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Quantum Nature of Heterogenic Catalysis

937M0100A Moscow *IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA* in Russian
Vol 35 No 7, Jul 92 (manuscript received 03 Feb 92)
pp 67-71

[Article by V.F. Chernyy, N.F. Kleshchev, Nidal Makhmud El-Khatib and N.G. Petrenko, Chair of Analytical Chemistry, Kharkov Polytechnical Institute imeni V.I. Lenin; UDC 66.094.37]

[Abstract] A philosophical approach is taken to explaining the nature of heterogenous catalysis based on advances in quantum electronics and developments in laser technology. It is based on certain analogies common to laser and catalyst functions. The following may be regarded as common features: (1) Both processes yield well-characterized output either in the form of chemical products (catalysis) or photons of a certain wavelength (laser beams); (2) Both processes depend on activation and, hence, require an energy input; and (3) Ions of transition metal oxides are active in both heterogenous catalysis, as in oxidation of ammonia, for example, and as active components in photon emitting solid bodies. A key feature of the oxides is that they are paramagnetic and capable of transition to an excited state, particularly at low concentrations (< 1%). Transition from one energy level to another underlies laser function. The discussion is extended to show that the efficiency of Fe₂O₃ catalysts in ammonia oxidation is due to analogous quantum mechanisms. In this case a specific form of emission (875.4 cmE-1) on activation of Fe₂O₃ predisposes the breakdown products (atoms and radicals) of the substrate to form groups with bonds

capable of absorption at that wavelength. Consequently, this and other examples suggest that selection of catalysts on the basis of their quantum characteristics may be used to enhance selectivity. Figures 3; references 9: Russian.

Ways to Improve the Efficiency of Catalysts for Oxidative Methane Condensation

937M0127A Moscow *USPEKHI KHIMII* in Russian
Vol 61, No 8, Aug 92 (manuscript received 8 Apr 92)
pp 1550-1563

[Article by O. V. Krylov, Institute of Chemical Physics, Russian Academy of Sciences; UDC 541.128.13]

[Abstract] The oxidative condensation of methane into C₂-hydrocarbons is reviewed. The reaction, discovered in 1981-1984, is one of the most rapidly developing fields of catalysis. Group I-IV nontransition metal oxides, i.e., metal oxides with external sp-electrons, such as PbO applied on Al₂O₃ or MgO, Sm₂O₃, BaO₂, and Li/MgO are the most active and selective catalysts. Yields reported range from 26 to 32.3 percent. The best temperature range is 950-1100 K. Lower temperatures lead to deep oxidation, and higher temperatures lead to deep oxidation and catalytic cracking. Conversion increases with an increase in pressure, but selectivity decreases. An increase in pressure positively affects the oxidative dehydration of ethane to ethylene. Water vapor affects the heterogeneous and not the homogeneous stage of the process. Chlorine compounds such as LiCl, NaCl, KCl, CsCl and also LiBr increase the oxidative condensation product yield. CO₂ has a positive effect on selectivity and a negative effect on catalytic activity. References 102: 18 Russian, 84 Western.

Porosity of Weakly Basic Anion Exchange Styrene-Divinylbenzene (S-DVB) Copolymers

937M0112A St. Petersburg ZHURNAL PRIKLADNOY KHIMII in Russian Vol 65 No 4, Apr 92 (manuscript received 25 Mar 91) pp 844-849

[Article by K.M. Saldadze, Ye.M. Gutkina, T.K. Brutskus, E.A. Uvarova, N.V. Chkheidze, A.G. Artyushin, G.Ya. Sorochkina and L.G. Panchenko, Scientific Research Institute of Plastics, "Platmassy" Scientific Industrial Association, Batumi; UDC 661.183.12:539.217]

[Abstract] An analysis was conducted on the porosity of a series of S-DVB copolymers—containing 3-8% by wt. DVB—modified with dimethylamine (DMA), diethylamine (DEA), ethylenediamine (EDA) and diethylenetriamine (DETA). Treatment with poreformers—alkyl benzenes, benzene, or decane—yielded a variety of macroporous chloromethylated copolymers. Surface area, porosity and pore size were dependent on the nature of the copolymer and rather than on the conditions of amination. In general, copolymers prepared with n-decane and aminated with DMA, EDA or DETA were characterized by high pore volumes in combination with small surface areas and a narrow spectrum of pore size. Depending on the copolymer, the pore size with DMA and DETA ranged from < 100 to 1000 Å, and with DEA and EDA from < 100 to 300 Å. Figures 4; tables 3; references 7: 6 Russian, 1 Western.

Internal Structure and Ion Exchange Properties of Polymeric Filters

937M0112B St. Petersburg ZHURNAL PRIKLADNOY KHIMII in Russian Vol 65 No 4, Apr 92 (manuscript received 02 Nov 90) pp 850-854

[Article by A.B. Oreshkov, N.V. Katushkina, B.I. Venzel, G.K. Imangaziyeva, N.Ya. Lyubman and V.M. Kolikov, St. Petersburg State Technical University; Scientific Research Institute of "Azmeckhanobr", Alma-Ata; UDC 534.544]

[Abstract] Scanning electron microscopy was combined with mercury porosimetry in a study of the internal structure and ion exchange characteristics of globular polymers serving as filters. The cylindrical filters (18 mm x 120 mm; 8 mm int. diam.; 25 ml vol.) were prepared from formaldehyde cross-linked phenol, resorcinol, pyrocatechol, and melamine and additives to impart ion exchange properties. Ultrastructural analysis revealed that the microglobules had an average diameter of 1 µm with a 10-15% range. However, differences in permeability were due to pore size, porosity and packing density of the microglobules rather than globule size. The exchange capacity for anions and cations ranged from 0.66 to 0.255 and from 0.09 to 0.240 mg-eq/g, respectively. Figures 2; tables 1; references 8: 6 Russian, 2 Western.

Behavior of Impurities in Electrochemical Refining of Tellurium From Acid Electrolytes

937M0102A Moscow ELEKTROKHIMIYA in Russian Vol 30 No 9, Sep 92 (manuscript received 09 Oct 90) pp 1272-1279

[Article by V.M. Bigelis, T.I. Parmanov, A.B. Mirkarimov and G.A. Dzhanbekova, Institute of Nuclear Physics, Uzbek SSR Academy of Sciences, Tashkent; UDC 541.138.2+546.24]

[Abstract] Radiometric and polarization techniques were employed in assessing the behavior of Sb and Se impurities in electroprecipitation of Te from a complex acid electrolyte (1 M TeO_2 + 0.5 M $\text{C}_4\text{H}_8\text{O}_6$ + 3 M H_2SO_4 + 4.17×10^{-3} M $\text{Se}(\text{SO}_2)$ + 2.7×10^{-3} M $\text{Sb}(\text{Sb}_2\text{O}_3)$). Data interpretation was based on results obtained after 2 to 20 h of electrolysis at 20, 45 or 65°C with a 2, 10, 50 or 100 mA/cm² cathodic current. The resultant findings indicated that contamination of the Te samples with Sb is due to adsorption or mechanical incorporation during electrolysis. In the case of Se contamination a more complicated scenario was encountered, involving electrochemical as well as chemical factors. One aspect of contamination included electrochemical as well as chemical reduction of Se(II) ions to Se on the electrode. Figures 7; tables 2; references 12: Russian.

Impedance of Semiconductor Electrode With Jump Conductivity in Subsurface Nonstoichiometric Layers

937M0102B Moscow ELEKTROKHIMIYA in Russian Vol 30 No 9, Sep 92 (manuscript received 12 Jul 91) pp 1310-1319

[Article by Yu.L. Mikhlin and Ye.V. Tomashevich, Institute of Chemistry and Chemometallurgical Processes, Siberian Branch, USSR Academy of Sciences, Krasnoyarsk; UDC 541.135]

[Abstract] Best evidence indicates that subsurface zones of semiconductors consist of layers with crystallographic—or electronic—defects to depths ranging from hundreds to thousands of nanometers. Defects of this nature due to vacancies of metals and of metal complexes have been shown to have a variety of electrical sequelae due to shifting and displacement of the Fermi layer, holes in the valence bands, etc. Using the mathematical formulations developed by Mott et al. [Mott, NF, Davis, EA, "Electronic Processes in Non-Crystalline materials," Oxford U. Press, NY, 1979 (Russ. transl., 1982)], in combination with experimental data derived from studies on n-PbS, has provided a theoretical foundation for assuming that jump conductivity across such electronic defects is a feasible event based on charge tunnelling and diffusion on application of alternating currents. Figures 4; tables 1; references 19: 7 Russian, 12 Western.

Electrochemical Behavior of Polycyclic Arenes—Activators of Peroxide-Oxalate Chemiluminescence. Oxidation Potential as Indicator of Activation Efficiency in Reaction of Bis-(2,4-Dichloro-6-Carbalkoxyphenyl)-Oxalates With Hydrogen Peroxide

937M0102C Moscow ELEKTROKHIMIYA in Russian Vol 30 No 9, Sep 92 (manuscript received 11 Oct 91) pp 1335-1335-1343

[Article by O.A. Antonkina, S.K. Smirnov and P.O. Gitel, State Russian Scientific Research Institute of Organic Chemistry and Technology, Moscow; UDC 541.138.2:547.6:535.379]

[Abstract] An analysis was conducted on the efficiency of various naphthalene and anthracene derivatives as activators of chemiluminescence production as a result of the reaction of bis-(2,4-dichloro-6-carbalkoxyphenyl)-oxalates with hydrogen peroxide catalyzed by sodium salicylate. The results yielded the linear equation $\ln(I_{\max}/A) = a + (b)E_{1/2}(\text{Ox})$, where I_{\max} is the maximum intensity, A absolute quantum yield of luminescence, $E_{1/2}(\text{Ox})$ is the oxidation potential of the arene, "a" is reactivity constant of the bis-oxalates, and "b" is a transition state constant. The results showed that elongation and branching of the ester group in the bis-oxalates had no effect on the reaction. The effective energies of activation fell into the 63.2-88.3 kJ/mole range, and their high correlations ($r = 0.999$) with $E_{1/2}(\text{Ox})$ indicates that the key stage in light emission involves interaction of the active intermediate with the luminophore. Figures 2; tables 6; references 18: 4 Russian, 14 Western.

Electrocatalytic Ni^{2+} -o-Phenylenediamine System in Polarography: Parallel Surface Reactions in Complexation

937M0118A Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 6, Jun 92 (manuscript received 20 Mar 90) pp 1223-1230

[Article by Ya.I. Turyan; UDC 547.553.1:541.128:543.251]

[Abstract] Detailed kinetic studies were conducted on the adsorption of o-phenylenediamine (L) to Hg electrodes and complexation with Ni^{2+} in electrocatalytic systems. The kinetic parameters described optimum conditions for formation of adsorbed $\text{Ni}(\text{L})$ complexes, the latter displaying a high degree of catalytic activity leading to formation of $\text{Ni}(\text{L})(\text{L})$ -type complexes. AcO^- ions further accelerated the catalytic reaction via parallel reactions leading to NiOAc^+ , $\text{Ni}(\text{OAc})_2$ and mixed $\text{Ni}(\text{Ac})(\text{L})$ complexes. In addition, the inhibitory effects of PF_6^- ions were due to formation of catalytically inactive $\text{Ni}(\text{PF}_6)$ complexes. Figures 2; tables 2; references 44: 14 Russian, 30 Western.

