

UNCLASSIFIED

AD NUMBER

AD335308

CLASSIFICATION CHANGES

TO: unclassified

FROM: confidential

LIMITATION CHANGES

TO:
Approved for public release, distribution unlimited

FROM:
Controlling Organization. Central Intelligence Agency, Office of Central Reference, 2430 E. Street, NW, Washington, DC 20505.

AUTHORITY

CIA ltr, 7 Sep 2004; CIA ltr, 7 Sep 2004

THIS PAGE IS UNCLASSIFIED

CONFIDENTIAL

AD 335 308

*Reproduced
by the*

**ARMED SERVICES TECHNICAL INFORMATION AGENCY
ARLINGTON HALL STATION
ARLINGTON 12, VIRGINIA**



CONFIDENTIAL

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

CATALOGED BY ASTIA

AS AD 712

335308

CONFIDENTIAL



SCIENTIFIC INFORMATION REPORT

Chemistry and Metallurgy

(26)

Summary No. 4363

7 March 1963

Prepared by

Foreign Documents Division
CENTRAL INTELLIGENCE AGENCY
2430 E St., N. W., Washington 25, D. C.

AS 108
1963
TISA

CONFIDENTIAL

GROUP 1
Excluded from automatic
downgrading and
declassification

BEST

AVAILABLE

COPY

W A R N I N G

**THIS MATERIAL CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE
OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS,
TITLE 18, USC, SECS. 793 AND 794, THE TRANSMISSION OR REVELATION OF
WHICH IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.**

C-O-N-F-I-D-E-N-T-I-A-L

SCIENTIFIC INFORMATION REPORT

Chemistry and Metallurgy (26)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly; the sixth series, Organization and Administration of Soviet Science, is issued monthly; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

Table of Contents

	<u>Page</u>
I. Chemistry	1
Insecticides and Herbicides	1
Medical Chemistry	4
Organophosphorus Compounds	6
Propellants and Combustion Studies	8
Radiation Chemistry	11
Rare Metals	16
Semiconductor Chemistry	21
Miscellaneous	23
Meetings and Conferences	31
II. Metallurgy	37
Corrosion	37
Crystallography	40
New Electric Furnaces	48
Phase Studies	50
Special Processes	53
Welding	58
Miscellaneous	60
Conferences	66

C-O-N-F-I-D-E-N-T-I-A-L

Insecticides and Herbicides

1. Effect of Organophosphorous Insecticides on Plant Respiration Studied

"The Effect of Organophosphorus Insecticides on the Respiration Rate of the Cotton Plant," by T. V. Bobyeva, Institute of Zoology and Parasitology, Academy of Sciences Uzbek SSR; Moscow, Fiziol. giya Rasteniy, Vol 9, No 6, 1962, pp 733-740

A study was made of the effects of various concentrations of mercaptophos and methylmercaptophos on the rate of respiration of cotton plant leaves. Respiration was determined with a Warburg apparatus in units of microliters of oxygen absorbed per hour by one gram of cotton leaves.

The data show that spraying with both mercaptophos and methylmercaptophos in concentrations of 0.05 percent and 0.2 percent causes stimulation of respiration. In the case of the 0.2 percent concentration, the intensity of respiration first became inhibited, after which it became more stimulated and had a longer lasting effect than in the case of the lower concentration. Experiments conducted with a 1.2 percent concentration show that inhibition takes place during the first 1.5-3 hours, after which there is a 200-percent increase in respiration after 5 hours. Respiration then decreases, and after 5 days it becomes considerably less than that of the untreated control plant.

The results of the investigation show that cotton plant intoxication with organophosphorus insecticides such as mercaptophos and methylmercaptophos results in profound changes in the physiological and biochemical status of the plants. The extent of this change depends on the concentration and physiological state of the plant. It was concluded that intoxication of cotton plants with mercaptophos and methylmercaptophos in concentrations recommended for protection against plant pests stimulates the life activities of the cotton plant.

Best Available Copy

2. Amides of Tetrathionic Acid Synthesized

"From the Field of Organic Insectofungicides LXVII. Preparation of Salts of Tetrathionic Acid With Aromatic Amines," by H. M. Mel'nikov and P. P. Trunov, Scientific Institute for Fertilizers and Insectofungicides; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 4015-4017

The authors recently discovered that calcium tetrathionate is an effective fungicide against powdery mildew. It, therefore, seemed interesting to synthesize and study the fungicidal properties of salts of tetrathionic acid and various organic amines, since such salts are expected to be even more active against phytopathogenic fungi. Twelve various amines were treated with tetrathionic acid and the corresponding amides obtained. The majority of the compounds were white crystals, moderately soluble in water, and poorly soluble in hydrophobic organic solvents. The salts were stable and did not decompose during storage and mild heating.

