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Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 5 Aug 82) pp 1231-1235

DUBININ, M. M., KUT'KOV, V. S., LARIN, A. V., NIKOLAYEV, K. M. and POLYAKOV, N. S., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Studies were conducted on the effects of preadsorbed water in active charcoal on the dynamic parameters of simultaneously adsorbed water and cyclohexane vapors. The adsorption isotherms for water vapor yielded an S-shaped curve with increased adsorption at relative pressures of $h > 0.5$ with hysteresis. Cyclohexane adsorption was predicated on the relative pressure of the water vapor at equilibrium and independent of the amount of preadsorbed water. With an increase in the relative humidity, cyclohexane adsorption was found to diminish, especially when $h > 0.5$; within the range of h values in the 0.15 to 0.45 interval, cyclohexane adsorption was virtually unaffected, while water adsorption increased. Furthermore, the quantity of preadsorbed water was found to alter significantly the retention times of identical concentrations of cyclohexane. Figures 4; references 4 (Russian).
[343-12172]

UDC: 547.944/945

ALKALOIDS OF THALICTRUM MINUS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 83 (manuscript received 16 Dec 82) pp 393-394

MUKHAMEDOVA, S., MAYEKH, S. Kh. and YUNUSOV, S. Yu., Order of Labor Red Banner Institute of Plant Substance Chemistry, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] Continuing their study of the alkaloid composition of Thalictrum minus, the authors studied roots, stems, seeds and above-ground portion of Th. minus L. collected from various locations. Column and thin layer chromatography were used to separate individual bases and, in addition to previously-obtained alkaloids, aromalin, talbadensin, corunnin, thaliximidine and N-methylargemonine were obtained. References 5: 2 Russian, 3 Western.
[341-6508]

UDC: 547.944/945

THALICTRUM FOETIDUM ALKALOIDS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 83 (manuscript received 16 Dec 82) pp 394-395

MUKHAMEDOVA, S., MAYEKH, S. Kh. and YUNUSOV, S. Yu., Order of Labor Red Banner Institute of Plant Substance Chemistry, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] The stems, seeds, roots and above-ground portion of Thalictrum foetidum L. were studied for alkaloid content. The sum of bases obtained by the usual methods was divided into the phenol and nonphenol fractions. Chromatography on columns with aluminum oxide and silica gel obtained two new bases, both produced by chromatography of the nonphenol fraction on aluminum oxide. Base I (eluent-ethylacetate) has mp219-221° (decomp), UV spectrum characteristic for oxoaporphin alkaloids. Base II (eluent benzene-ether 5:1) crystallizes from a mixture of chloroform and methanol (1:1), mp252°. The UV spectrum is described. The mass spectrum shows intensive

peaks of ions with m/z 212, 197 and 169 indicating that it is garmine. References 4: 2 Russian, 2 Western.
[341-6508]

UDC: 547.944/945+547.856.1

SYNTHETIC ANALOGUES OF PEGANUM ALKALOIDS, PART 2: SYNTHESIS OF 5-METHOXY- AND 5-OXYSUBSTITUTED DEOXYVASICINONES AND DEOXYPEGANINS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 83 (manuscript received 11 Jan 83) pp 396-397

KARIMOV, A., PLUGAR', V. N., TELEZHENETSKAYA, M. V. and YUNUSOV, S. Yu., Order of Labor Red Banner Institute of Plant Substance Chemistry, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] Continuing work on synthesis of peganum series alkaloid analogues, the authors obtained 5-methoxy and 5-oxy substituted deoxyvasicinone (DOV) and deoxypeganins (DOP). The 6-methoxyanthranilic acid required was obtained from m-dinitrobenzene converted to 6-methoxy-2-nitrobenzonitrile, which was reduced by the ordinary method to an amino derivative which was hydrolyzed by 20% NaOH to compound IV which was condensed with α-pyrrolidone, synthesizing 5-methoxy DOV, mp 140-141°C. Its mass spectrum showed it to be different from 6-,7-,8-methoxy isomers primarily in the relative intensity of M^+ and fragment ions. 5-methoxy DOP, mp 136-138°C was obtained from 5-methoxy DOV by a method described earlier. References 5: 4 Russian, 1 Western,
[341-6508]

UDC 537.533

SEM STUDY OF MONOCRYSTALLINE SILICON RIBBONS

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 7, Jul 83 (manuscript received 10 Dec 82) pp 62-67

BUZYNIN, Yu. N., ORLOV, Yu. N., BUZYNIN, A. N., DEMENT'YEV, Yu. S., BUTYLKINA, N. A., LUK'YANOV, A. Ye. and URAZGIL'DIN, I. F.

[Abstract] Scanning electron microscopy (SEM) was employed in comparative studies on 50 x 25 x 1 mm twinned and monocrystalline silicon ribbons, including dislocation-free samples, to determine structural and electrical heterogeneity. The monocrystalline ribbons were shown to possess greater electrical homogeneity and that only a minimum number of electrically-active defects contain mirror-smooth facets in the dislocation-free ribbon samples. Furthermore, the periods of laminar heterogeneity patterns due to impurities in the crystal ribbons were found to depend on the nature of the doping agent. Figures 4; references 19: 12 Russian, 7 Western. [372-12172]

UDC 621.315.592

ELLIPSOMETRIC DETERMINATION OF EXTENT OF DAMAGE OF IMPLANTED LAYERS IN SILICON

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 7, Jul 83 (manuscript received 26 Jul 82) pp 68-72

MUKASHEV, B. N., KUSAINOV, Zh. A., NUSUPOV, K. Kh., SMIRNOV, V. V. an TOKMOLDIN, S. Zh., Institute of High Energy Physics, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] Ellipsometric methods were used to evaluate changes in the polarization angles Ψ and Δ of silicon samples subjected to bombardment with B, P, As, and Sb ions with energies ranging from 1 to 20 keV and a dose of $10^{13} - 10^{16}$ ions/cm^2. The analysis was based on the assumed formation of an amorphous layer at a certain depth from the surface and its

growth in relation to the degree of penetration. The thickness of the amorphous layer for the various ions was determined from the $\Psi(\Delta)$ coordinates and showed good agreement with the doubled value of the first moment of spatial distribution of the radiation damage. The critical dose (Φ_{cr}) for the formation of the amorphous phase was inversely related to the energy of the bombarding ions and, when exceeded, to changes in the absorptive and refractive indices of the amorphous layer. Figures 4; references 20: 8 Russian, 12 Western.
[372-12172]

UDC 541.118

USE OF MOLYBDENUM IN METALLIZATION OF INTEGRATED CIRCUITS

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 7, Jul 83 (manuscript received 5 Jun 82) pp 78-83

BASS, V. I., GLEBOVSKIY, V. G., KAS'YANOV, V. G., MARKARYANTS, A. Ye. and MARKARYANTZ, E. A., Institute of Solid State Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] Studies were conducted on the feasibility of using molybdenum for the metallization of integrated circuits in view of the relatively low electrical resistance of molybdenum and an expansion coefficient quite similar to that of silicon, The results showed that magnetron sputtering of pure molybdenum targets produced molybdenum films 0.15-1.0 mcm thick at a rate of deposition of 1 nm/sec with an average specific resistance of 10 ± 1 mcOhm·cm, which changed little if the critical rate of deposition was maintained. Such films were found suitable for integrated circuits with metal-dielectric-semiconductor structure. Figures 6; references 16: 6 Russian, 10 Western.
[372-12172]

UDC: 628.543.12:543.257.1:546.264:662.74.013.8

DETERMINATION OF CARBONATES IN AMMONIA SOLUTIONS

Moscow KOKS I KHIMIYA in Russian No 7, Jul 83 pp 22-23

PESKOVA, D. V., ZYSKINA, F. A., and SHASHMURINA, L. A., Eastern Scientific Research Institute of Coal Chemistry

[Abstract] An accelerated method has been suggested for determining carbonates in the presence of sulfides and cyanides, based on successive titration of HS^- and CN^- ions with an $Hg(NO_3)_2$ solution with a Pt-W electrode pair and subsequent titration of $NH_3 \cdot H_2O$ and HCO_3^- with nitric or hydrochloric

acid with a glass-silver chloride electrode pair. In order to reduce analysis time and increase accuracy, the authors of the present article suggest potentiometric titration of hydrocarbonate ions with a solution of $Pb(ClO_4)_2$ with a Pt-W electrode pair. Figure 1; references 3 (Russian). [350-6508]

UDC: 631.893.12:66.099.2

SURFACE TENSION OF SYSTEMS FORMED UPON HEATING OF MIXTURES OF NH_4NO_3-$NH_4H_2PO_4$-KCl

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 83 pp 358-359

KONONOV, A. V., STERLIN, V. N. and ZORIKHINA, Z. A.

[Abstract] The literature contains no information on the surface tension of the fused salt systems formed upon heating of NH_4NO_3-$NH_4H_2PO_4$ and NH_4NO_3-$NH_4H_2PO_4$-KCl. To determine this surface tension, a method was used based on measurement of the maximum pressure necessary to force an inert gas bubble (nitrogen) through the fluids studied. A diagram of the installation used is presented. The influence of temperature on surface tension and the influence of temperature on surface tension and the influence of $N:P_2O_5$ ratio on surface tension are presented in graphic form. A regression equation adequate to the experimental data is presented. Figures 3; references 10: 8 Russian, 2 Western.
[338-6508]

UDC 66.094.187:[661.7:547.636]

DEHYDROGENATION OF 1,1-DIARYLETHANE ON AN INDUSTRIAL IRON-CHROME-POTASSIUM CATALYST

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 398-400

RYABOV, V. D., BYKOV, V. I. and KOROBKOV, V. Yu.

[Abstract] 1,1-Diarylethylenes are used to synthesize numerous heat-resistant polymers, liquid crystals, biologically active and scented substances, dyes and pharmaceuticals. Two catalysts that can be used in their production by dehydrogenation from 1,1-diarylethane were tested; an iron-chrome catalyst was found to be more selective than the alumochromium "styrene contact" catalyst, and other tests have also showed that a chromium-based catalyst is more effective. The authors studied dehydrogenation of diphenyl- and ditolyethanes with an iron-chrome-potassium catalyst that had been used successfully in dehydrogenating ethyl benzene into styrene. Results showed that introducing methyl groups into the diphenylethane molecule brought some loss of thermodynamic dependability of ditolylethane dehydrogenation compared to the dependability of diphenylethane dehydrogenation. The isomer composition of the initial product had an important role in this outcome, since the predominant o,n-isomer underwent dehydrogenation to an insignificant degree, due to spatial limitations. The stability and selectivity of the test catalyst suggest that it has high potential for industrial application in dehydrogenation of diarylethanes. Figures 3; references 7: 3 Russian, 4 Western.
[358-12131]

UDC 66.093.8.001.57:661.718.5

OPTIMIZATION OF PROCESS OF VAPOR-PHASE CATALYTIC HYDROLYSIS OF DIMETHYLDICHLOROSILANE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 400-402

YEZERETS, M. A., KHAZANOV, I. I., BALYUKOVA, T. M., MARTYUSHIN, Ye. I., STASENKO, V. G. and YEVROPIN, V. A.

[Abstract] The reaction of vapors of dimethyldichlorosilane(DMDCS) and water in the presence of a catalyst yields liquid products containing more

than 90% dimethylcyclosilanes (DMCS); thus vapor-phase catalytic hydrolysis of DMDCS is promising for low-yield continuous production of DMCS. Contact time, ratio of water to DMDCS and temperature were established as determinants of yield and the level of destruction of the Si-C bonds. The author's three-factor experiment in a laboratory microreactor showed that the degree of breakdown of the Si-C bonds increased as all tested factors grew in magnitude, but temperature was the key determinant. Production tests indicated the need to control temperature in the range of 178-194°C. The minimum temperature for effective production of octamethylcyclotetrasiloxane, the product sought, was 170°C. Figures 2; references 5 (Russian). [358-12131]

UDC 541.128.5

DEACTIVATION OF CATALYST FOR LOW TEMPERATURE CONVERSION OF CARBON MONOXIDE AND DEVELOPMENT OF METHODS TO PROTECT IT

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 422-424

BUDKINA, O. G., SEMENOVA, T. A., BARDIK, Z. N., KOPYLOVA, Ye. A., MARKINA, M. I. and DMITRIYEVA, A. I.

[Abstract] Low temperature conversion of carbon monoxide with water vapor in ammonia production is accomplished with various domestic Soviet and foreign catalysts that vary mainly in their content of copper, zinc and aluminum oxides. With use, all have reduced activeness so that residual CO gradually increases from 0.1-0,2% to 0,5-0,6%. The authors studied the effects of chlorine distribution in catalyst layers of an industrial gas installation with 160 cm^3 of contact, vapor:gas ratio 0,5-0,8 and volume rate of 2500-15000 hr^{-1}. In contrast to such contaminants as sulfur compounds, which are adsorbed layer by layer, chlorine was found throughout the catalyst, leading to more powerful deactivation. Formation of copper chloride, zinc sulfide and moisture condensation were all involved in this process. Below dew point, moisture formation also spread chlorine from the catalyst surface to lower layers following the direction of gas flow. Especially for operations producing more than 600 tons of ammonia per day, methods are needed to protect low temperature catalysts from chloride contamination. A chlorine adsorbing apparatus developed at the "Azot" [nitrogen] Cherkassk Production Association serves this purpose. References 12: 6 Russian (1 translated from English), 6 Western. [358-12131]

UDC 541.127.543.5

X-RAY ELECTRON STUDIES ON $ZrNiH_{2.8}$ AND $HfNiH_{2.8}$ CATALYST SURFACE

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 7, Jul 83 (manuscript received 20 Jul 82) pp 111-115

FIDLER, R., CHULKOV, N. G., KUZNETSOVA, N. N., LUNIN, V. V. and NEFEDOV, V. I., Moscow State University imeni M. V. Lomonosov

[Abstract] X-ray electron studies were conducted on $ZrNiH_{2.8}$ and $HfNiH_{2.8}$ to determine the effects of thermal oxidative-reduction treatment on the surface characteristics of these catalytic hydrides. Determination of the relative intensities of lines Ni3p, Zr3d, and $Hf4d_{5/2}$ showed that heating in air at 200°C for 30 min resulted in enrichment of the $ZrNiH_{2.8}$ surface by Zr and of the $HfNiH_{2.8}$ surface by Ni. After heating at 350°C for 30 min both surfaces were enriched in Ni. After heating at 350°C for 30 min both surfaces were enriched in Ni. Exposure of the oxidized surfaces of both catalysts to hydrogen for 30 min at 350°C led to recovery of the original surface structure. Figures 4; references 7: 3 Russian, 4 Western. [372-12172]

UDC 541.127.543.5

X-RAY ELECTRON STUDIES OF $ZrCoH_{2.88}$ AND $HfCoH_{2.88}$ CATALYST SURFACE

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 8, Aug 83 (manuscript received 20 Jul 82) pp 49-51

FIDLER, R., CHULKOV, N. G., SOLOVETSKIY, Yu. I., LUNIN, V. V. and NEFEDOV, V. I., Moscow State University imeni M. V. Lomonosov

[Abstract] X-ray electron spectroscopy and ion etching were used in studies on the effects of thermal oxidation-reduction treatment on the surface composition of $ZrCoH_{2.88}$ and $HfCoH_{2.88}$ catalysts. Evaluation of the intensities of lines Co3p and $Hf4d_{5/2}$ showed that storage of $HfCoH_{2.88}$ in air for several months resulted in an insignificant surface enrichment in Co. Heating of $HfCoH_{2.88}$ in air at 250 or 350°C for 30 min led to a marked enrichment of the surface layer in Co. Treatment of the oxidized hydride $HfCoH_{2.88}$ with hydrogen for 30 min at 350°C markedly depressed surface Co content to background levels. A similar pattern, but more profound in degree, applied to $ZrCoH_{2.88}$ on the basis of Co3p and Zr3d line intensities. These findings indicate that the diffusion of Co is more profound that for Ni-based hydride catalysts. The fact that the surface of these catalysts is readily activated by hydrogen is a key point toward understanding the mechanism of action of this class of catalysts. Figures 5; references 3 (Russian). [373-12172]

UDC 541.183.541.128.13

OXIDIZED CHARCOAL: ELECTRICAL CONDUCTIVITY AND ADSORPTIVE AND CATALYTIC CHARACTERISTICS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 49, No 7, Jul 83 (manuscript received 9 Mar 82) pp 719-723

