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Science & Technology
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Theoretical Study of Reactions of Molecular Hydrogen With Active Sites in $B_nH_{n-1}^-$ Clusters

937M0129B Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 37, No 10, Oct 92 (manuscript received 12 Jul 91) pp 2355-2362

[Article by A. M. Mebel and O. P. Charkin, New Chemical Problems Institute, Chernogolovka; UDC 539.194]

[Abstract] Previously conducted non-empirical SSP-calculations of potential surface demonstrated the absence of a barrier along the shortest possible route in the reaction of hydrogen molecules with the active site B^* in the cluster $B_6H_5^-$ obtained from closo-borane $B_6H_6^{2-}$ by splitting off H^- from a boron atom. In the present work non-empirical calculations were made on the SSP/4-31G approximation of segments of the potential surface on the shortest possible reaction route of hydrogen with various active sites in clusters $B_5H_4^-$ and $B_7H_6^-$. The active triple-coordinated $B_{(3)}^*$ atom and the quadruple-coordinated $B_{(4)}^*$ inculcate the H-H bond with no barrier, while the reaction of hydrogen with $B_7H_6^-$ with an active penta-coordinated $B_{(5)}^*$ has a barrier of about 9.3 kcal per mole. A previously proposed model (based on canonical molecular orbitals) making it possible to estimate the presence of a barrier on the potential surface of the shortest possible route in the rupture of the H-H bond at the active site, may be used also for active sites having various coordination numbers and clusters. Figures 4; references 9 (Russian).

Theoretical Study of Reaction of Inculcating Active Site in Cluster in C-H and C-C Bonds

937M0129C Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 37, No 10, Oct 92 (manuscript received 12 Jul 91) pp 2363-2374

[Article by A. M. Mebel, O. I. Charkin, and Ye. V. Strunina, New Chemical Problems Institute, Chernogolovka; UDC 539.194]

[Abstract] In a previous work it was demonstrated that clusters without barriers (or very low barriers) are capable of being inculcated in the H-H bond. This property markedly distinguishes active cluster atoms from valence-unsaturated atoms B, Al, C, or Si in the simplest hydrides or halides such as BX, AlX, CX_2, or SiX_2 where the shortest possible reaction route with hydrogen is forbidden owing to the high barrier associated with displacing an unshared pair in the active site. In the present work non-empirical calculations were carried out in SSP/4-31G approximation of potential surface segments of the shortest possible reaction route of $BH + CH_4 = BH_2CH_3$, and three other borane reactions involving inculcation of the B atom in the BH molecule and the active site B^* in the $B_6H_5^-$ cluster at the C-H and C-C bonds. It was demonstrated that during inculcation of a B atom in a cooperating covalent bond in a cluster, its inculcation barrier in the C-H and C-C bonds is diminished significantly, but not completely as in the H-H bond. This result is rationalized on the basis of structural analysis of canonical molecular orbitals of reagents and reaction products using a previously proposed model of the active site in a cluster. Figures 5; references 11: 10 Russian, 1 Western.

Structural and Catalytic Characteristics of ZVM Zeolites During Intermediate Stages of Crystallization

937M0124A Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 10, Oct 92 (manuscript received 30 Jul 91) pp 2708-2711

[Article by L. Ye. Latysheva, V. V. Chenets, I. V. Diss, S. E. Kopylov, I. N. Nikiforova, K. P. Zhdanov, G. V. Lobza, Institute of Petro- and Coal-Chemical Synthesis, Irkutsk State University; UDC 549.67:541.28]

[Abstract] The goal of this study was to obtain more detailed data on structural changes occuring during the synthesis of ZVM zeolite and on the catalytic properties of the product. The characteristics of the zeolite structure and its aluminum content changed during the crystallization process. In the early stages fine crystals were formed with practically the maximum number of uniformly spaced aluminum atoms. As the crystals grew, the ratio between the Al atoms in the elementary cells of the lattice and the total content of aluminum changed while the structural defects increased. At the final stage of crystallization the aluminum content in the lattice dropped to 2.1%. Samples with a 60-75% crystallinity phase exhibited the highest selectivity in disproportionation of ethylbenzene to diethylbenzene. A higher percentage of the crystalline phase led evidently to side reactions resulting in a lower yield of diethylbenzene. Tables 2; figures 3; references 6: 4 Russian, 2 Western.

What Type of Aerosol Thermophoresis Experiments Are Needed Now and Why

937M0125A Moscow KOLLOIDNYY ZHURNAL in Russian Vol 54 No 5, Sep-Oct 92 (manuscript received 14 Apr 92) pp 39-42

[Article by S. P. Bakanov, Institute of Physical Chemistry, Russian Academy of Sciences, Moscow; UDC 541.182.2/.3]

[Abstract] Thermophoresis is characterized by two parameters of length dimensions: characteristic units of non-uniformity of gas temperature and dimensions of particles subjected to the effect of non-uniformly heated gas. Hence, two non-dimensional parameters exist in thermophoresis, the so-called Knudsen numbers, determined by the ratio of the length of free run of gas molecules λ to each of these length dimensions. Based on the results of theoretical studies of the thermophoresis phenomenon, two limiting situations are possible: one with small K_n when $\lambda/R > 1$ and one with large K_n when $\lambda/R < 1$. The experiments with high heat conducting bodies with the Knudsen numbers $K_n < k/k_i$ are of special interest. The results obtained from such experiments could prove or disprove current concepts about the mechanism of thermophoresis; they would supplant the Epstein model and play an important role in thermophoresis of high heat conducting bodies. Theoretically, it has been shown that negative thermophoresis is possible only for high heat conducting bodies. The experiments proposed would show in which cases this would hold true in practical situations. References 9: 3 Russian, 6 Western.

Interphase Catalysis in Electrophilic Substitution Reactions. Part 1. Synthesis and Physicochemical Properties of Potential Catalysts for Interphase Tranfer of Electrophilic Reagents

937M0108E Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 58 No 9, Sep 92 (manuscript received 01 Jul 91) pp 798-801

[Article by L.I. Velichko, A.P. Zarayskiy, O.I. Kachurin, N.M. Matviyenko, Z.A. Okhrimenko and N.A. Zarayskaya, Institute of Physicoorganic Chemistry and Coal Chemistry, Ukrainian Academy of Sciences, Donetsk; UDC: 541.128+541.12.012]

[Abstract] The increasing importance of interphase catalysis prompted an investigation on the synthesis and properties of novel catalysts for interphase transfer of electrophilic reagents. The synthetic efforts concentrated on lipophilic bipolar betaine congeners because of their seeming suitability as universal catalysts for nucleophilic and electrophilic reactions. Major efforts were directed at assessment of dimethylalkylcarboxybetaines, N,N-dimethyl-N-lauryltaurobetaine, N,N-dimethyl-N-stearyltaurobetaine, stearyl tauride and tetra-(perfluorophenyl)boranate tetramethylammonium (I), for which critical data are summarized in tabular form. The compound I was of particular interest because of its stability for a month in 55.5% sulfuric acid at room temperature and for 7 days at 55°C. In addition, compound I withstood nitrosination for 16 h at 35°C and oxidation by atmospheric oxygen for 24 h at room temperature. However, its $t_{1/2}$ at room temperature was 3 h vis-a-vis amination and 10 min on hydroxylation. Tables 3; references 9: 5 Russian, 4 Western.

Maximum Relaxation Time/Turnover Time (τ/μ) Ratio in Catalytic Reactions

937M0107B Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 9, Sep 92 (manuscript received 15 Jul 91) pp 2376-2381

[Article by N.I. Koltsov and B.V. Alekseyev, Chuvash State University imeni I.N. Ulyanov, Cheboksary; UDC 541.124]

[Abstract] A mathematical approach is proposed for the evaluation of the maximum τ/μ ratio of open isothermic catalytic systems. The formal analysis dealt with three-stage catalytic systems, and was followed by simplifications to encompass two-stage and expanded to multi-stage systems. Usefulness of information on the maximum τ/μ value rests on its application to assessment of catalytic rate constants and reaction mechanisms. Figures 2; tables 1; references 7: Russian.

Optimization of Catalyst Grain Size in Sewage Treatment

937M0103B Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 04 Sep 91) pp 667-669

[Article by A.B. Shilshut, Sh.T. Karimov and M.P. Yunusov, All-Union Scientific Research Institute of Chemical Technology of the Medical Industry, Tashkent; UDC 628.543.349:541.547]

[Abstract] Mathematical analysis was conducted on the performance of IK-12-72 catalyst used in sewage treatment for oxidation of organic pollutants. The basic purpose was to optimize grain geometry for maximum surface area under operational conditions in order to ensure catalytic efficiency. The results showed that for complete oxidation of acetone the optimum grain size was 1.5 mm, in a system consisting of a 1.4 m x 2.6 m reactor containing 1.8 mm^3 of catalyst with a flow rate of 1.5 m^3. Tables 1; references 3: Russian.

Effective Heat Conductivity of Hydrocarbon Conversion Catalyst

937M0099C Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 5, May 92 pp 298-299

[Article by D. L. Astanovskiy, V. P. Kiyashova, S. I. Glumova, T. A. Semenova, and S. Kh. Yegeubayev; UDC 536.2]

[Abstract] One of the most widely used methods for preparing hydrogen and synthesis gas for ammonia production is catalytic conversion of hydrocarbons. Either in the vapor phase in pipe furnaces, or as vapor-air mixtures in shaft furnaces, the endothermal hydrocarbon conversion reactions require an external heat supply. In pipe furnaces this is brought about through the walls of the pipes by burning a fuel gas in the space between the pipes, while in shaft furnaces a part of the hydrocarbon stock is burned in the reactor directly above the catalyst bed. Since hydrogen and ammonia production units have become widespread throughout industry, the problem of rational utilization of energy for this units has become urgent. Other than the activity, selectivity, heat resistance, mechanical strength, and hydraulic resistance of the catalyst, a limiting factor in intensification of the catalytic conversion of hydrocarbons with steam is the supply of the necessary amount of external heat to carry out the process and to maintain a uniform temperature field within the catalyst bed. In the present work the heat conductivity of pelletized hydrocarbon conversion catalysts was determined. Cylindrical shaped catalyst pellets were prepared, calcined, and impregnated with nickel and aluminum nitrates, after which effective heat conductivities were determined and listed. References 5 (Russian).

Development and Model Testing of Method for Catalytic Treatment of Gases Containing Acrylonitrile

937M0099B Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 5, May 92 pp 273-275

[Article by V. M. Vlasenko, S. A. Solovyev, G. M. Belokleytseva, S. A. Marusyak, and V. Ya. Volfson; UDC 66.074.385]

[Abstract] The ventilation gases from enterprises producing objects made from plastics such as ABS, frequently contain highly toxic acrylonitrile. To detoxify these gases, various methods based on adsorption, absorption, and catalysis have been developed. However, the first two methods are characterized by having low productivity in periodic or batch mode, and a further complication resulting from having to treat secondary toxic products produced during the treatment process itself. While catalytic processes have high productivity and may be run in continuous mode, they require high temperatures. A combined adsorption-catalytic method has been recommended which consists of chemosorption of the toxic ingredients on the catalyst surface at room temperatures followed by periodic short-term regeneration of the catalyst in air at 250-300°C where the adsorbed impurities are oxidized on the catalyst surface and the reaction products are desorbed into the gas phase. This method has been used successfully to treat ventilation gases containing phenol, formaldehyde, styrene, and other organic substances using a manganese oxide catalyst (MKP-1) developed at the Physical Chemistry Institute imeni L. V. Pisarzhevskiy, and in the present work a study was made of the possibility of using this catalyst to treat acrylonitrile. Positive laboratory results led to model testing at a plant in Zaporozhye producing ABS products and having a vented air output of 250 m^3 per hour. The tests demonstrated that both the MKP-1 catalyst and a palladium-manganese catalyst (PMK-0.25) fully remove acrylonitrile at 160-180° C and 10,000 hourly space velocity. The catalysts may be recommended for practical utilization because they contain only slight amounts of noble metal (palladium). Figure 1; references 9: 6 Russian, 3 Western.