Electrochemical Oxidation of Tetramethyl Esters of $\alpha,\alpha, \omega,\omega$ -Alkanetetracarboxylic Acids

937M0128A Moscow *IZVESTIYA AKADEMII NAUK RAN SERIYA KHIMICHESKAYA* in Russian No 10, Oct 92, (manuscript received 30 Sep 91) pp 2332-2339

[Article by M. N. Elinson, S. K. Fedukovich, B. I. Ugrak, and G. I. Nikishin, Institute of Organic Chemistry imeni N. D. Zelinskiy, Russian Academy of Sciences, Moscow; UDC 541.138:547.463]

[Abstract]The electrooxidation of the esters $(\text{MeOOC})_2\text{CH}(\text{CH}_2\text{CH}(\text{COOMe}))_2$ when $n = 2-10$ was studied under conditions which are optimal for the

electrochemical cyclization of the tetramethyl ester of propane- 1,1,3,3-tetracarboxylic acid. Esters of butane-1,1,4,4- and pentane-1,1,5,5-tetracarboxylic acids are cyclized in MeOH in the presence of NaI into esters of cyclobutane-1,1,2,2- and cyclopentane-1,1,2,2-tetracarboxylic acids in more than 95 percent yields. The esters of the higher acids undergo iodination and hydroxymethylation under similar conditions with CH_2 formed. During electrolysis in MeOH in the presence of NaOAc, the esters undergo hydroxymethylation with subsequent cyclization into substituted five- and six-membered lactones or tetrahydrofurans where structurally possible. NMR data are reported. References 12: Russian 5, Western 7.

Highly Compressed State of Substance: New Potential of Chemistry and Material Handling

937M0073A Moscow VESTNIK RAN in Russian No 9, Sep 92 pp 89-92

[Article by K. N. Semenenko, V. A. Nalimova, Department of Chemistry and Physics of Elevated Pressures, Moscow State University]

[Abstract] Under conditions of very high pressures and resulting compressions, exposed materials convert to a "supercompressed state" which is accomplished by rearrangement of atomic electron clouds. The principal concept was first noted by Wentorf in 1962. Some of the early products of this discovery are the synthetic diamonds and cubic boron nitrides, presently manufactured on industrial level. Current experiments in this field utilize pressures from several Kbar to 2-2.5 Mbar. In some of the more interesting studies, investigators looked into the high pressure polymorphism of heavy alkali and alkaline earth metals - Rb, Cs, Ba. An alternative route was developed at the Moscow State University imeni Lomonosov to "supercompressed state" which did not require very high pressures. The new approach was based on the principle of "chemical compression" or a combination of a chemical reaction followed by compression at relatively modest pressures. Using special apparatus, C_2Li and C_4M (where M= K, Rb, Cs) were obtained and proved to be stable entities, capable of existing as such after decomposition at room temperature. This discovery could find application in production of lithium batteries. This principle of "chemical compression" could be applied to other cases, such as metalization of iodine complexed with dextrine, or metalization of hydrogen dissolved in metal-graphite matrixes at relatively low pressures of 1-5 Kbar. Figures 3; references 13: 2 Russian, 11 Western (2 by Russian authors).

Preconcentration in Voltammetric Analysis of Platinic Elements

937M0117A Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 47 No 9, Sep 92 (manuscript received 22 Nov 91) pp 1546-1566

[Article by N.A. Ulakhovich, G.K. Budnikov and E.P. Medyantseva, Kazan state University; UDC 543.253]

[Abstract] A review is presented of largely Soviet literature on advances in voltammetric determination of platinic materials. Analysis of this class of elements is largely limited to physical methods, with voltammetry gaining in importance and acceptance as its sensitivity improves. The latter has in part been due to new organic complexing agents, refined concentration and extraction techniques, and development of more sensitive and selective electrodes. Currently, detection sensitivities on the order of $10E-8$ to $10E-7$ M have become routine for Pt(II), Pd(II), Ir(III), Ru(III), Os(III) and Rh(III). Tables 4; references 143: 103 Russian, 40 Western.

Determination of Palladium in Platinic Concentrates by Ion-Pair HPLC

937M0117B Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 47 No 9, Sep 92 (manuscript received 03 Dec 91) pp 1712-1720

[Article by Ye.M. Basova, L.G. Bondareva and V.M. Ivanov, Moscow State University imeni M.V. Lomonosov; UDC 546.9:543.544:542.61:54.412.2]

[Abstract] An analysis was conducted on separation of Pd(II), Pt(II), Rh(III) and Ru(III) complexes in reverse-phase ion-pair HPLC for purposes of refinement of the technique. The approach employed EDTA for chelation, a Separon C_{18} column, and tetraethyl-, tetrabutyl- and cetyltrimethylammonium bromides as ion-pair reagents. Using Pd as an example, adjustment of pH and concentrations of reagents showed that the system could be fine-tuned to detect 0.1 μ g of Pd using a 50:50 water:acetate buffer, pH 3.8, phase 0.1 M in tetraethylammonium bromide. Figures 5; tables 4; references 8: 5 Russian, 3 Western.

Determination of Free CuO in High-Temperature Superconducting $YBa_2Cu_3O_{7-8}$ Ceramics

937M0117C Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 47 No 9, Sep 92 (manuscript received 15 Nov 91) pp 1727-1730

[Article by S. Yu. Sumarokov, N. I. Shevtsov and A. B. Blank, Institute of Single Crystals, Ukrainian Academy of Sciences, Kharkov; UDC 531.9:543.77]

[Abstract] Free CuO concentrations in Y and Ba cuprates and $YBa_2Cu_3O_{7-8}$ superconducting ceramic were analyzed by x-ray phase and x-ray fluorescent analysis. In recovery studies following solubilization in acetic acid the x-ray fluorescent technique yielded results with a standard error of deviation of 0.12 in the interval of 0.05-1 % by wt. of CuO. In addition, the results were found to be in excellent agreement with those obtained by x-ray phase analysis. Tables 2; references 5: 3 Russian, 2 Western.

Effect of Cerium Oxide on Radiation Stability of Alkaline Fluorophosphate Glass

937M0135A St. Petersburg FIZIKA I KHIMIYA STEKLA in Russian Vol 18 No 5, Sep-Oct 92 pp 51-54

[Article by S. A. Stepanov, I. B. Urusovskaya, Scientific Research and Technological Institute of Optical Material Handling, All Russian Scientific Center "GOI (State Optical Institute) imeni S. I. Vavilov, St. Petersburg, Russia]

[Abstract] The effect of cerium oxide on crystallization ability, spectral and radiation characteristics of the $P_2O_5-Na_2O-K_2O-LiF-AlF_3$ system glass was studied. This glass is transparent to IR, UV and visible light.

Glass samples were irradiated with ^{60}Co γ -quanta. Analysis of the experimental data showed that introduction of up to 1% of CeO_2 in excess of 100% produced glass with relatively low crystallization tendency; they appear to be resistant to radiation, i.e. they do not darken when exposed to intense radiation. Thermal decolorization of the irradiated glass samples ($T > 60^\circ\text{C}$) results in an almost complete removal of the introduced absorption. Figures 2; references 3: 2 Russian, 1 Western.

Investigation of Structural Changes in Thin As-Se System Films by Differential Scanning Calorimetry Method

937M0135B St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92 pp 55-64

[Article by V. A. Bershteyn, L. M. Yegorova, A. V. Kolobov, V. A. Ryzhov, Physical-Technical Institute imeni A. F. Ioffe, Russian Academy of Sciences, St. Petersburg, Russia]

[Abstract] Some of the more interesting phenomena, characteristic of the amorphous chalcogenic films, are the photo- and thermally stimulated changes of their properties. Structural changes in thin films of $\text{As}_{50}\text{Se}_{50}$ and As_2Se_2 were investigated by the differential scanning calorimetry method. Differences in thermal behavior of the films and glass were noted along with changes in their structural states. The exothermal changes occurred above and below their glassing temperature, T_g . As a result of the exposure to visible light or due to heating at temperatures close to T_g , the enthalpy of these changes increased, but these factors were not additive. This may be related to two aspects: breaking down of the weakest covalent bonds or additional ordering, deterioration of the molecular packing in the glass. The carrier played an important role in forming the structural-energetic states of thin films and massive glass. Table 1; figures 5; references 10: 1 Russian, 9 Western (3 by Russian authors).

Anisotropy Induced During Photoinduced Doping of Glass-like As_2Se_3 With Silver

937M0135C St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92 pp 65-68

[Article by A. V. Kolobov, V. M. Lyubin, V. K. Tikhomirov, Physical-Technical Institute imeni A. F. Ioffe, Russian Academy of Sciences, St. Petersburg, Russia]

[Abstract] Photoinduced dichroism (PID) was observed for the first time; it accompanied photo-doping of glassy As_2Se_3 with silver under the action of linearly polarized light. It was observed that PID could be induced only by the linearly polarized light; illumination of the sample with non-polarized light or with circularly polarized light did not result in the appearance of PID, or if it did, it also disappeared very quickly. The kinetics of the appearance of dichroism and its sign are significantly

different from PID observed in non-doped films of the chalcogenic glass. A microscopic model was proposed to explain this phenomenon. The linearly polarized light is absorbed primarily by the structural elements of the glass oriented parallel to the electric light vector. This light may break down these structural fragments or increase their number, resulting in different signs of the PID. Figure 1; references 6: 1 Russian, 5 Western (3 by Russian authors).

Novel Chalcogenic Glass With Conductivity Caused by Copper Ions

937M0135D St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92 pp 84-91

[Article by A. M. Bolotov, Ye. A. Bychkov, Yu. G. Ulasov, S. B. Rozenkov, F. Khalifa, Institute of Chemistry, St. Petersburg University, St. Petersburg, Russia]

[Abstract] Silver and copper can be introduced in considerable quantities into the composition of chalcogenic glass. Glass doped with these metals exhibit excellent chemical stability and are widely used as photoresistors and in chemical sensor membranes. The goal of this work was to investigate the relationship between the structure of copper containing glass doped with triiodides and their ionic transport. Specifically, the formation of glass and its thermal and transport properties were studied in the system: $\text{CuI-AsI}_3\text{-As}_2\text{Se}_3$, $\text{CuI-SbI}_3\text{-As}_2\text{Se}_3$ and $\text{CuI-BiI}_3\text{-As}_2\text{Se}_3$. The greatest region of glass formation was observed in the system $\text{CuI-SbI}_3\text{-As}_2\text{Se}_3$; this glass, resistant to crystallization, contains up to 50 mole-% of CuI in a wide range of compositions. It was established that the degree of depolymerization of the conservative tetrahedral network of copper containing chalcogenide glass depends on the chemical nature of the halide: the greatest effect is shown by As, Sb and Bi triiodide, the lowest by CuI . The ionic conductivity along Cu(I) correlates with the degree of depolymerization of the glass network and with the effect of large radius cations affecting the ionic mobility. Quaternary glass $50\text{Cu}_x10\text{SbI}_3x20\text{PbI}_2x20\text{As}_2\text{Se}_3$ exhibited maximum ionic conductivity of copper ions. Figures 6; references 7: 2 Russian, 5 Western (1 by Russian authors).

Optical Properties of Novel Boron-Lanthanum Oxido-Fluoride Glass

937M0135E St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92 pp 98-101

[Article by V. Ye. Galant, Ye. B. Nosyreva, Scientific Research and Technology Institute of Optical Material Handling, All Russian Center "State Optical Institute (GOI) imeni S. I. Vavilov", St. Petersburg, Russia]

[Abstract] Optical properties and crystallization ability of the glass of $\text{B}_2\text{O}_3\text{-La}_2\text{O}_3\text{-YF}_3$ system were investigated. Glass material was prepared on a laboratory scale in platinum crucibles at 1250°C . Addition of 2 mole-%

of BaO, BaF₂, CaO, CaF₂ and SrF₂ resulted in formation of crystalline crust on the surface and crystalline inclusions inside the glass. Crystal-free glass was obtained with addition of 2 mole-% of SrO, ZrO₂, ZnO, ZnF₂, AlF₃, Al₂O₃; or 4 mole-% of ZnO, SrO, ZnF₂, AlF₃, Al₂O₃ and 10 mole-% of BaAF₂. Optical constants of 21 modified glass samples were tabulated. Optimal composition was selected for production of novel glass. Tables 2; figures 2.