TARKOVSKAYA, I. A., STAVITSKAYA, S. S., KOZUB, G. M., GOBA, V. Ye., ZAV'YALOV, A. N., KOLOTUSHA, B. I. and PETRENKO, T. P., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] An investigation was conducted on the correlation between electrical conductivity of oxidized charcoal and its adsorptive and catalytic properties. Testing of various activated charcoal samples demonstrated an inverse relationship between resistance and the rate of cumene oxidation and decomposition of H_2O_2, ClO^-, and ClO_3^-, as well as formation of metal ion (Fe^{3+}, Ni, Co) complexes. The considerable differences exhibited by the various charcoal samples in their adsorptive and catalytic characteristics were largely explained on the ease with which electron transfer took place, and were correlated with the energies of activation for conductivity. These observations indicate that measurement of electrical conductivity can serve as a good indicator of the suitability of a given oxidized charcoal sample for a particular technical process. Figures 2; references 9: 8 Russian, 1 Western.
[371-12172]

UDC 665.664.4

CHANGES IN PHYSICAL-CHEMICAL PROPERTIES OF KR-104 CATALYST DURING ITS USE

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 pp 11-13

SEN'KOV, G. M., TETERUK, V. G., KOZLOV, N. S. and YAKUBENKO, V. M., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences, "Novopolotsknefteorgsintez" Production Association

[Abstract] Experimental results are reported on the behavior of a polymetallic catalyst KR-104 for cracking low octane gasoline fractions observed during a four year period of operation on LG-35-8/300B unit. Over all that period the catalyst showed high activity and stability; its productivity in 51 months of operation was 59.5 t/kg. Four regenerations were performed during this time: at the 7th, 25th, 36th and 45th month of operation, achieving excellent results along with preservation of high platinum dispersion. The principal deficiency of polymetallic catalysts is their sensitivity to catalytic poisoning. This catalyst, analogously to its monometallic counterparts AP-56 and AP-64, accumulated iron and sulfur during its operation. Specific surface of the catalyst decreased by

about 20% during a 3 year run, otherwise the physical changes were insignificant. Figures 2; references: 11 (Russian).
[352-7813]

UDC 665.644.4

CHLORINATION OF CATALYSTS FOR REFORMING IN INDUSTRIAL CONDITIONS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 pp 13-14

SKIPIN, Yu. A. and MARYSHEV, V. B., "Lenneftekhim" NPO (Scientific Production Association)

[Abstract] During chlorination of reforming-catalysts, the content of water and chlorine in the catalysis zone is seldom considered, which leads to overchlorination or underactivation of the catalyst. Keeping a constant ratio of water:hydrogen chloride at a specific level makes it possible to regulate chlorine content in the catalyst, while maintaining high octane number and increased humidity level. A formula was presented for calculation of optimal chlorine content in the catalyst: $M = 2.16 \cdot 10^{-7} PB/C$, where M = molar ratio of water:HCl; P = recirculation frequency of hydrogen-containing gas, m^3/m^3; B = water content in hydrogen-containing gas, Mln^{-1}; C = chlorine content in the hydrogenate, % (mass). Figures 2; references 5 (Russian).
[352-7813]

UDC 661.183.6

SYNTHETIC METHODS FOR NEW ZEOLITES CONTAINING HIGH LEVELS OF SILICON

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 pp 42-45

NEFEDOV, B. K., ALEKSEYEVA, T. V. and KONOVAL'CHIKOV, L. D., All-Union Scientific Research Institute of Petroleum Processing

[Abstract] Zeolites with high content of silicon (ZSM Group) have unique adsorption and catalytic properties. They exhibit high thermal stability, excellent hydrophobic properties, and high reaction selectivity in respect to normal hydrocarbons. They are widely used in cracking processes, in selective hydrocracking, alkylation and aromatization of petroleum crude. In this paper an exhaustive review of patents covering ZMS zeolites is presented. It was shown that their production technology is simple, requiring no complex equipment. Their future production will be directly related to the need for new catalysts and adsorbents and will be dictated by economic efficiency of new petroleum processing methods in which these agents will be widely used. Historical development of these reagents and

UDC: 66.094.373:661.248

STABILITY OF VANADIUM SULFATE CATALYSTS UNDER INDUSTRIAL CONDITIONS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 83 pp 354-356

PETROVSKAYA, G. I., IVANOV, A. A., MASLENNIKOV, B. M., BELYAYEVA, N. P., POLYAKOVA, G. M., TALANOVA, V. N. and NOVIKOVA, T. N.

[Abstract] Results are presented from a study of the catalysts SVD, SVNT and BAV after use in systems operating with gases from the roasting of pyrites. The purpose of this study was to determine the stability of the characteristics of these catalysts over time. Activity was measured by standard methods and described by the degree of conversion or contact reaction rate calculated by a kinetic equation. The specific surface was determined based on low temperature adsorption of nitrogen, the pore structure by impression of mercury. It is found that the decrease in the activity of these vanadium catalysts used in the production of sulfuric acid is caused by at least two factors--a change in the pore structure of the carrier under the influence of the high temperatures and chemical poisoning (primarily by fluorine compounds). Chemical poisoning decreases the activity of the catalysts to a greater extent than does the change in pore structure. Figures 2; references 12: 11 Russian, 1 Western. [338-6508]

UDC 542.941.7:546.262.3-31

HYDROGENATION OF CARBON MONOXIDE ON NICKEL-CONTAINING CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 2 Aug 82) pp 1258-1262

LUNIN, V. V., KRYUKOV, O. V., SAVEL'YEV, M. M. and LAPIDUS, A. L., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow; Moscow State University imeni M. V. Lomonosov

[Abstract] The intermetallic compound ZrNi, the hydride $ZrNiH_{2.8}$ and 32% Ni/ZnO_2 were evaluated for their catalytic efficiency in promoting hydrogenation of carbon monoxide under 1 atm pressure at 200-500 °C in a flow-type reactor. Maximum conversion of carbon monoxide (96-98 vol%) in all cases was obtained at 380-400°C, with CH_4, CO_2 and H_2O as the major products. C_2-C_3 hydrocarbons were formed in insignificant quantities. Evaluation of the yields indicated that $ZrNiH_{2.8}$ and 32% Ni/ZrO_2 retained full activity after 7 h, while that of ZrNi decreased by 50% in that same period of time. Differences in the activities of these catalysts in promoting carbon monoxide hydrogenation were attributed to differences in their active surface structure. Figures 4; references 12: 10 Russian, 2 Western. [343-12172]

UDC 541.124:541.128:542.936:547.262

ELECTRONIC MECHANISMS OF CATALYTIC DEHYDRATION OF ETHANOL

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 27 Jul 82) pp 1262-1268

GAGARIN, S. G., ZAKHARIN, R. Z. and KOLBANOVSKIY, Yu. A., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow; Institute of Combustible Mineral Resources, USSR Ministry of the Coal Industry, Moscow

[Abstract] Quantum chemical studies were conducted to determine the alterations in molecular conformation of ethanol undergoing catalytic dehydration. The results showed that disruption of the C-O and C-H bonds induced deformational forces affecting all the atoms and bonds in the molecule. The mechanism of the reaction on aluminum oxide involved the capture of an electron by the adsorbed ethanol molecule. The electron comes either from an active site on the catalysts containing a localized electron, or from a product of the reaction adsorbed to such a site on the catalyst. References 20: 17 Russian, 3 Western.
[343-12172]

UDC 542.97:542.92:541.57:546.26:547.442.3

CLEAVAGE OF C-C BONDS IN β-DICARBONYL COMPOUNDS CATALYZED BY TRANSITION METAL COMPLEXES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 6 May 82) pp 1346-1350

AKHREM, I. S., VARTANYAN, R. S., AFANAS'YEVA, L. V. and VOL'PIN, M. Ye., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Transition metal complexes were found to catalyze the cleavage of C-C bonds in β-diketones under neutral or slightly acidic conditions, with the formation of a ketone and an ester. Experimental studies showed that the cleavage of acetoacetic ester resulted in the formation of acetone, and that these catalysts were less efficient in the case of trifluoroacetylacetone and ineffective in the case of hexafluoroacetylacetone. Evaluation of C-C bond cleavage in acetylacetone showed that the metal compounds ranked as follows in terms of efficiency: $MnCl_2 \lesssim ZnCl_2 < CoCl_2 < NiCl_2 << CuCl_2 < PdCl_2$. This order was in agreement with their decreasing capacity for complex formation. References 14: 3 Russian, 11 Western.
[343-12172]

UDC 541.124.7:547.415

HETEROGENOUS DISPROPORTION REACTION OF SECONDARY AMINES IN PRESENCE OF DEPOSITED RHODIUM-PLATINUM CATALYSTS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 6, Jun 83
(manuscript received 22 Feb 82) pp 353-356

ARUTYUNYAN, V. A., Yerevan Polytechnical Institute, Yerevan

[Abstract] Disproportionation of dibutylamine, $2(C_4H_9)_2NH \rightarrow (C_4H_9)_3N + C_4H_9NH_2$, in presence of rhodium, platinum and rhodium-platinum catalysts deposited on Al_2O_3 was studied. The following catalysts were examined: 1) Rh (0.96%) + 0.48% Pt/Al_2O_3; 2) Rh (0.96%) + 0.2% Pt/Al_2O_3; 3) Rh (0.96%) on Al_2O_3; 4) Pt (0.48%)/Al_2O_3; 5) Pt (0.2%)/Al_2O_3; 6) unreduced type 1 catalyst; 7) unreduced type 2 catalyst. Only the first two showed activity comparable to Rh-Pt/SiO_2 catalyst. Evidently, simultaneous deposition of Rh and Pt on Al_2O_3 increases their adsorptive power towards H_2. This was shown to be true in a low pressure experiment of chemoadsorption of H_2 over these catalysts. Figure 1; references 5: 4 Russian, 1 Western.
[359-7813]

UDC 542.94.459.547.22

DEHYDROHALOGENATION OF HALOORGANIC COMPOUNDS USING INTERPHASE TRANSFER CATALYSTS, PART 9: PREPARATIVE SYNTHETIC METHOD FOR DIACETYLENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 6, Jun 83
(manuscript received 24 Feb 82) pp 408-411

ROSTOMYAN, I. M., ISRAYELYAN, A. G., SARKISYAN, E. L. and CHUKHADZHYAN, G. A., Scientific-Production Association "NAIRIT", Yerevan

[Abstract] A simple synthetic method was developed for the preparation of diacetylene based on dehydrochlorination of 1,4-dichloro-2-butyne with aqueous solution of sodium hydroxide under conditions of interphase catalysis. Optimal yields were obtained with dimethylakylbenzylammonium chloride - catamine AB, and a 10% aqueous NaOH. All experiments were performed with intensive stirring under a stream of nitrogen. The yields were 80% and higher. References 5: 4 Russian, 1 Western.
[359-7813]

STRENGTHS, SHORTCOMINGS IN BELORUSSIAN CHEMICAL INDUSTRY'S CONTRIBUTION TO AGRICULTURE

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 6, Jun 83 pp 34-37

[Article by G. Tsivinskiy, head of the Belorussian SSR Gosplan Department of Chemical and Petroleum Industries: "Republic Chemists for Farm Workers"]

> [Text] Our republic is a major supplier of important types of chemical and petrochemical products, and it is solidly in first place nationwide with regard to some of the most advanced of these products. Thus, our enterprises produce 19 percent of the national output of mineral fertilizers, 24.4 percent of chemical fibers and filaments, and 12.5 percent of plastics and synthetic resins.
>
> Especially great is the republic's individual contribution to the national production of potassium fertilizers, which is currently 53.6 percent. This is no small contribution to the chemicalization of agriculture, and consequently, to the realization of the USSR Food Program as well.

Let us begin with the increased productivity of agricultural crops. Currently about half of the entire yield is due to the introduction of mineral fertilizers into the soil. The same can be said about the increased productivity of hay fields and pasture lands. It is well to recall that under the conditions of our republic the return from 1 kilogram of nitrogen-phosphorus-potassium fertilizer totals an average of 6 kilograms of grain, which is the reason for the high estimated demand for mineral fertilizers. Our republic gets a significant part of the mineral fertilizers it uses from the Grodno Azot Production Association and the Beloruskaliy Association, and also from the Gomel' Chemical Plant. Last year, for example, about one fourth of the nitrogen fertilizers, half the phosphorus fertilizers, and practically the entire volume of potassium fertilizers received by republic kolkhozes and sovkhozes was produced by Belorussian chemists.

In the current five-year plan, chemists of the republic are posed extremely responsible tasks in further expanding production capacities and increasing the output of various chemical products, including those supplied to agriculture. In particular, it is planned to produce 6,442,000 tons of

mineral fertilizer in 1985--almost one third again what was produced in 1980. During the initial two years of the 11th Five-Year Plan, collectives of the Grodno Azot Production Association, the Gomel Chemical Plant, and the Polimir Production Association produced 56,700 tons of nitrogen fertilizer and 7,900 tons of phosphorus fertilizer above stipulated targets. Regarding the collective of the Beloruskaliy Production Association, during this period it unfortunately failed to supply 753,000 tons of potassium fertilizer (8 percent of the target). What's going on here?

The tasks assigned to the republic for the five-year plan stipulate increasing the output of potassium fertilizers by a factor of 1.4, which can only be done by making full use of all existing production capacities and the timely introduction and assimilation of new ones. Failure to accomplish assimilation and insufficient use of capacities were the reason the collective of the Beloruskaliy Association was unable to meet the planned goals. Unfortunately, the lagging of Soligorsk mining and chemical workers has already lasted five years. But, just as before, the experimental-industrial technological equipment of the enriching factory of Mine Administration No 4 is still not operational, although it was accepted as operational in 1979-1980. The problem is that the equipment and technology for halurgic enrichment with potassium salts turned out to have considerable structural deficiencies and design flaws whose elimination requires a great deal of additional work. Suffice it to say that over 18 million rubles have already been spent on alteration of the technological schema and modernization of equipment. The complete elimination of design and structural errors will require about 20 million rubles more. That is why the new large capacities are currently working at only half efficiency.

Under the circumstances, the collective of the Beloruskaliy Association is focusing all its efforts and attention on ensuring steady operation of the enriching factory of Mine Administration No 4. In solving this problem, workers in Soligorsk are running into a number of other no less complex problems which are holding up the further increase in potassium fertilizer output. Today, for example, the Association does not have the necessary amount of mining equipment for recovering ore by advanced methods, likewise the vehicles and tractors for transporting people and freight during underground work, nor does it have the normal stock of cable, electrical equipment, transporter belts, spare parts, and other material resources. As a result, the return from already assimilated capacities of mines and flotation enrichment factories of mine administrations Nos 1, 2, and 3 has not only not increased in recent years, it has actually fallen off somewhat. In 1982, the output of potassium fertilizer by these mine administrations was 99.9 percent of the 1981 level. Moreover, the capacities of mine administrations Nos 1 and 2 were operating at only 95-96 percent efficiency.

Constant delays in the railroad transport of finished output also have a negative effect on the use of production capacities of the Association. Last year alone, the Belorussian Railroad Administration failed to supply almost 13,500 cars for potassium fertilizer haulage. For this reason the plan for supplying it to agriculture was underfulfilled. At the same time,

139,000 tons of untransported potassium fertilizer remained in the warehouses of the mine administration at the beginning of this year.

Currently, the Beloruskaliy Production Association is producing potassium fertilizers and supplying them to agriculture in the form of concentrated potassium chloride (89 percent of the total output), including fine-grain (63 percent), fine-crystal (11 percent), and granular (15 percent), and also in the form of mixed potassium salts (11 percent). This year, the plan is to assimilate production of new forms of potassium fertilizers--potassium sulfate and fertilizers with copper additives. Putting chlorine-free potassium fertilizers (potassium sulfate) into the soil will make it possible to substantially increase the starch content in potatoes, improve their taste quality, and raise their resistance to disease, Copper-potassium fertilizers are being applied on all crops in peat-marsh soils. When this is done additional yield, especially on reclaimed soils with low concentrations of free copper, is very high--20-30 percent and more.

Production of granular potassium chloride will also be increased. The Association has already created capacities which make it possible to produce at least 30 percent of the fertilizers as granules. By the middle of the 12th five-year period, agriculture will be receiving these fertilizers only in granular or crystal form.