3. New Method for Preparing Aryldialkyl Carbamides

"Herbicides and Plant Growth Regulators XXXVIII. New Method for Preparing Aryldialkyl Carbamides," by H. M. Mel'nikov, K. D. Shvetsova-Skilovskaya, and D. I. Levedeva, Scientific Institute for Fertilizers and Insectofungicides; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 3957-3959

Aryldialkyl carbamides and other urea derivatives have been widely used in recent years as weed killers. The arylalkyl carbamides are normally obtained by reaction of arylisocyanates with dialkylamines. A major disadvantage of this method for preparing arylalkyl carbamides is the necessity of using phosgene to synthesize the arylisocyanates.

In the present work, the Hoffman reaction was used to synthesize arylalkyl carbamides. Aryldialkyl carbamide yields of 20-60 percent were obtained.

4. Soviet Patent on New Insecticide

"Method of Preparing Insecticidal Formulations," by H. H. Tilichenko and T. M. Doranyuk, USSR Author's Certificate No 144342, Filed 2 Jun 62 (from Referativnyy Zhurnal -- Khimii, No 24, 25 Dec 62, Abstract No 24L522, by A. Nyska)

"Insecticides containing heterocyclic compounds with a nitrogen atom in one ring are prepared by treating polymethylenepolycyclohexanone (I) with formamide (II) or ammonium acetate (III) in glacial acetic acid. A mixture of 20 grams of polyketone (I) and 140 grams of (II) are heated at 130-130°C for 17-18 hours, cooled and treated with 20 percent sodium hydroxide, and heated again. The resulting precipitate is filtered, washed, and dried in air. The yield is 17.5-18.4 grams. The reaction may be accelerated if (I) plus (II) are heated in a 1:1 mixture of glacial acetic acid and formic acid. A mixture of 20 grams of (I), 250 grams of (III), and 270 ml of glacial acetic acid are heated for 2.5 hours at 130-135°C, and after similar treatment, 16 grams of reaction product are obtained. The resulting insecticides are effective in concentrations of about 5 percent in combating houseflies and leaf bugs."

5. Outdoor Aerosol Generator

"Aerosol Generator"; Budapest, Nepszeru Technika, Vol XI, No 9, Sep 62, p 281

Soviet engineers constructed an aerosol generator which serves agriculture by spraying forests and gardens. When mounted on a tractor, the generator, the AG-UD 2, can spray an area 200 meters wide with various atomized chemical substances.

[The source contains a clear photograph of the aerosol generator.]

6. Various Poisonous Chemicals Being Produced in Rubezhnoye

"'Dinok' Is Not Alnoe"; Kiev, Pravda Ukrainy, 9 Jan 63, p 1

The article discusses three poisonous chemicals produced in Rubezhnoye. The first is "Dinok," a compound used successfully against scale insects, psylla, and aphids. The second, "Manu," is sprayed on apple and pear trees while the fruit is maturing to ensure that it does not fall before the harvest. The third, pentachlorophenolate, is a weed-killer used in mustard, castor bean, and coriander cultivation.

7. New Stationary Fueling Station for Mixing Fertilizer Solutions

"SZS-10 Will Be in Production in 1973"; Kishinev, Sovetskaya Moldaviya, 3 Jan 63, p 1

SZS-10 (stationary fueling station with a capacity of 10 tons per hour) is a new device for preparing fertilizer solutions used in spraying vine-yards and orchards. It is used mainly for preparing Bordeaux mixture but can also be used to prepare mineral fertilizer solutions. Experimental models were prepared by the experimental factory of the State Special Design Bureau of the sovnarkhoz. Production will begin this year.