Photoinducing Processes in Photochromic FCS-2 Glass Bulk and in Waveguides Made From It

937M0135F St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92
pp 109-117

[Article by A. V. Dotsenko, N. V. Nikonorov, M. V. Kharchenko, Scientific Research and Technological Institute of Optical Material Handling, All Russian Scientific Center "State Optical Institute (GOI) imeni S. I. Vavilov", St. Petersburg, Russia]

[Abstract] The interest in photo-directed devices for integral optics based on planar waveguides is increasing continuously. One of the promising photosensitive materials is the photochromic glass (PG) which can be used in production of planar waveguides. In the present work photoinduced anisotropy of the absorption of coloring centers was investigated using PG-2 glass and the waveguides made from it. It was shown that maximal changes in the induced absorption during the coloring and decolorization of PG was observed when the polarization of the activating and probing radiation was superimposed; when their polarization was perpendicular to each other, the effect was minimal. The magnitude of the dichroism depends on the radiation dose and on the wave length of the probing radiation, reaching values of 0.25 cm⁻¹ ($\lambda_{\text{probe}} = 633 \text{ nm}$). In the bulk of the glass studied, exposure to the red light resulted only in a breakdown of the coloring centers, in a wide range of radiation activation densities. In the waveguides the only result is the formation of coloring centers. The dichroism has opposite signs in the glass bulk than in the waveguides. In planar waveguides the dichroism of induced absorption could be used in development of various photo-controlled devices such as polarization selectors, switches, etc. Figures 6; references 9: 7 Russian, 2 Western.

Nature of Glass Formation and Nature of Glassy State

937M0135G St. Petersburg FIZIKA I KHIMIYA
STEKLA in Russian Vol 18 No 5, Sep-Oct 92
pp 119-125

[Article by P. I. Buler, Friedrich-Alexander University, Erlangen-Nurnberg; Institute of Material Handling, Erlangen, Germany]

[Abstract] The currently used model of glassing leaves a number of questions unresolved. A new model was proposed by the author based on the following: 1) the glassing liquids deviate from the structural equilibrium at temperatures above the crystallization points; 2) the glassing process is a first degree phase transition process in which the supercooled liquid becomes an amorphous solid bulk and 3) the glassing temperature is characteristic of a given substance or a system but it does not represent the kinetic characteristic of the cooling process of the melt. The paper presents theoretical arguments in favor of this model showing that a specific order is established in the glass structure during the glassing process which is not altered during the cooling stage. This characterizes the process as a phase transition of the first order which becomes restricted by the establishment of the close order of the supercooled liquid structure. Such a phase transition is possible only at a given, adequately high density which often reaches 10¹³ Pa. This model avoids some of the misconceptions like that of the existence of a number of substances in only two aggregate states (liquid and vapor) or the existence of a situation in which the liquid entropy would exceed the entropy of the crystal. Figures 2; references 14: 6 Russian, 8 Western.

Change in Sub-Surface Layer Composition After Abrupt Energy Change in Bombarding Ions

937M0143A Moscow POVERKHNOST: FIZIKA,
KHIMIYA, MEKHANIKA in Russian No 1, Jan 1993
(manuscript received 12 Dec 91; after revision
14 Dec 91) pp 26-33

[Article by S. S. Voytusik, G. V. Kornich, V. I. Zaporozhchenko, and S. V. Teplov, Center for Study of Surfaces and Vacuum SRI (AU), Moscow; UDC 620.193.6:533.924]

[Abstract] Although intensive research has been conducted over the past 15 years on altered layers formed as a result of ion beam bombardment, the results have been inconclusive. Study of the kinetics of surface concentration during an abrupt energy change in bombarding ions presents great interest since it contains information on preferential atomization, ionic mixing, and other factors associated with the formation of an altered surface layer. In the present work an analysis was conducted—within the framework of a diffusion model of ionic mixing—of the experimental kinetics of the surface concentration of cobalt silicide during an abrupt energy change in bombarding Ar⁺ ions from 1 to 4 keV and from 4 to 1 keV. The chief causes for the observed change in kinetics were ionic mixing and preferential atomization. It was demonstrated that growth in the energy of bombarding ions is directly proportional to the rate of movement of atomized surface. Kinetic asymmetry is related to residual defects following the 4 to 1 keV energy change. Figures 6; references 23: 4 Russian, 19 Western.

Amorphization Mechanism of Semiconductors During Irradiation With Various Particles

937M0143B Mosow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 1, Jan 93 (manuscript received 9 Jan 92, after revision 27 Jun 91) pp 34-41

[Article by I. G. Gverdtsiteli, A. N. Guldamashvili, R. N. Kuteliya, and M. I. Sadagashvili, Stable Isotopes SRI, Tbilisi; UDC 621.315.592]

[Abstract] Although the phenomenon of semiconductor amorphization during ionic doping has been well established, the nature of the transition from single crystal to amorphous state has not been finalized, nor has a theory fully describing the process been formulated. In the present work a unified description is presented on the rules governing amorphization of irradiated semiconductors that is based on the requirement of an accumulation of a stationary quantity of radiation-caused crystal structure defects sufficient for the formation of a solid amorphous layer. A shift toward higher temperatures has been established in the amorphization dose/temperature curve with increasing defect forming capability of irradiated particles. This temperature shift evidently results from the need to maintain a constant rate of generation of defect points in relation to their consumption to an accumulation level sufficient for amorphization. Figures 5; references 21: 11 Russian, 10 Western.

Enhancement and Attenuation of Pulsating Solitons of Surface Acoustic Waves in Paramagnetic Dielectrics

937M0143C Mosow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 1, Jan 93 (manuscript received 30 Apr 91; after revision 10 Sep 91) pp 42-47

[Article by G. T. Adamashvili and L. I. Asanishvili, Tbilisi State University; UDC 534.232-8:534.8]

[Abstract] Surface acoustic waves may develop along the interface between various media, and if the amplitudes of these waves are high enough, various non-linear phenomena may develop. An especially pronounced non-linear effect takes place at frequencies exceeding 10^9 Hz. Especially interesting are those non-linear effects which lead to the formation of non-linear waves such as solitons. These include soliton formation in solid dielectric materials under conditions of anharmonic lattice and dispersion vibrations, as well as the possibility of formation of pulsating solitons under the same conditions. In the present work a theory was developed for non-linear surface acoustic waves in solid dielectric materials containing paramagnetic impurities. Pulsating solitons formed under conditions of anharmonic lattice and dispersion vibration were taken into account, and conditions were examined under which these waves are enhanced or attenuated as a result of interaction with paramagnetic impurities. The conditions under which

pulsating solitons of stationary form are propagated are presented. References 10: 7 Russian, 3 Western.

Features of Behavior of Phosphorus in Silicon Previously Implanted With Ytterbium

937M0143D Mosow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 1, Jan 93 (manuscript received 26 Sep 91, after revision 9 Jan 92) pp 86-88

[Article by V. V. Petrov, V. S. Prosolovich, Yu. N. Yankovskiy, and A. P. Kovarskiy, Belorussian State University, Minsk; UDC 621.315.592]

[Abstract] Addition of rare earth elements to silicon melts during crystal growth raises the resistance of these materials to radiation and high temperatures. However, until now the possibilities of lanthanoid doping with ionic implantation and their effects on both the properties of silicon single crystals and the characteristics of their semiconductor structures have not been investigated. In the present work mass spectrometry was used to study the behavior of phosphorus atoms in silicon previously irradiated with ytterbium ions. Immediately following implantation, no shifts in the profile of phosphorus distribution to the surface as compared with Si:P were observed. With heat treatment at 950° , the presence of ytterbium alters the migration of phosphorus both toward the surface and within the bulk of the crystal. Figures 2, references 5 (Russian).

Surface Diffusion of Nickel in Metal Oxide High Temperature Superconductors

937M0143E Mosow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 1, Jan 93 (manuscript received 16 Aug 91, after revision 10 Apr 92) pp 108-112

[Article by P. L. Gorbik, B. M. Gorelov, V. V. Dyakin, L. I. Mironov, V. S. Melnikov, V. M. Ogenko, and G. M. Shalyapina, Surface Chemistry Institute, Kiev; UDC 537.312.539]

[Abstract] Various types of diffusion are possible in heterogeneous, anisotropic, and polycrystalline metal oxide high temperature superconductors. This is confirmed by a variety in magnitudes in activation energy and preexponential factor in the diffusion coefficient of certain metals. Two types of diffusion, surface and bulk, exist in heterogeneous polycrystalline systems. The mechanism of surface diffusion is a function of the states of the surface and subsurface regions, which determine the magnitudes of the activation energy and the frequencies of vagrant diffusing atoms. The mechanism of bulk diffusion in the system $YBa_2Cu_3O_{7-x}$ depends apparently on both the degree of ordering in the oxygen sublattice and the oxygen content, since varying these two factors alters the crystal lattice and the electron density at the Cu1-O and Cu2-O bonds. By varying the crystal lattice parameters and defect concentration, it is possible

to determine which type of diffusion exists in a system. In the present work a study was made of the effects of particle size, composition, internal disorder, and alternating deformations on the diffusion of nickel in the high temperature superconductors $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ and $(\text{Bi}_{0.8}\text{Pb}_{0.2}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10})$. In both systems diffusion is characterized by rapid and slow components with near

activation energies in the 200-500° temperature interval. A transition from two component to a single component diffusion with a change in activation energy was observed in the $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ system. This behavior of the diffusion coefficient evidently results from the surface type of migration of Ni atoms. Figures 2, references 8: 7 Russian, 1 Western.

Synthesis and Porosity Characteristics of Ethylene-Propylene Copolymers

937M0100B Moscow *IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA* in Russian Vol 35 No 7, Jul 92 (manuscript received 21 Oct 91) pp 91-94

[Article by S.I. Pakhomov and G.P. Andrianova, Chair of Technonology of Polymeric Films and Artificial Skin, Moscow Technological Institute of Light Industry; UDC 662.998.3.678]

[Abstract] Porous ethylene-propylene polymeric films were prepared from the copolymer powder under a pressure of 1.4×10^7 Pa for 25 min at 180°C , cooling at a rate of $5^\circ\text{C}/\text{min}$, treatment with *o*-xylene at 125 or 138°C for 8-12.5 min, washing with acetone and drying to a constant weight at 25°C . Analysis of porosity by various techniques demonstrated that porosity and pore size were directly related to the duration of *o*-xylene treatment and temperature. Maximum tensile strength (6.0 MPa) was obtained with *o*-xylene treatment for 10 min at 125°C , which yielded films with $S_{sp} = 10.5 \text{ mE}^2/\text{g}$ and $V_o = 1.02 \text{ cmE}^3/\text{g}$. Figures 1; tables 1; references 4: Russian.

Polymerization of N,N-Diallylphthalimide Iodide

937M0100C Moscow *IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA* in Russian Vol 35 No 7, Jul 92 (manuscript received 14 Oct 91) pp 112-113

[Article by F.A. Pulatove, A.S. Maksumova and I.I. Ismailov, Chair of Theoretical Chemistry, Tashkent

Institute of Textile and Light Industry; UDC 541.64:542.952]

[Abstract] Dilatometric techniques were used to monitor radical polymerization of N,N-diallylphthalimide iodide at 40°C using azo-bis-butyric acid as the initiator. The order of the reaction was 1.7 in monomer and 0.5 in initiator. The five-membered cycloliner polymer was obtained as a white powder soluble in water, DMSO and DMF. Figures 1; references 5: 3 Russian, 2 Western.

Methoxyethylmethacrylate Polymerization Kinetics: Mathematical Modeling

937M0116D Tashkent *UZBEKSKIY KHIMICHESKIY ZHURNAL* in Russian No 3-4, May-Jun 92 (manuscript received 30 Oct 91) pp 56-58

[Article by E.U. Teshabayeva, B.T. Sabirov, U.A. Safayev and I.I. Ismailov, Tashkent Institute of Textile and Light Industry; UDC 541.64+127]

[Abstract] Microcomputer-based mathematical analysis was applied to the kinetics of low-temperature radical polymerization of methoxyethylmethacrylate (MEMC), employing dinitrylazo-bis-isobutyric acid (DNBA) as the initiator. Over a temperature range of 298 to 313 K and monomer and initiator concentrations of 0.01-0.04 and 1.0-4.0 M, respectively, the calculated energy of activation came to 58.78 kJ/mole. The experimental data were used to derive the following descriptive equation for the overall process: $V = 0.16 \times 10^{-15} \times [\text{MEMC}]^E + 1.45 \times [\text{DNBA}]^E + 0.46 \times e^{-58.78/RT}$. References 3: Russian.