This year the Grodno chemical workers will exceed the level of nitrogen fertilizer production which was planned for the end of the five-year period. They supply agriculture with carbamide, ammonium nitrate, ammonium sulfate, liquid ammonia, and ammonium hydroxide. More than 85 percent of the nitrogen fertilizers produced here bear the state Emblem of Quality. About 80 percent of the solid fertilizers are produced as granules. This year the Azot Association will begin producing zinc-containing carbamide, whose use is effective in raising flax, corn, vegetables, and perennial seed grasses. Construction is also underway on a new large-unit-capacity facility to produce ammonia. Its introduction will create a strong base for further increasing the output of nitrogen fertilizers. In the interests of rational use of ammonia resources, it is planned to expand the existing capacities for carbamide production and create new ones, and also to build several dozen large and small warehouses to store ammonia in places where it is needed and used in liquid form.

The majority of areas in the republic are known to have soils with a low concentration of phorphorus; therefore, in the effort to increase their fertility, a decisive role is played by phosphorus fertilizers, the bulk of which are produced by Gomel chemical workers. The Gomel Chemical Plant produces and supplies agriculture with granular and concentrated forms of double superphosphate (43 percent of the total output of phosphorus fertilizers), ammophos (49 percent), and complex mixtures of nitrogen-phosphorus-potassium fertilizers (about 8 percent). A portion of the double superphosphate produced has boron additives, whose use in soddy podzolic soils makes it possible to increase the productivity of sugar beets, feed roots, flax, and pulse crops by 5-15 percent.

Despite the fulfilling of planned tasks for producing phosphorus fertilizers, their production level compared with 1980 decreased by almost 15 percent because of the phasing out of simple superphosphate, and also the scarcity of wet-process phosphoric acid. In addition, uncompleted technology and outdated equipment in the double superphosphate shop is making it impossible to turn out the finished product at the present level, which makes it necessary to find new ways of increasing the operating steadiness and the effectiveness of this facility. But the enterprise's plans for renovation and technical retooling of the phosphoric-acid and double-superphosphate shops are not yet being implemented. The plant's board of directors is inexcusably slow in resolving questions of coordinating pre-design and design decisions, and thus is obstructing the further development of phosphorus fertilizer production.

The contribution of Belorussian chemical workers to the USSR Food Program is not confined to supplying mineral fertilizers. Great significance in strengthening the material-technical base of agriculture pertains to the use of various articles made from plastic, and supplying tires, technical articles made from rubber, fuel-lubricants, and other materials for agricultural machinery.

Polymer tubes have received broad application in reclamation projects. They are produced at the Borisov Plastic goods Plant. This plant manufactures polyethylene film which is used to construct greenhouses, hot beds, and closed areas for silage and hay, and to protect agricultural produce from rainfall. A substantial amount of such film is also produced by the Polimir Production Association and the republic's local industry. Back in 1972 the Vitebsk Khimplast Production Association became the first in the country to create production facilities to handle recycled polyethylene film, which made it possible to substantially expand the raw materials base by using, in production, film which has completed its service term.

Film for food packaging, milk cartons, containers for sour cream and cottage cheese, and other polymer containers are produced at the Borisov Polimiz [sic] Plant. The Mogilev Synthetic Fiber Plant produces a double film for packing meat and fish products, and artificial sausage casing. The products of these enterprises are used widely in the food and meat-dairy industries.

Polyethylene, which is produced by Novopolotsk chemical workers, is the raw material for producing polymer tubes and films, and also a wide assortment of plastic goods. Despite the fact that the Polimir Production Association is one of the country's largest producers of this type of plastic, the republic's existing capacities for processing it are working at only 50-85 percent efficiency, since at the present time most of the polyethylene is used to produce other types of products. Under these conditions, the work of the Association's collective must be focused on producing polyethylene over and above the plan by economizing on the consumption of raw materials, curtailing planned and non-planned stoppages of technological equipment, and perfecting equipment and the technological process, which will make it possible to make fuller use of the capacities of the enterprises producing plastic goods. Because of a shortage of spare parts for its compressors,

the Association's collective is still not fully using its capabilities for increasing the output of above-plan polyethylene.

In collaboration with scientists, Novopolotsk chemical workers developed and began to produce a photodegradable composite vased on polyethylene with an adjustable service life, which is used to obtain sensitized polytheylene film. This film is then used for mulching the soil mechanically in raising grape plants. As a result the output of standard plants per hectare has increased by 10,000. After two or three months the film is no longer present in the earth; it is mixed in with the soil and completely destroyed by microorganisms. These properties make it unnecessary to gather up the material which has outlived its usefulness.

Every year kolkhozes and sovkhozes increase their fleets of trucks, tractors, combines, and other agricultural machines which can't get around without their "shoes." Such "footwear" is produced by Bobruysk tire manufacturers. The Bobruyskshina Production Association produces tires for Kirovtsy, Belarus' tractors, Niva and Kolos grain-harvesting combines, agricultural trailers, and also trucks and light automobiles. Presently more than half the tires produced for agricultural vehicles are in the highest quality category, and 38 percent have advanced radial construction. The workers of the Association are constantly raising the quality of their product and they deliver it to the consumers on time. In 1982 alone, they produced more than 13,000 high-quality tires above the plane for agricultural machinery. The collective of the Belarus'rezinotekhnika Production Association also supplies a large assortment of industrial rubber goods.

At the same time, the Bobruysk Tire Repair Plant is still not doing an adequate job of restoring worn-out tires for agricultural machinery. It is necessary to accelerate the pre-design work for improving and developing tire repair.

Providing farm workers with rubber footwear remains a pressing problem. Without the footwear, it is impossible to get around in rainy weather, and it is needed for field work and on livestock farms. The Krichev Rubber Goods Plant and enterprises of local industry produce such footwear in a wide assortment, but the demand for it is only being about half met. And not because the manufacturers are doing a bad job--just the reverse. The collective of the Krichev Plant increased their output of rubber footwear by a factor greater than four, and completely exhausted their development capability in existing facilities. It is necessary to state frankly that the equipment, buildings, and installations being used have been worn out for a long time and do not correspond whatsoever to current technological standards. Renovation is presently underway in the enterprise. The planned task is to bring its capacity up to a level which will fully satisfy the demand of the people of the republic for rubber footwear. This would seem to be the correct direction to take. But the renovation has dragged on for an unjustifiable length of time. It began in...1968, and even now half of the planned work has not been done. According to construction norms, the work should have been completed within three years. The client was forced more than on e to redraft the budget-plan documentation, the new equipment was installed in old, completely overloaded production areas, and the

Belorussian Ministry of Industrial Construction's Construction Trust No 12 consistently failed to complete planned targets on the construction of enterprise facilities. One would like to believe that the Belorussian Ministry of Industrial Construction will eventually recognize this fact of over-slow construction and takes measures to complete the renovation of the Krichev Rubber Goods Plant in the current five-year period.

Timely repair of agricultural machinery largely depends on supplying repair enterprises with gaseous oxygen for doing work which requires gas welding. More than 80 percent of the gaseous oxygen used in the republic is produced at the Minsk Chemical Plant, whose equipment has been operating for more than 25 years at maximum load. Currently gaseous oxygen is supplied to agriculture only in cylinders. This is convenient for the consumer but too disadvantageous for the government (transport costs are very great). Suffice it to say that in transporting gaseous oxygen in cylinders, the weight of the container is eight times greater than the weight of the product. So, the Belorussian State Committee for Agricultural Technology should adopt without delay more advanced methods of transporting oxygen--in tank vehicles or in liquid form for subsequent gasification and packaging in cylinders at the consumption site. This will make it possible to fully satisfy agriculture's need for gaseous oxygen and do away with inefficient truck transport, freeing thousands of vehicles and drivers for other purposes.

In preparing and producing feed, great significance attaches to chemical preservatives and common salt, which are still entirely imported into our republic from other regions of the country, in very limited quantities. Currently the need for preservatives is less than half satisfied, and table salt is being used to feed livestock and in the mixed feed industry.

By request of the Belorussian Ministry of Agriculture, the Grodno Azot Production Association, the Mogilev Khimvolokno Association, and the Gomel Chemical Plant are studying the possibility of using a number of chemical substances as preservatives and organizing their production. In particular, the Grodno chemical workers have already created an experimental installation to produce the perservative "Neman-1," which is a mixture of a 40-percent ammonium sulfate-bisulfate solution and a 24-percent sodium bisulfate solution. The Mogilev chemical workers have produced several experimental-industrial batches of 30-percent sodium benzoate solution, and the Gomel workers have come up with samples of sulfite-bisulfite solutions for testing. The Belorussian SSR Ministry of Agriculture should speed up tests on the suitability of these additives. They should also accelerate tests on using, as a feed salt, the halite wastes from the Beloruskaliy Production Association's Mine Administration No 4. These wastes contain 90-93 percent common salt, about 4 percent potassium chloride, and up to 5 percent insoluble residues. Using them for feeding livestock and in producing mixed feeds would make it possible to reduce the republic's importation of common table salt by 120,000-150-000 tons. The Belorussian SSR Ministry of Agriculture must say the final word on this question.

Releasing food-source raw materials used in industry is an important reserve in increasing food stocks. Suffice it to say that in our republic paint and varnish production alone consumes 25,000-30,000 tons of vegetable oils yearly. In recent years, paint and varnish enterprises of the republic and the country have implemented a number of measures to replace food stuff raw materials with synthetic raw materials. Using wastes of chemical and petrochemical production, it has been possible to create effective substitutes for vegetable oils which are not inferior to the latter in quality. Thus, at the Lida Paint and Varnish Plant, 1,775 tons of vegetable oil were saved last year alone by using substitutes. Currently the Belorussian SSR Ministry of Local Industry is implementing specific measures for using the byproducts of pyrolysis of directly distilled gasolines at the Polimir Production Association to organize the production of petro-polymer resins in quantities up to 15,000 tons per year. This will make it possible to economize on vegetable oils, whose production requires processing sunflower harvests from an area greater than 25,000 hectares.

The above makes it clear that the republic commands great posssibilities for the chemicalization of agriculture. The task it to make fuller use of them. It is necessary to resolve this task quickly, with close cooperation of industry and agriculture.

12255
CSO: 1841/345

ROLE OF CHEMICAL INDUSTRY IN FULFILLING USSR FOOD PROGRAM

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 387-390

POLYAKOV, Z. N., deputy minister of the Chemical Industry

[Abstract] To achieve the goals of increased food production with the least possible expenditures of raw materials, energy and human resources, the chemical industry must provide major innovative input. Major areas for chemical advances are, predictably, in improved quantities and quality of chemical fertilizers and means of plant protection. Raw material sources other than petroleum must be found to meet the needs of the year 2000, including anthracite and lignite coals and biomass. Methanol and methyl-formate can be used to produce vitamin-protein concentrates and formic acid, respectively, and methanol also has promise as a component of motor fuels and as a carrier for long-distance energy transmission. Membrane technology applied to preserving fruits and vegetables in inert gases can dramatically reduce losses in storing applies, pears, potatoes, carrots, garlic, cabbage and tea leaves. Membrane filtration can increase soft-cheese production by 8-10%, and can also increase effective use of whey from cheese production. Biologically-active trace elements such as boron, copper, cobalt, maganese and iron can contribute to reduction of lime chlorosis, which is especially common in the Caucasus, Central Asia and the Ukraine in fruit trees, grapes, olive trees, hops, grains and decorative plants. Iron complexes based on diethylenetriaminepentaacetic and polyethylenepolyaminopolyacetic acids have been selected for this purpose. Complexons containing phosphorus also offer promise. Corrections of trace element deficiencies are also crucial for animals that produce fur, and for laying hens. Another major thrust of the chemical industry must be in polymers for both packaging and low-cost structures. Capsulation of seed with fertilizers can also bring major savings.
[358-12131]

UDC 66.074.7

NEUTRALIZATION OF MULTI-COMPONENT GAS EMISSIONS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 405-407

SAVEL'YEVA, L. A., KASHNIKOV, Yu. V., KOBYLINSKIY, A. I. and SUBBOTIN, A. I.

[Abstract] The low concentrations of organic impurities in industrial gas emissions include complex esters, ketones, aromatic and haloid-containing compounds requiring economical neutralization. Thermocatalytic and thermal methods require large use of fuel and contaminate production catalysts. The present study reports on use of AR-A activated charcoal for adsorbing vapors of organic solvents. Results indicated that 5.3% of adsorbent capacity was taken up by acetone and 18%, by trichloroethylene. Desorption with live steam at 105°C permitted reuse of the activated charcoal. Technical economic calculations confirmed the high effectiveness of the adsorption-thermal method tested: it reduced costs by nearly 50%. Neutralization of desorbate was conducted at 950-1010°C. No successful recycling of the impurities removed has been achieved. Figures 2; references 8 (Russian). [358-12131]

UDC 661.634.2:66.067

EXTRACTING FLUORINE IN PRODUCING EXTRACTION PHOSPHORIC ACID FROM NEW FORMS OF PHOSPHATE RAW MATERIALS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 412-416

RODIN, V. I., TSYBINA, M. N., KRAYNEV, N. I., ARKHIPOVA, L. N. and NOVIKOV, A. A.

[Abstract] Exploitation of Karatau, Khubsugul, Belaya Zima, Oshchurkov and other phosphate ore variations, dictated by shortages of more traditional fluorine ores in the USSR, is complicated by environmental considerations and technical problems. The present study reports on such extraction from phosphoric acid produced through sulfuric acid decomposition of various phosphate ores where fluorine compounds constitute 59-81% of the resulting acid; the remaining fluorine is lost in phosphogypsum or in gas emissions. Fluorine can be extracted from the phosphoric acid either by the latter's concentration and subsequent extraction in the gas phase, or by binding the fluorine in silicon fluoride salts of alkaline metals. Tests of the first approach yielded no more than 50% of the fluorine in the phosphoric acid, but when the fluorine was first extracted as $MgSiF_6 \cdot 6H_2O$, approximately 90% of the fluorine was removed. Impurities in the acid greatly affected the quality of sodium siliconfluoride and the amount extracted, with magnesium and iron having little effect but aluminum and calcium seriously reducing the quality of siliconfluorides obtained. Rapid

extraction, within 10-15 minutes, was found necessary to prevent formation of Na_2SiF_6 crystals. Steeping the acid, concentration and filtration also improved yield and quality. Chemical enrichment of salts obtained from extraction phosphoric acid aided in producing high quality chemical fertilizers from apatite ores. Figures 6; references 3 (Russian).
[358-12131]

UDC 620.193.47

STABILITY OF PACKING RESINS IN VINYLACETATE PRODUCTION MEDIA

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 404-405

DOROSHENKO, I. D., KLIMENKO, T. G., KACHANOV, V. A., NIKITIN, D. G. and GUROV, O. I.