Medical Chemistry

8. East Germans Producing Atropine

"Proposals for Inclusion in the German Pharmacopeia," by W. Poethke and S. Beckert; Berlin, Die Pharmazie, No 12, Dec 62, pp 735-744

At least one in a series of three articles dealing with tests of selected pharmaceuticals, conducted by the Institute of Pharmacy and Food Chemistry (Institut fure Pharmazie und Lebensmittelchemie) of the Friedrich-Schiller University in Jena, reveals that East Germany is producing atropine, although no mention is made of the scope of its production'

In three separate articles, the authors, one of whom is the director of the above institute, describe in detail, the procedures used in testing atropine sulfate, homatropine hydrobromide, and scopolamine hydrobromide as a prerequisite for the inclusion of the drugs in the German Pharmacopeia. The authors describe the characteristics, indexes, historical development, dosage, methods used in synthesis, tests for purity, content, and identity, and effects and indications for use of each drug, drawing extensively on native and foreign publications, including numerous Western sources.

The closing paragraphs of each article, discussing the application of the drug in ophthalmology, psychiatry, or anaesthesiology also touch upon the origin of the samples tested. Whereas samples of scopolamine hydrobromide were said to have been obtained from West Germany (BERGEL of Darmstadt), France (SOFIDEX of Paris), and the

USSR (CHEMEXPORT) and homatropine hydrobromide was reportedly obtained from Hungary (CHHCHH of Budapest), the article on atropine discloses that several samples "of varying strengths, produced by the VEB Arzneimittelwerk (People-Owned Pharmaceuticals Plant) in Dresden," were obtained and that the plant also made available the "norm sheet containing the quality standards for atropine Sulfate."

9. New Antituberculin Agents Synthesized

"Research on Furan Derivatives XXVII. Synthesis and Study of Antituberculin Properties of Some Hydrazones of the Furan Series," by A. L. Indzhoyan, V. G. Afrikyan, A. A. Dokhikyan, and L. D. Zhuruli, Institute of Fine Organic Chemistry, Academy of Sciences Armenian SSR; Yerevan, Izvestiya Akademii Nauk Armyanskoy SSR, Vol 15, No 3, 1962, pp 291-301

A total of 39 hydrazone-hydrazones of isomeric pyridine alpha-, beta-, and gamma-carboxylic acids were prepared by a method previously developed for the synthesis of aldehydes and ketones of 4 and 4,5-substituted furans. Thirty-six of these compounds are described here for the first time. Tests show that derivatives of pyridine alpha- and gamma-carboxylic acids have high tuberculostatic activity. The most active compounds were 5-benzil- and 5-p-tolyl-2-acetylfurans which suppressed tuberculosis growth in dilutions of 1:1,000,000 million. These preparations are being studied more carefully for the purpose of transferring them to clinical study.

10. New Cardiac Glycosides Synthesized

"Ericordine and Desglucoericordine -- New Cardiac Glycosides," by I. F. Makarevich, N. Ya. Tropp, and D. G. Kolesnikov, Khar'kov Scientific-Research Chemical Pharmaceutical Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, 1 Dec 62, pp 849-851

A cardiac glycoside tentatively identified as a glycoside, was isolated from a grass (*Dryinum Cheiranthoides* L.). In the present work, an attempt was made to determine the chemical structure of this glycoside which was subsequently named ericordine after a study of its chemical nature.

Organophosphorus Compounds11. Effects of High Pressure on Arbuzov Rearrangement Studied

"Studying the Effect of Pressure on the Rate of Arbuzov's Reaction," by H. G. Gonikberg and I. Z. Faynshteyn, Institute of Organic Chemistry imeni H. D. Zelinskiyi, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 3, 21 Nov 62, pp 612-614

A study was made of the effects of pressure ranging from atmospheric to 12,000 kilograms per square centimeter on rearrangement reactions of triethylphosphite with ethyl iodide and with isopropyl iodide. The results show that increasing the pressure from atmospheric to 2,000 kilograms per square centimeter increases the rate constant for the reaction with ethyl iodide by about 12 times. Experiments with isopropyl iodide at 12,000 kilograms per square centimeter show that this reaction takes place very rapidly at 90° C to form a diethyl ester of isopropylphosphonic acid. Results obtained in this work show that high pressures have a profound effect on the rate of the Arbuzov reaction. It might even be possible to succeed in overcoming spatial hindrances in reactions of esters of phosphoric acid with alkyl halides which do not take place under ordinary conditions.

12. Dihexyl Ester of Allylphosphonic Acid Synthesized

"Research on Derivatives of Phosphonic and Phosphonous Acids XVIII. Synthesis and Properties of Dihexyl Ester of Allylphosphonous Acid," by A. I. Razumov and B. G. Liorber, Kazan Chemical-Technological Institute; Moscow, Zhurnal Obshchei Khimii, Vol 32, No 12, Dec 62, pp 4063-4066

The dihexyl ester of allylphosphonic acid was synthesized and some of its reactions with trivalent phosphorus studied. It was shown that the reactivity of the phosphorus atom in this ester is not affected as greatly as some other homologs of this series. Other compounds, similar to the ester, were shown to possess biological activity.

