parasubstituents in the benzene ring symbatically displace the signals of the methine proton and the benzene ring carbon attached to the methine group, the influence of the substituents on the chemical shift of the phosphorus atom being opposite in nature.
[68-6508]

SYNTHESIS AND STRUCTURE OF NITROPHOSPHOLENONE OXIMES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 17 Nov 80) pp 2418-2428

BERESTOVITSKAYA, V. M., YEFREMOV, D. A., BERKOVA, G. A. and
PEREKALIN, V. V., Leningrad State Pedagogic Institute imeni A. I. Gertsen

[Abstract] Analysis of the physical and chemical characteristics of nitrophospholenone oximes leads to the conclusion that compounds of this group are formed apparently as one E isomer, have flat structure, exist preferentially in the form of associates with an intermolecular hydrogen bond. The specifics of the electron organization of this rigid polyfunctional system result from the mutual influence of the nitro-, phosphoryl, oximino groups and the multiple bonds. Nitration of 1-oxo-1-alkoxy-3-phospholenes and 1-oxo-1-alkoxy-3-methyl-3-phospholenes with nitrogen tetroxide produces a number of 1-oxo-1-alkoxy-2-oximino-4-nitro-3-phospholenes, the first representatives of nitrogen containing organophosphorus oximes. The method developed can be suggested as a preparative method for production of these substances. NMR, IR and UV spectroscopy are used to study the structure of the synthesized series of nitrophospholenone oximes. They are all stereochemically homogeneous and exist primarily in the form of associates with an intermolecular hydrogen bond. Figures 4; references 27: 23 Russian, 4 Western.
[68-6508]

REACTIVITY OF GEOMETRIC ISOMERIC 1,3-BUTYLENEPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 18 Nov 80) pp 2428-2435

NIFANT'YEV, E. Ye. and KRYUCHKOV, A. A., Moscow State Pedagogic Institute
imeni V. I. Lenin

[Abstract] The first data are presented on the study of the kinetics of the reactions of geometrically isomeric 1,3-butylenephosphites-4-methyl-2-hydro-2-oxo-1,3,2-dioxaphosphorynanes with CCl_4 , p-bromobenzaldehyde and trifluoromethyl (p-tolyl) ketone, catalyzed by triethylamine in chloroform. The isomers differ in their reactivity, which was established by measurement of the reaction kinetics. Interaction of the geometrically isomeric 1,3-butylenephosphites with electrophillic reagents preserves the configuration of the phosphorus atom, opening a path to stereodirected synthesis of complex phosphorynanes. The stereochemical result of chlorination of cyclical hydrophosphoryl compounds can be determined by the basicity of the tertiary amine used and the experimental conditions. References 16: 10 Russian, 6 Western.
[68-6508]

UDC 547.245'241+547.953.1

SYNTHESIS AND CHEMICAL PROPERTIES OF 1,2-O-ISOPROPYLIDINEGLYCERO-3-O-DI(TRIMETHYLSILYL)PHOSPHITE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 28 Jan 81) pp 2435-2441

NIFANT'YEV, E. Ye., PREDVODITELEV, D. A. and FURSENKO, I. V.,
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[Abstract] A report is presented on the first results of studies on the production of lipids such as phosphatide acids and thiophosphatide acids, as well as selenophosphatide acids. The key substance for the production of the phosphatide acids selected was 1,2-O-isopropylidineglycero-3-O-di(trimethylsilyl)phosphite, not previously described in the literature. All of the organophosphorus compounds produced are quite stable upon storage in an inert atmosphere. The selenium-containing products liberate red selenium when exposed to air. The initial product used for the synthesis of acid silylphosphite was acid phosphite obtained in the reaction of acidolysis of amidophosphite. Syntheses using derivatives of trivalent phosphate were performed in an atmosphere of dry argon. The 1,2-O-isopropylidineglycero-3-O-di(trimethylsilyl)phosphite produced is easily oxidized, sulfurized and salinized. The salilated derivatives of the corresponding acids of pentavalent phosphorus are converted by hydrolysis to isopropylidineglycero-phosphate, -thio- and selenophosphates. NMR spectroscopy with ^{31}P is used

to determine the structure of the compounds produced. References 20:
14 Russian, 6 Western.
[68-6508]

UDC: 547.26'118+541.127

INFLUENCE OF ALCOHOL SOLVENTS ON REACTIVITY OF FLUORIDE ION IN SUBSTITUTION
AT PHOSPHORYL GROUP

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 27 Jan 80) pp 2442-2445

BEL'SKIY, V. Ye., SAKULIN, G. S. and PROSTOV, Yu. P., Institute of
Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate,
USSR Academy of Sciences

[Abstract] Systematic studies of the reactivity of the fluoride ion in
proton donor medium have not been performed earlier. We studied the in-
fluence of alcohol solvents on the reaction rate between the F^- and O,S-
diethylmethylphosphonate. We also produced data on the reactivity of a
number of substrates in the reaction consisting of nucleophilic substi-
tution at the phosphoryl group, similar to alkaline hydrolysis of the sub-
strates. The results produced show that in methanol and ethanol the
reaction rate is lower, in other alcohols higher, than in water. The
reaction rate increases in accordance with the increasing pK_a . In addi-
tion to the rise in rate constant, a significant decrease in activation
energy is observed, explained by participation in the reaction of com-
plexes with the hydrogen bond formed by the fluoride ion with alcohols.
References 19: 5 Russian, 14 Western.
[68-6508]

UDC: 547.341

INTERACTION OF PHOSPHORUS PENTACHLORIDE ADDUCTS AND SATURATED AND
UNSATURATED ALCOHOL ETHERS WITH ETHYLENE OXIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 9 Feb 81) pp 2445-2447

KORMACHEV, V. V., MITRASOV, Yu. N. and KURSKIY, Yu. A., Chuvash State
University imeni I. N. Ul'yanov

[Abstract] Continuing work on studies of the reaction of pentacoordinated
phosphorus halides, the authors studied the interaction of phosphorus
pentachloride and alkylvinyl, alkylallyl, and dialkylethers, as well as
tetrahydrofuran with an equimolar quantity of ethylene oxide at 0-20°C.
 1H and ^{31}P NMR and IR spectroscopy demonstrated that the dichlorides of the

corresponding alkoxyalkenylphosphonic acids can be removed from the reaction mixture in pure form. The constants of the synthesized dichlorides agree well with the data from the literature. References 6 (Russian).
[68-6508]

UDC: 547.26'118

REACTIONS OF PHOSPHORUS-CONTAINING POLYSULFIDES: INTERACTION OF
BIS(DIALKOXYPHOSPHORYL)TRI- AND -TETRASULFIDES WITH DIAZOMETHANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 14 Jul 80) pp 2447-2449

KHASKIN, B. A., TOLMACHEVA, N. A., KOROLEVA, T. I. and NEGREBETSKIY, V. V.,
All-Union Scientific Research Institute of Chemical Substances for Plant
Protection

[Abstract] It was established earlier that the reaction of bis(dialkoxythiophosphoryl)polysulfides with diazomethane leads to products of selective substitution of the methylene group in the polysulfide chain. The authors established that analogously the reaction of bis(dialkoxyphosphoryl)-tri- and tetrasulfides with diazomethane occurs with the formation of products containing thionic sulfur at the phosphorus atom. The phenomenon of transition of the sulfide sulfur to thionic sulfur was qualitatively studied by ^{31}P NMR spectroscopy with successive addition of diazomethane to bis(dipropoxyphosphoryl)trisulfide in molar ratios of 0.5 to 7 mols of diazomethane to 1 mol of trisulfide. The thionic structure products are also formed upon interaction of bis(dialkoxyphosphoryl)tetrasulfides with diazomethane. References 3 (Russian).
[68-6508]

UDC: 547.887.3

SYNTHESIS AND CERTAIN PROPERTIES OF 1,2,3,4-TETRAHYDRO-1,2,4,5-TETRAZA-3-PHOSPHORINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 16 Mar 81) pp 2449-2456

KORNUA, P. P., BOBKOV, V. N., POLUMBRIK, O. M. and MARKOVSKIY, L. N.,
Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] To study the influence of the tetrazine ring of the phosphorus-containing group on the properties of the radicals generated in oxidation of 2,4-dimethyl-3,6-diphenyl-3-oxo-1,2,3,4-tetrahydro-1,2,4,5-tetrazo-3-phosphorine by lead dioxide, a number of tetrazaphosphorines were synthesized

and their properties were studied. Studying the condensation of di- α -methyl hydrazines of the acids of phosphorus with orthoesters in tetrazaphosphorine derivatives, the authors established that in the presence of catalytic quantities of boron trifluoride etherate it is significantly accelerated and easily occurs at room temperature, completing in 30 minutes at 80°C instead of the 8 hours previously reported. Tetrazaphosphorines have typical properties of radical leuco bases. Strong oxidizers containing active halogen atoms easily oxidize tetrazaphosphorines to free radicals which decompose rapidly in an excess of the oxidizing reagent. Homolysis of the N-H bond of tetrazaphosphorines also occurs under the influence of certain stable radicals such as tritertbutylphenoxyl. References 7: 4 Russian, 3 Western. [68-6508]