[Abstract] To select the most durable resins for heat exchange equipment packings, the Ukrainian Scientific Research Institute for Chemical Machinery tested samples of SKN-18 butadiene-nitrile rubber, SKF-32 fluoro-rubber, SKEP ethylene-propylene rubber and SKEPT triple ethylene-propylene rubber in media involving several heating and cooling column operations. Durability under pressure, corrosion resistance and resistance to swelling were measured. Relatively good results were obtained with SKEP and SKEPT rubbers, labelled 51-3042 and 51-1481, which had 11.9 and 11.7% swelling after 960 hours of exposure. After 24 hours in acetic acid, 51-1481 and 67.7% swelling, but 51-3042 had only 14.3%. Thus the triple copolymer was judged best in that medium, although in a solution of vinylacetate, benzene, crotonaldehyde and acetic acid, it was not resistant to swelling. While 51-3042 and 51-1481 are recommended for use in vinylacetate production, no long-term durability should be expected.
[358-12131]

UDC 66.012-52

DEVELOPMENT OF TRAINING SYSTEMS FOR CHEMICAL INDUSTRY ENTERPRISES TRAINING CENTERS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 83 (manuscript received 18 Jan 83) pp 59-62

DAVYDOV, E. V. and SARATIKYAN, V. P., Scientific Research Institute of Fertilizers, Insecticides and Fungicides Ya. V. Samoylov

[Abstract] A system used to train extraction-phosphoric-acid production operators, developed for use at the Almaluk chemical plant, is described and discussed. The technological circuit for extraction-phosphoric-acid production with automatic stabilization loops is presented and intricacies

of the operation are discussed. The basic functions which must be performed by an effective trainer include: imitation of the technological process involved and presentation of this information to the operator, perception of the trainee's actions, perception of the instructor's actions, presentation of information concerning the course of instruction to the instructor, analysis of the trainee's activity and selection of the regime and tempo of instruction. The structural scheme of the complex of devices for performing these functions is presented and described and mathematical software used in the process is discussed. Introduction of this training system makes it possible to incrase acid production by 2 percent without additional expenditures of raw materials, fuels and materials. The economic effect from introduction of the trainer with an increase of acid output of only 1 percent is 2,3 million rubles per annum with recovery of the cost of the system in 6 months. Figures 3; references 6 (Russian).
[356-2791]

UDC 621.512.2-762.86.661.666.2

LUBRICANT-FREE SEALERS OF COUPLING RODS CAPABLE OF OPERATING IN PRESSURES OF UP TO 18 MPa

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 7, Jul 83 pp 13-15

ZAKHARENKO, V. P. and NOVIKOV, I. I., candidates of technical sciences

[Abstract] Lubricant-free sealing of coupling rods with flat reinforcing elements is used in compressors under conditions where gas compression must yield clean product free of oil impurities. Usually nonmetallic "self-lubricating" materials are used for this along with specially-constructed coupling rods and pistons. The situation is even more complex when heat must be removed from the operational area. In such cases various antifriction graphite materials are used reinforced with metals, bronze or various antifriction graphite materials are used reinforced with metals, bronze or various resins; however, their utilization is limited to less than 3 MPa. To get to higher pressures, coupling rods with flat sealing elements are used. Various details of the operation of such sealers are discussed. Simplicity of construction, high gas compactness and long term performance without repairs are the advantages of this system of lubricant-free sealing with flat rings. Figures 2; reference 1 (Russian).
[353-7813]

UDC: 661.718.5

PRODUCTION OF METHYLDIPHENYLCHLOROSILANE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 83 pp 332-334

SHELUDYAKOV, V. D., SOKOLOV, N. M., ZHUN', V. I., ZHARKOVA, N. M., FURSA, O. N., BELORUSSKAYA, L. A. and FEDULOVA, Ye. L.

[Abstract] Two versions of organomagnesium sysnthesis of methyldiphenylchlorosilane (MDPCS) are suggested. The first is methylation of diphenyldichlorosilane with methylchloride; the second is production of methyldiphenylsilane and subsequent chlorination. A comparison is made of phenylation of methylphenyldichlorosilane and the other two methods to determine the most promising method of synthesis. The most promising method is found to be chlorination of methyldiphenylsilane. Reaction mechanisms are suggested for the synthesis of methyldiphenylchlorosilane by all three methods. Figures 3; references 6: 4 Russian, 2 Western.
[338-6508]

UDC 553.983:550.4(047)

HIGHLIGHTS OF THIRD ALL-UNION CONFERENCE ON GEOCHEMISTRY OF OIL SHALES

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 3, May-Jun 83 pp 81-82

[Article by I. N. Roshchin and Ye. Kh. Kim, Institute of Geological Sciences imeni K. I. Satpayev: Kazakh SSR Academy of Sciences; "Third All-Union Conference on the Geochemistry of Oil Shale"]

[Text] The Third All-Union Conference on the "Geochemistry of Oil Shale" was held in Tallinn from 21-24 September 1982. It was dedicated to the memory of the famous research scientist A. F. Dobryanskiy, corresponding member of the Estonian Academy of Sciences.

The conference was organized by the Geology and Chemistry Institutes of the Estonian SSR Academy of Sciences, the Estonian SSR Geology Administration, the All-Union Petroleum Scientific-Research Geological Exploration Institute of the USSR Ministry of Geology, the Institute of Shales of the USSR Ministry of Petroleum Industry, the Estonian SSR Academy of Sciences Program Council on Comprehensive Use of Oil Shale and the Estonian Republic Board of the All-Union Chemical Society imeni D. I. Mendeleyev. The conference was attended by more than 150 people from various scientific and production organizations of the RSFSR, the Ukraine, Estonia, Belorussia, Kirghizia, Kazakhstan, Uzbekistan, and Tajikistan.

More than 50 reports were given in the general sessions, and about 80 reports in display form, including the following two reports from Kazakhstan, presented by the Kazakh SSR Academy of Sciences Institute of Geological Sciences imeni K. I. Satpayev: "Rhenium in Kazakh Oil Shales" (S. K. Kalinin, T. M. Azizov, Ye. Kh. Kim, and E. Ye. Fayn), and "Environmental and Genetic Characteristics of the Formation of Kazakh Oil Shales" (I. N. Roshchin and R. S. Seralin). In addition, associates of the Estonian Academy of Sciences Institute of Chemistry delivered three reports on the geochemical characteristics of the organic matter of Kenderlyk oil shales and balkhashite.

The themes of the reports were quite diverse. Some of them dealt with the geochemical and petrographic characteristics of the oil shales of various regions of the country, results of research on the make-up of the organic matter of oil shales and, also, the chemical and mineralogical make-up of the

inorganic part of bituminous rocks in order to make comprehensive use of them in the economy. The use of shales as an all-round raw material with many uses, as well as the prospects for increasing their role in the country's fuel-energy balance, is determined by the economic effectiveness of shale extraction and the recovery of shale tar, and also the degree to which the raw materials base has been tested and prepared. Large-scale production of synthetic oil as an alternate source of hydrocarbons requires improvement of an entire array of tasks, from scientifically predicting the shale content of large regions and methods of exploring and prospecting shale deposits to the technology of recovering and enriching shale tar.

Much attention at the conference was focused on the metamorphic shales of the Precambrian and Lower Paleozoic periods, which contain carbonaceous organic matter which, like the deposits of the Phanerozoic Period, has a bituminous-sapropelic genetic character. This makes it possible to think of the highly carbonaceous deposits of the Precambrian and Lower Paleozoic periods not just as the surrounding layer for a particular series of metallic components but also as a potential mineral resource of the caustobiolith class.

Several reports touched on questions of the origin of oil shales. There are several hypotheses of the accumulation at various stratigraphic levels of a great quantity of biomass which served as the source for the formation of sapropelic rocks. Many researchers explain the periodicity of global eras of shale accumulation as the manifestation of the activization of the earth's rift systems. In these eras, shale accumulation was accompanied by transgressions, high seismic activity, volcanicity, and the ingress of an excessive quantity of a number of substances into the waters of basins. Some of these substances (phosphorus, nitrogen, carbon dioxide) stimulated the growth of the bioproductivity of individual forms of primitive algae. Others (uranium and other heavy metals) suppressed the life processes of many groups of more developed organisms, which led to the sedimentation of great masses of planktonic organic matter. Thus, eras of shale accumulation reflect not the optimal, but rather the most severe conditions for the existence of organisms, the biosphere's reaction to the pollution of the environment by uranium and a number of other heavy metals.

Organic matter and phosphorus are the main sorbents of metals, so oil shales may be considered a possible source for recovering uranium by processing carbon-containing shales. An example of this is the use of deposits in the United States and Sweden. The concentrations of uranium in them amounts to thousandths of a percent, rarely higher. But the considerable extent and consistent distribution of uranium-bearing shales makes its recovery profitable.

A number of reports focused attention on the paragenesis of oil shales and petroleum. For a number of reasons (the similarity of the original organic matter of petroleum and oil shales, the concentrations of low elements in them, the environmental conditions in the period of accumulation of organic matter of both petroleum and oil shales, and so forth) oil shales are considered the criteria for prospecting for petroleum (several deposits in the Caspian basin, the Novouzensk Field, and others).

The conference passed a resolution which defined the basic tasks in the field of studying oil shales in the near future, the successful fulfilling of which will be a worthy contribution to the implementation of the social-economic program proposed by the 26th CPSU Congress.

12255
CSO: 1841/336

UDC 552.57:662.62

OZONIZATION IN CONCENTRATION OF MINERAL COMPONENTS OF COAL

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 49, No 7, Jul 83 (manuscript received 26 Nov 82) pp 770-771

RUDAKOV, Ye. S., ZAMASHCHIKOV, V. V., PRYADKO, O. N., SIN'KOVA, L. A, and SHPIRT, M, Ya., Institute of Physico-organic Chemistry and Coal Chemistry, Ukrainian SSR Academy of Sciences, Donetsk

[Abstract] Investigations were conducted on the efficacy of ozonization as a method for the concentration of the mineral components of coal. Procedures carried out at room temperature showed that the carbon content of a 10 g coal suspension in 100 ml of glacial acetic acid exposed to a ozone-oxygen mixture (3-4 O_3 vol%) at a flow rate of 60-100 ml/min with mixing was reduced two- to four-fold after 15 h. The process was far less efficient in carbon tetrachloride or with dry samples. It appears that ozonization may be a promising approach for the separation of the mineral components of coal, assuming that the mineral components show adequate stability under the conditions employed. References 8: 5 Russian, 3 Western.
[371-12172]

UDC: 662.741.3.022:534.321.9+669-98.001.5

STUDY OF HEATING OF COAL BY ULTRASONIC OSCILLATION AND PRESSURE

Moscow KOKS I KHIMIYA in Russian No 7, Jul 83 pp 4-7

AZIMOV, A. A., LARIN, V. N., OSTROUSHKO, A. P., REVA, A. S., (deceased), Design Bureau, Koksokhimmash Giprokoks and GLYANCHENKO, V. D., Eastern Scientific Research Institute of Coal Chemistry

[Abstract] Laboratory studies were performed with simultaneous action of pressure and ultrasound on a coal charge in a laboratory device consisting

of a lever press, working stage and insulating material into which the coal is placed. The acoustical power of oscillations applied was 0.1 to 1.0 kW. Application of ultrasonic oscillations caused heating of the coal charge with a significant temperature drop through its height. Particles adjacent to the sound source were heated first. Ultrasonic oscillations combined with pressure have a positive influence on the shaping of the plastic coal mass and can be used in screw type molding machines to produce plastic coal shapes. Differences in properties of the initial coal are manifested as it is heated by the ultrasound under pressure. Figures 4; references 4 (Russian).
[350-6508]

UDC: 541(61+126)

INFLAMMABILITY OF METAL-CONTAINING EPOXY MATERIALS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 5, May 83 (manuscript received 22 Jan 82) pp 332-335

AYVAZYAN, G. B., KHALTURINSKIY, N. A., AKOPYAN, A. A., RASHIDYAN, L. G., ORDYAN, M. B. and BERLIN, Al. Al., Yerevan State Medical Institute

[Abstract] The introduction of metal-containing compounds including variable-valence-metal acetates to epoxy resins is a new and effective method of reducing the inflammability of the epoxy materials. The purpose of this work was to study the inflammability and combustion of epoxy resin in the presence of a metal acetate additive. The initial material was ED-20 epoxy resin cured by a mixture of 4,4'-diaminodiphenylmethane and m-phenylene diamine. Chromium and nickel acetates were the additives. The experiments showed that compositions without additives and with the chromium salt ignite simultaneously, with nickel acetate somewhat earlier. The epoxy materials form a great deal of coke upon combustion. The additives influence this process. The introduction of chromium acetate intensifies formation of coke, addition of nickel acetate suppresses coke formation at temperatures above 800°C. Above 800°C the material with the nickel salt additive forms gas more rapidly than the pure material, while the chromium salt slows gas formation. Figures 3; references 3 (Russian). [348-6508]

UDC 541.(64 + 126)

COMBUSTION PATTERNS OF HALOGEN-CONTAINING METHACRYLATE COMPOUNDS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 6, Jun 83 (manuscript received 22 Jan 82) pp 391-396

AYVAZYAN, G. B., ORDYAN, M. B., KHALTURINSKIY, N. A. and BERLIN, A. A., Yerevan State Medical Institute

[Abstract] Halogen-containing compounds are used widely in fire retardant operations. According to Rosser, inhibition of the combustion process by

these halides is based on reaction of hydrogen halides with free radicals in the flame, forming inactive products. In an attempt to explain the behavior of halogen-containing polymers in combustion, the effect of CCl_4 on the flame of methylmethacrylate (MMA) vapors was studied. It was shown that addition of small quantities of the inhibitor slowed down the spread of MMA flame by altering the heat transfer on the flame-polymer interphase due to intensified coke formation of the material being combusted. This effect was not due to inhibition of reactions occuring in the flame. Figures 3; references 7: 5 Russian, 2 Western.
[359-7813]

UDC 631.893.12

QUANTITY AND COMPOSITION OF SOLID PHASE FORMED IN AMMONIZATION OF EXTRACTION PHOSPHORIC ACID FROM COMMON ORES OF KARATAU BASIN IN pH RANGE OF 1.3-2.5

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 417-419

KONONOV, A. V., TRUTNEVA, N. V., LENEVA, Z. L. and YEVDOKIMOVA, L. M.

[Abstract] The Karatau phosphorite deposits are expected to provide Soviet industry with phosphorus fertilizers. The current study is aimed at finding ways to prevent formation of various insoluble compounds during extraction of phosphates for further processing into fertilizer. Solid phase composition in the initial non-ammoniated EPA with water content of 50% and 20%, in EPA after processing with sodium carbonate to eliminate part of the fluorine, in phosphate pulps immediately after ammonization, and in those pulps after 4 hours of heating at 100° C, were assessed. Results showed that pH values had more effect on the ratio of solid to liquid phase components than did pulp moisture level (in the range of 50-20%). At pH of 2.35-2.40 practically all the iron and a significant part of the aluminum precipitated out. An extreme in viscosity-pH dependence occurred at about 1.5 as part of the solid phase dissolved in the beginning of ammonization. Figures 2; references 10: 4 Russian, 6 Western.
[358-12131]

UDC 631.81.095.337:543.226

EFFECTS OF MICROADDITIVES ON THERMAL STABILITY OF NITROAMMOPHOSKA AND COMPLEX MIXED FERTILIZERS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 419-421

MESHALKINA, L. K., TAVROVSKAYA, A. Ya. and MARKOVA, T. K.