13. Unsaturated Organophosphorous Compounds Prepared

"Triallyloxyphosphazosulfonylaryls," by V. I. Shevchenko, V. P. Tkach, and A. V. Kirsanov, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 4047-4049

A study shows that sodium allylate reacts with trichlorophosphazosulfonylaryls to form triallyloxyphosphazosulfonylaryls and diallyl esters of arenesulfonylamidophosphoric acids. These compounds are also formed by reaction of triallylphosphite with sodium chloride salts of arenesulfonic acids. The triallyloxyphosphazosulfonylaryls have properties similar to those of trialkoxyphosphazosulfonylaryls and other unsaturated compounds, i.e., addition, oxidation with permanganate, and polymerization in the presence of benzoyl peroxide to form solid, vitreous, clear resins or thick oily liquids.

14. Reactions of Phosphines Studies

"Properties of Phosphines V. Reactions of Phosphines With Chloramines, Sulfene Chlorides and Amides," by K. A. Petrov, V. A. Parshina, B. A. Orlov and G. M. Tsypina; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 4017-4022

A study was made of the reactions of primary and secondary arylphosphines with sulfene chlorides and chloramines. It was shown that trimethylolphosphine reacts with sulfene chlorides and chloramines to form corresponding phosphonium chlorides. Reactions of trimethylolphosphine, propyldimethylolphosphine, and dipropylmethylolphosphine with diethylamine show that alpha-aminomethylphosphines are formed. Primary aromatic phosphines react with tetraethylmethylenediamines to form alpha-aminomethylphosphines.

15. Reaction of Chlorophenyldichlorophosphine With Ethylene Oxide Studied

"Reactions of Aryldichlorophosphines With Cyclic Oxides V. Reaction of Chlorophenyldichlorophosphine With Ethylene Oxide," by Ye. L. Geftter and I. A. Rogacheva, Scientific-Research Institute of Plastics; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 3962-3965

A study was made of the reaction of chlorophenyldichlorophosphine with ethylene oxide and the conversions of the resulting di-beta, beta'-chloroethyl ester of chlorophenylphosphonic acid.

16. Derivatives of Dithiophosphoric Acid Synthesized

"Synthesis of Some Derivatives of Esters of O,O'-Dialkyl-dithiophosphoric Acids and Their Infrared Spectra," by M. I. Zemlyanskiy, L. K. Klimovskaya, V. I. Galibey, B. S. Drach, I. V. Murav'yev, and V. V. Turkevich, L'vov State University; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 4066-4069

Acyl derivatives of some dithiophosphoric acids were prepared by reacting potassium salts of O,O'-dialkyl-dithiophosphoric acid with the chlorides of acrylic, methacrylic, and fumaric acids. Neutral esters were obtained by addition of some dithiophosphoric acids to isoprene at the 1,2-position. Infrared spectra showed that the presence of the acyl group causes a shift in the characteristic frequency of the P = S bond toward the short-wave region.

Propellants and Combustion Studies17. Study of Shock Wave-Flame Front Interaction

"Relaxation Interaction of Shock Waves With a Flame Front," by V. I. Skobelkin; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 9, Sep 62, pp 1979-1986

In the interaction of compression waves with a flame front, intensification of the wave amplitude with increased rate of chemical reaction during the relaxation period was observed in addition to the usual disintegration of the waves at the contact gap. A mathematical formula was derived for the intensification factor using all of the required parameters. It applies only to an ideal gas and does not account for absorption of waves due to thermal conductivity, viscosity, or the presence of reaction products in the combustion zone.

In normal conditions of combustion, the critical frequency is of the order of $10^7 - 10^8$ cps which considerably exceeds the observed frequency oscillations of rocket engine chambers (500-5000cps). Therefore, wave absorption may prove of significance at high frequency oscillations and will require special treatment.