UDC: 547.26'118.07

ARYLESTERS OF N,N-BIS(2-CHLOROETHYL)-N',N'-BIS(2-METHANESULFONYLOXYETHYL)-DIAMIDOPHOSPHORIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 25 Feb 81) pp 2456-2462

TITARENKO, I. P. and PROTSENKO, L. D., Kiev Scientific Research Institute of Pharmacology and Toxicology, Ukrainian Ministry of Health

[Abstract] Considering that one promising trend in the search for antitumor preparations of alkylating type is the synthesis of substances containing several different biologically active groups, the authors synthesized compounds containing simultaneously the methane sulfonyl oxyethylamine and chloroethylamine groups, developing conditions of synthesis of the compounds mentioned in the title. The method of producing these compounds is sequential action of diethanolamine, then methane sulfonylchloride on arylesters of the acid in an organic solvent in the presence of triethylamine. Colorless fluids were produced, with the p-bromo, o-fluoro and p-fluorophenyl esters synthesized first. The intermediate arylesters and the final arylesters are thick yellowish fluids which do not evaporate in a vacuum without decomposition. The properties of the substances produced are presented in an extensive table. References 10: 9 Russian, 1 Western. [68-6508]

REACTIONS OF STERICALLY HINDERED PHOSPHINES WITH CARBON TETRAHALIDES:
P-HALOGENYLIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 6 Apr 81) pp 2466-2480

KOLOGYAZHNYI, O. I., Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] A report is presented on the reaction of carbon tetrahalides with sterically hindered phosphines, not previously studied under the conditions of this reaction. The presence of large volume substituents at the phosphorus atom has a significant influence on the reaction process and leads to qualitatively new results. The interaction of tertiary phosphines with carbon tetrachloride and carbon tetrabromide occurs quite easily in ether or pentane and leads to the formation of p-halogenylides with various substituents at the ilide carbon atom, including unsubstituted methylene and alkylidene groups. The yields are high. The study of the reaction of sterically hindered phosphines with carbon tetrabromide at low temperatures not only confirmed the reaction plan assumed by the authors, but also revealed the existence of bromophosphonium tribromomethanides, analogs of trihalogen methylorganometallic compounds not containing metal. The most stable p-halogenylides are those with acceptor substituents at the ilide carbon atom. All operations were performed in the experimental series with cautions to prevent access of moisture or the oxygen of the air. Figures 3; references 26: 7 Russian, 19 Western.
[68-6508]

UDC: 547.241+547.33

EQUILIBRIUM OF P(III)↔P(V) IN REACTION OF TRIVALENT PHOSPHORUS ACID
ESTERS WITH 1-NITRO-2-METHYL-1-PROPENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 11 May 81) pp 2626-2627

GAREYEV, R. D., LOGINOVA, G. M., BORISOVA, Ye. Ye., IL'YASOV, A. V.,
PUDOVIK, A. N. and SHERMERGORN, I. M., Kazan' Veterinary Institute
imeni N. E. Bauman; Institute of Organic and Physical Chemistry
imeni A. Ye. Arbuzov

[Abstract] A general plan is suggested for the reactions of trivalent phosphorus acid esters with conjugated nitroolefins. The general direction of the process is determined by the position of the equilibrium achieved. The interaction of Ph₂POMe (II) with methyl nitropropene (I) in ether produces 2-methoxy-2,2-diphenyl-3,3-dimethyl-5-oxo-1,5,2-oxaphosphol-4-ene

(III). It is found that III is unstable in water and when heated. Water converts it to diphenyl- α -nitromethylisopropylphosphineoxide, and at the melting point it breaks down into (I) and (II). References 2 (Russian). [68-6508]

UDC: 547.241

NEW METHOD OF DEHYDRATION OF CARBOXYLIC ACID AMIDES IN SYNTHESIS OF KETENIMIDOPHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 11 May 81) p 2628

GOLOLOBOV, Yu. G. and KRUGLIK, L. I., Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] A method of production of ketenimines was suggested, based on the use of POCl_3 with triethylamine as the dehydrating agent. The use of these reagents produces ketenimines with up to 50% yield. The method of dehydration of N-monosubstituted amides to ketenimines can be used when PCl_5 or P_2O_5 might damage amide groups sensitive to them. References 4: 2 Russian, 2 Western. [68-6508]

UDC: 547.419

C-PHOSPHORYLATION OF CARBOXYLIC ACID NITRILES WITH PHOSPHORUS TRICHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 30 Apr 81) p 2629

MALENKO, D. M. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] Dichloroacetates and methylmalonic ester react under the influence of triethylamine with phosphorus trichloride, splitting off hydrogen chloride and forming the corresponding dichlorophosphines. This article reports a similar effect for carboxylic acid nitriles. Dichloroacetonitrile or methylmalonic ester mononitrile interacts with phosphorus trichloride in the presence of triethylamine under mild conditions forming C-phosphorylated nitriles. Dichlorophosphine can also be synthesized by the interaction of phosphorus trichloride with the product of silylation of methylmalonic ester mononitrile with trimethylchlorosilane in the presence of triethylamine. References 3 (Russian). [68-6508]

DEHYDROCHLORINATION OF DICHLOROMETHYLDICHLOROPHOSPHINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 22 Apr 81) pp 2630-2631

PRISHCHENKO, A. A. and LUTSENKO, I. F., Moscow State University
imeni M. V. Lomonosov

[Abstract] It is demonstrated that dichloromethyldichlorophosphine easily enters into the reaction of dehydrochlorination with the participation of the mobile proton of the dichloromethyl group and into the reaction of nucleophilic substitution of chlorine atoms at the tricoordinated phosphorus. Dehydrochlorination of chlorophosphine by triethylamine yields 1,3-diphosphacyclobutane with high yield, apparently a product of dimerization of the intermediate trichlorophosphaethylene. Nucleophilic substitution of the chlorine atoms at the tricoordinated phosphorus in the chlorophosphine molecule easily occurs upon its interaction with such reagents as magnesium bromide etherate, isopropyl alcohol in the presence of triethylamine, diethylamine, tert-butylmagnesium chloride, forming the corresponding compounds including a dichloromethyl group. References 3 (Russian).
[68-6508]

PRODUCTION OF BIS-2-PHENOXYVINYLPHOSPHINIC ACID FROM VINYLPHENYL ETHER

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 26 May 81) pp 2632-2633

RYBKINA, V. V., ROZINOV, V. G. and SEREDKINA, S. G., Irkutsk State University imeni A. A. Zhdanov; Institute of Petrochemical and Coal Chemical Synthesis of Irkutsk State University

[Abstract] During phosphorylation of vinylphenyl ether with phosphorus pentachloride in a ratio of 4:1 in benzene with subsequent treatment, stable bis-2-phenoxyvinylphosphinic acid was produced. The phosphorane is liberated in crystalline form upon evaporation of the benzene solution. The solution in diethyl ether was poured onto ice and the mass then mixed. After evaporation of the ether the acid was obtained in the form of white crystals, mp 123°C (from ethanol). The structure was proven by NMR spectroscopy. References 2 (Russian).
[68-6508]

UDC: 547.26'118

INTERACTION OF DIETHYLCHLOROPHOSPHITE WITH MALONIC ACID DINITRILE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 18 May 81) pp 2633-2634

RYMAREVA, T. G., KHASKIN, B. A., SANDAKOV, V. B. and PROMONENKOV, V. K.,
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[Abstract] It was demonstrated for the first time that when diethylphosphite interacts with malonodinitrile in the presence of triethylamine as a hydrogen chloride acceptor, previously unknown dicyanomethylene-O,O-diethylphosphorane is formed. The reaction occurs in absolute ether at 5-10°C to the point of complete disappearance of the initial malonodinitrile and diethylchlorophosphite. References 8: 7 Russian, 1 Western.
[68-6508]

UDC: 547.56+535.34:542.91

INTRA- AND INTERMOLECULAR MIGRATION OF DIOXAPHOSPHOLANE GROUP IN
BENZAMIDINE SYSTEM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 19 May 81) pp 2634-2635

NEGREBETSKIY, V. V., BOGEL'FER, L. Ya., SINITSYA, A. D., KAL'CHENKO, V. I.
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of Sciences; All-Union Scientific Research Institute of Chemical Substances
for Plant Protection

[Abstract] It was established that the dioxaphospholane group of N¹,N²-dimethyl-N¹-2-(1,3,2-dioxaphospholanyl)benzamidinium, along with the phosphorotropic intramolecular N¹→N² migration in the ambident amidine triade migrates reversibly between the N¹→N¹ atoms of compounds (I) and the N¹, N²-dimethylbenzamidinium (II). Special experiments with the compounds purified of acid impurities shows that the addition of catalytic quantities of hydrochloride salts of benzamidinium or triethylamine has practically no influence on the process of the migrations. References 4: 2 Russian, 2 Western.
[68-6508]

MONOALKYL ESTERS OF N-PHOSPHONOMETHYLGLYCINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 9 Feb 81) pp 2635-2636

PETROV, K. A., CHAUZOV, V. A. and PASTUKHOVA, I. V.