[Abstract] The effects of various additives on the thermal stability of nitroammophoska was studied after obtaining test samples from Kola apatite, using thermogravimetric and weight methods and determination of the induction period prior to decomposition at high temperatures. None of the microadditives, which included boron, manganese, zinc, cobalt, iodine and molybdenum,

brought a decrease in the decomposition temperature. Similar results were obtained in tests with complex mixed fertilizers of a different composition. Thermal stability based on changes in mass after applications of 150-170° C temperatures and periodic interruptions of decomposition was determined to be unaffected by the additives. Samples of both fertilizers withstood higher temperatures with cobalt additive than with other additives separately or in combinations. Thus, those with cobalt were somewhat more dangerous to prepare and store. Figures 2; references 2: 1 Russian, 1 Western.
[358-12131]

UDC: 631.893.2'3

PRODUCTION OF COMPLEX LIQUID FERTILIZERS BASED ON EXTRACTION PHOSPHORIC ACID AND POTASSIUM CHLORIDE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83 (manuscript received 16 Feb 83) pp 61-63

NAMAZOV, Sh. S., AMONOV, M. R. and BEGLOV, B. M., Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] Chloride-ion-free, polymeric liquid fertilizers were produced using inexpensive extraction phosphoric acid and potassium chloride as raw materials. The process includes: interaction of potassium chloride with extraction phosphoric acid, dissolution of the acid products produced, decomposition in water and neutralization of acid solutions with gaseous ammonia. The possibility is thus demonstrated in principle of producing liquid (suspended type) fertilizers by interacting potassium chloride with extraction phosphoric acid and subsequent dissolution of the decomposition products in water and neutralization of the acid solutions with gaseous ammonia. References 5: 4 Russian, 1 Western.
[342-6508]

UDC 54.15:541.515:547.413:546.16

FORMATION OF STABLE RADICALS FROM ORGANOFLUORINE COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 5 Mar 83) pp 1225-1228

ALLAYAROV, S. R., BARKALOV, I. M., GOL'DANSKIY, V. I. and KIRYUKHIN, D. P., Chernogolovka Department, Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Subjecting organic perfluoro compounds to Co-60 γ-irradiation at 77 or 300 °K resulted in the formation of stable radicals. Furthermore, radicals formed at 77°K persisted for ca. 12 h at 300 °K following heating the reaction mixture to that level. Such stable radicals were obtained only from perfluoro compounds with a tertiary or a quaternary carbon atom and did not react with oxygen either during irradiation or storage for ca. 180 h in air. Since the radicals were also stable in the gas phase, fractional distillation may be a method for enriching the concentration of the stable radical in solution. The radicals of individual perfluoro compounds may be useful in the synthesis of various organofluorine compounds. Figures 1; references 3 (Russian).
[343-12172]

UDC 542.978:541.515:542.934:547.915.5

SPECIFIC FEATURES OF ACTION OF INHIBITORS OF FREE RADICALS REACTIONS IN LIPID OXIDATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 21 Sep 82) pp 1269-1272

KASAIKINA, O. T., LOBANOVA, T. V. and GAGARINA, A. B., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Kinetic studies were conducted on the oxidation of lipids in chlorobenzene at 60-90°C to determine the role of free radicals in the reaction mechanism. Addition of inhibitors of free radical formation

(nitroxyl radicals) showed attenuation of free radical formation, but oxygen consumption showed only a minimal decrease even in the presence of large amounts of the nitroxyl radicals (5-10%). Furthermore, free radical formation proceeded to an equal extent at high temperatures in air and under an inert gas indicating that free radical formation was not oxygen-dependent. The latter observation was also interpreted to indicate that most lipids contain inherent initiating (or autocatalytic) systems that assure a high rate of free radical formation. Figures 3; references 8: 7 Russian, 1 Western.
[343-12172]

UDC: 547.81.07+547.824.07

DIAMINES, AMINOAMIDES AND AMINONITRILES OF SPIROTETRAHYDROPYRANOPIPERIDINE SERIES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 5, May 83 (manuscript received 5 Jan 81) pp 302-308

KUROYAN, R. A., SNKHCHYAN, G. M. and VARTANYAN, S. A., Institute of Precision Organic Chemistry imeni A. L. Mndzhoyan, Armenian SSR Academy of Sciences, Yerevan

[Abstract] The authors recently described [this Journal, 1982] a general method of synthesizing spirotetrahydropyranopiperidines. In this work, to study their biological properties, these compounds were used to obtain certain diamines, aminoamides and aminonitriles in which the functional groups are separated by various numbers of methylene groups. The purity of the compounds produced was established by GLC, their structure confirmed by IR and mass spectroscopy. Some of the dihydrochlorides caused symptoms of central nervous system excitation in rats, while others did not influence the behavior or body temperature of the rats. The central analgesic effect and anesthetic effect were studied. None of the compounds had analgesic effect or morphine antagonism, several had an anesthetic effect.
References 3 (Russian).
[348-6508]

UDC: 547.491.8.07+088.8

α-CYANAMINO-β,β,β-TRICHLOROETHYLAMIDE OF ACETIC ACID AND SOME OF ITS TRANSFORMATIONS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 5, May 83 (manuscript received 19 Oct 81) pp 323-326

DOVLATYAN, V. V., KOSTANYAN, D. A. and ATURYAN, M. M., Armenian Agricultural Institute, Yerevan

[Abstract] The behavior of α,β,β,β-tetrachloroethylamides of carboxylic acids has not been studied in the cyanamination reaction. The α-cyanamino derivatives thus produced and the products of their transformation may be

interesting as potentially active pesticides. The authors studied this reaction on the example of easily available α,β,β,β-tetrachloroethylamide of acetic acid. Dilute aqueous solutions of acid cyanamide salts with strong alkaline reaction cause two competing reactions; α-oxy derivative hydrolyzis or substitution at the cyanamino group to form α-cyanamino-β,β,β-trichloroethylamide, which do in fact occur when the components are reacted carefully under low temperature conditions. References 6 (Russian).
[348-6508]

UDC 547.491.8.07(088.8)

N-CYANO-N-METHOXYMETHYL(α-ETHOXY-β-CHLOROETHYL-β-CHLORO-α-TETRAHYDROFURYL)-AMINO-SYMM-TRIAZINES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 6, Jun 83 (manuscript received 14 Apr 82) pp 404-407

DOVLATYAN, V. V., GYUL'BUDAGYAN, L. L. and AMBARTSUMYAN, E. N.,
Armenian Agricultural Institute, Yerevan

[Abstract] N-cyano-N-methoxymethyl(α-ethoxy-β-chloroethyl-β-chloro-α-tetrahydrofuryl)amino-symm-triazines were obtained by reacting α-chloroethers with N-potassium-N-cyanamino-symm-triazines. Using 2-N-cyano-N-methoxymethylamino-4,6-bis-isopropylamino-symm-triazine (I) as an example, the structure of these products was verified by an independent synthetic method. Acid hydrolysis of I led to formation of N-hydroxymethyl-N-symm-triazinylurea. References 2: 1 Russian, 1 Western.
[359-7813]

UDC 547.26.118

HYDROLYSIS OF SOME 1,3,2-DIOXAPHOSPHOLANE SERIES CHLOROPHOSPHITES, CONTAINING ALKOXYMETHYL SUBSTITUENTS

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 26, No 2, 1983 (manuscript received 24 Sep 82) pp 102-105

MASTRYUKOVA, T. A., KHABIBULAYEVA, O. K., BUTORINA, L. S., SIDORENKO, V. K., OCHILOV, R. O. and KIMSANOV, B. Kh., Tajik State University imeni V. I. Lenin

[Abstract] Six acid phosphites were produced by the action of water on some chlorophosphites of the dioxaphospholane series and are described. The study showed that 4-alkoxymethyl-2-hydroxy-1,3,2-dioxaphospholanes are acid phosphites with a tetracoordinated phosphorus atom in which the hydrogen atom is directly bound to the phosphorus atom and exist in the form of two stereoisomers. The tendency toward polymerization of these acid phosphites is reduced with the decrease of size of the substituent in position 4 of the phospholane ring. (This paper was submitted by I. V. Numanov, academician TaSSR Academy of Sciences, 12 Sep 82). References 7: 4 Russian, 3 Western. [364-2791]

UDC 543.422.25:541.632:547.1'118

^{13}C NMR SPECTRA OF 5-OXO- AND 5-THIO-5-PHENYL-2,4,6-TRIISOPROPYL-1,3,5-DIOXAPHOSPHORINANE STEREOISOMERS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 28 Jun 82) pp 1309-1313

ARBUZOV, B. A., IL'YASOV, A. V., ZYABLIKOVA, T. A., YENIKEYEV, K. M., YERASTOV, O. A. and ROMANOVA, I. P., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Determination of the spatial structure of cyclic organophosphorus compounds (COC) from ^{13}C NMR spectra is dependent on the angular function of the spin-spin interaction constant and changes in the chemical shift in relation to the orientation of substituents on the phosphorus atom. The 'compression effect' for COC rests on the fact that the chemical shift of

the α, β, and γ carbon atom with an axial orientation on the phosphorus atom is smaller than if they were positioned in an equatorial orientation. Such factors, in conjunction with the effects introduced by intramolecular interactions, went into the analysis of ^{13}C NMR spectra of 5-oxo- and 5-thio-5-phenyl-2,4,6-triisopropyl-1,3,5-dioxaphosphorinane stereoisomers. The results indicated that the most informative factors regarding the relative conformation, configuration and contribution of ring deformation were the spectral parameters which reflected the position of the carbon atoms on the ring and the ipso-carbons of the phenyl group. Furthermore, the value of the direct constant of spin-spin interaction decreased with replacement of the P=O group by the P=S group. Figures 1; references 15: 8 Russian, 7 Western.
[343-12172]

UDC 542.91:547.1'118'161

HEXAFLUOROISOPROPYLIDINE- AND PENTAFLUOROISOPROPENYL DERIVATIVES OF PHOSPHORUS, PART 1: ELECTROPHILICITY OF ALKYL PENTAFLUOROISOPROPENYL-PHOSPHONATES AND REACTIVITY OF PHOSPHORYLHEXAFLUOROISOPROPYL ANIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 1 Sep 82) pp 1353-1359

KADYROV, A. A. and ROKHLIN, Ye. M., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Experimental studies were conducted on the electrophilicity of alkyl pentafluoroisopropylpropenyl phosphonates and the reactivity of phosphorylhexafluoroisopropyl anions which demonstrated that the behavior of these chemicals is similar to that of the esters of pentafluoromethacrylic acid. On interaction with alcohols and carboxylic acids they yield addition productions, while reaction with diethylamine results in the formation of 'vinyl' substitution products, and, with dimethylformamide, in the formation of products in which the CF_2 = group is replaced by the Me_2NCH = group. Mesomeric carbanions obtained by addition of the F^- anion to pentafluoroisopropenylphosphonates readily undergo alkylation; with carbonyl compounds they enter into the Wittig-Horner reaction. References 14: 8 Russian, 6 Western.
[343-12172]

UDC 542.91:541.63:547.1'118

SYNTHESIS AND STERIC STRUCTURE OF 4,6-DISUBSTITUTED 2-BORON-1,3,5-DIOXAPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 14 Jul 82) pp 1374-1379

ARBUZOV, B. A., YERASTOV, O. A., NIKONOV, G. N., ROMANOVA, I. P., ARSHINOVA, R. P, and KADYROV, R. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Studies were conducted on the equilibria of 4,6-disubstituted 2-boron-1,3,5-diozaphosphorinane stereoisomers by means of ^{31}P NMR spectral analysis (2,5-diphenyl-2-boron-1,3,5-dioxaphosphorinane, 4,6-dimethyl-2,5-diphenyl-2-boron-1,3,5-dioxaphosphorinane, 4,6-diisopropyl-2,5-diphenyl-2-boron-1,3,5-dioxaphosphorinane, 2,4,5,6-tetraphenyl-2-boron-1,3,5-dioxaphorphorinane, and 4,6-diisopropyl-2,5-diphenyl-2-boron-5-oxo-1,3,5-dioxaphosphorinane). The substituents were prepared by the reaction of (α-hydroxyalkyl)phenyl phosphines with the anhydride of phenylboric acid. Data on the equilibrium concentrations of the stereoisomers are summarized in tabular form and confirm the stabilizing effect exerted by the boron atom on the structures with axial PhP substituents. Figures 1; references 17: 7 Russian, 10 Western.
[343-12172]

UDC 66.095.253:547.1'118

ALKYLATION OF PRIMARY PHOSPHINE AMINOMETHYL DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 14 Jul 82) pp 1379-1384

YERASTOV, O. A., NIKONOV, G. N., and ARBUZOV, B. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Investigations on the alkylation of aminomethyl derivatives of primary phosphines by alkyl halides showed that only the phosphorus atom of di(phenylaminomethyl)phenylphosphine, N,N-di substituted 5-phenyl-1,3,5-diazophosphorinas and 1,5-diaza-3,7-diphosphacyclooctane is alkylated. In the case of bis(diethylaminomethyl)phenylphosphine both the nitrogen and phosphorus atoms are alkylated. Two moles of the alkylating reagent were added to the phosphorus atom in alkylation of 1,3-di-p-tolyl-5-tolyl-aminomethyl-1,3,5-diazaphosphorinanes. The alkylation products were evaluated on the basis of ^{31}P NMR and IR spectra. References 11: 7 Russian, 4 Western.
[343-12172]

UDC 542.943:547,269.1:547.1'118

CONVENIENT METHOD FOR SELECTIVE OXIDATION OF SULFIDE SULFUR IN ALKYLMERCAPTOALKYL ESTERS OF PHOSPHORUS THIO- AND DITHIO ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 21 Jul 82) pp 1384-1389

MASTRYUKOVA, T. A., ZHDANOVA, G. V., SHIPOV, A. E. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A description is provided of a convenient method for the selective oxidation of sulfide sulfur in S-alkylmercaptoalkyl esters of phosphorus thio- and dithio- acids into the corresponding sulfoxides and sulfones. Detailed data are provided on the use of bromomethyl(carbomethoxymethyl)-sulfoxide for the oxidation of O-ethyl-S-(carbomethoxymethylmercaptomethyl)-methyldithiophosphonate (I), the corresponding monothiophosphonate, metabolite of I produced by hydrolytic detoxication (O-ethyl-S-(carboxymethyl-mercaptomethyl)methyldithiophosphonate), and certain other compounds with a sulfide atom of sulfur. Structures of the resultant sulfoxides and sulfones were confirmed by IR and NMR spectroscopies, with the constants, yields, and results of chemical analysis summarized in tabular form. References 12: 4 Russian, 8 Western.
[343-12172]

UDC 542.938:547.1'118

HYDROLYSIS OF SUBSTITUTED 2-ETHOXY-2-OXO-1-OXA-2-PHOSPHAINDANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 83 (manuscript received 13 Oct 82) pp 1410-1412

BEL'SKIY, V. Ye., KUDRYAVTSEVA, L. A., DERSTUGANOVA, K. A., VALITOVA, L. A., BYKOVA, T. G. and IVANOV, B. Ye., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Description is provided of the synthesis of 2-ethoxy-2-oxo-1-oxa-2-phosphaindanes by the reaction of o-aminomethylphenols with diethyl-phosphorous acid in the presence of triethylphosphite, with subsequent studies on the hydrolysis kinetics of these compounds. In neutral and weakly acidic solutions first order hydrolysis kinetics were followed due to the pseudomonomolecular nature of the process. Depending on the derivative, the energies of activation ranged from 7.86 to 9.40 kcal/mole. The key factors affecting the rate constants were the ester bond and the methylene group. References 9: 7 Russian, 2 Western.
[343-12172]

UDC 542.938:547.1'118

HYDROLYSIS OF DI(p-NITROPHENYL)METHYLPHOSPHONATE IN PRESENCE OF CETYL- AND DECYLAMINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 83 (manuscript received 9 Sep 82) pp 1429-1431

BAKEYEVA, R. F., KUDRYAVTSEVA, L. A., BEL'SKIY, V. Ye., FEDOROV, S. B. and IVANOV, B. Ye., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Investigations conducted on the effects of cetylamine and decylamine on the hydrolysis of di(p-nitrophenyl)methylphosphonate showed that increasing concentrations of the amines increased the rate of hydrolysis at 72.5 and 83°C and pH values of 6.5 and 8.82. These effects were attributed to micelle formation by these amines once a critical concentration was exceeded. In the case of cetylamine, for example, the energy of activation below the critical concentration was 13.7 kcal/mole, and 4-5 kcal/mole above it. Figures 3; references 10: 6 Russian, 4 Western.
[343-12172]

UDC 542.91:547.1'118

PERKOV REACTION OF MIXED BIS(1,1,3-TRIHYDROPERFLUOROPROPYL)ALKYL PHOSPHITES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian, No 6, Jun 83 (manuscript received 9 Sep 82) pp 1432-1434

KONOVALOVA, I. V., OFITSEROV, Ye. N., MIRONOV, V. F. and PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] Description is provided of the synthesis of mixed bis(1,1,3-trihydroperfluoropropyl)alkyl phosphites via the Perkov reaction with tris(perfluoroalkyl)phosphites. Under mild conditions bis(1,1,3-trihydroperfluoropropyl)ethyl phosphite and 1-(dimethylphosphono)-bis(1,1,3-trihydroperfluoropropyl) phosphite reacted with chloral to give stable phosphoranes with the P-C bond and vinyl phosphates. References 10 (Russian).
[343-12172]

UDC 581.1.142+547.426.251+547.426.21

PHYSIOLOGICAL ACTIVITY OF ALKYLBENZILIC DIETHERS OF GLYCEROL

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 26, No 2, 1983 (manuscript received 17 Dec 82) pp 113-116

NIMADZHANOVA, K. N., KIMSANOV, B. Kh., SABIROV, S. S., ABDIRAZAKOV, A. and NIMATOVA, K., Tajik State University imeni V. I. Lenin

[Abstract] Diethers of glycerol containing benzyl and various alkyl radicals were produced in a search for new plant growth inhibitors and a study was made of their physiological effect on cotton, barley and perko [apparently, a Tajik name] seeds. The seed growth inhibitor, maleic acid hydrazide, and seeds soaked in water for 24 hours at room temperature were used as a control. All preparations tested had an inhibiting effect on germination and sprouting energy of cotton, barley and perko seeds. The effect was greatest on cotton and barley seeds but it was weak with regard to perko seeds. The inhibiting action of the preparations was greatest at 0.2 percent concentrations and it decreased in proportion to reduction of concentration down to 0.001 percent. At 0,001 percent, their effect was the same as that of the control. (This paper was submitted by Yu. S. Nasyrov, academician, TaSSR Academy of Sciences, 17 Nov 82). References 6 (Russian). [364-2791]

UDC 665.637.6:621.892.261

EFFECT OF INTRODUCTION METHOD ON EFFICIENCY OF ANTIOXIDANTS IN LITHIUM LUBRICANTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 pp 17-18

SHIBRYAYEV, S. B., FUKS, I. G., TIKHONOV, V. P., BUTOVETS, V. V. and YAROSHEVICH, S. V., Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin; All-Union Scientific Research Institute PK [unknown abbreviation] Petrochemistry

[Abstract] The role of diphenylamine (DPA) and phenyl-β-naphthylamine (PNA) in relationship to the wear and effectiveness of lithium lubricants was investigated. The additives were introduced at the initial stage of thermochemical dispersion of the soap in oil, one minute before the cooling of soap-oil composition, using several options. It was discovered that the concentration of the additives in teh final product depended on the method of their introduction into the system. Portionwise addition of the antioxidants (0.5% at the initial phase and 0.5% just prior to the cooling step) was found to be optimal. Figures 2; references: 5 (Russian, 1 by Western authors).
[352-7813]

UDC 621.892.09:532.783

EFFECT OF LIQUID CRYSTALS ON LUBRICATING PROPERTIES OF MINERAL OILS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jun 83 pp 18-20

GRIBAYLO, A. P., KUPREYEV, M. P. and ZAMYATIN, V. O., Gomel State University

[Abstract] The effect of cholesterol-type liquid crystals form from organic compounds whose molecules have elongated shapes capable of considerable mobility along the interlayer bands. Due to these properties, they are of interest as additives to various lubricants. Several cholesterol

esters were used as additives to lubricants in this study. It was concluded that addition of liquid crystal components to mineral oils improved considerably their lubricating properties; the friction coefficient was lowered along with their wear and the temperature of contacting sufaces. Figures 2; references 9: 8 Russian, 1 Western.
[352-7813]

UDC 662.758:541.123.81

HYGROSCOPICITY OF FUELS CONTAINING WATER-ANTICRYSTALLIZATION ADDITIVES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 pp 22-23

BEDRIK, B. G., USPENSKIY, S. I. and GOLUBUSHKIN, V. N.