Effect of Modification With Tin and Antimony Compounds on Acidity of Cracking Catalysts

937M0098A Moscow NEFTEKHIMIYA in Russian Vol 32, No 4, Jul- Aug 92 (manuscript received 20 Dec 91) pp 299-302

[Article by E. A. Karakhanov, Ye. A. Viktotova, S. V. Kardashev, and S. V. Lysenko, Moscow State University imeni M. V. Lomonosov; UDC 66.092.4:66.097.36+66.092.4.7.385]

[Abstract] One of the most pressing problems in oil refining is the deactivation of cracking catalysts by deposition of heavy metals such as nickel and vanadium present in the bottoms stock. This poisoning causes a drop in the yield of the desired product, gasoline, and an increase in the formation of side products, coke and hydrogen. It was reported previously that this type of catalyst deactivation is accompanied by an increase in its acidity. The total acidity of a poisoned catalyst may be decreased by modification resulting in a significant improvement in the cracking characteristics as compared with the poisoned catalyst. In the present work a study was made of the acidity of a zeolite cracking catalyst after modification for the purpose of improving its resistance to poisoning with nickel and vanadium. It was demonstrated that modification with tin salts of synthetic fatty acids and antimony naphthenate makes it possible to maintain an acidity spectrum close to that of an equilibrium catalyst with a significant improvement in the basic cracking characteristics for vacuum gas oil as compared with the non-modified samples. Figure 1; references 4: 2 Russian, 2 Western.

Reaction of Methane With Acetylene in Presence of Ziegler-Natta Catalyst

937M0098C Moscow NEFTEKHIMIYA in Russian Vol 32, No 4, Jul-Aug 92 (manuscript received 5 May 91) pp 324-329

[Article by Ye. M. Yefimova, A. P. Moravskiy, and N. F. Noskova, Chemical Physics Institute, Chernogolovka; Organic Catalysis and Electrochemistry Institute, Alma-Ata; UDC 541.128.34]

[Abstract] The preparation of C_3 hydrocarbons by gas-phase interaction of methane-acetylene mixtures in the presence of a Ziegler-Natta catalyst system is being considered as a new non-traditional synthesis route for organic compounds utilizing the by-products of oil refining, natural gas, and coal. In the case of hydromethylation of acetylene with methane, highest yields are obtained by using a catalyst system based on nickel stearate, naphthanate, and naphthene hydroxamate on a nickel hydroxide carrier in conjunction with triethylaluminum, diisobutylaluminum hydride, or sodium bis(2-methoxyethoxy) dihydride aluminate. However, owing to the complexities of the system, the role of methane in the propylene formation process has not yet been fully established. The situation is further complicated by the fact that small amounts of propylene are formed even in the absence of methane. In the present work it was demonstrated that in the reaction of a gaseous mix of methane, acetylene, and hydrogen over a Ziegler-Natta catalyst based on nickel naphthene hydroxamate and carefully purified aluminum-organic compounds, the composition and quantity of products formed have nothing to do with methane present in the system. Experiments with C^{13}-labeled methane show that propane and propylene thus formed do not contain carbon atoms from the initial methane. Figure 1; references 6 (Russian).

Aromatization Kinetics of Light Alkanes Over High Silica Zeolite Catalysts

937M0098B Moscow NEFTEKHIMIYA in Russian Vol 32, No 4, Jul- Aug 92 (manuscript received 14 Mar 91) pp 306-313

[Article by B. L. Vorobyev, A. V. Kravtsov, Yu. N. Koshelev, N. V. Usheva, Ye. I. Smeshanina, and O. Ye. Moyzes, Petrochemical Processes SRI (AU), St. Petersburg; Polytechnical Institute imeni S. M. Kirov, Tomsk; UDC 541.127:542.971.3:547.21]

[Abstract] The aromatization of C_3-C_4 alkanes over Ga-containing zeolite catalysts type ZSM-5 is a new highly selective process for obtaining aromatic hydrocarbons and treating hydrocarbon off-gases. The kinetics of this process is complex because it involves several tens of substances belonging to various homologous series which simultaneously participate in several types of chemical reactions on the surfaces of polyfunctional catalysts. In the present work a study was made of the aromatization kinetics of the above light alkanes over the stated catalysts and a set of chemical reactions is proposed. This served as a basis for a kinetic model for the complex multi-component process which adequately describes the conversions of hydrocarbons and hydrogen. It was demonstrated that high levels of crude conversion and high yields of end products at 793-833 K temperature, and 0.1 MPa pressure are possible when using a butane-enriched mix. Figures 4; references 7: 3 Russian, 4 Western.

Effect of Platinum Surface Area on Activity of Bi-functional Alumina-Platina Catalyst in Synthesis of Alkylimidoazoles From Diamines and Carboxylic Acids

937M0097B Moscow IZVESTIYA AKADEMII NAUK ROSSIYSKOY AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 9, Sep 92 (manuscript received 4 Apr 91, after revision 2 Sep 91) pp 1992-1996

[Article by K. M. Gitis, N.I. Rayevskaya, A. V. Zaytsev, V. Yu. Borovkov, S. B. Kogan, and G. V. Isagulyants, Organic Chemistry Institute imeni N. D. Zelinskiy, Moscow; UDC 547.781.2+66.095.32+546.92]

[Abstract] The synthesis of C-alkylimidoazoles from diamines and carboxylic acids in the presence of bifunctional alumina-platina catalysts has been reported previously. The mechanism of the process consists of intermolecular dehydration in the first two stages followed by dehydrogenation of an intermediate product in a third stage. In the present work a study was made of the effects of the acidic and dehydrogenating functions of the alumina-platina catalyst during synthesis of 2-methylimidoazole from ethylenediamine and acetic acid. It was demonstrated that 2-methylimidoazoline, being the intermediate, is formed by virtue of the acid sites on the alumina, with the reaction rate of its formation exceeding that of its subsequent dehydrogenation into 2-methylimidoazole at the Pt-sites. The changes in yields of 2- methylimidoazole and the Pt surface area in the catalyst are in a symbatic relationship. Figures 4; references 6: 3 Russian, 3 Western.

EPR and ESDO Study of Co, Ni, and Cu States in Composition of Oxide Catalysts Obtained From Activated Aluminum Alloys

937M0097A Moscow IZVESTIYA AKADEMII NAUK ROSSIYSKOY AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 9, Sep 92 (manuscript received 9 Aug 91) pp 1987-1992

[Article by M. A. Ismailov, R. B. Akhverdiyev, E. G. Ismailov, V. S. Gadzhi-Kasumov, V. I. Yakerson, and R. G. Sarmurzina, Organic Chemistry Institute imeni N. D. Zelinskiy, Moscow; UDC 541.128]

[Abstract] In a previous work on phase composition and structure of Co-, Ni-, and Cu-containing catalysts obtained from activated aluminum, it was demonstrated that the presence of Co and Ni as an alloy in activated aluminum in the initial samples determines the X-ray-amorphous nature of Co- and Ni-containing phases at all stages, including heat treatment of hydroxide and oxide systems. In the case of copper alloyed with activated aluminum, partial crystallization of the CuO phase takes place only with heat treatment. Also, the method of preparation by introducing the Co, Ni, and Cu ions to the oxide- or hydroxide-aluminum matrix derived from activated aluminum, has a determining effect on formation of Co_3O_4, $CoAl_2O_4$, or $NiAl_2O_4$ phases after heat treatment. In the present work EPR and ESDO were used to study the valence and coordination states of the above metal ions at various stages of catalyst preparation by both impregnation and heat treating. Prior to heat treating, in Co and Ni catalysts prepared from alloys, it is characteristic for highly dispersed aggregates of M^0 to be formed. With the Cu-containing systems, regardless of the method of synthesis, several types of copper ions are observed, even before heat treatment. Figures 2; references 6: 5 Russian, 1 Western.

Synthesis of Alkylpiperidines From Carbon Monoxide, Hydrogen, and Piperidine Over Iron Catalyst

937M0095D Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 92 (manuscript received 30 Jan 92) pp 115-118

[Article by G. A. Kliger, L. S. Glebov, A. N. Shuykin, and S. M. Loktev, Petrochemical Synthesis Institute imeni A. V. Topchiyev, Moscow; UDC 547.422:542.97]

[Abstract] The feasibility of vapor phase synthesis of N-alkylpiperidines from carbon monoxide, hydrogen and piperidine over promoted iron-containing heterogeneous catalysts has been demonstrated previously. In the present work a study was made of the reaction of carbon monoxide with hydrogen and piperidine over the promoted molten iron catalyst. N-alkylpiperidines having the general formula $C_nH_{2n+1}NC_5H_{10}$, where n = 1-15, were prepared. The most active catalyst contained vanadia and alumina, or chromia and CuO. References 5: 4 Russian, 1 Western.

Alkylamine Synthesis From CO, H_2, and N_2 Over Iron Catalyst

937M0095C Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 92 (manuscript received 30 Jan 92) pp 112-114

[Article by L. S. Glebov, G. A. Kliger, and S. M. Loktev, Petrochemical Synthesis Institute imeni A. V. Topchiyev, Moscow; UDC 547.51+542.941]

[Abstract] The synthesis of organic compounds of nitrogen where the nitrogen-containing group is formed directly from nitrogen has not been well studied. In the present work a theoretical and experimental study was made of the feasibility of direct synthesis of alkylamine from a mixture of CO, hydrogen and nitrogen in the presence of a reduced, promoted, molten iron catalyst. The synthesis was carried out in a system employing two periodically interchangeable reactions in a closed cycle. Nitrogen and hydrogen reacted to form ammonia; CO reacted with more hydrogen to form alcohols, which then reacted with the ammonia to give the alkylamine. Selectivity of the process was 90 percent primary C_4-C_9 n-alkylamine. Figure 1; references 8: 5 Russian, 3 Western.

Liquid Phase Catalytic Oxidation of Organic Dyes in Neutral and Weakly Acidic Media

937M0075F Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 25 Dec 91) pp 2247-2250

[Article by V. G. Isak, A. Ya. Sychev, F. Zukher, S. G. Levitskiy; UDC 541.128 + 541.48 + 547.97]

[Abstract] In an attempt to investigate kinetics and mechanism of oxidation processes of organic dyes in neutral and weakly acidic media, the systems Mn(II)-HCO^--H_2O_2 and Fe^{2+}-H_2O_2 were used. The following industrial dyes were tested: direct rose, light resistant "C"(R); dispersive violet K; blue procyan and direct bordeaux 150. It was established that both of the above systems oxidized effectively the organic dyes listed. The rate of this process increased with increasing concentration of Mn^{2+}, HCO^-, H_2O_2, S and $1/H^-$. Addition of specific OH-radical acceptors lowered the oxidation of S. Overall, an exterior sphere mechanism of the oxidation of S was indicated. Tables 2; figure 1; references 3 (Russian).

Application of Linear Relationship of Free Energies Principle to Prognostication of Retention on Fluoro-Polymer Sorbents

937M0075E Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 10 Sep 91) pp 2235-2239

[Article by N. N. Ulinskaya, N. Ye. Shadrina, V. G. Korsakov, S. S. Ivanchev; UDC 543.544.2:678.743.41]

[Abstract] An attempt was made to use the linear relationship of free energies, usually used in studies of the reactive ability of low molecular compounds, to investigate the mechanism of the reaction of fluoro-polymers with adsorbents and to try to predict the retention parameters. Three groups of sorbents were used: 1) those based on copolymers of tetrafluoroethylene with ethylene, trifluorochloroethylene with ethylene and vinylidene fluoride with hexafluoroisobutylene; 2) the above modified with a third monomer: perfluoropropyl vinyl ether, tetrafluoroolefine or trifluorochloroethylene and 3) those based on fluoro-polymers chemically grafted on aerosil-175 in an aqueous medium or in a medium of freon. Retention parameters were determined for n-alkanes, m-alkylbenzenes, alkylacetates, ketones, n-alcohols and fatty acids (with carbon atoms from 1 to 12). Analysis of the results obtained showed that, in contrast to fluorine free polymer sorbents, the interaction between fluoro-polymer and the adsorbent follow the same mechanism. This mechanism involves formation of hydrogen bonds between the fluorine atom in the polymer and the active hydrogen atom in the adsorbed molecule. The correlations obtained for fluoro-polymer sorbents make it possible to predict the retention values for compounds with different functional groups. Tables 2; figures 2; references: 7 (Russian).

Reaction of SO_2 + O_2 Mixture With Mixed Palladium Catalysts Over -Al_2O_3

937M0075D Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 19 Nov 91) pp 2225-2228

[Article by N. M. Popova, K. Dosumov, A. K. Umbetkaliyev, Institute of Organic Catalysis and Electrochemistry imeni D. V. Sokolskiy, Academy of Sciences of Kazakhstan Republic, Alma-Ata; UDC 541.183]

[Abstract] The presence of SO_2 in industrial gas discharges makes it difficult to use the catalytic methods for their purification because the catalysts become poisoned by formation of sulfates with the carrier. Therefore, the investigation was undertaken of the reaction of SO_2 with Pd', Cr', Ce' and Co' containing catalysts deposited on γ-Al_2O_3 at different temperatures in the presence of oxygen and without it. It was shown that the quantity of the adsorbed SO_2 and its bonding strength depend on the metals and the temperature of preliminary interaction. The following series was identified in respect to the desorbed quantity of SO_2: Pd-Ce>PdCo>Pd>Pd-Cr. It was also shown that the presence of oxygen decreases significantly the quantity of desorbed gasses below 973 K and increases it sharply above 973 K. Addition of cerium and cobalt to palladium on γ-Al_2O_3 increased the quantity of adsorbed SO_2. On the basis of thermally programmed desorption and IR spectroscopic data, it was shown that SO_2 reacts with catalysts in the presence of O_2 yielding various sulfates. Figures 5; references 11: 7 Russian (2 by Western authors), 4 Western (1 by Russian authors).