Diamond Sufferings: Illegal Russian Diamonds Threaten DeBeers Monopoly

937M0024A Moscow TRUD in Russian 17 Oct 92 p 6

[Article by Zurab Nalbandyan, TRUD correspondent]

[Text] Johannesburg—A year ago, the most profitable monetary investment in the Republic of South Africa was considered to be purchase of shares in DeBeers Consolidated Mines. Whatever might be happening to the nation's economy, DeBeers shares were firmly advancing.

The history of DeBeers could be taught in management courses. Starting nearly three quarters of a century ago with "unpromising" diamond pits in the South African province of Transvaal, the company has risen to monopolistic control of these precious stones.

And suddenly, within the span of a few months, the long years of prosperity were ruined. DeBeers shares lost almost half of their value, and the company had a shortfall of eight billion dollars. For the sake of clarity, I should state that this is more than the annual budgets of some CIS nations!

Such a turn of events was unexpected besides because DeBeers is not only one of the world's largest producers of cuttable diamonds, but also their main seller. The Central Selling Organization (CSO) set up by this company several years ago sells more than 80 percent of the world's diamonds. This allows DeBeers itself to establish prices.

In addition to this, two years ago the CSO concluded an agreement with Glavalmazoloto, granting it exclusive rights to sell Russian cuttable diamonds. And in the spring of this year, the last source of diamonds on the territory of the former USSR was under the control of the CSO: the government of Yakutia agreed to sell 10 percent of the diamonds extracted in the republic through the CSO, an amount that according to a decree of President B. Yeltsin now remains to this region for its own needs.

But despite all these circumstances that are favorable to the company, one of the grandees of the capitalist world has fallen to the edge of bankruptcy.

In the opinion of one of the experts of the Johannesburg Stock Market, Jay Kotz, DeBeers can lay its problems at two doorsteps: Angola and Russia. It is from these two nations that illegal cheap diamonds have been flooding the world market.

During the civil war in Angola, access to the Cuango River Valley was not easy, and it was there that precious pebbles could be had by the open method without particular difficulty. With the advent of peace, more than 50,000 "fortune seekers" infected with "diamond fever" go out to the fields each day. Apparently, many of them are lucky, as the total value of diamonds recovered by them surpasses \$500,000.00 each year. And although

the Angolan government is making valiant efforts to establish control over the "leaking" national treasure, the great majority of diamonds from the Cuango Valley are illegally shipped out of the country and sold abroad at low prices.

It is to the "Angolan factor" that DeBeers authorities attribute the major cause of the company's present problems. However, the reliable South African newspaper BUSINESS DAY states that DeBeers is getting its main "headache" from Russia.

The fact is that enormous numbers of cuttable Russian diamonds have recently been shipped out to Europe, America and the Near East. These unaccounted-for precious stones are being sold, of course, without going through DeBeers at one third lower than market prices.

And so it turns out that the DeBeers monopoly has been undercut. London, Antwerp and Cairo jewellers prefer to take the cheaper unofficial product.

Reviewers in Johannesburg are assuming that it is the complexity of the current DeBeers situation that explains what many had not anticipated: the return to active business of the 84 year old Harry Oppenheimer, principal holder of shares in the company and its president for many years. Although the official representatives of the company firmly maintain that H. Oppenheimer visited Moscow on personal business and mainly as a tourist, the newspaper EXPRESS INTERNATIONAL directly points out that the "patriarch" after eight years of retirement specifically requested assistance for talks with the Russian government about establishing firmer control over the chaotic state of the diamond industry of the former USSR.

Oppenheimer returned from Moscow in good spirits. Does this mean that he was successful in getting an agreement, or is it only the customary guise of DeBeers executives to appear optimistic?

The company director Ogilvie Thompson believes in success as formerly. He maintains that DeBeers as before will profit from the confidence of its shareholders. He is also sure that today's difficulties will shortly be surmounted.

Behind the Glitter of Diamonds

*937M0025A Moscow ARGUMENTY I FAKTY
in Russian No 35, pp 1, 5*

[Interview with L. Gurevich, Russian deputy, co-chairman of the committee on reorganization of the diamond and cut gem industry, by A. Uglanov; place and date not given]

[Text] As a rule, diamonds in the USSR were the business of people at the top: Kosygin, Ryzhkov, Pavlov... Even today, the secrecy of the diamond and cut gem industry is zealously guarded. We talked about the consequences of the secrecy game with L. Gurevich,

Russian deputy, co-chairman of the committee on reorganization of the diamond and cut gem industry.

Gurevich: Most frequently in Russia, the problem of the diamond and cut gem industry turns on our relations with the world monopoly on cornering and reselling raw diamonds: The South African DeBeers Company. It is very important to note that it is this company that sets prices for diamonds in accordance with the very carefully worked out DeBeers Classifier, which contains about 6,000 entries. Its price list is the basis for buying up 80% of the diamonds of world producers.

Uglanov: What is Russia's place on the diamond market?

Gurevich: Russian is in fourth place. There is a special heading: "Russian Goods." This is because there is a high yield of pure white stones among Russian diamonds. The price of these goods on the world market is very high, especially when converted to cut gems. But almost all of Russian goods pass through one pair of hands, those of DeBeers.

According to the latest agreement with this company, which was signed under Ryzhkov, we are obliged to sell to DeBeers 95 percent of the entire export of Russian diamonds.

Trade in diamonds takes place in London at what are called "sights." It is a very intimate business. The buyer in private is presented with a "box" in which, according to traditions, there are assorted stones of different color, purity and weight. But on the whole they comprise a lot that is being sold in entirety wholesale. The seller is DeBeers. There are about 100 permanent buyers. The market is very tight, there is no opportunity for trading. A single instance of turning down a "box" offered by DeBeers may result in exclusion from the list of buyers. No deals are struck. One word "agreed," a handshake, and it's all over. No one knows the price at which the "box" has been sold.

Uglanov: How many diamonds did we "turn up" last year?

Gurevich: About 12 million carats of cuttable diamonds were mined. Most were sold to DeBeers as raw diamonds. The remaining stones, about 2 million carats, went to our diamond cutting enterprises, where they were dealt with very inefficiently. In this business, there is the concept of the "coefficient of cash effectiveness": the ratio of the value of the cut gem to the cost of the diamond from which the gem is made. In our industry, the coefficient is about 1. This means that the diamond is sometimes worth more than the gem produced from it! Sounds like nonsense, but nevertheless. The plants of our "Kristall" Association were subsidized in the amount of 200 million rubles last year.

Uglanov: And what is the average coefficient world wide?

Gurevich: As much as one and a half or more. In Israel last year, \$2,200,000,000.00 was spent on raw diamonds, and \$2,850,000,000.00 was received from the sale of cut

diamonds, i.e. 650 million dollars were earned from the work of diamond cutters alone.

At the same time, of all the diamond mining nations, ours is the only one that has its own processing industry. This in itself is unique. But this industry is operating extremely inefficiently, at a loss.

The entire structure of our diamond and cut gem industry is such that no one knows which raw diamonds should be cut today. For that, we need connections with the market.

Uglanov: Is there any relation between the poor performance of our diamond cutting industry and the interests of the Oppenheimer family who founded DeBeers?

Gurevich: I can't exactly say. But neither can I say "no." At any rate, some of our "masters of the diamond business" have been wonderfully stubborn in this respect. And among them, I include Mr. Rudakov, who at one time was head of "Glavalmazoloto" and is now head of "Rosalmazoloto."

Uglanov: I have heard that Yakutian deputies in the Russian parliament are rather arrogant with respect to your committee.

Gurevich: In contrast to some of the Yakutian deputies who have only just exchanged the ideas of communism for the ideas of national chauvinism, and so are still "adrift," DeBeers understands that this same Yakutia cannot be ripped out of the body of Russia. This is an economic impossibility. This is understood there, although they are playing their game with Yakutia, which is obvious. According to an agreement between the governments of the Russian Federation and Yakutia, the latter may dispose of 20 percent of the diamonds mined there. The Yakuts have gone to DeBeers and concluded an agreement like the one between DeBeers and Russia. Harry Ralph, the director of the DeBeers brain—the Central Selling Organization—later made a concise and cynical statement to the press, meaning Yakutia when he said that it is "the same skinned cat, just skinned another way."

Uglanov: Is B. Yeltsin aware of all these machinations. From what I hear, he is being bombarded from all sides by false representatives of DeBeers to put things back the way they were. How is he reacting to this?

Gurevich: Everything that I have told you is known to the government. But suddenly a draft resolution comes up that requires immediate implementation of the presidential decree of 19 February. This is classified decree No 158C about setting up the "Diamonds of Russia" Joint Stock Company, a decree that creates a monopoly that will not work for the good of the State. That is, 95% of the export of diamonds will be transferred to a joint stock society. The diamond cutting industry of Russia will be left aside, and should die off.

Uglanov: And what are the provisions made by the draft of your committee?

Gurevich: Creation of a Federal Diamond Center: An independent State organization that will purchase raw diamonds at DeBeers list prices from the diamond mining enterprises of "Yakutalmaz" Scientific Production Association and sell them to consumers on various levels. That is, a market will be introduced. We are not "pushing" Yakutia anywhere: if you want to do any preliminary grading for yourself, go right ahead. But for now, everything is being done the other way around.

I'll let you in on a secret. Parliament has already started work on a law about precious stones. Thereby we will do away with all the irresponsible fuss now rampant in the diamond and cut gem industry.

P.S. A DeBeers delegation held a reception a few days ago in Moscow. Making use of A. Hammer's experience, DeBeers patron H. Oppenheimer endowed a Culture Fund in the amount of \$300,000.00 (it is assumed that the "buy cheap and sell dear" difference for Russian diamonds amounts to 300-600 million dollars per year).

Those who arranged the event very much wanted B. Yeltsin or his ministers to be present. But for whatever reasons, they did not show. Present instead were Muscovite Yakut friends of DeBeers.

From what we have learned, DeBeers today is not the monolith that it still wishes to appear. Because of the advanced age of the company's patron H. Oppenheimer, a fierce power struggle is contemplated, and the outcome is difficult to predict. Nor is the company in such good financial shape: the price of shares has fallen by 20 percent.

And finally, Yakutia comparatively recently sold a diamond lot to the West. One wonders if the Yakutian workers in whose name the sovereign deal was made know how much money was obtained, in what western bank it was deposited, and to whose account.

Parliament Substitutes Government in Diamond Matters

937M0026A Moscow IZVESTIYA in Russian 17 Oct 92
p 2

[Article by Vladimir Guseynov, Izvestiya correspondent]

[Text] On Monday, 12 October, the Presidium of the Supreme Soviet of Russia laid the foundation for a global reformation of the diamond industry of our nation. That is the assessment of some reviewers of the decision of the Presidium to approve proposals of a special committee of the Supreme Soviet, which in the course of recent months has been studying problems of the diamond industry. Now the committee's proposals must be approved by the Supreme Soviet itself.

The problems of the Russian diamond industry for the past two years have been the subject of constant attention of the public and the press. The main reason is the growing significance of cash income from the sale of

diamonds for the nation's economy. Each year, the export of these precious stones brings more than 1.1 billion dollars, and is today the second income article of foreign trade.

Traditionally, the mining, processing and export of diamonds in recent years have been the business of the state association Glavalmazoloto SSSR (more recently "Rosalmazoloto" Corporation). In the intervals between separate stages of processing and sales of precious stones, they have been stored at Gokhran SSSR (and more recently at Komdragmet of Russia).

Contentions between these two state organizations and their successors, who have maintained powerful lobbies for control over the diamond trade in the higher echelons of Soviet and Russian administrations (Glavalmazoloto procured and sold, but did not store, Gokhran only stored, but could not sell and use), were, and to some extent continue to be the main intrigue of discussions around the domestic diamond industry.