[Abstract] Hygroscopicity is one of the most important properties of hydrocarbon fuels; its effect on technical performance under conditions of very low temperatures is significant. The hygroscopicity of fuel under static and dynamic conditions was studied using standard fuel TS-1 without any additives and fuel mixed with ethylcellulose or tetrahydrofurfuryl alcohol in concentrations preventing formation of ice crystals in the fuel. Experimental results showed that the physical stability of fuel with water anticrystalline (WAC) additives depends on their concentration in fuel. To stabilize the phase composition of fuel with the WAC additive, its content must be limited to 0.1% (mass). Figures 2; references 3 (Russian).
[352-7813]

UDC 665.45.032.5

ETHYLENE COPOLYMERS USED AS DEPRESSIVE ADDITIVES TO DIESEL FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 83 p 40

IVANOV, V. I., TORNER, R. V., FREMEL', T. V. and DUSHECHKIN, A. P., All-Union Scientific Research Institute of Petroleum Processing

[Abstract] The mechanism of action of diesel-fuel additives was studied by the X-ray and electron microscopy methods. Specifically, the attention was directed towards the supermolecular structure of ethylene copolymers with butylmethacrylate. For each copolymer its degree of crystallinity, its ability to form supermolecular structures and depressive activity, was investigated. It was shown that the depressive activity was most significant during the transition from ordered crystalline state to the amorphous bond structures. The polar groups of copolymers modify crystalline surface of paraffins, preventing their formation of a spacial framework. This results in lowering of the solidification temperature of diesel fuel.
References 7: 2 Russian, 5 Western.
[352-7813]

UDC: [661.7:547.537]:621.892.28

SYNTHETIC ALKYLBENZENE-BASED LUBRICATING OILS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 83 pp 328-331

PLAKSUNOVA, S. L., IVANOVA, Ye. K., SEREBRYAKOV, B. R. and SHKOL'NIKOV, V. N.

[Abstract] A very brief history is presented of the production of synthetic alkylbenzene-based low-temperature oils by Conoco, Mobil Oil, Gulf Oil and other western firms. The characteristics of several western synthetic oils are presented. The characteristics of the initial alkylbenzenes and methods used for their production are described. The oils are produceddby alkylation of aromatic hydrocarbons with chloroparaffins, disproportionation and realkylation of monoalkylbenzenes or alkylation of aromatic hydrocarbons with higher olefins. A clear trend is reported toward increasing production and application of synthetic oils, with the best production method being alkylation of benzene with higher linear olefins containing 10 to 13 carbon atoms in the chain. References 35: 10 Russian, 25 Western.
[338-6508]

UDC [661.7:547.599.2](047)

METHODS OF PRODUCTION AND USE OF NORBORNENE AND ITS DERIVATIVES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 83 pp 393-398

GRIGOR'YEV, A. A., IOFFE, A. E., SADOVSKAYA, T. P. and DOLGAYA, K. N.

[Abstract] This is a review. Norbornene [bicyclo(2,2,1)-heptene-2], an important monomer for producing polymers used in perfume production, medicine and the food industry, is produced from cyclopentadiene (CPD) or dicyclopentadiene (DCPD) and ethylene in a Diels-Alder reaction at 190-200°C and 9 MPa, with 74% yield. Numerous foreign patents and developments, from such companies as Esso Research and Engineering, Dow Chemical, Japanese and GDR firms, are summarized. The processes are highly exothermic and require olefins that are more than 50% pure. Variations of the processes use aromatic hydrocarbons with boiling points above 100°C. The double bond of some norbornene derivatives is highly reactive and leads to formation of 1,4,5,8-diendomethyleneoctahydronaphthalene. Alkyl-, alkenyl- and alkylidene forms of norbornene are the subjects of intensive study in the USA and Japan, where applications to synthetic rubber production are being sought. Derivatives containing haloids, produced at high temperatures with fluctuating pressure, alkaline metals with various catalysts and diverse processes are being studied by Union Carbide and the Japanese firm Nippon Oil Co to find substitutes for current porous rubbers and other elastomers, and addition of "Norsorex" to other elastomers improves their physicochemical and mechanical properties. Polyesters, polyamides, polyurethanes, polylactones and polyvinyl copolymers and grafted copolymers containing norbornene, with high chemical and heat resistance, have many potential applications. References 117: 14 Russian, 103 Western (chiefly patents).
[358-12131]

UDC: 541.64:539/2+3

ROLE OF POLARITY AND PHYSICAL STATE OF COMPOSITE POLYMER IN ITS STRUCTURAL-MORPHOLOGIC TRANSFORMATIONS UPON EMULSION POLYMERIZATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 270, No 3, May 83 (manuscript received 21 Jun 82) pp 625-628

YELISEYEVA, V. I., TITOVA, N. V., CHALYKH, A. Ye. and MATVEYEV, V. V., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] A study was made of the mechanism of forming particles of composite polymers obtained by two stage polymerization of chloroprene in the presence of various latex polymers. The polarity of the polymers is described by the interphase energy of the corresponding monomers at the boundary with water; the physical state is judged by the difference between glass point and polymerization point. The selected polymer latexes are in the polymerization state in only one physical state, the glassy state, but differ from each other in polarity (PMMA and PSt) or are similar in polarity, value of interphase energy--but one is in a glassy state, the other in a viscous flow state (PMMA and PEA). The difference in behavior of particles of polychloroprene formed in the second stage in the presence of polystyrene and polymethylmethacrylate is apparently related to a difference in polarity of the latex polymers. Due to the great difference in the chemical nature of polystyrene and polychloroprene, the particles of the latter upon flocculation form a separate fraction showing no tendency toward adsorption on the surface of the polystyrene. The behavior of the polychloroprene particles in the presence of PEA particles is different: the polychloroprene particles at the end of the process enter the PEA particles forming a separate phase. Figures 4; references 3 (Russian).
[344-6508]

UDC: 541.64.939.26

DISORDER-ORDER TRANSITION IN BLOCK COPOLYURETHANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 270, No 3, May 83 (manuscript received 28 Apr 82) pp 634-637

LIPATOV, Yu. S., academician, Ukrainian SSR Academy of Sciences, SHILOV, V. V., VORONA, V. V., MATYUSHOV, V. F. and SHEVCHUK, A. V., Institute of High Molecular Weight Compound Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Polyester urethane urea based on polytetramethylene glycol, molecular mass 1000, 2,4-toluylene diisocyanate and cyanoethylated ethylene diamine were studied. Oligomers of three types were synthesized. X-ray studies were performed in copper anode radiation with nickel filter using specimens of identical 1 mm thickness. The structural characteristics

of the systems studied are presented in a table. All of the polyurethanes studied were amorphous in structure. The amorphous nature of the structure allows unambiguous connection of the appearance of low angle reflexes with the formation of an ordered mass of microscopic areas rich in glycol or urethane components. It is possible to observe typical specifics of the transition of disorder to order in this example, characteristic for block systems. This sheds light on the specifics of development of order at the supermolecular level when a critical block length is reached as a result of transition through the phase diagram spinodal. Figures 2; references 12; 2 Russian, 10 Western.
[344-6508]

UDC: 541.64:539.3

STUDY OF PROCESS OF MECHANOTHERMODESTRUCTION OF POLYPROPYLENE IN PRESENCE OF MONOFUNCTIONAL RADICAL-CHAIN REACTION INHIBITOR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 270, No 3, May 83 (manuscript received 1 Nov 82) pp 637-642

ROGOV, Yu. N., DEYUN, Ye. V., ANISIN, V. A., SMIRNOV, L. P. and MANELIS, G. B., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka, Moscow Oblast

[Abstract] A theoretical and experimental study is presented of mechanothermodestruction of polypropylene in the presence of a stable nitroxyl radical. Isotactic polypropylene with $M_v = 5 \cdot 10^5$ and characteristic viscosity in decaline $[\eta_0] = 1.58$ at T = 408 K was used in the work. Films of IPP were prepared from purified powders by pressing at 448K 100 atm on a substrate of cellophane with subsequent cooling in ice water. The films were oriented by local heating at T = 408K. Introduction of the inhibitor at an initial concentration of $4 \cdot 10^{-4}$ mol/kg had no significant influence on durability of creep of specimens. When the concentration was increased, the boundary of action of the inhibitor shifted toward higher stresses. At a concentration of the radical of $8 \cdot 10^{-2}$ mol/kg a significant increase in durability and a decrease in steady creep rate were achieved. Figures 2; references 13 (Russian).
[344-6508]

UDC: 541.68

DESCRIPTION AND MODELING OF STRUCTURAL ORGANIZATION OF FILLER IN FILLED COMPOSITE MATERIALS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 270, No 3, May 83 (manuscript received 15 Jun 82) pp 649-652

TOVMASYAN, Yu. M., TOPOLKARAYEV, V. A., KNUNYANTS, N. N., OSHMYAN, V. G., BERLIN, Al. Al., OLEYNIK, E. F. and YENIKOPOLYAN, N. S., academician, Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Criteria are suggested for description of dispersed filled systems with spherical fillers allowing description, in addition to the mean parameters of the structure, of their deviations from the mean values as well. The mean characteristic of the distribution of the filler selected was parameter α, representing the mean distance between external surfaces of particles of the filler, and thus directly related to the volumetric fraction of filler present. The method suggested involves description not only of the mean characteristics of the structure of dispersely filled systems, but also the characteristics of fluctuation of dispersed phase density. The method and statistical approach described for analysis of the distribution of dispersed filler can be used in analysis of the structure of dispersed systems in metallography, biology, and also in calculating the structural parameters of the distribution of dispersed filler in composite materials not only with spherical fillers, but also with unidirectional fiber fillers. Figures 3; references 7: 6 Russian, 1 Western.
[344-6508]

UDC: 541.64:546.284

STUDY OF INTERACTION OF POLY-N,N'-DIMETHYLAMINOETHYLMETHACRYLATE WITH POLYSILICIC ACID SOLS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 25 Dec 81) pp 1391-1399

YERMAKOVA, L. N., NUSS, P. V., KASAIKIN, V. A., ZEZIN, A. B. and KABANOV, V. A., Moscow State University imeni M. V. Lomonosov

[Abstract] A study was made of the interaction of polysilicic acid (PSA) sol particles with a weak anionogenic polyelectrolyte poly-N,N'-dimethylaminoethylmethacrylate (PDMAEMA). PDMAEMA was obtained by radical polymerization of DMAEMA in benzene solution. Light scattering studies were performed on an FPS-3M scattered light photometer in nonpolarized light at λ = 436 nm. Solutions were depowdered on a centrifuge at 16,000 rpm, 2 hours. The reaction of PSA with PDMAEMA was studied by potentiometric titration. When solutions of PDMAEMA and PSA sol are mixed in weakly

alkaline and neutral media (pH 7-9) phase separation is observed, indicating the formation of insoluble polyelectrolyte complexes (PEC). No significant change in mixture pH is observed under these same conditions. The PEC formed by a weak polybase in alkaline media are significantly enriched in polyamine in comparison with the PEC formed by Q-poly-N-ethyl-4-vinylpyridinium bromide (Q-PVP). This is because in the alkaline media in which the degree of ionization of PDMAEMA is not great, most of the links of the chain of the polybase do not interact with silenol groups of PSA sol and are in loops in the uncharged state. The results of these studies show that the reactions of linear synthetic polybases with PSA sol particles may form either soluble or insoluble polycomplexes depending on medium pH, ionic strength of the solution and composition of polyelectrolyte mixture.
Figures 7; references 10: 6 Russian, 4 Western.
[346-6508]

UDC: 541(64+515):546.21

FORMATION OF QUASISTABLE RADICAL PAIRS EXCHANGED WITH OXYGEN MOLECULE IN POLYMER LAYERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 29 Dec 81) pp 1400-1405

TREUSHNIKOV, V. M, and FROLOVA, N. V., Gorkiy State University imeni N. I. Lobachevskiy

[Abstract] Radicals with certain types of EPR spectra have surprisingly high stability in polymer layers. For example, in polystyrene layers cyclized with natural rubber, polyphenylquinoxalines at room temperature or higher temperatures are retained for many days or even months without significant changes. None of these radicals, particularly peroxide radicals, has such high stability when the others are absent. The authors believe that this phenomenon is related to the establishment of the spatial placement of one radical with respect to the other such that the rate of exchange of molecular oxygen between them significantly exceeds the rate of all other reactions involving the radicals. Since this phenomenon and its explanation may be useful for the development of practical approaches for the control of chemical reactions in the solid state, the present study has used EPR methods to study it further. The results produced bring some clarity to the understanding of the problem. The stability of radicals formed upon photooxidation of 2,6-di-(4-azidobenzylidine)-cyclohexanone in layers of polystyrene, cyclized natural rubber and polyphenylquinoxaline is studied. The changes in spectral line shapes are considered to result from shifting of equilibrium with changing temperature. The analysis indicates that there are pairs of radicals in polymer layers which are replaced by oxygen molecules. The formation of such pairs leads to unusually high radical stability. The formation of stable radicals is not considered a result of decreasing reactivity of the radicals, but rather a result of kinetic effects. Only the reactions of exchange of oxygen among radicals

in pairs can occur due to factors related to kinetic specifics of the rigid matrix. Elimination of these factors leads to rapid death of the radicals. Figures 4; references 5 (Russian).
[346-6508]

UDC: 541.64:539.26

STRUCTURE OF CYCLOLINEAR ORGANOSILOXANES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 30 Dec 81) pp 1406-1412

SHKLOVER, V. Ye., TIMOFEYEVA, T. V., STRUCHKOV, Yu. T. and ZHDANOV, A. A., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences

[Abstract] X-ray structural studies were performed of 8 cyclolinear siloxanes. Conformational calculation of the molecules of 6 of them was performed by the atom-atom potentials method, and Cremer-Pople potentials of 8-membered tetrasiloxane cycles included in the molecules were computed to facilitate comparison of structures. Figures 2; references 21: 17 Russian, 4 Western.
[346-6508]