C-O-N-F-I-D-E-N-T-I-A-L

18. Combustion Velocities of Explosives Under Very High Pressures Measured

"Combustion Velocities of Some Explosives and Their Mixtures Under Very High Pressures," by A. F. Belyayev, A. I. Korotkov, A. K. Parfenov, and A. A. Sulimov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 37, No 1, Jan 63, pp 150-156

Combustion velocity was found to increase linearly with pressure to 4,000 atmospheres for homogeneous explosives of a chemical compound. The characteristic break in the velocity-pressure curve takes place considerably beyond 1,000 atmospheres for simple mixtures of explosives with increasing combustion velocity. In the case of gun powder, combustion velocity increases only up to 2,000 atmospheres at about 6 centimeters per second. There is no further increase in combustion velocity at least up to 4,000 atmospheres. A very rough estimate of the combustion velocities of various systems under detonation wave conditions shows that the difference in detonation capacity of individual systems may very well depend on the difference in combustion velocities.

19. Behavior of Atoms in Hydrogen Flame Studied

"Study of Hydrogen Atoms in the Rarefied Zone of a Hydrogen Flame," by V. M. Panfilov, Institute of Chemical Kinetics and Combustion, Siberian Department, Academy of Sciences USSR; Moscow, Kinetika i Kataliz, Vol III, No 5, Sep/Oct 62, pp 643-650

Electron paramagnetic resonance spectra were used to measure the concentration of hydrogen atoms in the rarefied zone of a hydrogen flame. The relationship between the concentration of hydrogen atoms and the reaction conditions was studied. Experiment results were compared with calculated predictions obtained by analysis of the reaction kinetics of hydrogen oxidation. It was shown that during combustion of a mixture containing less than 80 percent hydrogen, predictions obtained from simplified formulas which do not take into account recombination of hydroxyl radicals at the walls give too high values for hydrogen atom concentrations. The reaction rate constants for recombination of hydroxyl radicals at the walls are presented.

20. Kinetics of Hydrazine Oxidation Studied

"Kinetics of Hydrazine Oxidation With Nitric Acid in Aqueous Solution," by V. S. Koltunov, V. A. Nikol'skiy, and Yu. P. Agureyev; Moscow, Kinetika i Kataliz, Vol III, No 6, Nov/Dec 62, pp 877-881

A study was made of the kinetics of hydrazine oxidation with nitric acid in aqueous solution at 2.2-8.2 moles per liter concentration range of nitric acid. The reaction is shown to be of first order in respect to hydrazine and third order in respect to nitrogen. The rate constant at 97°C is equal to 0.7×10^{-5} mole⁻³ liter³ minute⁻¹. The activation energy was determined to be 27.2 kcal per mole. The composition of the reaction products was determined and the stoichiometrics were established. A possible reaction mechanism is presented and considered which includes as intermediate products nitric acid, tetrazene, isotetrazene, and others. The slowest stage of the reaction is apparently between N_2H_4 and NO_2^+ .

21. Ammonia and Hydrazine Free Radicals Studied

"The Formation and Recombination of Radicals During Gamma Irradiation of Solid Ammonia and Hydrazine," by V. I. Tupikov, Vi. I. Tsivenko, S.Ya. Pshezhetskiy, A. G. Kotov, and V. K. Milinchuk, Physical-Chemical Institute imeni L. Ya. Karpov; Moscow, Zhurnal Fizicheskoy Khimii, Vol 37, No 1, Jan 63, pp 138-142

A study was made of the formation of radicals and hydrazine during gamma irradiation of solid ammonia at -195°C. A correlation was established between the concentrations of these substances from which it follows that under these conditions hydrazine is formed chiefly by recombination of NH_2 radicals. Radical formation during gamma irradiation of frozen hydrazine was also studied. The steady state radical concentration is about 10^{20} radicals per gram of hydrazine and exceeds the concentration of radicals formed at the same irradiation dose in solid ammonia by one order. The electron paramagnetic resonance spectra of irradiated hydrazine is a ginglet. During irradiation, N_2H_3 radicals are chiefly formed, and to a lesser degree, NH_2 . The relation³ between radical formation and radiation dose corresponds to the bimolecular law of radical recombination.

22. New Hydrazyl Radicals Synthesized

"Research on the Chemistry of Free Radicals of the Hydrazine Series VIII. Synthesis of Alpha, Alpha-Diphenyl-Beta-2,6-Dinitro-4-Sulfophenylhydrazyl and Alpha, Alpha-Diphenyl-Beta-2,4-Dinitro-6-Sulfophenylhydrazyl," by M. A. Ikrina and R. O. Matevosyan, Ural Polytechnic Institute imeni S. M. Kirov; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62 pp 3952-3957

The above-named hydrazyl radicals were synthesized for the first time to clarify the role of substituents in the beta-phenyl ring on the stability of diphenylpicrylhydrazyl radicals. The results show that the stability of hydrazyl radicals increases as the group on the orthocarbon atom of the beta-phenyl ring becomes more negative.