CO Hydrogenation Over Ultra-Dispersed Powders of Iron Group Metals. 3. Catalytic Properties of Iron Powders Obtained by Electric Explosion Method

937M0075B Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 7 Jun 91) pp 2062-2067

[Article by O. V. Salova, N. N. Mikhalenko, V. M. Gryaznov, University of Peoples' Friendship imeni Patrice Lumumba, Moscow; UDC 541.128.13:541.128.34:546.74]

[Abstract] The effect of the particle size of ultra-dispersed iron powders was investigated in atmospheric pressure hydrogenation of CO at 523-623 K. The iron powders were obtained by the electric discharge method in a stream of argon, octane and ethanol. The activity of these powders changed, eventually reaching a steady state. This activity reached a maximum value only in the case of the most dispersed sample. Preliminary reduction of the catalysts in hydrogen at 473 K for 1-4 hours increased the yield of all products by about 50%. It was noted that with diminishing average size of the particles the specific activity of the catalyst diminished but their selectivity for olefines increased. The ultra-dispersed particles obtained in argon showed greater activity. Low activity of the powders obtained in organic liquid media could be due to the presence of hydrocarbon particles on their surface. The differences in catalytic behavior of iron powders obtained under identical conditions could be due to the fact that the number of active catalytic centers per unit surface of these particles was different. In addition, catalytic activity could be manifested by metal atoms present in specific surface sites most accessible to the coordination of reagents. Tables 3; figures 3; references 19: 4 Russian (1 by Western authors), 15 Western.

Effect of Pt-Rh Catalyst Composition on Their Activity in Reducing Nitrobenzene

937M0075A Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 13 Jul 90) pp 2058-2061

[Article by Ye. V. Meshcheryakova, T. M. Grishina, Chemical Faculty, Moscow State University imeni M. V. Lomonosov, UDC 541.13;546.92;546.97]

[Abstract] The goal of this work was to investigate the effect of the production conditions on catalytic properties of electro-precipitated catalysts of the Pt-Rh system based on a model reaction of electro-reduction of nitrobenzene. For this purpose the catalysts were prepared by electro-precipitation from a 1% platinum-hydrochloric acid solution and rhodium chloride on a platinum plate. These "freshly prepared" samples were then processed in one of the following ways: 1) cathode polarization with heating to 80°C in a stream of hydrogen, the so-called "artificial stabilization"; 2) storage in the background solution—"normal aging" and 3) cyclic anode-cathode polarization at 0.02-1.5 V. All catalysts actively reduced nitrobenzene.

Overall, the activity of these catalyst was related to their chemical composition and to the method of pretreatment. Platinum and the alloys containing 46 and 67% of rhodium appeared to be the most active reagents. All methods of pre-processing increased the specific activity of pure platinum and rhodium. The alloys also showed some changes with this pretreatment but to a much smaller degree. Hence, it was shown that the activity of catalysts depends mostly on their chemical composition while the method of preparation affects primarily the properties of individual platinum and rhodium. Table 1; figures 3; references: 5 (Russian).

Developmental Strategy of Russian Chemical Industry

937M0099A Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 5, May 92 pp 259-261

[Article by A. I. Salin, Director-General, Department of Chemical and Petrochemical Industry, Russian Federation Ministry of Industry]

[Abstract] Although the Russian chemical industry showed a significant absolute growth during the past 15 years, its ability to meet demand for the most important chemical products is still very inadequate, especially in plastics, synthetic resins, fibers, phosphorus fertilizers, rubber, and specialty products. The drop in production during the past 5 years has further exacerbated this problem. Present day chemical equipment is 70 percent obsolete, while weak development of the machine building base resulted in massive buying of foreign equipment. In connection with the liquidation of industrial ministries, management of the industrial complex has fallen to the Russian Federation Ministry of Industry, which is now a functional rather than a managing organ. The ministry now includes practically all sectors of the industry except for fuel and energy. Within the ministry, the Department of Chemical and Petrochemical Industry was formed for the main purpose of creating favorable conditions for effective functioning and development of chemical enterprises using economic, legal, and normative means. One function of the department is the development of investment policy. Current incomplete construction now stands at 7 billion rubles. Basic trends of joint investment strategy could be implemented in two stages. The first stage, before 1995, will see completion of unfinished construction, utilization of non-installed, mostly foreign equipment, and a rebuilding of many basic industries. The warehouses of republic chemical enterprises contain over 4 billion rubles worth of this equipment. It would be advantageous to attract foreign firms to complete this type of construction. New construction will begin during the second stage, after 1995, in regions such as western Siberia, the Transcaspian area, and Sakhalin Island, which has significant oil and gas resources and is a declared free zone. Costs of financing and developing science will be met by withholding 1.5 percent of production costs from enterprises. The department has informed the sector enterprises of the availability of this special account for their purposes. The financing will go not to institutes, but towards problems and programs. Joining forces in scientific and design collaboration will hasten the entry of the republic in the world economic system.

Distribution of Colloidal Fractal Aggregates by Height of Vessels in Steady State

937M0125B Moscow KOLLOIDNYY ZHURNAL in Russian Vol 54 No 5, Sep-Oct 92 (manuscript received 12 Apr 92) pp 93-98

[Article by I. Ya. Ladyzhinskiy, Institute of Chemical Physics, Russian Academy of Sciences, Chernogolovka; Institute of Physical Chemistry, Russian Academy of Sciences, Moscow; UDC 541.18.043.5]

[Abstract] During coagulation of particles in some dilute colloidal suspensions, large loose aggregates are formed with fractal structures. In a previous paper, the steady state of such suspensions was analyzed, when the coagulation process of fractal aggregates was compensated for by their separation into fragments. In the present paper, based on theoretical considerations, the distribution of the concentration by height of the vessels was determined for a diluted, reversibly coagulating colloidal suspension. It was noted that this distribution was not described by the barometric formula. Earlier observations were extended to cover cyclic structures of the aggregates. It was shown to be possible, in principle, to determine experimentally fractal dimensions of steady state aggregates and of the characteristics associated with the presence of cycles in aggregate structures. Figure 1; references 16: 3 Russian, 13 Western (12 by Russian authors).

Consideration of Diffusion Relaxation of Adsorbed Layer in Dynamics of Slow Coagulation of Lyophobic Colloidal Particles

937M0125E Moscow KOLLOIDNYY ZHURNAL in Russian Vol 54 No 5, Sep-Oct 92 (manuscript received 20 Nov 91) pp 182-196

[Article by S. Yu. Shulepov, S. S. Dukhin, I. Liklema, Institute of Colloidal Chemistry and Chemistry of Water, Academy of Sciences of Ukraine, Kiev; UDC 541.18.046:541.182.65]

[Abstract] Theoretical principles of the coagulation of lyophobic colloids were proposed back in the 40's in which the coagulation process was viewed as a result of concurrent effect of electrostatic repulsive forces and of dispersive forces of the attraction of a pair of colloidal particles. In this study one of the processes was investigated which could occur as a result of the motion of colloidal particles, namely the effect of the adsorbed ions resulting from surface diffusion on the colloidal coagulation process. The mutual effect of the approach rate and of the interaction potential of colloidal particles was analyzed; the coefficient of diffusion of these particles was considered to be constant. Because of the complexity of the problem, only some isolated cases were theoretically treated: small values of surface potentials; determination of the addition to the wedging pressure and the force related to it; effect of the relaxation force on diffusion of colloid particles; development of an equation for the potential of the interaction of colloidal particles; calculation of the interaction potential with consideration of the relaxation additive and the energy of the interaction of spherical colloidal particles with constant adsorption potential and surface charge. Equations were derived for non-equilibrium diffusion processes of adsorbed ions and colloidal particles on the basis of which the interaction modes of these particles was classified as: permanent change mode, quasi-equilibrium mode and a transient mode. A characteristic feature shown by this investigation was that the potential energy of the interaction of colloidal particles appeared to be a function of the surface diffusion ions. Figures 2; references 17: 11 Russian (1 by Western author) 6 Western (2 by Russian authors).

Microrheology of Slightly Concentrated Gels. Characteristics of Lamination on Oscillating Shear

937M0125D Moscow KOLLOIDNYY ZHURNAL in Russian Vol 54 No 5, Sep-Oct 92 (manuscript received 12 Jun 92) pp 138-151

[Article by N. B. Uryev, I. Ya. Ladyzhinskiy, Institute of Chemical Physics, Russian Academy of Sciences, Chernogolovka; Institute of Physical Chemistry, Russian Academy of Sciences, Moscow; UDC 541.182.644:532.135]

[Abstract] In earlier papers a hypothesis was proposed on the existence of "solid-like" and "liquid-like" layers in flowing colloidal gels which formed as a result of minimal energy dissipation rates. This was supported by data on viscose-elastic response of slightly concentrated gels. Theoretically, the solid-like and liquid-like gels were differentiated by the binding of colloidal particle aggregates. Based on this, a theoretical model was proposed aimed at explaining the strong relationship between the gel accumulation G' and gel losses G" moduli and the amplitude of the oscillating shear in a given amplitude range. This model predicted a version with a jump-like decrease of the G' modulus and a maximum on the time scanning of G" modulus during the early stage of a strong relationship of both moduli to the amplitude. Thus, even though the reported data and their interpretation are indirect, they nevertheless indicate the possibility of a lamination of flowing and oscillating low concentration gels into solid-like and liquid-like layers which ensure the minimal rate of energy dissipation. The work will be continued. Figures 9; references 17: 7 Russian (1 by Western author), 10 Western.

Rate of Fire Spread on Surface of Foam Plastics

937M0123B Moscow KHIMICHESKAYA FIZIKA in Russian Vol 11 No 10, Oct 92 (manuscript received 25 Nov 91) pp 1378-1382

[Article by V. M. Lalayan, M. V. Stepanova, V. A. Ushkov, B. N. Kondrikov, Institute of Chemical Physics imeni N. N. Semenov, Russian Academy of Sciences, Moscow; Moscow Chemical-Technological Institute imeni D. I. Mendeleyev; Moscow Engineering-Construction Institute imeni V. V. Kuybyshev; UDC 541.126]

[Abstract] The goal of this work was to investigate general regulations of the spread of fire towards a stream of the oxidizer on the surface of various foam plastics in small scale experiments. The following materials were tested: polyurethanes based on simple hydroxypropyl oligoethers, carbamide foam plastics, plastics from phenyl-formaldehyde resins, epoxide foam plastics, polystyrene foams and radiation cross-linked polyethylene foams. Combustion of thermal plastic foam polymers exhibits considerable alteration of sample geometry in the heating-up zone, forming a monolithic melt. Limiting oxygen concentrations were determined for different polymers. In case of thermally reactive foam plastics the flame spread was much faster, appearing to be a linear function of the concentration of oxygen: $Vp = A(Y-Y_o)/\rho - B$, where A and B are constants for a given polymer, Y = molar fraction of the oxygen in a stream of the oxidizer and Y_o = oxygen index/100. In case of phenyl plastic foams the geometry and type of their pores showed no effect on combustion indexes. Overall, the above equation agreed rather well with experimentally determined results and it could be used in developing comparative characteristics of the fire hazard of foam plastics. Figures 2; references 4: 3 Russian, 1 Western.

Photoelectrochemical Properties of Cd_4SiSe_6 and Cd_4GeSe_6

937M0094A Moscow ELEKTROKHIMIYA in Russian Vol 28, No 7, Jul 92 (manuscript received 14 May 91) pp 1000-1005

[Article by S. K. Kovach, S. F. Motrya, and Ye. Ye. Semrad, Ushgorod State University; UDC 541.13:541.14]

[Abstract] Multi-component chalcogenides have many useful electrochemical, optical, and electrophysical properties. The title compounds are members of the "argyrodite" family which has a general formula A_4BX_6, where A = Cd, Hg; B = Si, Ge; X = S, Se. Single crystals of these compounds have been prepared and some of their electrophysical and optical properties studied. In the present work single crystals of the title compounds were prepared by transport reactions and their specific resistance and other properties determined. The silicon derivative is an intrinsic semiconductor while the germanium derivative is an n-type semiconductor. Figures 6; references 13: 8 Russian, 7 Western.