From now on, following the approval of proposals of the parliamentary committee, which is informally called the "Gurevich Commission" from the name of one of its co-chairmen, the future structure of the diamond industry of Russia will have the following appearance.

In place of the defunct "Rosalmazoloto," mining and processing of diamonds will be handled by the "Diamonds of Russia-Sakha" Joint Stock Company that has risen from its ashes and taken over most of its enterprises.

Over this structure, a "Federal Diamond Center" will be set up, a state organization accountable to parliament that will supervise diamond export, and make expert assessments of foreign trade deals based on its own grading service (grading, i.e. the presale evaluation of raw diamonds, is the heart and soul of the diamond business throughout the world). In case of necessity, the "Diamond Center" will directly regulate the conditions of the sale of diamonds and the price level for them. And it may even make control sales of raw diamonds.

Incidentally, the right of control sales has been the cause of long-standing contentions between the government of Yakutia and representatives of the Russian parliament. The latter has maintained that such sales are in the nature of ordinary large-scale transactions. This would have violated the external system of trade in Russian diamonds via the DeBeers Company, and led to unpredictable economic consequences. The Yakuts have successfully insisted that control sales will be strictly limited in volume.

For all its complexity, in the current situation this kind of structure of the diamond business represents the optimum agreement of interests of various governmental agencies, the Republic of Sakha (Yakutia), and the main buyer of Russian diamonds, the DeBeers Company. The

South African Company has obtained de facto confirmation of efficacy of its contract for monopolistic purchase of Russian diamonds for five years.

Shares of the "Diamonds of Russia-Sakha" Company will be distributed among the labor collectives of mines and processing enterprises, the administration of the regions where deposits are located, the governments of Russia and Sakha (Yakutia), and also other structures. Among these is the Fund for Social Defense of Servicemen. What relation this fund may have to diamond mining is an enigma of our nation's economics.

The "Diamond Center" will actually be set up by the Committees on Precious Metals of the Russian Federation and Sakha (Yakutia). Consideration is also given here to the interests of the principal and influential opponent of the old trade system: the former Gokhran. The accountability of the "Diamond Center" to the parliament of Russia will allow the higher agency of legislative authority to control a major export sector, and hence, directly or indirectly, the income from it.

This "accountability" of the new diamond structure to parliament is perhaps the main "spice" of the reform that is being carried out. World practice is aware of the mechanism of accountability to parliament of the government as a whole, with all its institutes, including economic. But control of legislative authority over individual sectors of the economy, and moreover such lucrative sectors, is something else again. One thing is certain: after the Supreme Soviet has approved the new structure of the diamond industry of Russia, there is going to be a dramatic increase in direct intervention of the leadership of the Supreme Soviet in economics, and in particular in the foreign trade of the nation.

Diamond War of No Concern to Deputies

*937M0027A Moscow KOMMERSANT DAILY
in Russian 20 Oct 92 p 3*

[Article by Sergey Morgachev and Andrey Romanov]

[Text] Yesterday, the committee of the Supreme Soviet on international affairs and foreign economic relations had planned to conduct parliamentary hearings on problems of the diamond and cut gem industry of Russia. But other than the people who had readied this point of the agenda, only two deputies were in attendance. In conducting the meeting, Leonid Gurevich, chairman of the subcommittee on foreign economic affairs, declared the hearings a failure, and suggested limitation to a press conference.

The press conference was devoted to the work of the parliamentary committee that had prepared a proposal on optimizing the diamond and cut gem industry (the "Gurevich Commission," from the name of one of its directors). In Mr. Gurevich's own words, from the very first his group has felt the influence of "corrupted structures" taking part in operations with precious stones that differ from all criminal syndicates of this

kind in the very highest extent of conspiracy. Without naming names, Leonid Gurevich and Valeriy Skripchenko, who is the deputy chairman of the ways and means committee, gave us to understand that they were talking about collaborators in structures of the former USSR that had made efforts to "privatize" the diamond industry. It is they whom the speakers link to the signing of an "unscrupulous" pact with the DeBeers Company to buy raw diamonds in Russia on a monopolistic basis, and profit by selling them at a markup of 28-30% (280-300 million dollars per year).

Nevertheless, Mr. Gurevich has acknowledged that he has "not yet encountered a single expert who would advise a break with DeBeers. At the same time, it is Valeriy Skripchenko's opinion that relations with this company should be developed within a framework of an organization of OPEC type set up by nations that mine raw diamonds. Within this framework, producers would establish quotas for the purpose of jointly maintaining prices "acceptable" to all parties.

This sharpness of opinions is no surprise to experts "X," who are well aware of the conflict of ideas of different groups around reform of the diamond industry. The experts are inclined to single out two sides in the current controversy that with some degree of convention can be called "monopolists" and "reformers."

The "monopolist" party is made up of directors of the former Rosalmazzoloto headed by Valeriy Rudakov, the directorate of the large diamond mining production association of Yakutalmaz headed by director general Lev Safonov and Moscow representative Vladimir Piskunov. The concept of this group calls for maintaining their monopoly on all stages of the diamond triad—extraction, sorting and trade—as having made a good showing for the thirty-year history of the sector. They likewise appeal to the experience of the DeBeers Company that unites all these functions.

The "reformers" are guided by the capabilities of the committee that is developing proposals for optimizing the diamond and cut gem industry. The thrust of their original ideas on restructuring consisted in demonopolizing the sector and setting up several independent diamond mining, cutting and trading organizations. For State control it was suggested that a Federal Diamond Center be set up on the basis of the Committee for Precious Metals. The reformer feel that breaking up Rosalmazzoloto as a stagnant bureaucratic structure would significantly increase the profitableness of the diamond and cut gem industry.

Some experts "X" do not the opinion expressed in the press that the project of reform of the diamond industry now being proposed by the "Gurevich Commission" reflects a certain mutually acceptable compromise of the interests of these two sides. It calls for setting up a national diamond company and monitoring the State Federal Diamond Center in operations of sorting and exporting precious stones. There are grounds for

assuming that this compromise is clearly less acceptable for the party that unifies the former supervisors of the sector. In the opinion of experts "X," implementation of the project would be detrimental to the interests of yet another implicit character in the drama: the DeBeers Company.

The fact is that by comparison with the situation that existed in the time of Glavalmazoloto and Rosalmazoloto, the national diamond company in accordance with the project must give up control over the export of diamonds, and this would constitute the real meaning of the transformations taking place in the sector.

In February 1992, the directorate of the former Rosalmazoloto Association succeeded in getting the President to sign classified decree No 158C (dating from 19 Feb 92) on setting up the "Diamonds of Russia" Joint Stock Company, according to which the entire technological chain of the diamond industry was concentrated in the hands of this company. In July 1992, the presidium of the Russian parliament proposed that the president suspend operation of the decree, but formally, it was neither suspended nor changed. On 26 August 1992 in Mirnyy (the "diamond capital" of Yakutia), the directors of the Rosalmazoloto and Yakutalmaz associations registered the "Diamonds of Yakutia-Sakha" Joint Stock Company with a charter that coincided in principle with the ideology of the presidential decree; however, the government of Yegor Gaydar, taking consideration of the existence of different positions on this issue, refused to recognize the registration.

On 12 October, the presidium of the Supreme Soviet of Russia considered and approved a document of the "Gurevich Commission" under the rubric "Concept of Reorganization and Development of the Diamond and Cut Gem Industry of the Russian Federation," and decided to discuss it in the course of the parliamentary hearings of 19 October. Without waiting for this, on 17 October, Yegor Gaydar and the leader of the Republic of Sakha (Yakutia) Mikhail Nikolayev signed a joint resolution on setting up the "Diamonds of Russia-Sakha" Joint Stock Company with a draft in agreement with the "Gurevich Commission."

Specialists "X" feel that limiting the rights and functions of the national diamond company, whose interests are represented by the "monopolist party," would certainly contradict the interests of the DeBeers Company. It is Valeriy Rudakov and the directors of the diamond mining industry of Yakutia who have repeatedly publicly stressed that the present type of interrelationship between Russia and DeBeers is mutually advantageous and has no alternative. In accordance with the project of the committee of the Supreme Soviet, they would give up control over the formation of these interrelations in large measure to the Committee on Precious Metals that is to be the basis of formation of the Federal Diamond Center, and to parliament, which is to have jurisdiction over this center.

At the same time, it is known that the directorate of the Committee on Precious Metals has always questioned the main thesis of DeBeers, according to which Russia gains more from selling raw diamonds to this company than from expanding its own diamond cutting industry. Moreover, the directorate has taken steps to implement its own position, becoming co-founder of the "Inter-trade" Diamond Cutting Joint Venture. As to the committee of the Supreme Soviet that has prepared proposals on reform of the diamond industry, Mr. Gurevich and the co-chairman of the committee Igor Kazakov have repeatedly publicly denounced DeBeers and its unfair dealings with Russia, and have hinted at the possibility of a reexamination of relations with DeBeers. They are not now making this an official demand, but the logic of events is such that it may be advanced after a little time has passed. Meanwhile, observers feel that it is these people who will determine the policy of parliament in implementation of its supervisory functions with respect to the "Diamonds of Russia-Sakha" Joint Stock Company.

Incidentally, DeBeers up until now has not expressed its official stand on the issue of reform of the Russian diamond industry. It is possible that the company will do this in the course of a meeting with correspondents "X" about which we intend to report in tomorrow's issue.

First Yakutian Cut Diamond

937M0028A Moscow KOMMERSANT DAILY
in Russian 27 Oct 92 p 3

[Text] On 24 October in the Yakutian town of Suntar at a plant of the Russian-Japanese joint venture "Sakha-Japan Diamond," the first Yakutian brilliant was cut. Heretofore, Yakutia has only mined, but not processed diamonds.

Japan is one the largest (together with the United States) consumers of brilliant-cut diamonds. Against the background of a drastic reduction in volumes of Russian trade, there has been a considerable expansion in the import of Russian diamonds into Japan. In this connection, in 1992 the "Sakha-Japan Diamond" Joint Venture was created by the Japanese Arda Company and the "Tuymaada Diamond" Joint Stock Company that was founded in turn in 1991 for creation of a national Yakutian diamond processing industry. The diamond cutting plant in Suntar (director Valentina Ivanova) is the first of 14 that the "Tuymaada Diamond" Joint Stock company intends to construct in the Republic of Sakha (Yakutia).

The production of cut diamonds, aimed at the Japanese market, is the next phase in Japanese business operations on the Russian diamond market. In the summer of 1991, the Japanese Russian Trade Association, which unites medium-sized and small Japanese companies, signed a special protocol with the Republic of Sakha (Yakutia) on cooperation in the area of developing the diamond and cut gem industry.

Observers note that the intention of several Japanese companies to arrange production of brilliant-cut diamonds in Yakutia that is oriented toward the Japanese market coincides completely with the desire of the leadership of the republic, which has been granted the right to independent disposal of a percentage of mined diamonds, to sell not only raw diamonds, but also brilliants that have been cut in accordance with world standards. Yakutian diamond cutting plants will use Japanese equipment and technology, and personnel will be trained in Japan.

Around the Diamond Pie: Debeers Alarmed at Attempts to Break World Diamond Market

937M0029A Moscow ROSSIYA in Russian No 12, Nov 92 p 2

[Article by Yuriy Sigov]

[Text] The state of affairs in the diamond and cut gem industry of Russia has been at the center of attention of supervisory structures of the government and parliament in connection with its imminent radical reorganization. The "diamond battles" that have developed in Moscow and Yakutsk are causing serious unease even for the South African DeBeers Company that has monopolistic rights to the sale of Russian diamonds on the world market until 1995.

In February of this year, the "Diamonds of Russia" Joint Stock Company was created, which was to control the mining, grading and selling of Russian diamonds. In August, a new association, "Diamonds of Yakutia-Sakha," was registered, and on 17 October Ye. Gaydar and the leader of Yakutia, M. Nikolayev signed a joint document on setting up a joint stock company under the name of "Diamonds of Russia-Sakha" with regard to the proposals of the parliamentary committee under supervision of L. Gurevich.