Radiation Chemistry

23. Use of Froths To Enrich Radioactive Cesium Solutions

"Enrichment of Radioactive Cesium Solutions With Froths," by L. D. Skrylev and V. V. Pushkarev, Urals Polytechnic Institute imeni S. M. Kirov; Moscow, Kolloidnyy Zhurnal, Vol 24, No 6, Nov/Dec 62, pp 738-741

Highly insoluble, mixed, heavy metal ferrocyanides formed in the reaction of heavy metal salts were found to be good sorbents of radioactive cesium. An essential shortcoming of such compounds is their ease of peptization by excess precipitation of potassium ferrocyanide ions, thereby making it impossible to separate the solid and liquid phases by ordinary methods of filtration, centrifuging, or settling.

For the above reasons, the use of froths was advocated by the authors for extracting mixed ferrocyanides which would allow not only precipitates, but also colloids to be removed from the solution. The use of froths makes it possible to extract 97-99% of cesium-134 in a solution containing ferrocyanide ions.

24. Various Methods of Purifying and Separating Thorium From Other Elements

"Use of Salicylic Acid for the Purification and Separation of Thorium," by A. V. Nikolayev, Z. G. Rumyantseva, and V. B. Levin, Institute of Inorganic Chemistry, Siberian Department, Academy of Sciences USSR; Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 9 1962, pp 39-45

From studies on the separation of thorium with salicylic acid, it was shown that thorium can be quantitatively determined in the presence of a number of elements (Al, Ca, Mg, Mn, Pb, Ni, Cu, and Cr). The presence of trivalent iron hinders the process.

Thorium can also be separated from uranium with salicylic acid if the pH of the solution is 4-5. Further tests showed that thorium can be separated from a solution containing all the above-mentioned elements, including uranium, by precipitation with salicylic acid. If the solution contains lanthanum, it will be simultaneously precipitated with the thorium at the indicated pH, but at pH-3.3, lanthanum does not precipitate and the thorium can be separated.

Thorium can be separated from uranium with salicylic acid without filtration by using ether. The uranium salicylate is insoluble in ether and remains in the aqueous phase.

Another investigation was the separation of thorium from rare-earth metals as a salicylate by using acetone. Since both lanthanum and cerium salicylates were found to be insoluble in acetone, it was assumed that all rare-earth metals would be insoluble. Consequently, not only a chemically pure, but also a radiochemically pure thorium can be obtained.

25. Nuclear Charge Distribution of Fission Products With Atomic No = 139

"Determination of the Individual Isobaric Products With an Atomic Number of 139 by the Fission of Uranium With Neutrons at an Energy of 14 Mev," by A. N. Apollonova, I. T. Krisyuk, and V. N. Ushatskiy; Leningrad, Radiokhimiya, Vol 4, No 3, 1962, pp 587-591

A method of determining the fission products of uranium which have an atomic weight of 139 is described. Twenty-five brass plates in a special chamber were covered with a layer of uranium and a layer of barium stearate. Argon gas was used to carry the radioactive gases formed to cold traps where they could be analyzed.

C-O-N-F-I-D-E-N-T-I-A-L

I^{139} and Xe^{139} were identified and their relative amounts determined from which a nuclear charge distribution curve was plotted. This curve shows the percentage of each fission product with an atomic weight of 139 and atomic numbers ranging from 52 to 56 which will result from the fission reaction.

26. Adsorption of Plutonium on Polished Platinum

"Study of the Adsorption of Plutonium on Polished Platinum," by A. G. Samartseva; Leningrad, Radiokhimiya, Vol 4, No 5, 1962, pp 526-531

Due to the lack of data on the adsorption of plutonium on polished platinum, the relationship of this process to the concentration of H^+ ions (10^{-1} to $10^{-12}M$) at a plutonium concentration of $4 \cdot 10^{-9}M$ was studied. As the pH increases, the percent adsorption also increases up to a maximum at pH 3.5-4. Above pH 4, the adsorption begins decreasing with a minimum value occurring at pH 7.8.

Desorption of plutonium from the polished surface was also studied, from which it was established that in solutions with a pH or 2.5 the adsorption is irreversible.