[Abstract] It was found that P-monoalkyl esters of N-phosphonomethylglycine are easily formed by isomerization of monoalkyl esters of chloroacetamidomethylphosphonic acid (I) under the influence of aqueous solutions of bases, apparently occurring through a stage of formation of an azipyridine ring. Due to the thermal and hydrolytic lability of (I) esters, their separation in individual form is difficult, and alcohol solutions produced directly upon esterification are more convenient for use. References 2 (Western).
[68-6508]

UDC: 547.26'118+547.421.41,5

INTERACTION OF PHOSPHOROUS ACID CHLORIDES WITH DIACETALS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 10 Feb 81) pp 2637-2638

GAZIZOV, M. B., GIZATULLINA, I. Kh., RAZUMOV, A. I. and OSTANINA, L. P.,
Kazan' Institute of Chemical Technology imeni S. M. Kirov

[Abstract] It was found that 1,1,3,3-tetraethoxypropane (I) and 2-ethoxy-3-diethoxymethyltetrahydropyran (II) with the 1,3-position of acetal groups react with phosphorus trichloride (III) and ethyldichlorophosphite (IV) in relationships sufficient for substitution of all chlorine atoms by the ethoxy group, with the formation of a complex mixture of organophosphorus compounds. We therefore studied the conditions of substitution in the reactions of compounds (I) and (II) with PCl_3 in more detail. The structural difference of the acetal groups in diacetal (II) is clearly seen in their chemical behavior. Under mild conditions only the ethoxy group in the $\text{CH}(\text{OC}_2\text{H}_5)_2$ group is substituted, while exchange of the ethoxy radical bonded directly to the ring requires more severe conditions and the process is accompanied by partial elimination of hydrogen chloride.
[68-6508]

2-METHYL-3-CHLORO-1,3,5-HEXATRIENE-4-PHOSPHONIC ACID DICHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 1 Apr 81) pp 2625-2626

BREL', V. K., IONIN, B. I. and PETROV, A. A., Leningrad Technological
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[Abstract] When 3-methyl-1,2-butadienephosphonic acid dichloride interacts with halogens, 2,2,2,4-tetrahalogen-5,5-dimethyl-1,2-oxaphosphol-3-enes are produced. The authors establish that when 2-methyl-2,3,5-hexatriene-4-phosphonic acid dichloride is chlorinated, the reaction occurs analogously in the direction of cyclohalogenation with the formation of 3-ethenyl-2,2,2,4-tetrachloro-5,5-dimethyl-1,2-oxaphosphol-3-ene, dehydrochlorination of which leads to 2-methyl-3-chloro-1,3,5-hexatriene-4-phosphonic dichloride. References 6: 5 Russian, 1 Western.
[68-6508]

THERMAL TRANSFORMATION OF COMPLEXES OF RHENIUM (IV) WITH
DIPHENYLETHYLPHOSPHINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 26, No 12, Dec 81
(manuscript received 3 Feb 81) pp 3286-3289

KOTEGOV, K. V., LOVCHIKOVA, Z. A. and LOBADYUK, V. I., Leningrad Institute
of Technology imeni Lensovet

[Abstract] A study was made of the processes of solid phase thermal conversion of complexes of rhenium (IV) with diphenylethylphosphine and $[\text{Re}(\text{PEtPh}_2)_2\text{Cl}_4]$. The IR spectrum of the synthesized $[\text{Re}(\text{PEtPh}_2)_2\text{Cl}_4]$ has no absorption bands at 2410, 910 or 883 cm^{-1} as does the spectrum of $(\text{HPetPh}_2)_2[\text{ReCl}_6]$. The content of rhenium in the compounds was determined gravimetrically. The IR spectra were measured in the 400-3600 cm^{-1} range, thermal studies were performed on a derivatograph. Beginning at 230 C, intensive decomposition of the substance is observed. It is concluded that the green substance formed is a complex with coordinated phosphinate molecules with the composition $[\text{Re}(\text{OP}(\text{OEt})\text{Ph}_2)_2\text{Cl}_4]$, while the brown substance formed is a complex with coordinated molecules of phosphine oxide, of the composition $\text{Re}(\text{OP} \cdot \text{EtPh}_2)_2\text{Cl}_4$. The green substance of obtained with a yield of about 60%. It is assumed that the process of oxidation of coordinate diphenylethylphosphine probably occurs in stages according to the equation given at the end of the article. Figures 2; references 11: 7 Russian, 4 Western.
[70-6508]

PESTICIDES

UDC [547.621+547.548].03

PHYSICOCHEMICAL PROPERTIES OF 2,4-DICHLORO-4'-NITRODIPHENYL ETHER

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 12, Dec 81 p 728

VOROB'YEV, G. I., BORISOV, N. N., NOVIKOVA, G. A. and YEFIMOVA, V. L.

[Abstract] The compounds 2,4-dichlorophenol, 1,4-nitrochlorobenzene and 2,4-dichloro-4'-nitrodiphenyl ether were studied thermally and thermogravimetrically. Thermal and thermogravimetric analysis was conducted on an OD-102 derivatograph in the temperature range of 20-500°C at heating rate of 5 deg/min. Purified crystals from organic solvents if isopropanol, hexane and carbon tetrachloride were used in the experiments. The compounds proved to be thermally stable and undergo only phase changes of melting and evaporation. Calculation of the bonding energy of the molecules in the compounds indicated that there is a correlation between the bonding energy and heat of evaporation. References 8: 6 Russian, 2 Western.
[87-6521]

PHARMACOLOGY AND TOXICOLOGY

UDC 613.6 + 613.62]: 678.7

WORKING CONDITIONS AND HEALTH STATUS OF WORKERS IN BUTYL RUBBER PRODUCTION

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 1, Jan 82 (manuscript received 3 Sep 81) pp 6-9

SIMONOVA, N. I., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Ufa

[Abstract] Harmful factors of the working environment of the title production studied included chemical substances, in particular methyl chloride, as well as high noise levels and unsatisfactory microclimate. While at times methyl chloride concentrations were within maximum permissible limits, at other times it exceeded the limits by factors of 1.5, 3 and even 10. Its effects were studied on 198 persons with length of service of 1-7 years. Functional disorders of the nervous system were identified in about half the subjects, and were related to the time of service. Where methyl chloride concentrations exceeded maximum permissible limits by a factor of 10 and more, they affected those with even short job experience. Women in this group manifested acute upper respiratory inflammations. References 2 (Russian).

[106-12131]

UDC 613.632 : 546.268.1] -07.616.1-07

CHANGES IN CARDIOVASCULAR SYSTEM IN WORKERS PRODUCING TOLUYLENE DIISOCYANATE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 1, Jan 82 (manuscript received 6 Aug 81) pp 16-19

SHARONOVA, Z. V., PENKNOVICH, A. A., DOROFYEVA, Ye. D., KRYZHANOVSKAYA, N. A., MEL'NIKOVA, N. D., VOLKOVA, I. D., GOLOVA, I. A., ARZYAYEVA, Ye. Ya., KLIMOVA, E. I. and MAZE, E. N., Institute of Labor Hygiene and Occupational Diseases, Gor'kiy

[Abstract] Cardiovascular changes were examined in 240 workers involved in producing 2,4-toluylene diisocyanate (where hygienic conditions were

unsatisfactory) and in producing diisocyanates (where hygienic conditions were more satisfactory due to modernized technology). Environmental chemical concentrations in the former facilities exceeded maximum permissible limits by as much as a factor of 10. Pains in the upper left part of the chest were suffered by 18.5% of those producing 2,4-TDI, but by only 6.1% of those producing DIC. Those in badly contaminated workshops also suffered blood vessel damage of the retina, along with elevated blood pressure and ECG aberrations. Ischemic heart diseases were 1.5-2 times as common as in the general population. Higher cholesterol concentrations and some enzyme changes were also noted. It is concluded that TDI contributes to the development of cardiovascular pathology. References 6 (Russian).
[106-12131]