Clearly, efforts are being made to create a more or less stable governmental structure which, "under the care" of parliament, would be able to exercise control over the entire diamond mining industry of Russia. What is the attitude toward these events in the directorate of DeBeers?

The South Africans are primarily interested in expeditious establishment of unanimity in the Russian diamond and cut gem industry. A VEK correspondent was told by Harry Reif, the DeBeers director on transactions with Russia, that "if Russian diamonds are going to be simultaneously at the disposal of the leadership of Yakutia, its parliament, Russian ministers and members of the Russian parliament, and in addition the directorate of the 'Diamonds of Russia-Sakha' Joint Stock Company itself, the whole system is simply going to crash."

DeBeers is also troubled by the grave financial situation of some mines in Yakutia. Due to lack of building materials, structures of the Mirnaya tube are not being repaired, and construction of the new "Yubileynaya"

mine is practically frozen altogether (it is not expected to go into operation until 1994).

Increasingly stronger demands are being heard that Russia set up its own system, paralleling that of DeBeers, for mining, grading and selling diamonds, which would eliminate dependence on the South African Company in waging an independent diamond business. But is this possible for Russia under today's conditions? As it has turned out, the newly created and permanently renamed Russian joint stock companies do not have enough money even for purchasing the first lots of diamonds for sale on the world market, not to mention advertising (DeBeers spends more than 160 million dollars a year on advertisement of cut diamonds alone).

So is it worth breaking the rules of the game that have evolved for years on the world market, especially since by selling uncut diamonds to DeBeers, Russia has a **stable, guaranteed** cash income that might just plainly and simply come to an end for us in our nation with the proposed "diamond trifling"?

It is interesting that at the height of debates relating to Yakutian diamonds, another "shining point" has turned up on Russian territory: Arkhangelskaya Oblast, Pomarye Rayon, where diamonds have been found. According to H. Reif, DeBeers has already held consultations with the authorities of the region and representatives of geological organizations that are prospecting for diamonds.

Incidentally, DeBeers is not averse to taking a more active part in updating and retooling our diamond industry. The South Africans have already allocated 1 billion dollars for development of the diamond and cut gem industry of Russia. However, further investments are not possible at the moment, as we consider diamond mining to be a strategic sector, and participation of foreign capital in the business is not being allowed at this time.

And there is still another issue, perhaps the most important, in the "diamond fights" now heating up in Russia: concerning the prices for uncut diamonds and jewelry. It is felt that if Russia is not going to sell goods to DeBeers, it may "dump" on the world market much more of its diamonds in excess of the quota set by the South Africans, and at lower prices. However, this is not only an erroneous opinion, but extremely dangerous as well.

"As long as there are quotas for the mining and sales of diamonds, DeBeers is in a position to maintain reasonably high prices for cut gems and jewelry" says H. Reif. "People throughout the world buy jewelry and gem-quality diamonds because their value does not fall, but remains high and stable under any conditions. For many this is a guaranteed chance for investment of money. If the market should be destabilized, there will be no advantage to cornering cuttable diamonds even at giveaway prices. And at the same time, this will result in total chaos, and a crash of the entire system of relations in the diamond business."

Crisis in Export of Diamonds

937M0035A Moscow DELOVOY MIR in Russian
No 204 (518), p 1

[Article by Nikolay Zimin: "The Splendor and Misery of Russian Diamonds"]

[Text] There is no doubt that the diamond and cut gem industry of Russia is strategically important to the republic: the cash income from export of diamonds and cut gems is reputed to be second only to export receipts from Russian energy carriers.

But the obvious outward glistening cannot obscure effects of another order that are as obvious as they are paradoxical: This industry itself has actually been in crisis. In recent years, experts have noted that there has been a reduction in diamond output. The total receipts from export of cuttable diamonds have decreased, and the share of Russia in the world export of cut gems had fallen from nearly 10 percent in 1986 to 4 percent in 1991, when 530.5 thousand carats (at 567 million dollars were sold to foreign buyers.

Moreover, there has been an increase in the unsold reserves of cut gems, a rise in the share of exported raw diamonds, and some specialists believe that the diamond and cut gem industry has become increasingly dependent on the South African De Beers Corporation. Our domestic diamond cutting industry is in a very difficult situation. It specializes in handling only the least labor intensive diamonds, and cuts only 15-17 percent of all the range of raw diamonds that we sell to De Beers. Among the factors contributing to the low effectiveness of domestic industry in the production of cut gems are organizational lack of accord between production structures and objective requirements of the world market, and the fact that the existing arrangement for production and sales of cut gems does not provide for feedback with the world market. (We need not mention the domestic market: there has been none, and there is none now).

To add to these problems, that might be called objective, Soviet tradition has kept this area strictly under wraps, hidden not only from public view, but even from any kind of effective State control. Decisions relating to the diamond and cut gem industry were always made only on the highest level of leadership of the former USSR, and these decisions were carried out by a comparatively narrow circle of individuals. It is no wonder that this gave rise to perfect conditions for dishonest and self-interested people, the flourishing of syndicated crime and corruption.

In a word, neither the Russian parliament nor the new State leadership can circumvent the knot of contradictions that has arisen in the diamond and cut gem industry. In February-May 1992, a joint parliamentary and State committee on the diamond and cut gem industry had developed a conceptual scheme for market reorganization. It has been approved by two panels of

experts for Ye. Gaydar, but to date remains unimplemented. First of all, as they say, because of lack of State funding for launching the new system, in particular 300-400 million dollars for purchasing the first 2-3 lots of diamonds at "Yakutalmaz" Scientific Production Association, "Uralalmaz" Production Association and elsewhere. Secondly, there is the obstacle of an alternative concept in the form of Presidential Decree No 158 dating from 19 Feb 92 on setting up the "Almaz Rossii" [Diamonds of Russia] Joint Stock Company, and then, based on this enactment, the State Resolution on the "Almaz Rossii-Sakha" Joint Stock Company after registration in the city of Mirnyy on 26 August of this year.

It is also likely that the work of the parliamentary-State committee on the diamond and cut gem industry has itself felt the impact of two contradictory viewpoints that have arisen in the course of discussions on problems and ways of reorganizing diamond extraction in Russia and its diamond cutting industry, on mutual relations between the domestic diamond and cut gem industry on the one hand, and the trans-national De Beers Corporation and its Central Selling Organization on the other.

However, as of now, following talks of the parliamentary-State committee on the diamond and cut gem industry, as noted by its director L. Gurevich, chairman of foreign trade relations, with the leadership of the Republic of Sakha and the deputies of its Supreme Soviet, with the founders of the "Almaz Rossii-Sakha" Joint Stock Company, a compromise conceptual scheme has been worked out for operation of the diamond and cut gem industry.

In accordance with this concept, the newly established "Almaz Rossii-Sakha" Joint Stock Company is granted the right of carrying out the entire cycle of operations, from extraction and grading of diamonds to their export. But at the same time, a Federal Diamond Center (FATs [Federalnyy almaznyy tsentr]) has been instituted that is accountable to the Supreme Soviets of the Russian Federation and the Republic of Sakha "to carry out a unified State policy in the field of diamonds and cut gems in the Russian Federation, as well as economic supervision over the activity of entities of the Russian diamond and cut gem market and their export operations."

In the words of A. Gurevich, the new arrangement gives serious attention to the domestic diamond cutting industry. Its universal reinforcement and support are defined as priority tasks.

On the whole, however, talks in the Supreme Soviet about the splendor and misery of Russian diamonds are being somewhat delayed: there is too fine a line between what can and cannot be said aloud today as the time approaches for new contacts and talks with De Beers. As L. Gurevich himself has said: "The diamond trade is a lot like love: an intimate affair between two parties."

Nevertheless, in the near future, the concept of reorganization and development of the diamond and cut gem industry of Russian is to be presented for discussion by the Supreme Soviet.

Gold Production in CIS, Kazakhstan, Uzbekistan

Gaydar on Gold and Diamonds

937M0069A *Moscow NEZAVISIMAYA GAZETA*
in Russian 20 Oct 92 p 2

[Article: "Gaydar Decides Gold and Diamond Question"]

[Text] Acting Chairman of Government Yegor Gaydar completed a three-day trip through Russia's northern regions and returned to Moscow. He and Sakha (Yakutia) Republic President Mikhail Nikolayev signed a protocol on joint efforts in the mining and sale of natural diamonds. The recently established Almaz Rossii-Sakha Joint-Stock Company will have the exclusive right to sell local natural diamonds.

In Magadan, Yegor Gaydar conducted a conference on organizing bids for development of a large gold-bearing deposit and on attracting foreign investments into Magadan Oblast. The prime minister agreed in general that up to 10 percent of the gold mined in Magadan Oblast should remain on its territory.

Prices for Precious Metals Confirmed

937M0069B *Tashkent PRAVDA VOSTOKA* in Russian
1 Oct 92 p 1

[Article by I. Grushko: "Bank Confirms Prices: New Prices of Precious Metals Confirmed by the Board of the National Bank of Ukraine"]

[Text] From this moment on, one gram of gold and platinum will cost 2,000 rubles, and silver will cost R20. Such prices were set with the goal of encouraging enterprises and organizations to sell precious scrap such as used parts from computers, television sets and other television and radio equipment to the state, and of preventing export of this wealth outside Ukraine. By the way, gold jewelry and scrap containing gold are being accepted from the population as before, at R1,000 per gram.

Extraction of Gold From Wastes

937M0069C *Tashkent PRAVDA VOSTOKA* in Russian
11 Oct 92 p 2

[Article: "News! Gold From Waste Dumps"]

[Text] Every tonne of ore mined from the Muruntau deposit will now yield another gram of gold. But how much metal had "every tonne" already yielded before being dumped as waste?

With the help of other deposits, exactly as much as is necessary to put Uzbekistan on the list of the top 10 gold producers. But when the discussion turns to the gifts of nature, the leader is he who takes not only a lot, but all of it.

In the meantime the notion as to what complete extraction of metal from ore means is changing. There was a time when the plant in the Central Kyzylkum was the world record holder in this area. And not just a record holder but also a pioneer. It was here that an effective procedure for extracting "dispersed" gold—dust, essentially, lost among the lumps of stone—was employed for the first time in the world. This gold was believed to be practically inaccessible, but here the dust particles were collected together into heavy ingots, "bricks," bearing the mark of special purity—four nines.

What can we say? Perhaps "big gold" distracted attention from "small gold." But even then, they knew that its time would come. And hauling the spent rock to the waste dump meant not throwing it away, but storing it. Until....

The basic procedures for extracting the tiniest residues of metal are known. What is important is the degree of effectiveness and profitability. And when American specialists proposed their method to gold miners at Muruntau, a method which had already been tested out at many mines of the world, a decision was made here to unite efforts and create a plant using a procedure aimed at extracting gold from waste dumps.

The joint venture is already beginning its work. And a year from now, another creek will flow into the river of gold. Is this a lot—1 gram per tonne? The weight of the wastes that have accumulated here after almost a quarter of a century is measured in seven-digit figures. These wastes will be making another pass through the production lines.

Decree on Gold Extraction, Production

937M0069D *Moscow ROSSIYSKIYE VESTI*
in Russian 22 Oct 92 p 5

[Decree No 536 of the Government of the Russian Federation, 3 August 1992, Moscow: "On Information on Gold Extraction and Production"]

[Text] In connection with the Russian Federation's entry into the International Monetary Fund and the need for providing information to it on gold extraction and production, the Government of the Russian Federation resolves:

1. To lift the secret classification from information on gold extraction quotas and from reports on its extraction and production in the Russian Federation as a whole, as well as in the individual enterprises and organizations, regardless of their forms of ownership.
2. To take under advisement a communication from the Russian Federation State Statistical Committee that the

indicated committee will approve a system of state statistical reporting and establish the procedure and deadlines for submitting reports on gold extraction and production.

3. That jointly with the Russian Almaz-Zoloto Corporation the Russian Federation Ministry of Finances will submit data on annual gold production in the USSR for 1989-1991 to the International Monetary Fund.