Electrochemical Behavior of 6-N,N-Dimethylaminofulvene in Aprotic Solvents

937M0094B Moscow ELEKTROKHIMIYA in Russian Vol 28, No 7, Jul 92 (manuscript received 12 Aug 91) pp 1028-1031

[Article by V. L. Shirokiy, M. V. Yarosh, T. P. Kovovalova, A. N. Ryabtsev, and N. A. Mayer, Physical Organic Chemistry Institute, Minsk; UDC 541.138.3:543.253:547.51]

[Abstract] Substituted metallocenes may be conveniently prepared by electrolysis of fulvene on soluble metallic anodes. The present work is part of a continuing series on the study of the electrochemical behavior of fulvenes. Electro-reduction of the title compound was studied by cyclic volt-amperometry in aprotic solvents (dimethylformamide and dimethylsulfoxide). Against a background of tetraethylammonium perchlorate, the above fulvene is irreversibly reduced taking on a single electron with the formation of an anion radical which is then dimerized and further converted. The conversion products are electrochemically active and are fixated by cyclic volt-amperometry. A possible mechanism for the electrochemical reduction is presented. Figure 1; references 5: 3 Russian, 2 Western.

Theory of Electrochemical Doping of Polyaniline: Polaronic Model

937M0094C Moscow ELEKTROKHIMIYA in Russian Vol 28, No 7, Jul 92 (manuscript received 27 Jun 91) pp 1043-1049

[Article by L. I. Daykhin and M. D. Devi, Electrochemistry Institute imeni A. N. Frumkin, Moscow; UDC 541.13]

[Abstract] Processes that occur during electrochemical doping of polyaniline have lately attracted much attention. Electrochemical doping consists of all phenomena taking place both at the interface and within the bulk of a polymeric film. It includes such processes as electron transfer through the metal-polymer interface, ion and molecule transfer of the solvent through the polymer-solvent interface, as well as transfer of these particles into a film. In previous works a thermodynamic model representing electrochemical oxidation of polypyrroles, polythiophene, poly-p-phenylene and others was examined. This type of polymer is characterized by the absence of proton transfer from the electrolyte interface during doping. Isotherm analysis of these systems revealed the presence of Donan equilibrium in anions at the polymer-solvent interface making it possible to examine the distribution of potential skips at both interfaces. However, this approach is limited to the approximation of non-reacting particles over the range of change in electrode potential. Coulombic interaction between differently charged components of the system can be detected only under electrically neutral conditions. In yet another work employing a single-dimension lattice model of protonization of polyemeraldin (dye), proton interaction was observed. In the present work this latter model was extended to electrochemical doping of polyaniline, i.e. where the film contains two types of particles: protons and polarons, whose concentration is a function of the electrode potential and pH of the solvent. Isotherms were obtained for protonization and oxidation over a wide range of electrode potential and pH values. Figures 5; references 16: 1 Russian, 15 Western.

Electrochemically Induced Processes for Formation of Phosphorus Acid Derivatives. Report 4. Synthesis of Triarylphosphates From White Phosphorus

937M0097E Moscow IZVESTIYA AKADEMII NAUK ROSSIYSKOY AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 9, Sep 92 (manuscript received 6 Jun 91, after revision 7 May 92) pp 2039-2043

[Article by Yu. G. Budnikova, Yu. M. Kargin, I. M. Zaripov, A. S. Romakhin, Yu. A. Ignatyev, Ye. V. Nikitin, and A. P. Tomilov, Organic and Physical Chemistry Institute imeni A. Ye. Arbuzov; Kazan State University imeni V. I. Ulyanov-Lenin; UDC 541.138:(546.18+547.1.118)]

[Abstract] A variety of phosphorus acid esters may be prepared by electro-synthesis using white phosphorus and aliphatic alcohols, depending on the reaction conditions. The use of other potential reagents with white phosphorus is especially interesting as a means of broadening the possibilities of electro-synthesis of organophosphorus compounds from P_4, as well as furthering an understanding of the reaction mechanism of phosphorus and its oligomers. In the present work it was demonstrated that triarylphosphite and triarylphosphate are

formed as electrolysis products in dipolar aprotic solvents against a background of tetraethylammonium iodide in the presence of white phosphorus. The triarylphosphate is formed from white phosphorus by electrochemical reduction of pentaaroxyphosphorane, an intermediate product resulting from interaction of triarylphosphite with iodine and phenol. A strong relationship was observed between the yield and spread of products, and the composition of the electrolyte. Figure 1; references 9: 5 Russian, 4 Western.

Electrochemically Induced Processes of Formation of Phosphorus Acids Derivatives. Report 3. Electro-synthesis From White Phosphorus in Aqueous-Alcohol Solutions

937M0097D Moscow IZVESTIYA AKADEMII NAUK ROSSIYSKOY AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 9, Sep 92 (manuscript received 6 Jun 91, after revision 7 May 92) pp 2033-2038

[Article by Yu. G. Budnikova, Yu. M. Kargin, I. M. Zaripov, A.S. Romakhin, Yu. A. Ignatyev, Ye. V. Nikitin, A. P. Tomilov, and V. V. Smirnov, Organic and Physical Chemistry Institute imeni A. Ye. Arbuzov; Scientific Center, Kazan]

[Abstract] In a previous work it was demonstrated that complete esters of phosphorus acids are formed during electrolysis of alcoholic solutions of tetraalkylammonia in the presence of white phosphorus. It was suggested that the opening of stressed P_4 ring and formation of the complete product result from sequential attacks of nucleophilic and electrophilic components that are formed, respectively, on the cathode and anode in a non-partitioned electrochemical cell. Complete study of the synthetic possibilities and limitations of this reaction requires a full understanding of the conditions needed for sequential rupture of P-P bonds in the P_4 molecule, as well as the oligomerization and status of electrochemically generated nucleophilic and electrophilic reagents. In these processes the role of water is especially interesting since it may not only compete with the alcohol during the nucleophile generation stage, but it may also affect the functionalization stage of the P-H bonds formed by protonization of the phosphide anion. Water must also affect the status of the electrophilic and nucleophilic reagents, protonization rates of the basic sites, and other elements in the reaction mechanism of white phosphorus and its intermediate compounds. In the present work it was demonstrated that rupture of the P-P bond in white phosphorus is initiated by cathode-generated nucleophiles (HO^- and RO^-), while functionalization of the formed P-H bond in phosphorus oligomers occurs only in the presence of alcohol. The primary product formed after rupture of all P-P bonds in phosphorus oligomers is a dialkylphosphite (in water-alcohol solution), or a trialkylphosphite (in absolute alcohol). During the course of electrolysis, these are converted into trialkylphosphates. References 4: 1 Russian, 3 Western.

Electrochemical Reduction of 1,1-Dihalo-2,2-di-Substituted Cyclopropanes

937M0097C Moscow IZVESTIYA AKADEMII NAUK ROSSIYSKOY AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 9, Sep 92 (manuscript received 15 Oct 91) pp 2023-2032

[Article by Yu. M. Kargin, Ye. I. Gritsenko, V.V. Yanilkin, V. V. Plemenkov, L. K. Dubovik, N. I. Maksimyuk, B. M. Grrifullin, Sh. K. Letypov, and A. V. Ilyasov, Organic and Physical Chemistry Institute imeni A. Ye. Arbuzov; Scientific Center, Kazan; UDC 541.138.3]

[Abstract] The electron transfer reaction involving substituted gem-dihalogen propanes attracts attention not only in connection with the possible synthetic development of these processes, but also because of insufficient clarity regarding the stereochemical aspects of cyclopropane functionalization. Many controversial questions remain regarding the mechanism of electrochemical rupture of the carbon-halogen bond, clarification of which would facilitate the development of stereo-selective methods of electrochemical synthesis. In the present work polarography and preparative electrolysis were employed to study the electrochemical reduction of 1,1-dihalogen-2-R-2- methylcyclopropanes. Preparative electro-reduction in methanol against a background of 0.1M $LiClO_4$ resulted in a stereo-isomeric mixture of mono-bromo- and mono-chlorocyclopropanes with a yield of 60-70 percent. In the case of bromine derivatives of cyclopropane, current density was found to have an effect on the ratio of cis-trans isomers. This was interpreted as a change due to current density in the outputs of reducing reactions of the initial compounds and ionic pairs. The effects of the solvent and the background salt on the ratio of stereoisomers agree with this interpretation. References 12: 7 Russian, 5 Western.

Electrochemical Decolorization of Effluent From Production of Aniline Azo-Dyes Using Graphite Anodes

937M0104B Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA - KHIMIYA in Russian Vol 33 No 4, Jul-Aug 92 (manuscript received 20 Feb 92) pp 381-382

[Article by Ye. D. Pershina, E. A. Mamedov, V. L. Yarnykh, G. A. Bogdanovskiy, Chair of General Chemistry; UDC 541.138.2;547.625]

[Abstract] Three types of graphite [ARV,TKM (fibrous) and V_2L_{12} (modified with teflon)] were used to decolorize model solutions from a mixture of black, green yellow and blue dyes. In the potential range preceding evolution of molecular oxygen, the degree of color removal was as follows: blue>green>black>yellow, regardless of the type of graphite used. However, the final solution still showed the presence of aromatic and aliphatic compounds. A much more effective purification occurred at high anode potentials ("oxygen overcharge"). In this case the V_2L_{12} graphite proved to be more stable than the others. A follow-up was performed on natural effluent from an aniline dye plant. In a relatively short run an effective decolorization was achieved with complete destruction of aromatic structures and retention of only aliphatic components. Figure 1; references: 4 (Russian).

Electrochemical Processes on Platinum in Clay Paste in Presence of Urea and Copper Ions

937M0104A Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA - KHIMIYA in Russian Vol 33 No 4, Jul-Aug 92 (manuscript received 19 Dec 91) pp 375-376

[Article by V. F. Yefimova, A. D. Semenova, G. A. Bogdanovskiy, G. I. Kolomnikov, Chair of General Chemistry; UDC 541.13.546.92.552.52]

[Abstract] In connection with the use of natural sorbents such as montmorillonite in purification of effluent from copper ions and urea, a problem arose of isolating copper from its complexes adsorbed on montmorillonite. Platinum was used as a model electrode for this purpose. The relationship between the degree of electrode surface filling and the adsorption potential was investigated. The potential of maximum adsorption of complex ion $[Cu(NH_3)_4]^{2+}$ was 0.6 V. The stationary adsorption of this ion was normally reached in 20 min, with 45% of the electrode surface being occupied by the adsorbed complex ions. It was necessary to observe the experimental sequence to achieve the desired reduction of copper complex to metallic copper: initial establishment of a stationary adsorption of complex ion at $\varphi = 0.6$ V followed by precipitation of copper at $\varphi = 0.0$ V. The natural sorbent could be regenerated after purification of the effluent from copper ions and urea. Figure 1; references: 2 (Russian).

Electrochemical Oxidation of Quinine: Molecular and Crystalline Structure of Quinidinone

937M0113E Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 4, Apr 92 (manuscript received 02 Nov 90) pp 923-927

[Article by A.M. Gazaliyev, M.Zh. Zhurinov, S.N. Balitskiy, K.M. Turdybekov, E.B. Shamuratov, A.S. Batsanov and Yu.T. Struchkov, Institute of Organic Synthesis and Coal Chemistry, Kazakh Academy of Sciences, Karaganda; Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov, Russian Academy of Sciences, Moscow; UDC 541.138+/-548.737]

[Abstract] Electrochemical oxidation of quinine on Pt electrodes in MeCN:water (7:3) mixtures with KI was shown to proceed with inversion of the α-carbon and formation of the stereoisomer quinidione, based on x-ray analysis. Inversion of the α-carbon was attributed to the stereochemical nature of quinidinone adsorption to the surface of the electrode via π-electrons (vinyl group and quinoline fragment). Figures 1; tables 2; references 10: 5 Russian, 5 Western.

Electrochemical Behavior of Oxybis(Iodobenzene)Bis(Tetrafluoroborate) on Smooth Platinum

937M0113A Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 4, Apr 92 (manuscript received 29 Dec 90) pp 748-752

[Article by S.A. Kuliyev, A.M. Magerramov, A.I. Ismiyev, R.G. Guseynova, Ya.A. Yaraliyev, V.V. Zhdankin, A.S. Kozmin and N.S. Zefirov, Institute of Inorganic and Physical Chemistry, Azerbaijan Academy of Sciences, Baku; Baku State University imeni M.V. Rasulzade; Moscow State University imeni M.V. Lomonosov; UDC 541.138+547.539]

[Abstract] Electrochemical reduction of oxybis(iodobenzene)bis(tetrafluoroborate) in 0.5 M sulfuric acid on a smooth Pt electrode was shown to proceed with uptake of either two, four or eight electrons. This fact also accounts for the high reactivity of oxybis(iodobenzene)-bis(tetrafluoroborate) with organic substrates. Voltammetric studies in combination IR spectroscopy demonstrated that initial stages in reduction involve formation of iodosylbenzenes, which then undergo further reduction to iodobenzene. The final step consists of reduction to iodide ions and benzene. Figures 3; references 12: 5 Russian, 7 Western.