Foreign ions of $(NH_4)^{+1}$, La^{+4} , or Y^{+4} were found to have no effect on the adsorption process at a $10^{-9}M$ concentration, while Zr^{+4} and Th^{+4} ions of the same concentration almost halt the process. It is believed that Zr^{+4} and Th^{+4} form a hydroxide which adsorbs the plutonium ions and prevents them from being adsorbed on the polished surface, whereas $(NH_4)^{+1}$, La^{+4} , and Y^{+4} , which do not form the hydroxide, cannot displace the plutonium ions from their position in the double electric layer.

In a $10^{-2}M$ solution of H_2O_2 , the adsorption of plutonium increases even in very weak or neutral solutions.

27. Determination of Uranium in a Thiocyanide Reaction

"Spectrophotometric Determination of Uranium With Thiocyanide in the Presence of Molybdenum and Vanadium," by L. M. Moiseyeva and Yu. N. Tumanov; Moscow, Zhurnal Analiticheskoy Khimii, Vol 17, No 5, Aug 62, pp 595-597

The purpose of this research was to establish the conditions for permitting the use of thiocyanide in the determination of uranium in the presence of small quantities of molybdenum and vanadium.

The optical density of the uranium, molybdenum, and vanadium thiocyanide complexes was studied in relation to pH of the solution, concentration of the thiocyanogen ions, and reduction of ferric ions which interfere with the analysis.

28. Extraction of Protactinium-233 With Methyl Isobutyl Ketone

"An Analytical Method of Isolating Protactinium-233 by Extraction With Methyl Isobutyl Ketone," by I. Ye. Starik, A. N. Yelizarova, L. I. Il'menkova, V. N. Shchebetkovskiy, M. N. Chubarov, and V. V. Smirnov; Leningrad, Radiokhimiya, Vol 4, No 5, 1962, pp 620-622

Extraction of Pa²³³ from an acid solution containing tracer isotopes, Zr⁹⁵, Nb⁹⁵, Th²³⁴, and U²³³, with methyl isobutyl ketone can be accomplished very easily. All the protactinium is removed from the aqueous phase and part of the zirconium, niobium, and uranium. Thorium remains in the aqueous phase. Zirconium and niobium are removed from the ketone with a solution of 6N HCl + 4% oxalic acid. Protactinium is then isolated from the uranium by converting it to an aqueous phase with 8% oxalic acid solution. Protactinium yield for this process was 80%.

29. Alpha-Transition of Plutonium-241

"Alpha-Decay of Plutonium-241," by B. S. Dzheleпов, R. B. Ivanov, A. S. Krivokhatskiy, and V. G. Nedovesov; Leningrad, Radiokhimiya, Vol 4, No 5, 1962, pp 619-620

Five different alpha particles were observed to exist in the alpha-decomposition study of Pu²⁴¹. These particles ($\alpha_0, \alpha_1, \dots, \alpha_4$) were distinguished by their transition energies, energy levels, relative intensity, and forbidden-transition factors. The transition of the particles in the decay process were discussed with respect to spin quantum numbers and forbidden-transition factor. For instance, the transition energy of U²³⁷ in the ground state is 5,036 kev. This is the same energy which α_0 -particles possess. Therefore, it is possible that the transition of α_0 -particles is a direct transition between the ground state of Pu²⁴¹ (spin=+5/2) and the ground state of U²³⁷ (spin=+1/2). This hypothesis would also explain the large value (700) for the forbidden-transition factor.

30. Isotope Production Increased in Rumania

"Increased production of Radioactive Isotopes"; Berlin, Marktinformationen fuer den Aussenhandel, 1 Dec 62, p 4

Thirty-six different types of radioactive isotopes are now produced at the Bucharest Institute for Nuclear Physics. During 1962 alone, 12 new types were developed. Production during the first 10 months of 1962 was 15 percent higher than for the entire year of 1961. The quantity delivered to industry alone was twice as great as in the entire previous year. The greatest increase was in the production of Iridium 192, which is used in controlling welded seams and castings.

31. Equation for Countercurrent Ion Exchange Separation of Isotopes

"Solution of Equation for Operation of Countercurrent Ion Exchange Column for Isotope Separation," by M. I. Nikolayev, Physical-Chemical Institute imeni L. Ya. Carpov; Moscow, Zhurnal Fizicheskoy Khimii, Vol 37, No 1, Jan 63, pp 44-51

An equation was derived and solved for the operation of a countercurrent ion exchange column for stationary state conditions and assumed internal and external diffusion exchange kinetics. Mathematical expressions are presented for the height equivalent to a theoretical plate (HETP). Experimental and theoretical HETP values were found to be in satisfactory agreement.