4. That with the participation of the Russian Federation State Statistical Committee the Russian Federation Ministry of Finances and the Russian Federation Ministry of the Economy are to submit, to the Government of the Russian Federation, an annual analytical survey of the status and forecasts of gold extraction and production in the Russian Federation. The security classification of these surveys is to be determined in accordance with the established procedure.

[Signed] Ye. Gaydar

Dispute Among Gold Producers at Sukhoy Log

937M0069E *Sukhoy Log KOMMERSANT DAILY*
in Russian 11 Nov 92 p 3

[Article by Vladimir Teslenko: "Two Groupings Make Claims on Sukhoy Log"]

[Text] On 1 November 1992 a secret order issued by Yegor Gaydar on 14 October to prepare a decision on developing the Sukhoy Log gold deposit expired. An official decision on the fate of the deposit has not yet been adopted; however, according to unofficial data two groupings have claims on Sukhoy Log: the joint venture Lenzoloto, which is backed by the East Asian consortium Star, and the largest English mining and chemical firm, RTZ. On 31 October TVERDYI ZNAK promised to return to the topic of Sukhoy Log.

Sukhoy Log (Irkutsk Oblast)—the world's largest "untouched" gold deposit (reserves exceeding 1,000 tonnes).

According to information in the possession of TVERDYI ZNAK, Gaydar's order was addressed to the ministries of the economy, finances, atomic energy and defense, the General Staff (which handles secrecy issues regarding gold deposits), the Committee for Geology and Exploitation of the Subsoil, and the joint venture Lenzoloto. The instructions were to prepare proposals on accelerating the deposit's development and declassifying information on it.

As far as is known to TVERDYI ZNAK, the departments have not yet submitted any official documents on this matter. However, information from circles close to the government and parliament allow us to piece together the general situation regarding the deposit. Two groupings have claims on it. The interests of the "Australian" group are represented by the joint venture Lenzoloto, of which the firm Star Technology Systems Ltd. (Australia) is a participant. This firm is backed by

the consortium Star, which includes a number of companies of Australia and Southeast Asia. The property of the former production association Lenzoloto, which had already made investments into Sukhoy Log, was transferred to the joint venture of the same name, which now allows it to claim a right to the deposit. The other claimant is the firm RTZ (Great Britain). In Moscow it obtained the agreement of a number of influential persons to review the decision transferring Sukhoy Log to Lenzoloto as one adopted in haste, and to announce international competitive bidding for its development. RTZ possesses considerable international authority, and consequently it possesses all of the possibilities for winning this bid.

As Ms. Ludmila Moore, director of Star Technology Systems Ltd., explained to TVERDYI ZNAK, the joint venture Lenzoloto registered its property according to the established procedure, and any part of it could be alienated only through the International Court in The Hague. TVERDYI ZNAK possesses information that a third group of interested organizations intending to develop Sukhoy Log without any foreign assistance is also forming.

Japanese Interested in Silver, Gold in Kazakhstan

937M0069F *Alma-Ata KAZAKHSTANSKAYA*
PRAVDA in Russian 15 Oct 92 p 1

[Article by Tatyana Kostina: "They Could Give Everything, But... in Exchange for Raw Materials"]

[Text] Sumimoto Corporation Vice President M. Hashimoto visited Alma-Ata on a business trip. Mr. M. Hashimoto attended numerous meetings at a high official level. Included among them were a reception by Prime Minister S. Tereshchenko and a discussion with First Deputy Minister of Foreign Economic Relations B. Tayzhanov. Opening an agency of the corporation in the capital of Kazakhstan and the possibility for investing into the republic's economy through the ODA (Official Government Aid) were discussed. The prospects of establishing a joint venture with Sumimoto Corporation was discussed as well. The wide range of interests of Japanese entrepreneurs includes precious materials: They are prepared to purchase or to barter for silver and gold from the republic.

M. Hashimoto visited the Kazintorg and the Kazmuna gaz organizations, where he expressed an interest in obtaining products from the Pavlodar Oil Refinery, promising distillation piping in exchange. It should be noted in this case that piping, beginning with water pipes and ending with product pipeline pipes—are one of the principal directions of activity of the Japanese corporation. Added to this is production of steel articles and installation of structures made from them. The corporation also produces motor vehicles, including motorcycles and three-wheeled cars, seagoing vessels, railroad rolling

stock, suspended cableways and aviation equipment. In short, all of the things we do not have, have very little of, or need very much.

The Sumimoto Corporation has 144 permanent agencies throughout the entire world. The 145th may appear in Kazakhstan. It is a good thing of course that the Japanese have everything, and know how to do everything. But what is unfortunate is that they are not unique in their desires—like everyone else, they need raw materials.

Formation of Chelate Rings in Monovalent Gold Complexes; Secondary Gold- Heteroatom Bonds

937M0087A Moscow *ZHURNAL NEORGANICHESKOY KHIMII* in Russian Vol 37 No 8, Aug 92 pp 1773-1784

[Article by L. G. Kuzmina; UDC 548.737]

[Abstract] The structures of complexes of monovalent gold are studied, in which a five-membered chelate ring is closed by an intermolecular secondary gold-heteroatom bond. The heteroatom may be included in the ligand bonded with the atom by a sigma bond or in an adjacent molecule. All known cases of closure of five-membered chelate rings in monovalent gold complexes are considered. A singly charged AuL⁺ cation is capable of participating in migration processes similar to those characteristic for the HgR⁺ cation. Figure 7; References 37: 16 Russian, 21 Western.

Oxidation of Platinum (II) Disulfite Complex by Potassium Permanganate

937M0087B Moscow *ZHURNAL NEORGANICHESKOY KHIMII* in Russian Vol 37 No 8, Aug 92 pp 1785-1789

[Article by M. I. Gelfman, O. V. Kovalevich; UDC 541.79-546.92]

[Abstract] Oxidation of the disulfite complex Na₂[Pt(NH₃)₂(SO₃)₂] by potassium permanganate is studied in aqueous acid solutions (sulfuric acid 5·10⁻⁴ mol/dm³). Potentiometric titration establishes that addition of KMnO₄ in the quantity necessary to separate four electrons causes formation of sulfate ions and a platinum (II) aquo complex. A method is suggested for synthesizing Pt^{II} and Pt^{IV} trans-diammines. Figures 2; References 11: Russian.

Oxidative Addition of Bromine to Organogold Complexes

937M0101A Moscow *METALLOORGANICHESKAYA KHIMIYA* in Russian Vol 5 No 5, Sep-Oct 92 (manuscript received 25 Jun 91) pp 1060-1074

[Article by E.G. Perevalova, V.P. Dyadchenko, O.N. Kalinina, K.I. Grandberg, L.G. Kuzmina and O.Yu. Burtseva, Moscow State University imeni M.V. Lomonosov; UDC 542.957]

[Abstract] Reaction of monovalent gold compounds RAuPPh₃ (R = CH₃, CH₂CN, CH₂NO₂, CH(CN)COOCC₂H₅, C₆H₅, C₅H₅FeC₅H₄) with Br₂ was shown to proceed as oxidative addition with formation of trivalent gold compounds RAuBr₂PPh₃. Stability of the products was dependent on the R group, with the CN, NO₂, COOCC₂H₅ compounds exceeding the others in stability. RAuBr₂PPh₃ compounds readily undergo reductive elimination and react with RAuPPh₃ to form R₂AuBrPPh₃-type compounds. In addition, RAuPPh₃ and R₂AuBrPPh₃ react with NaSC(S)NAlk₂ to replace one Br atom by the dithiocarbamate ligand SC(S)NAlk₂. Conversion of the bromides to stable dithiocarbamates was found to be a useful technique for separation of the RAuBr₂PPh₃ series of compounds. Figures 1; tables 4; references 26: 12 Russian, 14 Western.

Hydrocarbonylation of Iodobenzene on Palladium Catalysts

937M0101B Moscow *METALLOORGANICHESKAYA KHIMIYA* in Russian Vol 5 No 5, Sep-Oct 92 (manuscript received 12 Aug 91) pp 1140-1144

[Article by E.P. Bakalova and F.K. Shmidt, Institute of Petro- and Coal Chemistry Synthesis, Irkutsk State University, Angarsk; UDC 542.97:546.98:547.539.4]

[Abstract] Phenylglyoxal yield and selectivity on hydrocarbonylation of iodobenzene were assessed in relation to the efficiency of acetic acid as Pd-catalyst activator, and with respect to the concentration of triethylamine and H₂/CO. The results demonstrated that inclusion of acetic acid increased the selectivity and yield of phenylglyoxal 2.5-fold in each case. Impact of acetic acid on yield and selectivity was attributed to greater reactivity of the resultant Pd-acetate complex due to its ready heterolysis and Pd hydride formation. These observations fit a reaction mechanism in which addition of CO to the Pd-H bond leads to an intermediate formyl complex. In addition, formyl formation was also shown to be favored by low (< < 1) H₂/CO ratios. Figures 3; tables 2; references 6: 2 Russian, 4 Western.

Synthesis of 4-Heteryl- and 4-Alkynylsydnones via Pd-Catalyzed 4-Coppersydnone Cross-Coupling

937M0101C Moscow *METALLOORGANICHESKAYA KHIMIYA* in Russian Vol 5 No 5, Sep-Oct 92 (manuscript received 23 Sep 91) pp 1198-1200

[Article by V.N. Kalinin, D.N. Pashchenko and She Fan Min, Institute of Heteroorganic Compounds imeni A.N. Nesmeyayov, Russian Academy of Sciences, Moscow; UDC 547:542.97]

[Abstract] Pd(PPh₃)₄ was used to catalyze cross-coupling of 4-coppersydnone with heteryl iodides and alkynyl bromides. As a result, a series of 4-heteryl and 4-alkynyl-3-sydnones were synthesized. In addition, transmethylation was used to prepare the stable reagent 3-phenyl-4-sydnonylzinc chloride. Trials with the latter

in Pd(PPh₃)₄-catalyzed cross-coupling reactions demonstrated its practical synthetic utility with p-iodonitrobenzene and o-bromostyrene, but not with alkynyl bromides or heteryl iodides. References 4: 2 Russian, 2 Western.

Anion Radical Ferrocenyl Derivatives of Nitrobenzene and Nitrophenylethylene: Electrochemical and EPR Studies

937M0101D Moscow METALLOORGANICHESKAYA KHIMIYA in Russian Vol 5 No 5, Sep-Oct 92 (manuscript received 04 Jan 92) pp 1207-1210

[Article by Z.V. Todres, D.S. Yermekov, R.D. Rakhimov, V.V. Zhiltsov and V.M. Kazakova, Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov, Russian Academy of Sciences, Moscow; UDC 546.96+541.572]

[Abstract] Electrochemical and EPR techniques were used to assess behavior of phenyl and ferrocenyl groups in nitrobenzene 4-ferrocenyl nitrobenzene, (4-nitrostyryl)ferrocene and 4'-(N,N-dimethylamino)-4-nitrostilbene anion radicals. Analysis of the oxidation and reduction characteristics showed that the ferrocenyl group facilitates oxidation to a greater extent than addition of a dimethylaminostyrene group. The data indicated that unpaired electron delocalization in the ferrocenyl-bearing anion radicals of nitrobenzene proceeds without involvement of the ferrocenyl fragment. Consequently, single-electron transfer to the nitro group-bearing compounds involves only the nitro group, an observation consistent with the fact that in aromatic nitro compounds the b orbital is the lowest vacant orbital. Tables 2; references 6: 1 Russian, 5 Western.