Electrochemical Polycondensation of Phenols and Styrene Polymerization

937M0113B Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 4, Apr 92 (manuscript received 05 Jun 91) pp 759-761

[Article by T.A. Plyusnina, Ye.P Kovalchuk and Ye.I. Aksimentyeva, Lvov State University imeni I. Franko; UDC 541.64:541.13]

[Abstract] Conditions are described for the electrochemical polycondensation of phenol, p-nitrophenol and o- and m-aminophenols on steel disk electrodes. The two-electron oxidation leads to the formation of phenoxy radicals, with the latter serving to initiate radical polymerization of vinyl monomers such as styrene. Polymerization is enhanced by the use of methanol or DMSO solvent rather than water since the former facilitate macroradical migration. On balance, the mechanisms have been resolved into three stages: (a) electrooxidation of phenoxy ions to radicals and their quinoid isomerization, (b) initiation of polycodensation by the radical particles, and (c) formation of block-copolymers in the presence of, for example, styrene. Figures 1; references 7: 5 Russian, 2 Western.

Free Radical Intermediates in Electrochemical Reduction of N-Arylthiobenzoquinonimines

937M0113D Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 4, Apr 92 (manuscript received 12 Feb 91) pp 911-915

[Article by R.A. Gavar, L.Kh. Baumane, Ya.P. Stradyn and V.G. Kolesnikov, Institute of Organic Synthesis, Latvian Academy of Sciences, Riga; Lvov Polytechnical Institute; UDC 547.567.5:543.422.277]

[Abstract] EPR studies demonstrated that electrochemical reduction of N-arylthiobenzoquinonimines in acetonitrile yields the corresponding anion radicals. Unlike N-arylsulfonyl anion radicals, the former do not undergo protonation to stable free radicals presumably due to insufficient electrophilicity of the SH group. In the anion radicals of the N-arylthiobenzoquinonimines the thio group does not completely screen the S-aryl substituents from the unpaired electron orbital on the benzoquinoimine fragment. In addition, the studies also indicated that nitroaryl quinoimines yield nitroarylthio-p-aminophenol anion radicals with delocalization of an unpaired electron on the nitrophenyl fragment. Figures 1; tables 2; references 12: 7 Russian, 5 Western.

Electrochemical Reduction of $GdCl_3$ to Gd_2Cl_3 in a Melt

937M0121A St. Petersburg RADIOKHIMIYA in Russian Vol 34 No 3, May-Jun 92 (manuscript received 7 Jul 91) pp 26-31

[Article by N. B. Mikheyev, A. N. Kamenskaya, I. A. Rumer, V. L. Novichenko; UDC 546.65 + 621.039.337]

[Abstract] The goal of this work was to obtain cluster gadolinium compounds by electrolysis of its trichloride melt. The electrolysis of $GdCl_3$ performed at 903 K produced a cluster Gd_2Cl_3 in about a 70% yield. The electrolysis lasted about 4 hours, during which time 30-40% of gadolinium converted to the cluster phase. It appeared that quantitative yield of the cluster could not be reached because of the electricity conducting properties of the cluster. Substituting Tb or Y for Gd as the anode material led to formation of mixed clusters with gadolinium trichloride. Identification of the intermediate products in the electrolysis of gadolinium trichloride will be studied next. Table 1; figures 2; references 6: 2 Russian, 4 Western (1 by Russian authors).

Spectroelectrochemical and Photochemical Properties of Electrochemical Oxidation Products of Aniline

937M0108D Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 58 No 9, Sep 92 (manuscript received 13 Jun 91) pp 761-764

[Article by N.V. Pogorelova, S.N. Slyusar and I.P. Kraynov, "Monokristallreaktiv" Scientific Industrial Association, Kiev; UDC 539,216.23:546.28.001.6]

[Abstract] Extensive data are presented on the spectroelectrochemical and photochemical properties of products obtained by electrochemical oxidation of aniline. The films formed on SiO_2 electrodes displayed reversible color changes depending on the potential, from translucent yellow at -0.2 V, to green at 0.58 V and blue at 0.81 V. The color changes were evident throughout the entire thickness of the film, a fact indicative of high conductivity. The strongest, most homogenous and translucent (in the visible spectrum) films were obtained in acid solutions (pH 1.8-2.0). The rate constants for film formation in sulfuric acid at room temperature were on the order of 10E-4 L/mole secE-1. Redox processes in these films involved exogenous proton donors since behavior of the films was identical in protonic and nonprotonic solutions. Addition of heavy metal dopants—eg, Pb, Sn and V—altered the electrochemical and optical properties of the films and resulted in unique metal-coated electrodes free of electrolytes. Figures 6; tables 1; references 4: 1 Russian, 3 Western.

Electrochemical Study of Dimeric Chloride Mixed-Valency Complex of Ruthenium (IV, III)

937M0129A Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 37, No 10, Oct 92 (manuscript received 21 Oct 91) pp 2223-2228

[Article by N. A. Yezerskaya and M. V. Afanasyeva, General and Inorganic Chemistry Institute imeni N. S. Kurnakov, Moscow; UDC 546.96:542.87]

[Abstract] In a previous work a potentiostatic coulonometric method for determining ruthenium was proposed. The method is based on the single-electron reduction of the dimeric chloride complex, $[Ru_2^{IV}(O)Cl_8(H_2O)_2]^{-2}$, present in 1-2 moles per liter solutions of HCl, to a mixed-valency dimeric complex of ruthenium (IV, III). While the formation of this compound in 0.5-2 moles per liter HCl has been established, its composition remains unknown. In the present work cyclic volt-amperometry and direct volt-amperometry with a rotating disk electrode were used in conjunction with spectrophotometry to study the redox reactions of the above mixed-valency ruthenium complex. The results of the study indicate that this compound is a molecule in which the Ru^{IV} and Ru^{III} ions are surrounded by various amounts of H_2O and Cl^- ligands. The possible characteristics of bridges joining Ru^{IV} with Ru^{III} are discussed. Figures 7; references 15: 10 Russian, 5 Western.

Identification and Quantification of Phenols in Geothermal Waters

937M0103C Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 08 Jan 92) pp 670-673

[Article by A.Sh. Ramazanov, Institute of Geothermal Problems, Daghestan Scientific Center, Russian Academy of Sciences, Makhachkala; UDC 543.544]

[Abstract] Mass spectrometry was combined with GLC for analysis of Makhachkala-Tarnair geothermal waters for pollution with phenolic compounds. The combined analytical approach led to the identification of the following pollutants: phenol, o-cresol, p-cresol, 2,3-dimethylphenol, 3,4-dimethylphenol, and isomers of methylethylphenol. These geothermal waters had been used for years in greenhouses, and had been discharged untreated into the Caspian Sea. Figures 1; tables 1; references 6: Russian.

Changes in Retentivity of Filter Medium During Water Filtration

937M0103D Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 14 Feb 92) pp 678-685

[Article by N.V. Yaroshevskaya, M.D. Andriyevskaya and T.Z. Sotskova, Institute of Colloid Chemistry and Water Chemistry imeni A.V. Dumanskiy, Ukrainian Academy of Sciences, Kiev; UDC 628.16.067]

[Abstract] A mathematical analysis was performed on the impact of coagulant levels on the efficiency of granular filter medium in water treatment. The essential findings were that the coagulant concentration was inversely related to the intensity of particle adhesiveness to filter granules. The net effect of optimum coagulant concentrations was to fill interganular spaces with trapped particles, enhance trapping efficiency, and prolong operational intervals between scheduled filter regenerations. Figures 1; tables 4; references 16: 15 Russian, 1 Western.

Treatment of Coal Mine Waters for Emulsified Oils

937M0103E Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 28 Apr 92) pp 686-688

[Article by T.Z. Sotskova, Z.N. Shkavro, Ye.S. Matskevich (dec) and L.A. Kulskiy, Institute of Colloid Chemistry and Water Chemistry imeni A.V. Dumanskiy, Ukrainian Academy of Sciences, Kiev; UDC 628.3:532.695]

[Abstract] An analysis was conducted on effective means of eliminating oil pollutants from coal mine waters. Such pollutants—routinely introduced by mining machinery—have been shown to form stable emulsions that are difficult to remove during water treatment. Since wetting angles correlate directly to adhesiveness between oil and a solid surface, this criterion was evaluated for its utility in devising efficient oil-removal systems. The results showed that fine coal particles (0.16-0.25 mm) yielded the smallest wetting angles (30-35°) and, hence, assured the greatest degree of oil adsorption in a solid-oil-water triphase system at 20°C. Accordingly, systems of this nature may have practical applications in treatment of mine waters and should undergo further trials. Tables 2; references 2: 1 Russian, 1 Western.

Advances and Perspectives in Leather Industry Waste Water Treatment

937M0103F Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 20 Dec 91) pp 689-699

[Article by S.S. Timofeyeva, Irkutsk Polytechnical Institute; UDC 628.543]

[Abstract] A literature survey is presented on water treatment and waste recovery at tanneries and leather-using plants. Expert consensus seems to be that on-site water treatment should concentrate on physicochemical recovery of chemical wastes and byproducts peculiar to the industry. Biological treatment is best conducted at specialized central facilities. Only through such an approach and combination of expert systems can a rational attempt be made at alleviating and controlling environmental problems related to the leather industry. Tables 4; references 35: 16 Russian, 1 Slavic, 1 Hungarian, 17 Western.

Magnetic Liquids in Managing Oil-Polluted Waters

937M0103G Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 22 Jan 92) pp 706-712

[Article by S.Ye. Dvorchik, S.Yu. Reutskiy and A.Ya. Svizher, Scientific Research Energy Institute imeni G.M. Krzhizhanovskiy, Moscow ; UDC 628.16]

[Abstract] Cursory details are presented on the use of ferromagnetic particles prepared as a suspension in kerosene for recovery of oil from polluted waters. The basic premise is that such suspensions are miscible with oil spills and serve to magnetize them. Two modalities of water treatment are covered: surface skimming and bulk treatment. In both cases several collector designs are mentioned which, in their various permutations, ensure recovery of the magnetized oil spills by magnetic devices. Under laboratory conditions efficiencies of 99.9% in recovery of the pollutants have been attained using the magnetization approach. Figures 4; references 15: 13 Russian, 2 Western.

Molecular Forms of Malate Dehydrogenase (MDH) in Activated Sludge at Municipal Aeration Plants

937M0103H Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 17 May 91) pp 713-717

[Article by I.F. Shatalayev and M.M. Telitchenko, Samara Medical Institute imeni D.I. Ulyanov; Moscow State University imeni M.V. Lomonosov; UDC 627.15.57]

[Abstract] Determinations were made of the multiple molecular forms of MDH (EC 1.1.1.37) in activated sludge at a municipal water treatment facility, using such data as an indicator of sludge efficiency. The electrophoretograms revealed the presence of 3 molecular forms (designated 1, 2, 3 in anodal → cathodal direction) of MDH. MDH-3 was identified as a cytoplasm-bound fraction, while MDH-1 and MDH-2 were determined to be endoplasmic forms. The findings showed considerable variations in the enzymatic activities of the different molecular forms at various stages of secondary sewage treatment, reflecting changes in sewage processing dynamics. In addition, varations were also noted in the number of subspecies (4-5) of MDH-2, depending on the stage of xenobiotic oxidation, indicating that enzyme induction mechanisms are in effect during sewage treatment. Figures 2; tables 1; references 7: Russian.

Liquid Adsorption by Adsorbent With Two Pore Sizes: Mathematical Modeling

937M0103A Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 9, Sep 92 (manuscript received 16 Apr 92) pp 643-647

[Article by P.P. Zolotarev, Scientific Physicochemical Institute imeni L.Ya. Karpov, Moscow; UDC 541.183]

[Abstract] A formal mathematical treatment was accorded to permeation of a liquid through a dry adsorbent characterized by macropores and micropores under isothermic conditions. The model system selected for analysis consisted of water and the assumed adsorbent possessed the characteristic of granulated zeolite or silicagel. The macropores were ascribed a diameter sufficiently large to ensure free transport of the water phase, while the diameter of the micropores was comparable in size to water molecules. Further, the granules and pores were assumed to be cylindrical in shape. Mathematical analysis of the putative permeation kinetics took into consideration liquid density, viscosity, capillary pressure, surface tension and wetting angle, and assumed that the matrix had a hydrophilic surface. The derived equations for flow kinetics of a low volatility liquid through an adsorbent with different pores are suitable for analysis of systems in which there is partial loss of liquid due to sequestration in micropores. References 8: Russian.