UDC 616.056.257-099-057

ADIPOSOGENIC ACTION OF SOME INDUSTRIAL POISONS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12, Dec 81 (manuscript received 22 Jun 81) pp 29-32

MAKAROV, I. A., MAKARENKO, K. I. and DESYATNIKOVA, N. V., Institute of Labor Hygiene and Occupational Diseases, Gor'kiy

[Abstract] The effects of vinylchloride and methylmethacrylate were studied in terms of their action on the nervous system of about 700 subjects each, with work service of 9.5 to 12 years in the chemical industry or in machinebuilding. Hormones involved in fatty acid metabolism, including insulin, prolactin and the somatotrophic hormone were measured in blood serum. Vinylchloride was found to promote increased fat storage in both men and women, while methyl methacrylate has this effect only in women. The chemicals caused in part reduced motor activity in the subjects, which was related to metabolic arthrosis and encephalopathia. Hormone imbalances occurred as insulin and prolactin production increased, but STH secretion was suppressed. Vinyl chloride had a more pronounced effect on hormones than did methyl methacrylate. References 21: 16 Russian, 5 English.
[112-12131]

METHOD FOR PREDICTING COURSE OF PATHOLOGICAL PROCESS AND VALIDATING THERAPEUTIC PRIORITIES IN ORGANOPHOSPHORUS INSECTICIDE POISONING

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12, Dec 81 (manuscript received 11 Mar 81) pp 32-25

LUZHNIKOV, Ye. A., DAGAYEV, V. N., GORIN, E. E., SADOVNIKOVA, L. D., BURLAKOV, I. A. and LESHUKOV, S. V., Scientific Research Institute for First Aid imeni N. V. Sklifosovskiy, Moscow

[Abstract] Two approaches were used in seeking to predict the course of organophosphorus poisoning. One involved selecting correct input for computer analysis, while the other sought to make predictions on the basis of original prognostic tables by seeking clinical precedents. The computer analysis was based on the course of poisoning in 117 subjects with 2nd and 3rd degree poisoning. Observations for these subjects included both typical cases and optimal monitoring of extreme situations. The highest accuracy using this method came for patients who recovered. Leading signs of poisoning and its course were used in the prognostic tables approach, including arterial hypertension, bronchoria, bradycardia and pulmonary paralysis. The latter system was effective and practical for determining the course of poisoning and selecting treatment, and later rehabilitation measures. References 6: 5 Russian, 1 English. [112-12131]

UDC 613.632.4 ; 546.183]: 613.155.3

DETERMINING MAXIMUM PERMISSIBLE LEVELS OF 3(2-ETHYLHEXYL)PHOSPHITE IN AIR OF WORKING ZONE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12, Dec 81 (manuscript received 4 Feb 81) pp 51-52

BARANOV, V. I. and BOL'SHAKOV, A. M., Central Institute for Advanced Training of Physicians; First Moscow Medical Institute imeni I. M. Sechenov

[Abstract] Toxicity of 3(2-ethylhexyl)phosphite in acute, semiacute and chronic poisoning levels was determined by administering controlled, air-borne doses to white mice, rats and rabbits, and measuring the effects on the central and peripheral nervous systems. The inhalant level for an acute dose was set at 36mg/cubic meter. Other tests showed the chemical to be a skin irritant and resorptive with a cumulative effect. Ingestion at a rate of 250 mg/kg of body weight brought reduction of erythrocyte peroxidation resistance. Internal organs, including the lungs, liver and spleen, suffered plethora. Study of a sub-chronic toxicity method showed a cumulative effect bringing on these maladies. The recommended maximum permissible level for the chemical is 1 mg/cubic meter of air. References 3 (Russian). [112-12131]

DETERMINING TIME OF DEATH FOR ANIMALS IN EVALUATING TOXICITY OF
COMBUSTION PRODUCTS OF MATERIALS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12,
Dec 81 (manuscript received 29 May 81) pp 57-58

ILICHKIN, V. S. and YANENKO, M. V., Leningrad Branch, All-Union Scientific
Research Institute for Fire Fighting

[Abstract] To improve on visual methods for determining the moment of death, a sensor was attached to the chest of experimental animal held in cages without immobilization while exposed to poisoning by products of thermo-oxidative destruction and combustion materials. Resistance changes in the sensor are registered on a paper tape until breathing motions stop. Results of toxicity test for burning cellulose and polyvinylchloride used in making linoleum, with white mice as the test subjects, are presented to demonstrate the accuracy of determining time of death with the device. References 4 (Russian).
[112-12131]

INFLUENCE OF ALKALI METAL SALTS ON AUTOOXIDATION OF HUMAN OXYHEMOGLOBIN,
PART I: AUTOOXIDATION OF OXYHEMOGLOBIN AT pH 4.0

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 17 Sep 80) pp 2612-2618

MYSHKIN, A. Ye. and CHUDINOVA, G. K., Institute of Chemical Physics,
USSR Academy of Sciences

[Abstract] A study is presented of the influence of alkali metal salts on the rate of autooxidation of human oxyhemoglobin in an acid medium at pH 4.0 on the assumption that the rate of autooxidation reflects changes in the structure of the hemoglobin and is a measure of its denaturation--reversible or irreversible. The kinetics of autooxidation of HbO_2 were measured by spectrophotometric methods at 39-40°C. The influence of salt anions on the rate of autooxidation in 0.1 N sodium acetate buffer basically corresponds to the lyotropic Hoffmeister series, the sequence of salts ordered according to their dissociative effect on hemoglobin. The influence of chlorides of various alkali metals on the rate of autooxidation of oxyhemoglobin varies. Potassium has the greatest effect, cesium the least. The curves of the reaction rate as a function of chloride concentration has three characteristic sections within the 0 to 0.4 mol/l range. Figures 3; references 10: 2 Russian, 8 Western.
[68-6508]

INFLUENCE OF ALKALI METAL SALTS ON AUTOOXIDATION OF HUMAN OXYHEMOGLOBIN,
PART II: INFLUENCE OF ALKALI METAL CHLORIDES IN ACID MEDIUM (ACETATE
BUFFER)

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 11, Nov 81
(manuscript received 1 Dec 80) pp 2618-2624

MYSHKIN, A. Ye. and CHUDINOVA, G. K., Institute of Chemical Physics,
USSR Academy of Sciences

[Abstract] Variations in the effect of various alkali metal cations on the rate of human oxyhemoglobin autooxidation in a sodium-acetate buffer at pH 4.0 are studied for other pH values in the acid area. As earlier, a 0.1 N sodium acetate buffer is used, kinetic measurements are performed spectrophotometrically at 39.2°C. In the previous report it was established that anions of sodium salts form a series in terms of their accelerating effect on oxyhemoglobin autooxidation at pH 4.0 which corresponds closely to the series of anions in terms of their dissociation effect for HBO_2 . The variation in autooxidation rate constant as a function of pH in the pH interval 4.3 to 5.6 without salts is strictly exponential. With salts their differences vary for the different cations at pH 4.3, 4.5, 5.0 and 5.6. For all chlorides the salt effects increase with decreasing pH from 5.6 to 4.0, with the slope greater below pH 4.5. References 6: 1 Russian, 5 Western.
[68-6508]

UDC 677.494

SOLUBILITY OF BENZIMIDAZOL-CONTAINING POLYAMIDES IN AMIDE SOLVENT-ORGANIC AMINE SYSTEM

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 81
(manuscript received 21 Jul 80) pp 23-24

AREF'YEV, N. M., CHEREYSKIY, Z. Yu. and VOGMAN, S. D.

[Abstract] The solubility of polyamide containing benzimidazol groups in mixtures of amide solvent such as dimethylacetamide and strong-base organic amines such as pyridine, triethylamine and n-phenylenediamine was investigated to determine whether strong organic bases capable of solvating NH groups of the imidazol cycle are good solvents of heteroaromatic polyamides. The dissolving capability of the solvents was evaluated by using a set of beakers with plugs on microsections filled with the fluids to be investigated. The dissolving capability of the solvents increased from diethylacetamide to dimethylacetamide + 4 percent lithium chloride. Moisture has a significant effect on the kinetics of dissolving with unsaturated fibers and causes a sevenfold increase in the length of dissolving. Water forms hydrogen bonds with the polymer and competes with the amines in dissolving. Figures 1; references 7: 4 Russian, 3 Western.
[86-6521]

UDC 541.15:541.64:678.743

RADIATION GRAFTING OF VINYL FLUORIDE TO POLYACRYLONITRILE FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 81
(manuscript received 11 Dec 80) pp 25-26

ASAMOV, M. K., ZIYAYEV, A. L., YUL'CHIBAYEV, A. A. and USMANOV, Kh. U.