UDC: 541(64+24):532.78

INFLUENCE OF PRESSURE ON SEED FORMATION DURING CRYSTALLIZATION OF OLIGOESTERS OF DIFFERENT MOLECULAR MASS FROM MELT

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 5 Jan 82) pp 1419-1425

PRIVALKO, V. P. and SHAROV, A. N., (deceased), Institute of High Molecular Weight Compound Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] A study is made of the influence of hydrostatic pressure on the seed formation energy during crystallization of two specimens of oligoester from melts, the molecular masses of which were below and above the critical mass at which a great increase in free energy of formation of crystallization seeds occurs, reflecting the change in structure of the end faces of the seed as a result of transition of the macromolecule from a linear to a folded conformation. The object of the present study was specimens of oligoethylene glycol adipinate with $M_n = 1.7 \cdot 10^3$ and $4.1 \cdot 10^3$. Measurements of the melting isobars at 15,8-112.4 MPa were performed by heating the specimens to 393K, holding for 30 minutes at 15.8 MPa then slowly cooling at the same pressure to 300 K. Crystallization rate decreases with increasing pressure as the energy barrier to seed formation rises. It is shown for the first time that the interphase free energy at the melt-lateral seed face boundary

of crystallization shows a tendency to decrease with increasing pressure, whereas the analogous parameter for the melt-end face seed boundary increases. This explains the increase in energy consumption for the folded structure seed, which crystallizes primarily by folding of macromolecules. Figures 4; references 20: 7 Russian, 13 Western.
[346-6508]

UDC: 541.64;532.2;547.458781

STRUCTURAL CHANGES IN CELLULOSE UNDER INFLUENCE OF DICHLOROMETHANE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 9 Jan 82) pp 1426-1430

MARCHENKO, G. N., MARSHEVA, V. N., KOVALENKO, V. I., BELOVA, Ye. M., KHRAPKOVSKIY, G. M., GUSTOVA, N. G, and SOPIN, V. F., Central Scientific Research Institute of Scientific and Technical Information and Technical-Economic Studies

[Abstract] Specimens of wood-fiber sulfate cellulose and cotton cellulose were used in this work. Chemically pure dichloromethane (DCM) prelimiarily dried over calcium chloride was distilled in a Widmer column. The cellulose was treated in liquid DCM and in DCM vapor for various lengths of time. Sepcimens were studied by IR spectroscopy in the 400 to 4000 cm^{-1} area. The cellulose was prepared for analysis by direct pressing of the fiber at up to 10^9 N/m^2. Radiographs were produced in Cu K_α radiation with a graphite monochromator. Electron photomicrographs of the surfaces of initial fibers, fibers after DCM treatment, a fragment of fibrilar structure before and after DCM treatment and microfibrils of cellulose before and after DCM treatment are presented. The use of DCM as a medium for the conduct of certain heterogeneous reactions on cellulose requires the consideration of the contribution of the aprotic fluid as an activator, loosener, allowing an increase in the accessibility of reactive cellulose hydroxyls. Figures 5; references 12: 7 Russian, 5 Western.
[346-6508]

UDC: 541.64:539.3

STUDY OF VISCOELASTIC BEHAVIOR OF THERMALLY STABLE POLYMERS UNDER CREEP CONDITIONS (USING POLYBENZOXAZOLE AS EXAMPLE)

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 14 Jan 82) pp 1436-1443

BANYAVICHYUS, R. B., BARAUSKAS, A. I., AMBRAZYAVICHYUS, A. V. and ASKADSKIY, A. A., Kaunass Polytechnical Institute imeni A. Snechkus; Institute of Heteroorganic Compounds, USSR Academy of Sciences

[Abstract] Polybenzoxazole (PBO) was used as an example to study the viscoelastic behavior of block thermally-stable polymers under isothermal creep conditions. The creep experiments, throughout the temperature and stress interval possible for this polymer, allowed full description of this area of mechanical usability and comparison of it with the area under stress relaxation conditions. The influence of stress and temperature on the creep process are studied. Analysis of the compliance functions generated reveals two areas with different slopes. The first area has a slight slope, indicating a slow creep rate in the given time interval. This is the interval of comparatively low temperatures. The second area, with greater slope, indicates comparatively rapid creep. By using the temperature-time analogy, the temperature interval of transition between these areas of relatively slow and rapid creep can be determined. Figures 7; references 9 (Russian). [346-6508]

UDC: 541.64:536.7

HEAT OF INTERACTION OF POLYVINYL CHLORIDE WITH PLASTICIZERS: KINETICS OF SWELLING AND PHASE EQUILIBRIUM

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 14 Jan 82) pp 1444-1450

TAGER, A. A., BESSONOV, Yu. S., IKANINA, T. V., RODIONOVA, T. A., SUVOROVA, A. I., EL'BOYM, S. A., Ural State University imeni A. M. Gorkiy

[Abstract] This article presents an attempt to measure the heat of swelling of PVC in various plasticizers over a broad range of concentrations and temperatures considering the kinetics and equilibrium degree of swelling, as well as the physical condition of the polymer. The kinetics of swelling of PVC in plasticizers, phase diagrams of polymer plus plasticizer and glass point of plasticized system were studied. The object of study was type S-70 suspension PVC with $M = 5.5 \cdot 10^4$. The fluids used were cyclohexane and industrial plasticizers: dimethylphthalate, dibutylphthalate, dioctylphthalate, tricresylphosphate, tributoxyethylphosphate, diphenyl-p-tert-butylphenyl-phosphate. Figures 8; references 15: 9 Russian, 4 Western. [346-6508]

UDC: 541.64:54-128.4

CATIONIC DESTRUCTION OF POLYISOBUTYLENE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 17 Jan 82) pp 1451-1457

SANGALOV, Yu. A., MINSKER, K. S., BERLIN, Al. Al., and PROCHUKHAN, Yu. A., Bashkir State University imeni 40th Anniversary of October; Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Thermal and thermocatalytic destruction of polyisobutylene (PIB) were performed in a glass thermostated reactor with a volume of $2 \cdot 10^{-5}$ m^3 in a thin layer of purified polymer to which a solution of $AlCl_3$ or $C_2H_5AlCl_2$+$AlCl_3$ catalyst with alkali metal halides was preliminarily introduced. Kinetic studies of polyisobutylene decomposition were performed by a volumetric method. Reaction of the model radical $(C_6H_5)_3C\cdot$ with $Na[C_2H_5AlCl_3]$ complex were studied by EPR in a toluene solution at 298-323K. Regardless of temperature the content of isobutylene in the thermal decomposition products is not over 20 weight %, the main product of the reaction being heavy (over C_4) hydrocarbons. Thermal destruction of PIB occurs primarily as a statistical-free radical process of macromolecular degradation. The use of specific complex catalysts leads to the formation of cation PIB decomposition centers. Occurrence of cation reactions in the process of PIB destruction significantly decreases the contribution of secondary radical center reactions, leading to an increase in the yield of monomer and the depth of polymer decomposition. Figures 5; references 8: 7 Russian, 1 Western.
[346-6508]

UDC: 541.64:535.39

RELATIONSHIP OF INDEX OF REFRACTION OF RETICULAR EPOXY POLYMERS TO CHEMICAL STRUCTURE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 19 Jan 82) pp 1473-1477

FRIDMAN, Yu. B. and SHCHUROV, A. F., Gorkiy Physical-Technical Research Institute, Gorkiy State University imeni N. I. Lobachevskiy

[Abstract] The great utility of densely cross-linked epoxy polymers makes the problem of determining the interrelationship between their chemical structure and index of refraction for purposes of its prediction quite pressing. The additive approach can be significant in solution of this problem, its use for the prediction of a number of important characteristics having been successful for linear amorphous polymers. The calculation plan for determining the index of refraction was based on the Lorentz-Lorentz equations, the additive principle of determination of molecular refraction and the inherent volume of repeating polymer links, with the assumption of

constancy of the molecular packing coefficient. Experimental results confirming the applicability of this system have been obtained for three aromatic thermally stable polymers as well as a number of structured polymers. In this work, using the additive approach, a study is made of the relationship between the index of refraction and chemical structure of cross-linked polymers based on epoxy monomers and dicarboxylic acid anhydrides in order to predict this important optical characteristic. It is found that compositions based on monomers containing atoms and groups of atoms with high refraction such as sulfur, bromine and aromatic rings have the greatest refracting capability. The results produced indicate that for cross-linked epoxy polymers the index of refraction is unambiguously determined by their chemical structure and can be calculated with good accuracy based on an additive calculation plan. References 18: 16 Russian, 2 Western. [346-6508]

UDC: 541.64:537.311

INFLUENCE OF DISTRIBUTION OF CARBON BLACK ON CONDUCTIVITY OF BINARY MIXTURE OF POLYMERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 25 Jan 82) pp 1483-1489

LIPATOV, Yu, S., MAMUNYA, Ye. P., GLADYREVA, N. A. and LEBEDEV, Ye. V., Institute of High Molecular Weight Compound Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] The principle of localization of filler on the interphase boundary was used to create electrically-conducting compositions using the well-studied mixture of polyethylene and polyoxymethylene and carbon black as the current-conducting filler. Industrial low density PE and POM were used. The filler was highly structured PM-100 black with a density of $1.82 \cdot 10^3$ kg/m^3. The carbon black was introduced by two methods: 1) black was mixed with the powdered POM, the mechanical mixture was extruded at 458K in a laboratory extruder, then the extrudate was crushed and mixed with powdered PE in the ratio necessary to produce compositions with 6 to 18% carbon black; 2) a mechanical mixture of the three powdered components was prepared in the required ratio, then extruded under the same conditions as above. The most significant result in the formation of the composite by dilution of the mother mixture with the second polymer component was a change in distribution of the carbon black from homogeneous to concentration at the boundaries of the mixture components, this process becoming more expressed with a decrease in the content of carbon black in the mixture. By forming the composite so as to produce a branched carbon black structure along the boundaries of the mixture components, high values of conductivity can be achieved with low carbon black content. There is no branched carbon black structure along the boundaries in composites obtained by the second method, even though the composition is the same as for products with branched structure achieved by the first method. Concentration of carbon black at

the interphase boundary can achieve a conductivity 10^6 times greater than that achieved by method 2. Figures 3; references 20: 19 Russian, 1 Western. [346-6508]

UDC: 541(64+15):547.422

STUDY OF RADIATION CHEMICAL POLYMERIZATION OF EPICHLOROHYDRIN IN PRESENCE OF DIPHENYLIODONIUM BOROFLUORIDE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 7, Jul 83 (manuscript received 10 Feb 82) pp 1505-1509

KOZLOV, A. A., DOROSHENKO, V. N. and MELESHEVICH, A. P., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Ukrainian SSR Academy of Sciences

[Abstract] A study is described of the specifics of radiation chemical polymerization of epichlorohydrin (ECH) in the presence of diphenyliodonium borofluoride (DIBF). The monomer, purified by double distillation and dried on NaX molecular sieves, contained 0.1% H_2O and 1% dichlorohydrin. Irradiation of DIBF and ECH solutions at 0.005-0.1 mol/l was performed using ^{60}Co gamma radiation, dose 7-50 Gr/s. The index of refraction was determined. The yield of polymer was evaluated gravimetrically after removal of the liquid and gaseous products in a vacuum. IR spectra were recorded on a UR-20 spectrophotometer, UV spectra on a Specord UV-VIS spectrophotometer. The molecular mass of the polyepichlorohydrin (PECH) was determined cryoscopically in benzene. The polymer yield was foundtto increase with increasing absorbed dose in ECH and ECH+BIFD to a varying extent. In pure ECH a linear variation of polymer yield as a function of dose was observed. In the monomer with DIBF, the polymerization rate in the intial period was greater than in the pure monomer, at doses over 0.02 MGr a significant increase in polymer yield was observed, reaching a practically constant value at 0.3-0.4 MGr. Quantitative characteristics of the effectiveness of the accelerating action of DIBF on radiation polymerization of ECH occurring by a cation mechanism were produced, and the general regularities characteristic for initiation of polymerization of epoxy compounds with Lewis acids were determined. Figures 4; references 13: 9 Russian, 4 Western. [346-6508]

UDC 66.074.5
66.095.26

EQUIPMENT FOR PURIFICATION OF GAS-VAPOR MIXTURES IN PRODUCTION OF POLYMER MATERIALS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 7, Jul 83 pp 44-47

MALYUTINA, E. D., engineer; TOV, B. G. and SHISHKIN, A. V., candidates of technical sciences

[Abstract] The extent of the ability to purify gaseous-vapor mixtures from liquid or solid impurities is the crucial property of equipment used in synthesis of polymers often determining whether a certain machine could be used effectively in production. Industrial production of polymers employs wet and dry methods of purifying gas-vapor mixtures. In this paper patent literature for a number of such purifiers or scrubbers is reviewed, stating their operational principles, advantages and shortcomings. It is concluded that further developments in this area will concentrate on equipment working on principles of concurrent action of inertia, gravitational and centrifugal forces. In these units the purification should be coupled with cooling of the vapors; this would facilitate wetting the work surfaces with liquid thus preventing adhesion of polymer particles to the equipment. Figures 7; references 13 (Russian).
[353-7813]

UDC: 541.6:539.55

INFLUENCE OF LOW MOLECULAR WEIGHT ELECTROLYTES ON CHARACTERISTIC VISCOSITY OF SOLUTIONS OF GRAFT COPOLYMERS OF POLYVINYL ALCOHOL WITH POLYVINYL PYRIDINE OXIDE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83 (manuscript received 29 Jul 82) pp 21-23

SAGDIYEVA, Z. G., NURGALIYEVA, F. F., TASHMUKHAMEDOV, S. A. and TILLAYEV, R. S., Tashkent Order of Labor Red Banner State University imeni V. I. Lenin

[Abstract] A study was made of graft copolymers of polyvinyl alcohol with polyvinyl pyridine oxide (PVA-PVPO) containing 6.95% and 7.42% nitrogen produced by oxidation of PVA-poly-4-vinylpyridine copolymers, synthesized by simultaneous irradiation of a mixture of PVA with 4-VP monomer in a methanol-water mixture, with various polymer and monomer ratios. Characteristic viscosity was determined on a capillary viscosimeter. It is found that [η] of the graft copolymers varies as a function of copolymer composition, nature of low molecular weight electrolyte and the influence of electrolyte anions on aqueous solution structure, which can be ordered in the

sequence $Cl^- > I^- > OH^- > SO_4^{2-}$. The role of the electrolyte in changing viscosity is apparently not only specific interaction with functional groups of the copolymer, but also its influence on solvent structure. Figures 4; references 8: 5 Russian, 3 Western.
[342-6508]

UDC: 541.64:539.2

PRODUCTION OF GRAFT COPOLYMER OF CELLULOSE WITH POLYVINYL FLUORIDE BY CHEMICAL METHOD

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83 (manuscript received 25 Dec 81) pp 40-42

YUL'CHIBAYEV, A. A., USMANOV, S. N, and YUL'CHIBAYEVA, S. G., Tashkent Order of Labor Red Banner State University imeni V. I. Lenin

[Abstract] A study was made of the kinetics of synthesis of a graft copolymer of cellulose with vinyl fluoride by a chemical method in the presence of an aqueous solution of cerium ammonium nitrate (CAN). Cotton (108F) fiber was modified by boiling in 2% caustic soda, extraction with eithyl alcohol and washing with distilled water. The fluorine-containing monomer was vinyl-fluoride. The cotton fiber was activated by swelling in water for one hour, then pressed and held inaa $5 \cdot 10^{-3}$ mol/l solution of initiator for one half hour, then the specimen was placed in an ampule, 1 ml of $1 \cdot 10^{-2}$ mol/l nitric acid added and the vinyl fluoride condensed with a vacuum dosing apparatus. The monomer was degassed to a residual pressure of $1 \cdot 10^{-3}$ Torr, the ampule sealed and thermostated at the graft polymerization temperature for various time intervals. Formation of graft copolymer was established on fluorine content, determined by combustion. The possibility was demonstrated of graft polymerization of vinyl fluoride with cotton cellulose in the presence of CAN. The kinetics of the reaction were studied at 0 to 60°C. At 0°C the reaction does not occur. The yield reaches a maximum at 30°C, then decreases at 60°C. Figures 2; references 5 (Russian).
[342-6508]

UDC: 541.64:542.952

SYNTHESIS AND STUDY OF COPOLYMERS OF ALLYL BROMIDE AND ACRYLONITRILE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83 (manuscript received 31 Jul 81) pp 42-44