Extraction of Water Soluble Phenols From Distillate Fractions of Fine Grained Kukersite Shale Oil Tars by Crossed Scheme

937M0095B Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 92 (manuscript received 15 Oct 91) pp 83-88

[Article by L. V. Tiykma and L. I. Melder, Chemistry Institute, Tallinn; UDC 541.123:547.56+66.061.51]

[Abstract] It was previously demonstrated that industrial fractions of Kukersite shale oil tars derived by condensation with a solid heat carrier or by distillation under special conditions using an ash type heat carrier, may contain a very high amount of water-soluble phenols (alkylresorcins). However, the potassium and magnesium carbonates in the mineral portion of the shale must not be allowed to decompose appreciably as the semicoke is burned off during the air-blown heating stage. In order to attain a high content of water-soluble phenols in the condensate fractions of solid heat carrier units, it is essential that there be practically no contact in the condensation system between the phenol-containing shale oil fractions and the water condensate, thereby ensuring that all water-soluble compounds remain in the tar. In the present work distillate fractions from fine grained Kukersite shale tar having an end boiling point of less than 320°C were treated with equal volumes of water to form aqueous extracts which contained over 20-50 kg per m^3 of water-soluble phenols. Blending with higher boiling cuts, e.g. 320-350° C, is not recommended since it results in poorer phenol extraction. References 8 (Russian).

Structural Features of Organic Matter in Outburst Dangerous and Safe Anthracite Seams

937M0095A Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 92 (manuscript received 29 Aug 91) pp 37-45

[Article by T. F. Peresunko and Yu. V. Fedorenko, Novocherkassk Polytechnic Institute; UDC 552.57:622.815]

[Abstract] A close tie has been established between the danger of outbursts in coal seams and the molecular and sub-molecular structural features of the coals. Confirmation of this tie would facilitate a greater understanding of the nature and mechanism of sudden outbursts. However, despite the great amount of work devoted to this problem, it is still not clear why sudden outbursts of coal and gas do not occur at all coal seams having the same geological and mining conditions. In the present work a study was made of the molecular and submolecular structural features of isometamorphous anthracite outburst dangerous and safe seams. It was demonstrated that structure formation of the organic matter in these seams is different and contributes to variations in quality and quantity of minerals which act as fillers. Figures 3; references 9 (Russian).

Radiation Disinfection of Industrial Effluent

937M0078D Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 1, Jan 92 (manuscript received 2 Sep 91) pp 58-62

[Article by Ye. A. Podzorova, V. I. Ryabchenko, N. I. Ryabchenko, Branch of Scientific Physical-Chemical Research Institute imeni L. Ya. Karpov, Obninsk; UDC 541.15]

[Abstract] Various microorganisms multiply freely in plant waste water and, at high concentrations, could interfere with its proper use. Out of several possible ways of lowering the level of infection to a practical minimum, the ionizing radiological approach appeared to be the most practical. Literature covering this field, however, is limited to reports of artificially prepared solutions. In this paper experiments have been reported which were performed in actual waste water prior to and after exposure to ionizing radiation (^{60}Co γ-quanta at 6-940 G/min). The results showed that at doses up to 500 G the survival of the microorganisms dropped by 5 orders of magnitude, while a 1,000 G dose was adequate for a 6-8 orders of magnitude decrease. A new approach was developed to calculate the necessary dosages for specific concentration of microorganisms and the final level of acceptable contamination. At the outset an assumption was made that absolute disinfection of plant waste water is not required in practical applications. Figures 2; references 7: 6 Russian, 1 Western.

Use of Baromembrane Methods To Decontaminate Sulfite-Cellulose Production Wastewaters

937M0085B Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 7, Jul 92 pp 537-546

[Article by V. M. Kochkodan, Ye. A. Tsapyuk, M. T. Bryk, I. D. Koldapova, I. P. Sapon, Ye. Ye. Danilenko; UDC 628.33:541.18.045]

[Abstract] Baromembrane methods including ultrafiltration and reverse osmosis can significantly reduce the pollution dumped by the sulfite-cellulose industry. The use of ultrafiltration, with or without reverse osmosis, both purifies the wastewaters and makes possible recycling of the solutions. This article reports on the study of the barometric separation of wastewaters of the Kaliningrad Cellulose-Paper Combine. It is found that when optimal membranes are selected for ultrafiltration treatment a compromise must be reached between maximum purification and sufficient throughput. The filtrates produced must be additionally treated by reverse osmosis or some other method before being dumped or used as wash water. The use of reverse osmosis yields filtrates which satisfy the requirements for recycled water in cellulose-paper production. The concentrate produced in this stage, containing significant quantities of sugars, can be mixed with the initial sulfite alkali and used in the process, or evaporated and incinerated. Figures 10; References 27: 21 Russian, 6 Western.

Anaerobic Bacteria in Aerobic Bioreactor Purifying Cationic Surfactant Synthesis Wastewater

937M0085C Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 7, Jul 92 pp 552-557

[Article by O. S. Radchenko, L. A. Taranova, M. A. Patrauchan; UDC 579695.1]

[Abstract] A study is presented of various physiological groups of anaerobic microorganisms in a bioreactor used to purify wastewater from the synthesis precursors of cationic surfactants—nitriles and alkyldymethylamines—with forced aeration of the reactor. Studies were performed on a laboratory bioreactor airated by feeding compressed air into the lower portion of the apparatus, with the microfluora immobilized on a corrugated plastic grid enriched with fiber modified with polyvinyl alcohol. The wastewater contained organic contaminants, primarily nitriles and ADMA, plus sulfates 300 mg/gm^3. At the BOD was 3-5 mg/dm^3; pH 7.6; Eh+200 mV. The aerobic bacteria association consisted of Pseudomonas stutzeri, Psudomonas sp., Alcaligenes denitrificans, Citrobacter freundii, Pseudomonas aeruginosa and Flavobacterium aquatile. The influence of hydrogen sulfide on the destructive activity of the aerobic microfluora in the bioreactor was determined by cultivating the bacteria on a liquid synthetic medium with 1 and 2% H_2S in the gas phase in a flask. The association of bacteria populating the reactor was found to be able to oxidize nitriles and ADMA, reducing sulfates, which apparently also occurs in the anaerobic areas of the structure. Although the optical density of the medium increases, methane is not present in the gas phase. The cultures of P. stutzeri, Pseudomonas sp., A. denitrificans under anaerobic conditions can utilize a number of xenobiotics, but their destructive activity is low when oxygen is absent. The studies showed that both facultative and obligate anaerobic microorganisms can be present, with nitriles and ADMA serving as sources of carbon, nitrogen and energy for individual strains and associations of anaerobic bacteria. However, the sulfide formed as a result of the vital activity of sulfate-reducing bacteria inhibits the destructive activity of the aerobic microfluora in the bioreactor. Figure 1; References 13: 5 Russian, 8 Western.

Scientific and Applied Aspects of Preparing Potable Water

937M0085A Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 7, Jul 92 pp 506-525

[Article by V. V. Goncharuk, V. V. Podlesnyuk, L. Ye. Fridman, I. G. Roda; UDC 663.6+628.1/3+614.777]

[Abstract] This review of the Russian and (primarily) Western literature covers methods of centralized purification of potable water and its further purification by means of low-capacity and medium-capacity filters. Particular attention is given to methods such as adsorption, membrane filtration and ozonation. Data are presented on the comparative economic effectiveness of various water treatment methods. The discussion is essentially based on US experience. A combined approach is said to be most common worldwide, utilizing various methods and stages of potable water treatment, with the adsorption method used as the basic element in most systems. Medium-capacity equipment, used at the water main entry to apartment buildings, is considered quite promising as a part of the mix of treatments. Figures 2; References 184: 16 Russian, 168 Western.

Purification of Natural Water With Hydrobionts Fixed on Fiber Packing

937M0078E Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 1, Jan 92 (manuscript received 24 Jun 91) pp 63-67

[Article by L. I. Globa, P. I. Gvozdyak, N. B. Zagornaya, G. N. Nikovskaya, S. M. Fedorik, L. I. Yablonskaya, Institute of Colloid Chemistry and Chemistry of Water imeni A. V. Dumanskiy, Academy of Sciences of Ukraine, Kiev; Institute of Hydrobiology, Academy of Sciences of Ukraine, Kiev; UDC 628.183]

[Abstract] The goal of this work was to investigate purification of natural water from the Dnipro river by removing chemical and biological contaminants by means of natural cenoses. The experiments were performed in a direct flow laboratory bioreactor with fiber packing on which the microorganisms from the river bottom deposits were fixed. The reactor consisted of five sections. The biocenoses formed in each section after a 2-week period of water passage were characterized. In the first section 10 types of diatomic algae were fixed, four species of blue-green and other bacteria; the second section contained a roughly similar variety of hydrobionts but at a lower level. In the third and fourth sections hydro-fauna from the bioreactors began to utilize the accumulated microbial biomass, especially the algae that increased in number and variety. Thus it was shown to be possible to improve the water quality at the outlet of the bioreactor. On the basis of principal indices (COD, BOD, suspended substances, number of microbes, etc.) the efficiency of this purification method exceeded 90%. Tables 2; figure 1; references: 16 (Russian).

Purification of Water of Cesium-137 and Strontium-90 Using Natural and Activated Materials Containing Carbonates

937M0078C Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 1, Jan 92 (manuscript received 31 Jul 91) pp 48-52

[Article by B. Yu. Kornilovich, L. N. Spasenova, A. A. Kosorukov, G. N. Pshinko, A. N. Masko, Institute of Colloid Chemistry and Chemistry of Water imeni A. V. Dumanskiy, Academy of Sciences of Ukraine, Kiev; UDC 628.16:552.54 + 543.52]

[Abstract] The goal of this work was to investigate sorption of cesium-137 and strontium-90 on natural minerals—dolomites and marl rocks. In addition, the effect of thermochemical and mechanical-chemical treatment of these rocks was evaluated on their activity. Dolomite and marl rocks came from Ukrainian deposits, from Kiev Oblast. The methodology was described in an earlier paper. Dolomite showed low sorption affinity for cesium, reaching several percent only after a 24-hour exposure. Preliminary mechanical and chemical treatment of dolomite increased substantially its effect in purification of polluted water. Better results were obtained with strontium. Mechanical-chemical activation of dolomite and marl rocks prior to their use led to a high degree of water purification. Overall, preliminary thermal-chemical treatment of these powder sorbents was advocated prior to their use in removing radionuclides from water. Table 1; figures 3; references 8: 7 Russian, 1 Western.

Removal of Mineral Nitrogen Containing Substances From Drinking Water

937M0078B Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 1, Jan 92 (manuscript received 19 Feb 91) pp 35-48

[Article by V. A. Slipchenko, T. N. Malitskaya, Institute of Advanced Studies of State-Municipal Services of Ukraine, Kiev; UDC 628.162/44]

[Abstract] In this review-type article, the experience gained in the use of various methods for removing mineral nitrogen-containing substances from natural water reservoirs and from drinking water was reported. After some introductory remarks on the sources of such contaminants and listing some negative aspects of their presence in water, the authors discussed the sanitation-hygienic issues relating to mineral nitrogen-containing materials. The next subdivision recited physical-chemical methods for the removal of these impurities. The principal attention was focused on the biological methods as the most effective and promising ones. Although a lot of material was related to local conditions, the preponderance of solid data appeared to have come from the western citations. Tables 3; figures 2; references 53: 20 Russian (1 by Western authors), 33 Western.

Mass-Spectral Investigation of Thermal Generation of Atomic Fluorine and Synthesis of Inorganic Fluorides

937M0075C Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 8, Aug 92 (manuscript received 20 Jun 91) pp 2118-2127

[Article by N. S. Chilingarov, Ye. V. Skokan, D. V. Ray, L. N. Sidorov, Moscow State University imeni M. V. Lomonosov; UDC 543.51:546.16]

[Abstract] Atomic fluorine is widely used in synthesis of inorganic fluorides. New materials are produced without adequate data on their thermochemical properties because these products are rather unstable and highly reactive. One way to solve this problem is to combine the synthesis and determination of such properties in one experiment. A thermal generator of atomic fluorine was combined with a mass spectrometer designed for high temperature thermodynamic studies, thus permitting the synthesis of inorganic fluorides to be carried out directly in the effusion chamber. Experimental results showed that thermal generation of atomic fluorine was possible over nickel surface at $p = 10^{-4}$ atm in a narrow temperature range of 1020-1100 K; the degree of dissociation of molecular fluoride reached was $\alpha[F_2] = 0.7$. Above 1100 K sublimation of the protective film NiF_2 is initiated and the atomic fluorine begins to react with metallic nickel. Addition of small quantities of platinum increases α to 0.9. This approach makes it possible to obtain atomic fluorine concentration which at $T \geq 400$ K exceeds the equilibrium state and is adequate for the mass-spectral investigations of unstable fluorides. Tables 6; figures 3; references 18: 13 Russian (2 by Western authors), 5 Western (3 by Russian authors).