[Abstract] Radiation grafting of vinyl fluoride in the presence of the vapors of some organic fluids to polyacrylonitrile fibers was investigated to increase the resistance of the fibers to heat, light and alkalis and to

improve dyeability. Among the vapors used, chloroform has a clear sensitizing effect on grafting vinyl fluoride to polyacrylonitrile fibers. The polyacrylonitrile fibers that contain fluorine have less shrinkage at 348 K in distilled water than the initial fiber. The bursting temperature of fibers is increased with an increase of the polyvinyl fluoride content in the grafted copolymer. Figures 2; references 2: 1 Russian, 1 Western. [86-6521]

UDC 541.64:547.79

COPOLYMERS AND MODIFIED DIENIC POLYMERS VIA REACTIONS OF TRIAZOLINEDIONES WITH ALKENES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 23, No 11, Nov 81 (manuscript received 23 Dec 80) pp 2387-2419

BUTLER, G. B., Center for Macromolecular Chemistry, University of Florida, Gainesville

[Abstract] The results are given of a great number of studies of triazolinediones, which are exceptionally strong electron acceptors and are among the most powerful enophiles known. The term "enophile" characterizes the reactivity of triazolinediones with respect to isolated C=C bonds. 4-Phenyl-1,2,4-triazoline-3,5-dione is both an exceptionally reactive dieno-ophile and enophile. Its reactivity in the Diels-Alder reaction with 2-chlorobutadiene is 1000-fold greater than tetracyanoethylene and 2000-fold greater than maleic anhydride. 4-Methyl-1,2,4-triazoline-3,5-dione is at least 30,000-fold more reactive with respect to cyclohexene than is ethylazodicarboxylate. Many reactions of these electron-acceptor molecules are concluded in a few seconds in the temperature range from 0 °C to room temperature. Discussed in detail are reactions of triazolinediones with vinyl ethers and esters, styrenes, beta-diketones and allyl silanes. These reactions yield novel copolymers. Emphasis is placed on the use of triazolinediones as low-temperature modifiers for dienic polymers and on their effects on polymer properties. The number of diene units taking part in a reaction is proportional to the triazolinedione ratio. The success of the modification process and the properties of the end product depend basically on the temperature conditions for performing modification, the flexibility of the chain, the degree of modification achievable, and the specificity of the reaction. Polymer properties achievable by using triazolinediones as modifiers vary over a great range from thermoplastic elasticity at low conversion to rigidity of amorphous polymers with high softening points at high conversion. The expected correlation between the degree of conversion and the softening point was observed in the polymers produced. Modified polymers generally have higher glass transition temperatures and are more polar than the parent polymers and consequently dissolve in polar solvents and they contain a moderately acidic proton and can form salts. At room temperature bis-triazolinediones cause the formation

of crosslinks. A proof is given of intra- and intermolecular association in polymers modified by phenyl triazolinedione and methyl triazolinedione, utilizing the data of infrared spectroscopy, NMR spectroscopy, viscosity measurements, gel permeation chromatography and differential-scanning calorimetry. Studies were made of tensile strength and strain properties. The results of a study of the behavior of modified polymers under tensile stress indicate in particular the considerable influence of urazene groups on the properties of a polymer in the case of poly-(1,2-butadiene). With a degree of modification of 5 percent elongation-to-break values, Young's modulus and tensile strength are twice those of the parent polymers with tensile recoveries of greater than 90 percent. Data are given on the maximum degree of modification of polymers with which their solubility in various solvents is preserved and with which polymers do not lose their thermoplasticity properties. Also discussed are the biological activity of polymers modified by means of triazolinediones and the antiviral activity of polyurazenes. References 42 (Western).
[90-8831]

UDC 541.68

BETA-PHENYLHYDRAZIDE OF CYCLOHEXANECARBOXYLIC ACID AS EFFECTIVE LIGHT STABILIZER OF POLYETHYLENE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 2, 1981
pp 78-81

DZHAFAROV, A. S., DZHALILOV, T. N., GASANOV, T. A. and GANIYEVA, M. F.,
All-Union Scientific Research Institute for Olefins, Azerbaijan Polytechnical Institute imeni Ch. Il'drym

[Abstract] The title compound was synthesized and its light-stabilizing effects on polyethylene were studied by applying the crystals obtained to high-density polyethylene using a rolling process with the rollers at 150° C for 10 minutes. Comparison with standard stabilizers showed that the beta-phenylhydrazide did not change the properties of the polyethylene substantially, but it had superior dielectric qualities. While the control, untreated polyethylene broke down completely after 200 hours of ultraviolet light exposure, the experimental, coated polyethylene held up as well as specimens stabilized with commercial light stabilizers. Figures 3; references 2 (Russian).
[63-12131]

INFLUENCE OF AROMATIC HYDROCARBONS ON CATALYTIC DEPOLYMERIZATION OF POLYISOBUTYLENE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 23, No 12, Dec 81
(manuscript received 3 Jun 80) pp 2652-2656

SANGALOV, Yu. A., YASMAN, Yu. B., KHUDAYBERDINA, Z. I. and MINSKER, K. S.,
Institute of Chemistry, Belorussian Affiliate, USSR Academy of Sciences

[Abstract] A study is made of the catalytic destruction of polyisobutylene (PIB) over a broad range of temperatures in the presence of certain methylbenzenes in order to explain the role of aromatic hydrocarbons in this process. AlCl_3 and its complexes are active catalysts of PIB destruction at 373-673 K. The main products of thermocatalytic destruction of PIB without a solvent present are isobutylene and its dimers and trimers. When toluene is present, the content of IB and low-molecular-weight PIB in the reaction products drops greatly and the degree of saturation of IB tetraheptamers increases. The participation of carbocations in the conversion of PIB is confirmed. The activating role of the aromatic hydrocarbon in decreasing the limiting temperature of the process of catalytic destruction of PIB consists of strengthening of β decomposition of PIB macrocations in the reaction of conjugate alkylation of PIB and bonding of IB in the reaction of direct alkylation. Figures 1; references 8: 7 Russian, 1 Western. [71-6508]

SYNTHESIS AND STUDY OF INHOMOGENEOUS POLYPROPYLENE CONTAINING DEUTERATED LINKS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 23, No 12, Dec 81
(manuscript received 18 Aug 80) pp 2788-2791

KORSHAK, V. V., KOZYREVA, N. M., SKUBINA, S. B., D'YACHKOVSKIY, F. S.,
TSVETKOVA, V. I. and NEDOREZOVA, P. M., Moscow Institute of Chemical
Technology imeni D. I. Mendeleev; Institute of Chemical Physics,
USSR Academy of Sciences

[Abstract] Results are presented from a study of the influence of anomalous links resulting from the presence of an isotope of deuterium on the physical, chemical and mechanical properties of PP. Propylene and deuteriopropylene homopolymers and copolymers were formed in the presence of a heterogeneous catalytic system $\text{Al}(\text{C}_2\text{H}_5)_2\text{Cl}-\text{TiCl}_3$ in a molar ratio $\text{Al}:\text{Ti}=2.5:1$. The studies were performed using isotectic fractions of the polymers obtained by extraction of the specimens in boiling normal heptane in an atmosphere of argon. Radiothermoluminescence was used to study the structural conversions in the PP. In all the specimens studied no significant differences were

found either in the vitrification points or in the overall intensity of radiothermoluminescence, nor in the form of the luminescence curve, which is approximately the same as for state standard grades of commercial unstabilized polypropylene. The relaxation characteristics of the polymers and their radiothermoluminescence thus depend little on the degree of deuteration of the macromolecules. The presence of the deuterated links in the PP does change the chemical behavior, mechanical properties and such characteristics as density, melting point, texture and decomposition, however. Figures 4; references 9: 8 Russian, 1 Western.
[71-6508]

UDC 541.15

EFFECTS OF ALPHA- AND GAMMA-RADIATION ON DECOMPOSITION OF TRIBUTYLPHOSPHATE, AND DISTRIBUTION COEFFICIENTS OF Pu^{4+} and Zr^{4+}

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 23 Jul 80) pp 825-831

KULIKOV, I. A., KERMANOVA, N. V., SOSNOVSKIY, O. A., SHESTERIKOV, N. N.
and VLADIMIROVA, M. V.