Synthesis of Sulfur Containing Fiber Sorbents Based on Polyacrylonitrile

937M0115D St. Petersburg ZHURNAL PRIKLADNOY KHIMII in Russian Vol 65 No 3, Mar 92 (manuscript received 3 Jul 91) pp 686-691

[Article by I. N. Zamorova, Yu. Ye. Kazakevych, Ye. Ya. Dankova, L. V. Yemets, Institute of Textile and Light Industry; UDC 677.494.745.32.005]

[Abstract] Synthetic methods of complex sorbents are based on polymer-like conversions with introduction of organic monomers including nitrogen and sulfur atoms. Standard matrixes exist for granular sorbents but not for fibrous materials. In this work, sulfur containing analytical groups were introduced into fibers via a universal matrix - a grafted copolymer of polyacrylonitrile fiber with polyglycidyl methacrylate. Graphically presented sorptive ability of these modified fibers were analyzed as functions of the content of the epoxy groups in the starting copolymer, of the concentration of sulfur containing compounds in the modifying solution and of its acidity. The kinetics of the production of fibrous sorbents containing sulfur was studied. Structural studies

and investigation of sorptive properties of these complexes will be published in future papers. Tables 2; figures 4; references 20: 19 Russian (2 by Western authors), 1 Western.

Oxidation of Alkanes With Peroxide Complexes of Palladium

937M0120F St. Petersburg ZHURNAL OBSHCHEY KHIMII in Russian Vol 62 No 5, May 92 (manuscript received 19 Jun 91) pp 1177-1178

[Article by J. Muzart, G. V. Nizova, A. Riahi, G. B. Shulpin, Scientific Center of Research Studies, University of Reims, Champagne-Ardenne, France; Institute of Chemical Physics imeni N. N. Semenov, Russian Academy of Sciences, Moscow; UDC 541.127]

[Abstract] Oxidation of alkanes with methyl peroxides was studied under thermal conditions and under the action of light. Full illumination with a mercury lamp of a mixture of [(t-BuOO)Pd(OCOCH₃)₄] (I) and cyclohexane (II) in methylene chloride yielded cyclohexanol (III) and cyclohexanone (IV); analogous results were obtained when the reaction was run in benzene solution, in air. In presence of [(t-BuOO)Pd(OCOCF₃)₄] (V), other conditions being kept the same, only (III) was obtained (the yield in this case was calculated in terms of 5 molecules of the product per Pd atom). Other alkanes can also be oxidized under such conditions. When the reaction was run in the dark, using hydrocarbon (II) and peroxide (V) in benzene, under an argon atmosphere, the products were (III) and (IV) as well as some cyclohexyl hydroperoxide. References 9: 4 Russian, 5 Western.

Synthesis of Potential Antitumor Reagents by Condensation of Phthalic Anhydride With 4-Bis(2-chloroethyl)aminophenylacetic Acid

937M0137C Moscow IZVESTIYA AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 11, Nov 92 (manuscript received 29 Dec 91) pp 2609-2617

[Article by L. M. Pisarenko, V. I. Nikulin, N. N. Sveshnikov, Institute of Chemical Physics imeni N. N. Semenov, Russian Academy of Sciences, Moscow; Institute of Chemical Physics in Chernogolovka, Russian Academy of Sciences, Chernogolovka; UDC 542.91:547.665:542.953:5476.584:547.586.2]

[Abstract] In search for novel antitumor reagents, condensation of 4-bis(2-chloroethyl)aminophenylacetic acid with phthalic anhydride was carried out in a solution of acetic anhydride and triethylamine. The products were separated on silica gel and analyzed by NMR, IR, ESP, mass-spectroscopy and PMR spectroscopy. Following

products were identified: Z-3-[4-bis(2-chloroethyl)aminobenzylidene]phthalide, 3-acetoxy-2-yl]inden-1-one, 2-[4-bis(2-chloroethyl)aminophenyl]phthalideneacetic acid, 2-[4-bis(2-chloroethyl)aminophenyl]-2-hydroxymethylindane-1,3-dione, 2-acetoxymethyl-2-[4-bis(2-chloroethyl)aminophenyl]indane-3-one and 2,2'-bis[4-bis(2-chloroethyl)aminophenyl]indane-1,3-dione. These products were tested for their antitumor activity using transplanted mouse models: L-1210, P-388, Lewis sarcoma LL, adenocarcinoma Ca-755 and melanoma B-16. Biological data were not reported but activity exceeding that of sarcolysin was mentioned for 3-acetoxy-2-[4-bis(2-chloroethyl)aminophenyl]inden-1-one and 2-[4-bis(chloroethyl)aminophenyl]indan-1,3-dione. Tables 3; references 23: 15 Russian, 8 Western.

Transformed Steroids. 190 Communication. Effect of Co-Complex Formation on Opening of Oxygen Cycle in 17 β -Ethyne-16 α ,17 α -Epoxyandrost-4-ene-3-one With Pyridine Hydrofluoride, Pyridine Hydrochloride and Pyridine Thiocyanate

937M0137D Moscow IZVESTIYA AKADEMII NAUK SERIYA KHIMICHESKAYA in Russian No 11, Nov 92 (manuscript received 2 Dec 91) pp 2661-2666

[Article by A. M. Tututa, A. V. Kamernitskiy, Lyu Dyk Khi, V. S. Bogdanov, Institute of Organic Chemistry imeni N. D. Zelinskiy, Russian Academy of Sciences, Moscow; UDC 542.91:547.92]

[Abstract] It was shown in earlier studies that methanolysis of 16 α ,17 α -epoxy-17 β -ethynylandrost-4-en-3-one (I) and its dicobalt-hexacarbonyl complex (II) occurs with identical opening of the epoxide ring at the tertiary center, differing only in the stabilization of the intermediates formed. In present work the reaction was extended to other nucleophilic reagents: pyridine hydrofluoride (PyHF), pyridine hydrochloride (PyHCl) and pyridine thiocyanate (PyHSCN). (I) reacted poorly with PyHF, PyHCl and PyHSCN at 40-50° C in EtOH yielding only 20-30% of the Wagner-Meerwein rearrangement products. In contrast, (II) reacted by breaking the C¹⁷-O bond; however, also in this case the Co-coordinated C¹⁷-cation was stabilized in different ways, depending on the reagent used. With PyHF the product was dicobalt-hexacarbonyl-17 α -fluoropregn-4-en-16 α -ol-3-one-20-yne; reaction with PyHCl gave a mixture of dicobalt-hexacarbonyl-17 α -pregn-4-en-13,16-dione-20-yne and its 17 β -isomer. The principal product of PyHSCN oxide opening was dicobalt-hexacarbonyl-pregn-4-en-3-one-20-yne[17 α ,16 α -a]-1',3'-oxazolidine-2'-thione. This reaction could possibly be extended as a general method for expanding a three membered oxide ring to a five membered one, using reagents like CO₂, CS₂, Me₂CO, RCSNH₂, RNCO, etc. References 13: 5 Russian, 8 Western (1 by Russian authors).

Study of Technology for Desalinating After Final Treatment of Municipal Effluents Over Macroporous Ionites

937M0141C Kiev KHIMIYA I TEKHOLOGIY VODY in Russian Vol 14, No 12, Dec 92 (manuscript received 14 Jul 92) pp 919-924

[Article by I. A. Malakhov, L. N. Poletayev, and A. K. Siaduzzaman, Azerbaydzhan State University imeni S. M. Kirov; UDC 628.162:621.187]

[Abstract] Chemical desalination is used widely at thermal and nuclear power stations as well as other industrial enterprises for the preparation of ultra-pure water. Also, the shortage of natural water in many regions necessitated the use of alternative sources, particularly the final treatment of municipal effluent containing dissolved organic matter and other impurities. Furthermore, many natural water sources are presently contaminated with organic impurities from residential, industrial, and agricultural wastes. In this connection, the sorption of dissolved organic matter requires the use of ionites having large sized pores which facilitate penetration of the organic molecules deep into the ionite particles where they are eliminated. In the present work a study was made of the technological specifications of macroporous ionites for use in two-stage desalination units using finally treated municipal effluents. The scope of the study included the determination of the rules governing the sorption and regeneration of mineral and organic impurities, their relative absorption between stages, basic technological specifications of tested macroporous ionites, and determination of the advantages of substituting gel type ionites with macroporous ionites for each stage. Figures 4; references 2 (Russian).

Treating Effluent From Printed Circuit Board Etching Section Contaminated With Heavy Metal Ions With Flotation

937M0141D Kiev KHIMIYA I TEKHOLOGIY VODY in Russian Vol 14 No 12, Dec 92 (manuscript received 17 Feb 92) pp 924-929

[Article by L. D. Skrylev, A. N. Purich, and L. M. Soldatkina, Odessa State University imeni I. I. Mechnikov; UDC 622.765.06]

[Abstract] Effluent from enterprises producing printed circuit boards contains significant quantities of copper, tin, iron, and other heavy metal ions. These effluents are normally treated by chemical precipitation (liming), cementation, ion exchange, or adsorption. Information on the use of flotation for these purposes is lacking, although this method has been used successfully in treating industrial wastes contaminated with heavy metal ions. The present work contains a description of a flotation process for treating printed circuit board etching wastes that is based on oxidation of metallic copper with trivalent iron ions. The process employs a fatty acid collector, soap, followed by coarse treatment in an impeller six-chamber flotation machine, and fine

treatment in a pneumatic flotation column. The process eliminates copper and iron ions from effluents well enough to conform to state standard GOST 9.314.90 for technical grade water. Figure 1; references 16: 14 Russian, 1 Western.

Absorption of Heavy Metal Ions From Water With Sorbents Based on Laminar Silicates Modified with Polyphosphates

937M0141E Kiev *KHIMIYA I TEKHNOLGIY VODY in Russian Vol 14 No 12, Dec 92 (manuscript received 30 Apr 92) pp 929-934*

[Article by G. M. Klimova and Yu. I. Tarasevich, Colloidal Chemistry and Hydrochemistry Institute, Kiev; UDC 628.3+621.357]

[Abstract] Despite its many shortcomings, the reagent method is still the most widespread means for treating electroplating waste effluent. It consists of transforming heavy metal ions into insoluble compounds by treating the effluent with acids or bases with subsequent separation of the precipitate from the liquid phase. The chief drawback of this method is the high residual heavy metal content (5-7 mg per dm³) which exceeds the maximum allowable concentration. A higher degree of purification may be achieved by using phosphates as settling agents. In the present work sorbents were developed for absorbing heavy metal ions from aqueous solutions based on laminar silicates modified with polyphosphates. It was demonstrated that they have high sorption capacity and selectivity in respect to Cr(III), Ni(II), and Co(II) ions. Figures 4; references 12: 9 Russian, 3 Western.

Hygienic Evaluation of New Methods for Preliminary and Final Treatment of Textile Effluents and Possibility of Using Them in Water Recycling

937M0141F Kiev *KHIMIYA I TEKHNOLGIY VODY in Russian Vol 14 No 12, Dec 92 (manuscript received 2 Jul 92) pp 940-944*

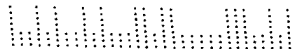
[Article by V. A. Prokopov, G. V. Tolstopyatova, T. F. Byshovets, E. D. Maktaz, M. N. Timoshenko, O. F. Udilova, and A. A. Roy, General and Comunal Hygiene SRI imeni A. N. Marzeyev; Colloidal Chemistry and Hydrochemistry Institute, Kiev; UDC 614.777:628.3:615.9]

[Abstract] Maximum effluent utilization in industrial water recycling systems is highly significant in resolving problems concerning the safeguarding of water reservoirs from contamination, and for this reason, various methods for preliminary and final treatment of production wastes have been introduced which bring water quality up to acceptable standards. However, the use of such finally treated water in industrial water supply systems which also include open surface water supply sources imposes hygienic study to evaluate human safety aspects. At the present time criteria have been developed for finally treated municipal effluents for closed cycle industrial water supply systems, and although some of these specifications may appear to be somewhat severe, it remains indisputable that hygienic standards for epidemiological and toxicological safety in open water supply recycling systems must be maintained. In the present work a hygienic evaluation was made of the possibility of repeated use of production effluents from the Chernigov Textile- Sewing Association which have been treated by two processes. Microbiological treatment of effluents using microorganism- destructors immobilized on both capron substrates of the "VIYa" type and on carbon fiber type "Busofit" prevent cutaneous- sorptive, systemic, gonadotoxic, and mutagenic activity against animal organisms. Effluent finally treated with activated charcoal and disinfected may be used for industrial purposes. References 8 (Russian).

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