Phase Diagrams and Thermodynamics of Alkoxyphenyl-Alkyloxybenzoate Liquid Crystal Mixtures

937M0107A Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 9, Sep 92 (manuscript received 16 Jul 91) pp 2343-2358

[Article by B.M. Bolotin, V.P. Voronov and R.U. Safina; UDC 541.11]

[Abstract] An adiabatic microcalorimeter was used to study the thermodynamics of phase transitions in an alkoxyphenyl-alkyloxybenzoate homologous series of liquid crystal mixtures. Assessment of isotropic liquid-nematic, nematic-smectic, smectic A-smectic C transitions in 4-n-hexyloxyphenyl-4'-n-octyloxybenzoate, 4-n-hexyloxyphenyl-4'-n-decyloxybenzoate and 4-n-hexyloxyphenyl-4'-n-dodecyloxybenzoate mixtures demonstrated that the thermodynamics fit within the framework of Landaus's theory at triple, tricritical and multicritical transition intersection points. The binary mixtures behaved, in general, as ideal solutions. However, deviations from anticipated results were attributed to Halperin-Lubenski-Ma fluctuations and intermittent rather than continuous transitions in some cases. Figures 13; references 13: 3 Russian, 10 Western.

Model of Supercooled Liquids

937M0107B Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 9, Sep 92 (manuscript received 21 Jun 91) pp 2382-2387

[Article by L.N. Yefanov, Krasnoyarsk State University; UDC 541.8:532.7]

[Abstract] A model for supercooled liquids has been developed to cover certain anomalous temperature-related behavior patterns. The observed anomalies are now known to be due to formation of amorphous aggregates in the liquid on cooling. Consequently, supercooled liquids represent a system of such amorphous globules. Mathematical equations have been developed to provide estimates of globule concentrations and enthalpies of formation. These calculations have shown that at saturation temperatures larger globules are formed than those prevalent at temperatures below the saturation temperatures. These physical changes account for the different properties of supercooled liquids from those of unsaturated solutions. Figures 1; references 24: 21 Russian, 3 Western.

Non-Resonance Absorption (NRA) Evidence of Weak High-Temperature Superconductivity of Oligo- and Polyphthalocyanines

937M0107D Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 66 No 9, Sep 92 (manuscript received 11 Jul 91) pp 2510-2526

[Article by L.S. Lyubchenko, S.V. Stepanov, M.L. Lyubchenko, A.I. Sherle amd V.R. Epshteyn, Institute of Chemical Physics imeni N.N. Semenov, Russian Academy of Sciences, Moscow; UDC 543.422.27:547.312.8]

[Abstract] NRA studies on metal-containing (Co, Fe, Ni, Mn, Zn, Cu) and nonmetallic oligo- (I) and polyphthalocyanines (II) revealed weak high-temperature superconducitvity with a T_c at 80-90 K. Detailed analysis of nonmetallic I compounds revealed the existence of three fractions, one with $T_c = 92$ K, another with $T_c = 83$ K, and a third lacking a superconducting phase. The superconducting phase in the nonmetallic I compounds exceeded 1.5- to 2-fold by weight the superconducting phase of Y ceramics, and 100- to 1000-fold that of metal-bearing I and II compounds. In terms of NRA signal quenching the metals formed the following series: $Co > Fe > Ni > Mn > Cu$. In general, the NRA signals reflect temporospatial interference and are thus reminiscent of noise spectra. Figures 14; references 17: 10 Russian, 7 Western.

Crystallochemical Analysis of Superionic States of Copper and Silver Halides

937M0108A Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 58 No 9, Sep 92 (manuscript received 29 Jul 91) pp 730-734

[Article by V.D. Prisyazhnyy, Yu.M. Gufan, A.I. Grankina, I.N. Moshchenko and V.I. Snezhkov, Institutes of General and Inorganic Chemistry and of Metallophysics, Ukrainian Academy of Sciences, Kiev; Rostov Design Engineering Institute; UDC 641.135.4]

[Abstract] Crystallographic analysis was performed on $\alpha \rightarrow \beta$ transitions in the ionic conductors AgI and CuBr in order to gain a better undestanding of ion movements in crystals. The results showed that in AgI the transition involved a change from a superionic to a normal state with a 10E+4 reduction in conductivity, whereas in CuBr conductivity was not affected. Comparative analysis of changes in coordinates and symmetries of the cations on deformation of the anionic lattice from cubic to a densely packed hexagonal form indicated that the superionic state was not due to an excess number of vacant spaces. Rather, superionic transitions appeared to rest on energetic considerations analogous to those applicable to metal-dielectric transitions. Ordering of the cations was shown to involve 18 sublattices in the tetrahedron, which indicates that estimation of occupancy requires determination of 18 probability functions. Figures 3; tables 1; references 9: 7 Russian, 2 Western.

Hydrogenation of CO, Acetylene and CO + Acetylene Mixtures on Group VIII Metal Catalysts

937M0108B Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 58 No 9, Sep 92 (manuscript received 13 Jun 91) pp 737-742

[Article by S.N. Orlik, Yu.I. Pyatnitskiy and G.G. Girushtin, Institute of Physical Chemistry, Ukrainian Academy of Sciences, Kiev; UDC 541.128]

[Abstract] An analysis was conducted on the impact of catalysts on the outcome of hydrogenation of CO, acetylene and CO + acetylene mixtures under atmospheric and 1500 kPa pressures at 100-180°C. The catalysts employed in the trials were represented by Group VIII metals—Fe, Ni, Pd and Rh—supported on Cr_2O_3, SiO_2, Al_2O_3, TiO_2 or porous Ti carriers. Product analysis showed that catalyst manipulation in combination with selected pressure parameters can be used to achieve synthesis of a wide spectrum of desired hydrocarbons, concomitantly with inhibition of oligomerization. Figures 1; tables 3; references 8: Russian.

4-Diethylaminophthalhydrazide (DEAPH)-Based Chemiluminescent Assay of Cobalt in Drinking Water

937M0108C Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 58 No 9, Sep 92 (manuscript received 18 Jul 91) pp 750-753

[Article by O.A. Zaporozhets, O.Yu. Nadzhafova, L.I. Savranskiy and V.V. Sukhov, Kiev University; UDC 543.31:543.4:543:546.73]

[Abstract] The sensitivity of chemiluminescent assays for Co in drinking water has been improved 10-fold by a preliminary step in which Co is chelated by 1-(2-pyridylazo)-2-naphthol (PAN). After adsorption to unmodified L40/100 silicagel, interfering Cu, Fe, Zn, Ni and Mn chelates were eliminated by acidification with 0.5 M HCl. The $Co(PAN)_2^+$ chelates were desorbed, dissociated, and Co recovered for quantification on the basis of DEAPH chemiluminescence. This modified chemiluminescence assay was found suitable for Co detection over a concentration range of 0.01 to 100 μg/L. Figures 3; tables 1; references 16: 11 Russian, 5 Western.

Reaction of 4-Methyl-5,6-Dihydro-2H-Pyran With Phosphorus Pentachloride

937M0113C Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 4, Apr 92 (manuscript received 21 Nov 90) pp 804-806

[Article by S.V. Fridland and L.I. Lapteva, Kazan Institute of Chemical Technology imeni S.M. Kirov; UDC 547.341.811.01(047)]

[Abstract] An analysis was conducted on the chlorination and phosphorylation products obtained by the reaction of phosphorus pentachloride with 4-methyl-5,6-dihydro-2H-pyran, 4-methyltetrahydropyran, 4-methyl-4-chkitetrahydropyran, 4-methyl-4-phenyltetrahydropyran, 4-methyl-4-xylyltetrahydropyran and 4-methyl-3-methylchlorosilyltetrahydropyran. The results showed that the presence of two unconjugated nucleophilic centers in the pyran congeners leads to chlorination products. Exclusion of one such center (π-bonds) results in phosphorylated products in analogy to the reactions obtained with cyclic ethers. Tables 1; references 9: Russian.

Enzyme Electrodes for Determination of Organophosphorus Compounds

937M0086A Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 8, Aug 92 pp 573-579

[Article by Ye. A. Korostyleva, G. G. Kholina, A. A. Tumanov; UDC 543.066:577.15]

[Abstract] This review of the Russian and Western literature discusses enzyme-type electrodes with immobilized cholinesterase for determination of organophosphorus compounds in water, air and soil. The organophosphorus compound is judged based on the degree of inhibition of cholinesterase activity. One advantage of immobilized cholinesterase is the possibility of repeated use of the same quantity of enzyme, as well as its increased stability in storage and use and resistance to temperature variations. A variety of immobilization methods are used. A table lists the enzyme, substrate, compound determined, electrochemical sensor, range of detection and electrode stability of several typical methods. References 50: 36 Russian, 14 Western.

Geochemical Methods of Predicting Hydrocarbon Pools Using Multivariate Statistical Analysis

937M0072A Moscow GEOKHIMIYA in Russian No 3, Mar 92 (manuscript received 19 Apr 91) pp 368-376

[Article by A. V. Chakhmakhchev, All Union Scientific Design- Construction Research and Technological Institute of Geologic, Geophysical and Geochemical Information Systems, Moscow; UDC 550.84:553.981/.982]

[Abstract] Long experience gained in geochemical studies showed that the light fractions of petroleum (C_5-C_8) and condensed gas systems are sufficiently informative to be used in developing prognostic indicators for the underlying deposits. An attempt was made to develop indices based on the composition of the high fraction of hydrocarbon fluids that would reflect various types of the starting biomass; using multivariate statistical analysis, criteria were to be developed for predicting the pool types. It was shown that the type of the starting organic substance does affect the composition of the light fraction of these hydrocarbons and condensates. Based on the component and discriminant analysis, criteria were obtained for separation of the hydrocarbon systems by their phase-genetic types. This could be applied to local or zone based predictions, even at the stage of exploratory drilling. Tables 4; figures 3; references 6: 4 Russian (1 by Western author), 2 Western.

Physical-Chemical Aspects of Formation of Modern Oceanic Phosporites

937M0072B Moscow GEOKHIMIYA in Russian No 3, Mar 92 (manuscript received 12 Oct 90) pp 377-388

[Article by V. S. Savenko, Moscow State University; UDC 550.41:536.35]

[Abstract] Physical-chemical analysis of the equilibria in the system CaO-P_2O_5-CaO_2-HF-H_2O was carried out taking notice of the new findings obtained for solid phases of calcium phosphate and dissolved forms of inorganic phosphorus in aqueous solutions. On the basis of literature data, analysis of chemical and physical properties of calcium phosphate, different forms of phosphorus in aqueous solutions (including sea water) and of factors controlling solubility of chemical phosphate, a conclusion was reached that the solubility of calcium phosphate depends on the composition of the aqueous medium as well as on the composition and degree of aging of the solid phase. An important role in this process is played by the bacterial population of the precipitates, after the soft tissue of dead organisms is replaced by calcium phosphate. Tables 4; figures 3; references 37: 23 Russian (2 by Western authors), 14 Western.

Equilibrium Adsorption of Some Dissolved Organic Substances on Vinylpyridine Polymer Sorbents

937M0078A Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 14 No 1, Jan 92 (manuscript received 11 Jul 91) pp 20-25

[Article by V. V. Podlesnyuk, L. Ye. Fridman, Ye. A. Fesenko, N. A. Klimenko, V. A. Baskakov, G. P. Kharina, Institute of Colloidal Chemistry and Chemistry of Water imeni A. V. Dumanskiy, Academy of Sciences of Ukraine, Kiev; UDC 541.183.5]

[Abstract] Normally, activated charcoal is used to remove dissolved organic materials from water; recently polymers were introduced for this purpose. It was of interest to investigate adsorption properties of hydrophilic polymer sorbents based on 2-methyl-5-vinylpyridine. In this work results have been reported of the investigation of equilibrium adsorption of organic materials (benzoic acid and its derivatives) over polymer sorbents with different content of crosslinking agents and solvent: the best results were obtained on sorbents containing 70-90% divinylbenzene and 10-30% 2-methyl-5-vinylpyridine. In general, vinylpyridine copolymers appeared to be promising sorbents for the removal of acidic reagents from aqueous solutions. This finding expands considerably the extent of the application of the adsorption methods to water purification. Tables 3; figures 6; references 16: 8 Russian, 8 Western.