[Abstract] The effect of alpha- and gamma-radiation (from Pu^{4+} and Zr^{4+} -containing nuclear fuel) on tributylphosphate (TBP), dissolved in a hydrocarbon diluent, used to extract the spent fuel, is the subject of this report. Results are presented for the effects of the alpha- and gamma-radiation on a 30% tributylphosphate solution in paraffin, and the distribution coefficients of Pu^{4+} and Zr^{4+} in that system. Paper chromatography was used to analyze the composition of the initial tributylphosphate and the accumulation of radiolysis-products containing phosphorus. Nitration and oxidation products of the organic phase were determined by infra-red spectrometry. The gas phase yielded 95-98% molecular hydrogen and gaseous methane and ethane. With the proportions used in the test series, the effects of the alpha- and gamma-radiation were practically the same. With increased concentrations, the products of TBP decomposition were traced to acceptors of intermediate radicals, molecular oxygen and NO_2 . Products of nitration and carboxylation were related to decomposition of the extracting agent. Pu^{4+} was shown to increase with the alpha-radiation level. If a paraffin diluent is used that has a lesser content of aromatic hydrocarbons, there is little increase in Pu^{4+} , but Zr^{4+} increases by 40-50 times. Figures 2; references 11; 8 Russian, 1 Polish, 2 Western. [103-12131]

CHEMILUMINESCENCE OF URANYL SOLUTIONS CONTAINING XeO_3 DURING RADIOLYSIS

Leningrad RADIOKHIMIYA in Russian Vol 23, No 6, Nov-Dec 81
(manuscript received 27 Jan 81) pp 889-895

LOTNIK, S. V., PARSHIN, G. S., KLIMOV, V. D. and KAZAKOV, V. P.

[Abstract] To test the hypothesis that the high sensitivity of a chemiluminescent reaction would make it possible to discover concentrations of U^{4+} of less than 10^{-9} mol/liter, H_2SO_4 was distilled until no ultra-violet absorption was present. Uranyl solutions were prepared from UO_3 . Solutions of XeO_3 were obtained by dissolving sodium perxenate in 0.2 mol/liter of the H_2SO_4 . Examination of the products obtained showed that increasing illumination intensity in the presence of UO_2^{2+} ions during radiolysis was related to increasing concentrations of UO_2^{2+} and U^{4+} in the process of forming U(VI) with molecular hydrogen. Up to 50% of the forms of uranium obtained in radiolysis could be attributed to molecular hydrogen which reduced the uranyl ions. The illumination mechanism in mixing irradiated XeO_3 solutions and uranyl solutions was determined to be basically the same found during the reaction of the irradiated acid with non-irradiated uranyl solutions: H_2 formed in radiolysis reduces U(VI) , then low-valent forms of uranium react with XeO_3 . Xenon trioxide also reacted with stable products of radiolysis such as H_2O_2 and H_2 . Figures 4; references 22: 13 Russian, 9 English.
[103-12131]

RUBBER AND ELASTOMERS

UDC [661.7:547.654.1]:678.048.21

PRODUCTION OF NEOZONE D

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 12, Dec 81 pp 726-727

SHEYN, S. M. RUSOV, V. P., SOKOLENKO, V. I. and KHMELINSKAYA, A. D.

[Abstract] A method was investigated for producing neozone D from the sodium salt of 2-naphthalenesulfoxy acids and aniline. The reaction was conducted in the presence of metallic sodium or hydroxides and salts of alkali metals. The temperature range for conducting the investigations was determined by the thermal stability of neozone D. The kinetic principles of the process of producing neozone D were studied in the range of 190-290°C. The duration of the process was reduced significantly with an increase of temperature. The ratio of neozone D and 2-naphthol produced can be regulated over a wide range by varying the reaction temperature. The optimum temperature for production of neozone D is in the range of 230-270°C and the optimum temperature for production of 2-naphthol is in the range of 290-310°C. The total yield of products comprises 97-98 percent for the sodium salt of 2-naphthalenesulfoxylic acid. Figures 3; references 6 (Russian).
[87-6521]

UDC 678.03:678.044.7

INVESTIGATION OF HYDROGEN XANTHANATE AS ACTIVATOR OF VULCANIZATION PROCESS FOR GENERAL-PURPOSE RUBBERS

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 6, Nov-Dec 81
(manuscript received 15 Jun 81) pp 14-16

SHPAKUNOVA, N. A., PODNEBESNYY, A. P., BLOKH, G. A. and CHUYKOV, V. S.,
DKhTI

[Abstract] The use of hydrogen xanthanate as a vulcanizing agent of rubber mixtures based on chloroprene rubbers and the use of thiocarbamide as the activator of sulfur vulcanization accelerators was investigated. The

activating effect of hydrogen xanthanate was studied in a liming mixture based on a combination of polyisoprene and butadienestyrene rubbers. A series of equations was derived to describe the optimization parameters and that describe the dependence of the physicochemical properties of the vulcanizing agents on the composition of the activating group. The combined contour curves of the dependence of the physicochemical properties of hydrogen xanthanate on the content of zinc oxide and hydrogen xanthanate were plotted by graphical solution of regression equations. The optimum value is within the range of 2.0-2.4 parts by weight of zinc oxide and 0.4-0.6 part by weight of hydrogen xanthanate. Figures 2; references 4 (Russian). [89-6521]

UDC 678.01;539.2;678.762.3

INVESTIGATING MOLECULAR STRUCTURE OF SKI-3 RUBBER OF FIRST AND SECOND GENERATIONS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 16 Oct 80) pp 8-10

GRECHANOVSKIY, V. A., DMITRIYEVA, I. P., PISKAREVA, Ye. P. and
PODDUBNYY, I. Ya., All-Union Scientific Research Institute of Synthetic
Rubber imeni S. V. Lebedev

[Abstract] The basic differences in the molecular structure of cis-polyisoprene of first and second generations were considered for SKI-3 brand rubber. The cross-linked structures were determined in this type of rubber by studying the solubility under static conditions and by the preparative ultracentrifuging method. Data obtained by both methods and by the analytical ultracentrifuging method were compared to resolve the ambiguity related to incomplete separation of the microgel particles and macromolecules. The average molecular mass is greater in second generation rubber and the content of cross-linked structure is less than in first generation rubber. The molecular masses calculated on the basis of measurements in hexane are higher than those calculated on the basis of measurements in toluene. Figures 1; references 11: 9 Russian, 2 Western. [54-6521]

PROPERTIES OF SOOT- AND OIL-FILLED SKD RUBBER PRODUCED ON BASIS OF HIGH-MOLECULAR POLYMER

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 5 Feb 80) pp 10-12

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Scientific Research Institute of the Tire Industry; Voronezh Synthetic
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[Abstract] The possibility of preparing mixtures and rubber on the basis of high-molecular SKD polymer filled with commercial charcoal and oil in the stage of solution was considered to improve the production properties of the mixtures and the operational properties of the rubber. High-molecular SKD rubbers were synthesized in the presence of an industrial catalytic system of mixed titanium halogenide + triisobutylaluminum. The use of high-molecular butadiene rubber filled with a large quantity of commercial charcoal and oil during manufacture permits an improvement in the physical properties of these rubbers. The rubbers have a high friction coefficient due to resinous acids in the rubber formed by using surfactants. Vulcanizates of soot- and oil-filled rubber have increased tensile strength, wear resistance and fatigue properties.
[54-6521]

PROPERTIES OF COLD-RESISTANT ACRYLATE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 25 Feb 81) pp 12-14

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imeni S. V. Lebedev

[Abstract] The properties of more cold-resistant copolymers of heptyl-, amyl-, butyl- and ethylacrylates with ethoxyethylacrylate and a third monomer with functional group were studied to determine their minimum elasticity and strength. The cold resistance of rubbers is improved with significant deterioration of strength and oil and gasoline resistance if the number of carbon atoms in the alkylacrylate chain in copolymers of alkylacrylates and ethoxyethylacrylate is increased. The elasticity of the copolymers is not affected by changing the ratio of butylacrylate and ethoxyethylacrylate copolymers, while the strength characteristics of the rubbers deteriorate and their oil and gasoline resistance increases. Strength characteristics can be improved by converting from emulsion to alternate polymerization. Figures 4; references 8: 4 Russian, 4 Western.
[54-6521]

EFFECT OF TYPE AND CONCENTRATION OF FILLER AND MIXING CONDITIONS ON RHEOLOGICAL PROPERTIES OF RUBBER MIXTURES

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 20 Apr 81) pp 14-18

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[Abstract] The structural-dispersion parameters of primary aggregates of commercial carbon and the hydrodynamic approach to describing the rheological properties of dispersed systems were investigated to determine the type and concentration of filler and mixing conditions on the rheological properties. An equation was derived that links the viscosity of binary mixtures of rubber and filler to the degree of agglomeration of primary aggregates of commercial carbon in the rubber mixtures. The degree of agglomeration of filler aggregates in the rubber mixtures increases from 1.5 to 4 as the activity of commercial carbon increases. The equations can be used to calculate the parameters of filled rubber mixtures such as the specific surface of commercial carbon accessible to the macromolecules of the elastomer and the specific activity of commercial carbon determined by the content of rubber bound by the commercial carbon with a specific degree of agglomeration. Figures 5; references 16; 5 Russian, 11 Western. [54-6521]