SAFAYEV, U. A., RAKHMATULLAYEV, Kh., DZHALILOV, A. T., Tashkent Order of People's Friendship Polytechnical Institute imeni Abu Raykhana Beruni

[Abstract] A study was made of radical copolymerization of allyl bromide with acrylonitrile. Copolymers were synthesized containing the bromomethyl group which easily entered various chemical reactions. Allyl bromide was dried over $CaCl_2$ and twice distilled at atmospheric pressure. Double distilled acrylonitrile was also dried over $CaCl_2$. The initiators used were benzoyl peroxide and azoisobutyric acid dinitrile, purified and freshly crystallized. Copolymerization was performed in mass in ampules and in the presence of solvents in a dilatometer at 40, 50 and 60°C. The copolymers produced were dissolved in dimethyl formamide and precipitated with isopropyl alcohol, then dried in a vacuum at room temperature to constant weight. Compositions of the purified copolymers were determined by elemental analysis and IR spectroscopy. The primary factor determining the yield of copolymer is the composition of the initial mixture. Increasing temperature helps to increase the yield of copolymer. The activation energy is 70.124 kJ/mol. With increasing concentration of initiators, the rate of copolymerization increases and the characteristic viscosity decreases. The thermal stability of the copolymers synthesized was studied by differential-thermal analysis. For comparison, a derivatogram was taken of polyacrylonitrile (PAN). At 400°C, mass loss of PAN was 20%, of its copolymer with allyl bromide--12%. Figures 3; references 4 (Russian).
[342-6508]

UDC 678.744:678.01:53

POLYDIACETYLENES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 6, Jun 83 (manuscript received 8 Sep 82) pp 356-370

VINOGRADOV, G. V. and MATNISHYAN, A. A., Armenian Branch of All-Union Scientific Research Institute "IREA", Yerevan

[Abstract] Polymerization of diacetylene monomers is reviewed in three subheadings: polymerization mechanism of diacetylenes (DA), optical properties of poly-DA and their electrophysical characteristics. Polymerization of DA is initiated thermally, under pressure, or through such initiators as UV, X-rays, various halides, ozone and other active gases. A high temperature coefficient of polymerization rate is noted coupled with an autocatalytic process or an asymptotic one. In the autocatalytic process,

a long induction period takes place (up to 60 days). The reaction is over when 100% conversion of the reagents has occurred. In the induction phase, oligomers are formed in which the distance between the monomers is shortened leading to a stressed state which eventually is relaxed by a rapid polymerization. Considerable changes in EPR adsorption spectra occur during polymerization of DA. The characteristic phenomenon of poly-TS absorption spectra of completely or partially polymerized samples is that at low temperatures the number of lines is doubled in comparison to that observed at room temperature. Concerning electroconductivity, poly-DA are dielectrics. The absolute value of the photocurrent of poly-DA depends on the monomer and is linearly related to light intensity. References 151: 7 Russian (1 by a Japanese author), 144 Western.
[359-7813]

UDC 621.384.326.225.36

ELECTRON RADIATION DOSIMETRY OF MOVING OBJECTS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 83
(manuscript received 31 Mar 83) pp 12-15

STRAKOVSKAYA, R. Ya., SHLAPATSKAYA, V. V, and P'YANKOV, G. N., Institute of Physical Chemistry, UkSSR Academy of Sciences

[Abstract] Methods for determining the absorbed radiation dose in objects being moved under an electron beam are described and discussed with consideration of linear uniform motion, rotation and spiral motion of the surface of the objects in the radiation field. Calculated ratios, used for preliminary determination of irradiation regimes during radiation processing of objects with such shapes are presented and discussed. The use of the formulas presented for preliminary calculation of radiation processing regimes is especially effective when dealing with large articles.
Figures 3; references 6: 5 Russian, 1 Western.
[356-2791]

UDC 621.039.531+621.039.616+539.12.04

HELIUM BLISTERING OF AMORPHOUS METAL ALLOYS

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 8, Aug 83
(manuscript received 7 Dec 82) pp 23-27

AFRIKANOV, I. N., GUSEVA, M. I., IVANOV, S. M., KOVNERISTYY, Yu. K., MANSUROVA, A. N., MOLOKANOV, V. V., RYAZANOV, A. I. and SHIRYAYEV, P. P.

[Abstract] Studies on radiation-induced metal corrosion have been expanded to include the effects of helium ions on the surface microstructure of amorphous alloys such as $Co_{54}Ni_{15}Fe_5Si_6B_{10}$(I), $Fe_{40}Ni_{40}B_{20}$(II), and $Ti_{66}(Cu+Ni+Si)_{34}$(III). At temperatures below 0°C the samples were exposed to 40 keV He^+ with current densities varying from 5 to 100 mcA/cm^2 of target surface and dosages ranging from 5×10^{17} to 2×10^{18} He^+/cm^2. No surface damage occurred at a current density of 5 mcA/cm^2 and a maximum dose of 10^{18} He^+/cm^2, although under analogous conditions crystalline

alloys sustain blistering. However, with a current density of 5 mcA/cm^2 and a dose of 2 x 10^{18} He^+/cm^2 II developed blisters ranging from 1 to 6 mc in diameter at a density of ca. 3.7 x 10^6 per cm^2, with 10% of the largest blisters showing flaking. In the case of I, a blister density of 5.6 x 10^6 per cm^2 was observed; the size range was 1 to 9 mc and ca. 5% of the blisters showed flaking. Observations on III showed that 50% of the surface was flaking, while the rest of the surface contained blisters 0.5-8 mc in diameter at a density of ca. 1.3 x 10^6 cm^{-2}. The amorphous alloys under investigation were shown to be considerably more resistant to radiation-induced corrosion than the crystalline alloys usually employed at nuclear power plants. Figures 3; references 10: 4 Russian, 6 Western.
[373-12172]

UDC: 541.15+547.211+546.21

INFLUENCE OF SURFACE ON RADIATION CHEMICAL OXIDATION AND DECOMPOSITION OF METHANE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 5, May 83 (manuscript received 15 Jun 81) pp 279-286

MANTASHYAN, A. A. and ADILKHANYAN, D. M., Institute of Chemical Physics, Armenian SSR Academy of Sciences, Yerevan

[Abstract] Results are presented from studies of the oxidation of methane in ampules filled with glass packing or silica gel. It was assumed that energy would be effectively absorbed by the solid body and transmitted to the gas molecules by development of active defect centers and excited states on the surface of the solid bodies. The CH_4-O_2 reaction mixture was irradiated at 90.6 kPa in ampules of molybdenum glass with ^{60}Co gamma radiation, dose rate 0.5·10^{13} eV/cm^3·s. The specimens were irradiated at room temperature under static conditions in ampules with no packing, glass packing and silica gel. Results showed that in addition to hydrogen, ethane and ethylene, a number of oxygen-containing products were formed. The presence of oxygen increases the yield of ethylene, which is also increased by filling the ampules with silica gel. Reaction formulas are suggested and kinetic cirves of accumulation of CH_3OOH and CH_2O [sic] and consumption of methane are presented. The presence of the glass packing did not change the yield of the products H_2, CH_3OH, C_2H_5OH, CH_3CHO; the change in yield of C_2H_4, CH_2O, C_2H_6, CH_3OOH and the appearance of CO_2 resulted from the surface effects. Gamma irradiation of packing without the reaction mixture present did not result in the formation of stable defects on the surface of the silica gel. Figures 2; references 4: 2 Russian, 2 Western.
[348-6508]

UDC 678.028.1/.4.4

VULCANIZATION OF BUTADIENE-NITRILE RUBBER IN PRESENCE OF AMMONIUM THIOCYANATE

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 83
(manuscript received 16 Jan 82) pp 20-23

BLOKH, G. A., ZORINA, V. B. and DUPLYAKIN, V. D., DKhTI (not further identified)

[Abstract] A study of the effectiveness of ammonium thiocyanate, in an optimum composition, as a vulcanizing agent in production of butadiene-nitrile rubber showed it to be as effective as captax with regard to some properties and superior to captax with regard to heat-stability, resistance to oleic acid and water. The high effectiveness of the use of ammonium thiocyanate and altax in vulcanization of butadiene-nitrile rubber was shown and discussed. Regression equations were used to determine optimal batching of components. Comparison of properties of vulcanized rubbers produced in the presence of hydrogen xanthanate and in the presence of ammonium thiocyanate and hydrogen xanthanate showed the superiority of the second system with regard to strength, elasticity and resistance to acids but inferiority with regard to tensile strength. The use of ammonium thiocyanate with hydrogen xanthanate made it possible to decrease the amount of zinc oxide from 5 to 3 parts by weight and the amount of hydrogen xanthanate from 2,3 to 1.6 parts by weight. Figure 1; references 4 (Russian). [356-2791]

UDC: 552.55:678.016.3

RUBBER FILLER FROM NATURAL OPOKA-TYPE CLAY

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83
(manuscript received 10 Apr 81) pp 72-73

KHAMIDOV, B. N., MAL'TSEV, V. V. and ARIPOV, E. A., Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] Rubber compositions were prepared containing SKB-35 Rsmz raw rubber, sulfur, captax, thiuram, zinc oxides, stearin, linoleum powder, wood pulp powder, vaseline oil, kaolin, chalk and opoka-like clay in various ratios. The opoka-like clay was used to replace chalk and kaolin. Experimental specimens prepared using the clay were equal in physical and mechanical properties to series-produced specimens using chalk and kaolin. Experimental specimens were superior in elongation to the series-produced specimens. References 5 (Russian).
[342-6508]

UDC 628.3:725.42:66

STUDY OF EFFLUENT WATERS OF CHEMICAL REAGENTS PLANT

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 7, Jul 83
pp 18-20

ZHIL'TSOV, V. M., candidate of technical sciences, State Planning Institute for the Planning of the Medical Equipment Industry

[Abstract] A study of the chemical and bacteriological indicators and the salt composition of the Donets Chemical Reagents Plant effluent waters showed them to be toxic but mixing them with municipal waste waters in specific ratios made them harmless. The effect of these waste waters on the action of adapted sludge and on hydrobionts of adapted active sludge was studied with the aid of an experimental semi-industrial water-treatment device with an aeration oxidizer and an air tank. This device is illustrated and the method of operating it is described and discussed. The studies showed that a mixture of the plant waste waters and municipal waste waters in a 1:4 ratio can be considered to be biochemically pure. After biochemical purification and tertiary treatment on sand filters, these waters can be returned to the water supply system. Figure 1; reference 1 (Russian). [361-2791]

UDC 628.3:665.6/7:615.874.9

ASSESSMENT OF TOXICITY OF COMPONENTS OF PETROCHEMICAL PRODUCTION EFFLUENT WATERS

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 7, Jul 83
pp 26

GYUNTER, L. I., doctor of technical sciences, Scientific Research Institute KVOV (not further identified) [Kuybyshev water purification installation?]; SHATALAYEV, I. F., engineer and BAKULIN, N. D., candidate of medical sciences, Kuybyshev Medical Institute

[Abstract] The degree of toxicity of industrial waste waters was determined by use of a modification of a method of determining dehydrogenase activity of

sludge. Typical impurities found in petrochemical industry waste waters were studied, including phenol, ortho-cresol, pyrocatechin, resorcinol, hydroquinone, 1-naphthol, 2-naphthol, sulfosalicylic acid, aniline, pyridine and quinoline. The toxic effect of these components on active sludge depended upon the structure and concentration. The degree of toxicity of these components for active sludge was discussed. This information made it possible to determine the degree of preliminary purification of waste waters required before returning the waters to the municipal sewage system and helps to improve operation of municipal water treatment installations. Figures 2; references 3 (Russian).
[361-2791]

UDC: 662.74:628.543.563:628.356

IMPROVEMENT OF METHOD OF DETERMINING BOD_5 IN COMBINED BIOLOGICAPURIFICATION OF DOMESTIC WASTE AND PHENOL WATERS FROM COKE CHEMICAL PRODUCTION

Moscow KOKS I KHIMIYA in Russian No 7, Jul 83 pp 50-51

GORELIK, B. S. and VERBIN, V. A., Central Design and Testing Laboratory, "Ukrpromvodchermet" Production Association

[Abstract] It is difficult to determine BOD_5 in combined domestic waste and phenol waste waters due to the highly developed process of nitrification, which continues during incubation. The authors used a type I-7 air analyzer produced by the Horiba company of Japan to determine the oxygen content. The device indicated that addition of ethylene thiourea or thiourea to the water caused the concentration of nitrites during the incubation period to change little, remaining within the limits of the norm, This indicates that all the oxygen is essentially expended in oxidation of organic matter. References 6 (Russian).
[350-6508]

UDC: 628.349

USE OF HIGHER OXIDES OF NICKEL AS OXIDANTS IN PURIFICATION OF WASTE WATER

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 83 pp 341-344

KOZHEMYAKINA, I. N., PLEKHOTKIN, V. F. (deceased), and LODYGINA, L. S.

[Abstract] Results are presented from the development of a new chemical method of decontamination of waste water using hydrates of higher nickel oxides as oxidizing agents. The hydrates are mixtures of nickel hydroxides of various valences formed by the action of sodium hypochlorite or other oxidizer on nickel hydroxide. The hydrates have greater oxidation-reduction potential than other known oxidants, and are also known to catalyze many

oxidation and decomposition reactions of organic compounds. The hydrates are practically insoluble in water so that they can be easily separated and reused, decreasing the comsumption of oxidant by a factor of 1.5 to 2 in comparison to the consumption of active chlorine. The method was tested on a pilot scale in a plant with a throughput of 15 to 20 cubic meters per day. The results of the experimental work fully confirmed the laboratory studies. Figures 3; references 11: 6 Russian, 5 Western.
[338-6508]

UDC: 641.64:537.311

ORGANIC SEMICONDUCTORS AND METALS. SYNTHESIS AND PROPERTIES OF POLYAROMATIC COMPLEXES WITH IODINE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 5, May 83 (manuscript received 16 Feb 83) pp 343-344

MATNISHYAN, A. A., GRIGORYAN, L. S. and SHAROYAN, E. G., Armenian Branch, "IREA" All-Union Scientific Research Institute, Yerevan; Institute of Physical Studies, Armenian SSR Academy of Sciences, Ashtarak

[Abstract] By reacting naphthalene and anthracene with iodine, the authors have produced highly-conductive, thermally-stable, insoluble black-colored products with a metallic shine which according to elemental analysis correspond to the general formula $(ArI_x)_n$. Depending on reaction temperature and reagent ratio, the iodine content in the products synthesized varies from 5 to 30%. The yield of polyaromatic complexes increases with increasing temperature and iodine concentration in the reaction system. References 4 (Western).
[348-6508]

UDC: 666.11.01

CRYSTALLOCHEMICAL ASPECTS OF VARIATION OF MICROHARDNESS OF GLASSES WITH COMPOSITION

Tashkent UZBEKSKIY ZHURNAL in Russian No 3, May-Jun 83 (manuscript received 23 Jun 82) pp 26-30

KASYMOVA, S. S., MILYUKOV, Ye. M. and PETROVSKIY, G. T., Tashkent Medical Institute

[Abstract] The literature contains no information on the microhardness of phosphate glasses. This article reports studies of the variation of microhardness of these glasses and others as a function of composition. A diamond pyramid was used to measure the microhardness of silicate, borate, germanate and phosphate glasses in binary and trinary systems containing the oxides of elements of groups I, II and III of the periodic table.

Selective chemical analysis indicated that the variation of the analytic composition from the synthetic did not exceed 1 mol.%. Glasses containing alkali and thalium oxide have the least microhardness, those containing the cations of trivalent metals have the greatest. Glasses containing oxides of lead, cadmium and zinc do not follow the general regularity of variation of hardness as a function of composition. These disruptions of the variation of microhardness as a function of stress field can be explained by differences in the structure of the outer electron shell of the cations. A rapid increase in microhardness of binary alkali borate glasses is observed in the 85-100 mol.% B_2O_3 area, which is explained by its correspondence to the area of accumulation, related to the transition of boron atoms from a trinary to a quaternary coordination state. The microhardness of silicate, borate, germanate and phosphate glasses is thus determined by purely crystal chemical factors--radius and charge of ions, their packing (coordination) and polarization. Figures 4; references 15: 12 Russian, 3 Western. [342-6508]

CSO: 1841 - END -