Uranium Containing Plastisol Compositions and Polymers Based on Them

937M0121C St. Petersburg RADIOKHIMIYA in Russian Vol 34 No 3, May-Jun 92 (manuscript received 13 Mar 91) pp 178-182

[Article by M. A. Katkova, M. R. Leonov, T. V. Severina, V. N. Selivestrov, I. Z. Kozina; UDC 546.791:678.743.22]

[Abstract] Uranium containing plastisol polyvinyl chloride compositions (PVC) were obtained from uranium trioxide and converted to uranium filled polymers—flexible dielectric films containing up to 80% uranium. Such a composition is a multiphasic system because its components are practically insoluble in each other. The optimal plastisol composition was obtained from dibutylphtallate with a 2:1 ratio of the plasticizer:PVC and a 20% content of uranium oxide. Addition of uranium oxide resulted in a marked effect on the rate of thermal breakdown and on absorption of the x-rays; complete absorption of the x-rays was observed in a sample containing 60% of uranium oxide. Thus it was shown that uranium oxide is an active filler of PVC plastisols, with a complex multifaceted effect. Tables 2; figures 2; references: 5 (Russian).

Investigation by NMR and EPR Methods of Initial Stage Copolymerization of Polysulfide and Epoxide Oligomers in Presence of a Mannich Base

937M0123A Moscow KHIMICHESKAYA FIZIKA in Russian Vol 11 No 10, Oct 92 (manuscript received 19 Nov 91) pp 1371-1377

[Article by Ye. S. Nefedyev, T. A. Zyablikova, V. A. Silayev, R. M. Gaynullin, M. K. Kadirov, A. V. Ilyasov, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Scientific Center, Russian Academy of Sciences; UDC 543.422:539.189]

[Abstract] The goal of this work was to investigate early stages of the copolymerization of model compounds: the initiation and early propagation of molecular chains, using NMR and EPR methodology. The models used were: phenylglycidyl ether, tert-dodecyl mercaptan and normal dodecylmercaptan; the initiators also known as Mannich bases were: dimethylaminomethylphenol and bis-2,6-dimethylaminomethylphenol. The reactions were carried out at 70°C. Analysis of detailed spectroscopic data identified formation of a phenoxy radical from the Mannich base in this early stage of copolymerization; this radical played an active role in forming the structure of the copolymer. A radical mechanism was proposed for the reaction, and the products of copolymerization process were identified. It was shown that normal dodecylmercaptan was more active as an initiator than the tert-dodecyl mercaptan. Figures 2; references 10: 8 Russian, 2 Western.

Conductivity of Metal Filled Polymer Films at Percolation Threshold

937M0125C Moscow KOLLOIDNYY ZHURNAL in Russian Vol 54 No 5, Sep-Oct 92 (manuscript received 20 Mar 91) pp 109-113

[Article by T. D. Pryamova, V. I. Roldugin, Institute of Physical Chemistry, Russian Academy of Sciences, Moscow; UDC 678.01:537.311]

[Abstract] Composition polymer systems with electricity conducting fillers are being intensively studied from both the theoretical and practical aspects because of their unique physical-chemical properties and possibly wide application. The mechanism of the charge transfer and the effect of the structure forming processes on the mechanism, of the fillers or of the polymer matrix have not been fully elucidated. Experiments were carried out on the conductivity of direct current by epoxy oligomer films of different thickness. Nickel carbonyl was used as the filler. The data showed that with decreased thickness of the films the value of threshold concentration increased and the respective critical index diminished. Therefore, the threshold concentration is determined by the thickness of the film and the composition of the material: the structure formation processes have a definite effect on the electrophysical properties of polymer dispersion. Determination of percolation characteristics in filled polymers makes it possible to stipulate the formation of conducting structures in such systems and eventually could help to regulate the electricity conducting properties in polymers. Tables 2; figures 3; references 7: 5 Russian (1 by Western author), 2 Western.

Extraction of Trace Quantities of Gold From Hydrochloric Acid Solutions With Cyclic and Linear Ethers

937M0121B St. Petersburg RADIOKHIMIYA in Russian Vol 34 No 3, May-Jun 92 (manuscript received 23 Sep 91) pp 156-165

[Article by V. V. Yakshin, O. M. Vilkova, L. T. Makarova, N. A. Tsarenko, A. A. Podmarenkov; UDC 542.61]

[Abstract] The investigation of the distribution of gold in extraction systems was carried out using linear polyethers (dibutyl ethers of di-, tri-, and tetraethylene glycols) and crown ethers. In preliminary experiments it was discovered that the highest gold distribution coefficients were observed in case of 18-crown-6 and so its derivatives were used in this study (cis-dicyclohexyl-18- crown-6 and its alkyl derivative). The principal factors affecting the coefficient of distribution of trace quantities of gold (10^{-3} to 10^{-5}) in extraction from hydrochloric acid solutions are: the concentration of hydrochloric acid, of chloride ions and of the impurities in water, the ether structure and the solvent type in the organic phase. In all cases examined the distribution coefficients increased with increased concentration of HCl. Overall, the most effective extracting agent was the dicyclohexyl-18-crown-6 dissolved in chloroform. The sulfate and nitrate ions did not interfere with extraction of gold from complex solutions. Tables 6; references 6: 3 Russian, 3 Western.

Round Table Meeting on Gold Mining in Kazakhstan

937M0105A Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 3-16

[Abstract] On April 14 a round table meeting was held in Alma-Ata dealing with the gold industry in Kazakhstan chaired by O.N. Soskovets, Kazakh Minister of Industry. The participants included economists, industrialists and technical experts acutely aware of their new responsibilities in a competitive global market place. Extensive reports and discussions addressed the problems facing this branch of industry in light of Kazakh independence and transition to a market economy. In particular, the participants recognized a pressing need to better assess available gold reserves, increase production two- to three-fold, develop the gold processing sector since currently 30.2% of the gold ore is exported, expand basic research, and modernize every aspect of the industry to make it a viable contributor to the development of Kazakhstan. Finally, recognition was accorded to the fact that the quality of life of the workforce needs serious improvement. Illustrations 4.

Gold Reserves of Kazakhstan: Geological Problems

937M0105B Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 16-20

[Article by T.M. Zhautikov, dr. geol. mineral. sci., and L.G. Nikolayev, cand. geol. mineral. sci., IGN [Institute of Geological Science], Kazakh Acad. Sci.]

[Abstract] A brief review is provided of the gold resources in Kazakhstan and their geologic characteristics, with emphasis on the need for more detailed basic research on the qualitative and quantitative facets of the reserves. Comparison is made where appropriate with the state of gold exploration and mining in other countries. The review concludes with remarks on the economic and social issues pertinent to the gold industry in Kazakhstan, and the need to develop marketing expertise and skills in order to compete in the global economy. Tables 2.

60th Anniversary of "Kazzoloto" Trust

937M0105C Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 20-24

[Article by A.S. Kabyldenov, director, "Kazzoloto" Enterprise; UDC 622.342.1:622.272]

[Abstract] Although the "Kazzoloto" Trust was founded in 1923, its roots go back to 1836 with the discovery of placer deposits in Northern Kazakhstan. By the end of the Fifth 5-Year Plan, "Kazzoloto" was producing 70% of Kazakhstan's gold. With depletion of placer deposits the trust turned its attention to deep mining in the mid-sixties and the introduction of new technologies for streamlining the entire process. Nevertheless, the gold industry was underfinanced during the Soviet period and was regarded merely as a supplier of raw materials that generated hard currency. With the independence of Kazakhstan this situation is being rectified and the social needs of the workforce are being addressed as well. Illustrations 3.

Evaluation of Deep Quartz Vein Gold Deposits in Northern Kazakhstan

937M0105D Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 24-28

[Article by Sh.Kh. Suleymenov, chair, working group, SK, GRE [not further expanded], GOK [Mining Enriching Combine], "Kazzoloto", Ye.P. Balashov, chief geologist, GOK, "Kazzoloto", and O.P. Kazantsev, group chair, GRE, Tselinograd; UDC 622.342.1:553.576:622.013.34]

[Abstract] Geological characterization is presented of gold-bearing quartz veins in northern Kazakhstan, studies that were undertaken with a view toward better estimation of gold reserves in the area. The detailed studies covered veins to depths of 1000 m and led to modifications in mining operations to render recovery more efficient. The statistical approaches that were developed for the geologic conditions in this particular area are also applicable to other regions with suitable modifications. Figures 3; tables 1; references 3: Russian.

Developments and Trends in Gold Vein Mining

937M0105E Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 29-36

[Article by D.I. Rafiyenko, cand. tech. sci., IPKON [not further expanded], Russian Acad. Sci., D.K. Urazov, chief engineer, B.Ye. Sharipov, cand. tech. sci., chief, technical dept., and V.M. Ivanov, chief, PKO, GOK [Industrial Trade Organization, Mining Enriching Combine], "Kazzoloto"; UDC 622.342.1:622.272]

[Abstract] Details are provided for new gold vein mining technologies employed at the Bestyube deposits in northern Kazakhstan because of the size of the deposits and their complex geologic features. The technological advances that have been implemented in drilling, ore recovery, storage, and classification have already served to increase productivity two- to three-fold. However, even more advanced technologies need to be implemented and adapted so that even deeper veins can be tapped to maintain productivity and production. Figures 5; references 5: Russian.

Implementation of Pulsation Units at Zholymbet Gold Recovery Plant

937M0105F Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 46-47

[Article by V.A. Kovalchuk, chief concentration specialist, cand. tech. sci., and V.A. Klimenko, chief, research laboratory, GOK [Mining Enriching Combine], "Kazzoloto"; UDC 622.342.1(574)]

[Abstract] A serious shortcoming of the cyanidation process is the length of time required for completion, which in some cases may be 60-70 h. In order to improve the efficiency of the process, four pneumatic pulsation units—PPM-8s—were introduced at the Zholymbet plant, with the result that the gold recovery step from flotation tailings was reduced from 31 to 4 h. As a result, gold recovery during the first year of operation increased by 11.5% with a cost effectivenss of 284,000 rubles (1990 currency). Figures 2.

60th Anniversary of "Maykainzoloto" Gold Mining and Recovery Plant

937M0105G Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 53-57

[Article by V.F. Tyumentsev, director, "Maykanzoloto" ; UDC 622.012.3:622.342()61.75)]

[Abstract] The "Maykainzoloto" complex had its beginnings in 1914 when copper began to be mined, but the importance of mineral deposits in the region was already documented in 1860. At present the "Maykainzoloto" trust is undergoing reorganization and implementing new technologies in an attempt to increase production of gold, silver, copper, zinc and other minerals by 30%. Emphasis has also been placed on exploring titanium and zirconium deposits despite the current financial difficulties experienced by the trust. However, strategic plans have been formulated which anticipate that in 5-7 years "Maykainzolotoy" will become one of the leading mineral processors in Kazakhstan and a more profitable enterprise. Illustrations 4.

Exploration, Planning and Construction of Alpys Mine

937M0105H Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 57-59

[Article by A.V. Kostyrin, chief engineer; UDC 622.012.2"Maykainzoloto",001.2]

[Abstract] A historical sketch is provided of the Alpys mine, a part of the "Maykainzoloto" trust, where exploratory studies began in 1977. The mine has been yielding gold, zinc, selenium, lead, cadmium silver and other valuable minerals. Ongoing efforts are being made to improve the efficiency of recovery, particularly as greater depths have to be mined to maintain production and maintain or even improve profitability. Figures 1.

Social Development at Mining Complexes

937M0105I Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 59-61

[Article by O.A. Kovel, deputy director, and M.Z. Abenov, chair, trade union; UDC 622.012.2"Maykainzoloto":301"313"]

[Abstract] The "Maykainzoloto" trust is one of the older industrial enterprises in Kazakhstan and has been faced with many of the economic and social problems characteristic of the Soviet period. With independence, new approaches are being taken to provide for workers and maintain an acceptable social infrastructure at a time of uncertainty, in part due to Kazakhstan's transition to a market economy and financial accountability. Nevertheless, despite anticipated difficulties, the committment displayed by the administration and line workers and their cooperation portends a bright future for the trust. Illustrations 2.

Rational Land Utilization at Apys Mine Dumping Sites

937M0105J Moscow GORNYY ZHURNAL in Russian No 8, Aug 92 pp 61-62

[Article by V.I. Nikishow, chief technologist; UDC 622.882.001.86:622.012.2"Maykainzoloto"]

[Abstract] A new dumping site has been designed for the Alpys mine of the "Maykainzoloto" trust, which is intended to combine safety, convenience and minimize land use. Taking topographic features into consideration, the planned site will save 27 hectares of arable land and reduce transportation distance by 120 m, with heights of the heaps reduced to 25-27 m for safety reasons. Figures 1.

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