INVESTIGATING EFFECT OF ALKYLPHENOLAMINE OLIGOMER ON PROPERTIES OF MIXTURES AND RUBBERS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 3 Dec 80) pp 29-32

GANCHUKOVA, K. P., IVOLIN, V. V., KOSTYUCHENKO, V. M. and
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[Abstract] The process of vulcanization in the presence of alkylphenolamine oligomer Octofofor SN, produced by condensation of alkylphenol disulfides and hexamethylinetetramine by comparatively simple scheme, was investigated to determine the effect of the oligomer on the properties of mixtures and rubbers. Rubbers that are considerably superior in dynamic durability and wear resistance at elevated temperatures and thermal oxidation strength of rubber with Octofofor 10S were produced by using the alkylphenolamine oligomer as the vulcanizing agent together with khloksil. The resistance of the rubber mixtures to subvulcanization is enhanced when Octofofor SN is used together with diperoxide (diisopropylxanthogen disulfide) and N,N'-dithiodimorpholine. The high technical properties of the rubbers are achieved only

with joint use of the organic disulfides and alkylphenolamine oligomer. Figures 4; references 11 (Russian). [54-6521]

UDC 678.4.019.252.678.4.06:62-762

SHRINKAGE DURING VULCANIZATION OF FABRIC-REINFORCED RUBBER GASKETS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 6 Jan 81) pp 38-40

ORLOV, Z. D., SEMENOK, Ye. I., LOMAKINA, T. V. and TOKMANTSEVA, L. F.,
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[Abstract] The effect of the degree of reinforcement of rubber gaskets with rubber-fabric material on shrinkage was investigated during vulcanization of gaskets of the packing and cuff type. Packing with cross-section of 12 X 12.5 mm and inner diameter of 65 mm and also V-shaped cuffs with inner diameter of 65 mm were used as the subject of investigation. The shrinkage of reinforced gaskets depends on the ratio of the mass of rubber and rubber-fabric materials and their structural arrangement. Introduction of a single corner rubber-fabric element into the packing results in a sharp reduction of shrinkage through diameters D_0 and d_0 and increase of shrinkage through diameters D and d . If two rubber-fabric components or a single component along the entire height of the packing is introduced, the rubber essentially does not shrink. Figures 3; references 4 (Russian). [54-6521]

UDC 678.06:621-762:620.165.29

SEALING COMPOSITE BASED ON OLIGODIENEDIISOCYANATE FOR SEALING BATTERIES

Moscow KAUCHUK I REZINA in Russian No 11, Nov 81
(manuscript received 23 Apr 79) pp 40-41

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[Abstract] A composite material based on oligodienediisocyanate that has satisfactory physicomechanical and adhesion properties and acid-alkali resistance was developed as a sealer material for storage batteries. The composite was produced by interaction of butadiene and isoprene copolymer containing hydroxyl groups and toluene diisocyanate for FP-65 prepolymer. ED-20 and dimethylbenzylamine were used as the trimerization reaction catalysts. The sealing effect of the composite material based on oligodienediisocyanate is caused by formation of a donor-acceptor chemical bond

between the isocyanate and epoxide groups of the polymer and the hydroxyl groups of NiOH of the polarized surface to be sealed. Figures 3; references 7 (Russian).
[54-6521]

UDC 678.7:66.081

STUDY OF EFFECTIVENESS OF BUTADIENE RUBBER STABILIZERS USING METHODS OF DIFFERENTIAL-THERMAL AND THERMOGRAVIMETRIC ANALYSES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 24, No 11, Nov 81
(manuscript received 12 May 80) pp 1422-1425

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[Abstract] The goal of the present study was to compare various thermal and light stabilizers of synthetic rubber by comparison of data from differential-thermal (DT) and thermogravimetric (TG) analyses. The stabilizers were added to toluene solutions of the rubber sample being analyzed, placed in platinum containers and set to evaporate. The optimum thickness of 30 mg test samples was 22 μ m. It was established that addition of stabilizers resulted in a shift of the DT and TG peaks towards higher temperatures--a result of the inhibition of the oxidation process. Along with inhibition of the oxidation, increase in rubber mass was noted to be smaller in samples containing the stabilizer. The best stabilizer was the "4010" stabilizer, the worst--Tinuvin 326. In general, stabilizers based on aromatic amines appeared to be superior to all other agents. Figures 1; references 3: 2 Russian, 1 Western.
[80-7813]

UDC 678.021.17;678.762.2

PACKING CHARACTERISTICS OF RUBBERS BASED ON HIGH MOLECULAR WEIGHT CIS-POLYBUTADIENE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 24, No 11, Nov 81
(manuscript received 22 May 80) pp 1432-1436

BABYUK, D. N., POLYAK, M. A., KOSTRYKINA, G. I. and ZAKHAROV, N. D., Chair of Chemistry and Technology of Elastomer Processing, Yaroslav' Polytechnic Institute

[Abstract] Past studies had shown that packing polybutadiene rubbers with industrial carbon and plasticizers led to improved properties, increased

friction coefficient towards wet surfaces, longer performance of the finished products and less costly products. Also, higher molecular weight of rubbers increased their breaking and tearing strength. Laboratory tests carried out on a series of rubber compositions vulcanized at 143°C showed that with higher molecular weight and increased content of industrial carbon in the rubber its stickiness increased, while its pliability diminished. The best set of properties was achieved with less active, poorly structuralized technical carbon. It was concluded that the material PM-120 should not be used for packing high molecular weight SKD rubbers, because the increased stickiness made the processing of such materials much more difficult. Figures 2; references 6 (Russian).
[80-7813]

UDC 541.64;539.3:537.226

INFLUENCE OF STRAIN ON DIELECTRIC RELAXATION IN FILLED RUBBER

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 23, No 11,
Nov 81 (manuscript received 9 Apr 80) pp 2449-2453

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[Abstract] Some results are given of a study of the influence of tensile strain on molecular mobility in the surface layers of rubber filled with Aerosil and the results are compared with data for unfilled samples. The dielectric relaxation method was used to study molecular mobility. An RT-9701 alternating-current bridge was used to make measurements in the frequency range of 0.100 to 200 kHz at temperatures from 20 to -150 °C. Standard methyl styrene rubber containing two parts by weight of sulfur in addition to stabilizers and accelerators was vulcanized at 155 °C for 50 min and stress was applied by means of weights for 24 h. A study was then made of relaxation processes. The filled samples contained 10 percent by weight of unmodified Aerosil. The samples were vacuum treated at 1.33 N/m² in a graduated flask for 3 h before the measurements were made. The results obtained indicate that tensile strain results in an increase in the rigidity of sections of chains between points of the net and reduces the looseness of packing of macromolecules both in the body and in the surface layers of filled polymers. In filled rubber the rigidity of chains is increased on account of the presence of a hard surface; the mobility of segments of macromolecules is reduced with an increase in the load on them. Above a certain critical value of the stress the polymer's macromolecules are not in a state to change their conformational collection, resulting in the partial breaking of chemical bonds at low loads and in total failure of the polymer when these loads are increased. The change in molecular mobility resulting from tensile strain occurs also on account of the change in the system's conformational state. Figures 5; references 7 (Russian).
[90-8831]

MATHEMATICAL MODELING OF DEHYDROGENIZATION PROCESS IN ISOAMYLENES IN PRESENCE OF OXYGEN ON CALCIUM-NICKEL-PHOSPHATE CATALYST IN ADIABATIC REACTOR

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 2, 1981 pp 3-8

ALIYEV, V. S., KASIMOV, A. A., TER-SARKISOV, B. G., DZHAFAROV, R. P.,
ALIYEV, F. V. and ABILOV, A. G., Institute of Petrochemical Processes,
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[Abstract] A mathematical model is constructed of the kinetics involved in preparation of isoprene by dehydrogenation of isoamylene--in an adiabatic reactor--in presence of oxygen. The calcium-nickel-phosphate catalyst was worm-shaped, 3 x 4 mm particles, with specific surface during contact of 15 m²/g. Isoamylene (C₅H₁₀) and steam were reacted, in oxygen, at temperatures of 570, 580, 590 and 600°C; molar ratio of C₅H₁₀ to H₂O was 1:20; concentration of oxygen, under the experimental conditions, did not affect rate of conversion. Taken into consideration in construction of the model were material and heat exchanges under hydrodynamic conditions. Equations are derived for conversion of C₅H₁₀, formations of isoprene, CO₂, H₂O, H₂ and C₁-C₄ and expenditure of oxygen. Parameters (calculated) of the dehydrogenation process are tabulated. Figures 3; references 3 (Russian). [63-12131]

WATER TREATMENT

UDC 628.543.1:677.563.042.2

REMOVAL OF SURFACTANTS FROM NEUTRAL WASTE WATERS OF VISCOSE PRODUCTION

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 81
(manuscript received 21 Oct 80) pp 49-50

LYUBOVA, T. A., VASINA, T. V., TOKAREVA, L. G., SHIMKO, I. G. and
SHMATOVA, V. V.

[Abstract] Adsorption extraction of surfactants from neutral runoff containing Na_2SO_4 and ZnSO_4 was investigated to determine whether these surfactants can be removed from waste water from viscose production. Viscose 31 and viscose 34 are completely removed over a period of 26 hours and viscose 314 and PEG-35 are removed over a period of 66 hours when activated charcoal is used as the adsorbent. The high adsorption of the surfactant in neutral water occurs due to the surfactant being mainly in the nondissociated state in the solution. PEG-35 is completely removed over a period of 100 hours when KU-1 cation exchanger is used as the adsorbent. KU-2-8 cation exchanger and AV-17-18 anion exchanger achieve 100 percent removal of surfactants from the waste water over a period of 40-60 hours. Activated charcoal BAU displays the best adsorbability of surfactants among all the adsorbents investigated.
[86-6521]

UDC 662.74:628.543.563

EXPERIENCE OF UTILIZING BIOCHEMICAL PLANT FOR PURIFICATION OF PHENOL-CONTAMINATED WATER

Moscow KOKS I KHIMIYA in Russian No 12, Dec 81 pp 46-48

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[Abstract] In 1975 a project was developed for a biochemical plant for thorough decontamination of the phenol and tar water of trapping sections

No 1 and 2 and for processing chemical coking products and the condensate of blast furnace and coke oven gas from the gas lines of the Magnitogorsk Metallurgical Combine. The planned capacity of this plant was 500 m³/h. In order to collect phenol and tar water, collectors were installed along with transfer pumps for accidental overflows and surface water, along with control separators and pumps for delivering separator water to the final cooling cycle for coke oven gas. In addition, discharge water is collected from platforms where tank cars are steamed and pumping stations have been set up for transferring phenol and tar water to the biochemical plant. Before being purified, the tar water is cooled to 40 to 60 °C in shell-and-tube coolers, then it is mixed with phenol water in two pre-aerators with the assistance of air and iron vitriol as a coagulant. The iron vitriol improves the degree of decontamination of the water with respect to resins and oils. The iron ions bind the cyanides into complexes harmless to bacteria. From the pre-aerators, the water passes successively through 12 radial-type primary settling tanks, a 12-section impeller-type oil separator and 3 flotation machines. After being processed with a solution of orthophosphoric acid the water, by means of gravity flow, enters an 8-section balancing reservoir which is used as a pre-aeration tank. The water is then sent to aeration tanks of two stages with recirculation of the bacterial sludge formed in them. The first stage consists of 10 aeration tanks in which decontamination from phenols takes place, and the second of 10 in which decontamination from thiocyanates and in part from cyanides takes place. The water is sent from stage II aeration tanks to four secondary settling tanks for removal of the sludge. The clarified and purified water enters two collectors from which it is drawn to quench the coke. Modifications which have been made in the process are discussed in detail. Tables are presented of the qualitative composition of the phenol and tar water arriving from trapping sections and of the water purified in the biochemical plant, as well as of the quantity of oxidized phenols, thiocyanates and cyanides. The startup of the biochemical decontamination plant in 1980 made it possible to eliminate practically totally the discharge of toxic substances into the air and water of the Magnitogorsk industrial region and to considerably improve occupational health conditions at coke oven batteries and coke graders. Gas condensate arriving at the rate of 280 to 300 m³/h is decontaminated and the consumption of air is 180 to 192 m³ per cubic meter of decontaminated water. It takes 20 h to aerate the water in the aeration tanks of stage I and 26 in those of stage II, [77-8831]

THERMAL STABILITY OF POTASSIUM ORTHOPHOSPHATE IN PHOSPHATE-SILICON MELTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 29 Apr 80) pp 2400-2403

SILAYEVA, I. V., VORONINA, Z. I., KUZNETSOVA, V. L., YERSHOV, V. A. and
SULTANOVA, I. G.

[Abstract] A study was made of the thermal stability of pure potassium orthophosphate and its mixtures with calcium orthophosphate and silicon in the 1350-1500°C temperature interval in an inert medium in order to determine how alkali metal phosphates develop in the dust in phosphorus plants. Pure K_3PO_4 evaporated after a half hour's holding in the temperatures of interest, evaporation accompanied by partial dissociation into $K_4P_2O_7$ and K_2O . The condensate contained an azeotropic mixture of 80+5 mass % K_3PO_4 + 20+5 mass % $K_4P_2O_7$. The dissociation rate constant of K_3PO_4 in the 1400-1500°C temperature interval follows the Arrhenius equation. The results of the study of evaporation of the mixture with calcium and silica showed that, where the acidity modulus is 0.8, K_3PO_4 undergoes the least dissociation and the sublimation of KPO_3 and K_2O is correspondingly minimal. Presence in the phosphate-silicon melt of alkali, particularly potassium, leads to its evaporation from the melt in the form of the metaphosphate and simultaneously intensifies the process of reduction of phosphorus due to the transition of orthophosphate ions to pyro- and metaphosphate ions. Figures 4; references 9: 7 Russian, 2 Western.
[72-6508]

AUTOMATED CONTROL OF DEEP ELECTROIONITE DEIONIZATION OF WATER BY COMPUTER

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 15 Apr 80) pp 2523-2526

BORODIKHINA, L. I., PERMINOVA, L. G., PEVNITSKAYA, M. V. and
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Sciences

[Abstract] Analysis of the theoretical equations and results of experimental study of the process of deep deionization of water by the electroionite method have revealed the factors which determine the value of parameter ρ during practical performance of electroionite processing. They include the current density, linear speed, time factor considering the unsteady state of the system and a factor considering the status of the ion exchange filler (degree of regeneration and aging, poisoning, etc.). The

problem of automatic control of the process was solved on the basis of these experimental facts. The basis of the control algorithm is a search for the optimal current density. A flow chart of the program used is presented. The algorithm was implemented on a Saratov-1 computer with 4K memory, 12 bit word length and digital control of the process. Figures 2; references 1 (Russian).
[72-6508]

UDC: 628.162.5

ELECTROCOAGULATION OF BIOORGANIC IMPURITIES IN WASTE WATERS FROM BIOCHEMICAL PRODUCTION FACILITIES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 11, Nov 81
(manuscript received 4 Apr 80) pp 2553-2555

MATVEYENKO, A. P., STRIZHEV, Ye. F., VOLKOVA, A. N., IVANOVA, L. V. and YAKOVLEV, V. I., Leningrad Technological Institute imeni Lensovet

[Abstract] The most effective and economically justified method of purification of waste waters (in biochemical production) to remove solutions of protein and ether-soluble compounds is the use of aluminum sulfate. However, this method of chemical coagulation of dissolved and finely-dispersed impurities consumes many tons of reagent and results in pollution of water with salts of sulfuric acid. To eliminate the additional process of salting purified waste waters, studies were performed on the electrochemical coagulation of proteins and ether-soluble compounds using aluminum anodes. The effectiveness of purification of the waste water of protein was determined by the method of Lowry, of ether-soluble substances, as well as transparency, odor, color and suspended matter were determined by known methods. It can be considered proven that aluminum is present in the sediment as the hydroxide with protein complexes. The advantage of electrochemical coagulation of industrial waste water over reagent coagulation has been demonstrated.

[72-6508]

MISCELLANEOUS

UDC 537.311.33:546.65

RARE EARTH SEMICONDUCTORS: OUTLOOK FOR THEIR DEVELOPMENT AND APPLICATION

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA

IM. D. I. MENDELEYEVA in Russian Vol 26, No 6, Nov-Dec 81 pp 602-611

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[Abstract] This is an overview type article addressing the rapidly developing field of rare earth semiconductors, compounds with unique properties in the fields of communication, computerization, information storage, processing of optical information, laser technology etc. The author first covers general information about rare earth semiconductors including their electronic structure, reasons for increased interest in these agents during recent decades and typical structural units involved. After reviewing the history of research achievements in the area of rare earth semiconductors, the author discusses the differences between rare earth and standard semiconductors. The last part of the review lists fields of practical application and recent world-wide developments of these agents. Figures 3; references 138: 54 Russian, 84 Western.
[79-7813]

CSO: 1841

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