Rare Metals

32. Photometric Determination of Gallium With Antipyrine Dyes

"Some Antipyrine Dyes As Reagents for Photometric Determination of Gallium," by A. I. Busev, L. M. Skrebkova, and V. P. Zhivopistsev, Moscow State University imeni M. V. Lomonosov; Moscow, Zhurnal Analiticheskoy Khimii, Vol 17, No 6, Sep 62, pp 685-692

Some dyes of the antipyrine series were synthesized, and their analytical characteristics were studied: dimethylaminodiphenylantipyrilcarbinol, tetramethyldiaminodiphenylantipyrilcarbinol, bis-(*m*-nitro-*n*-dimethylaminophenyl)-antipyrilcarbinol, and bis-(*n*-methylbenzylaminophenyl)-antipyrilcarbinol.

The reactions of the above dyes with gallium halides were studied, and it was shown that bis-(*n*-methylbenzylaminophenyl)-antipyrilcarbinol is a sensitive and selective reagent for the spectrophotometric determination of gallium.

33. Reagents for the Spectrophotometric Determination of Indium

"Spectrophotometric Study of Reagents for the Determination of Indium," by A. K. Babko and P. P. Kish, Uzhgorod State University; Moscow, Zhurnal Analiticheskoy Khimii, Vol 17, No 6, Sep 62, pp 693-699

A study was made of the spectrophotometric characteristics of 16 reagents which form colored compounds with indium.

The effect of pH on the absorption of the reagents and their complexes with indium was studied; optimum conditions of complexing were found, and the composition of some of the complexes were established.

34. Synthesis and Electrical Properties of Cerium Aluminates

"Reactions Between Ce_2O_3 and Al_2O_3 at High Temperatures and the Properties of the Resulting Cerium Aluminates," by A. I. Leonov and E. K. Keler, Institute of Silicate Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademi Nauk SSSR, Otdeleniye Khimicheskikh Nauk, No 11, Nov 62,

Cerium aluminates were synthesized at 1,000-1,750°C and their properties studied.

Reactions in the solid phases of the $Ce_2O_3-Al_2O_3$ system were studied by heating a mixture (99.85% Ce_2O_3 , 0.1% La_2O_3 , 0.05% Pr_2O_3 , 0.06% Fe plus Al_2O_3) to above 1,500°C in a reducing atmosphere of hydrogen or ammonia, whereby the Ce^{4+} is reduced to Ce^{3+} which later reacts with the alumina to form two compounds, $CeAlO_3$ and $Ce_2O_3 \cdot 11Al_2O_3$. The melting points of these two compounds were found to be 2,075±25°C and 1,950±25°C, respectively. When heated in air, cerium aluminates decompose into free Ce_2O_3 and Al_2O_3 .

The dielectric permeability and dielectric phase angle at 295°C were determined for $Ce_2O_3 \cdot 11Al_2O_3$ samples which were sintered at 1,650°C for 2 hours. The same electric properties were determined for $CeAlO_3$ at 78°, 295°, and 496°C. Numerical values for the permeability and loss were found to vary greatly at different temperatures and frequencies, which was assumed to be a result of the synthesis conditions.

35. New Reagent for Extracting Ruthenium

"Extraction of Radioactive Ruthenium With Sodium Piperidinedithiocarbamate," by K. V. Astakhov, S. V. Mikhaleva, and V. I. Tselin; Leningrad, Radiokhimiya, Vol 4, No 5, 1962, pp 540-543

For the first time, the possible use of sodium piperidinedithiocarbamate for the extraction of radioactive ruthenium was shown and the optimum conditions for the extraction process determined.

Maximum extraction (98%) is possible if the ruthenium isotope is first reduced to its lowest valence state with ammonium hydroxychloride prior to the extraction.

36. Extraction of Americium With Organophosphorus Compounds

"Investigation of the Complex Formation of Americium With Neutral Organophosphorus Compounds," by V. I. Zemlyanukin, G. P. Savoskina, and M. F. Pushlenkov; Leningrad, Radio-khimiya, Vol 4, No 5, 1962, pp 570-575

A study of the extraction of americium with organophosphorus compounds -- tri-n-butyl phosphate (TEF), di-n-butyl ester of n-butyl phosphonic acid (DBEEF), n-butyl ester of di-n-butyl phosphonic acid (BEDEF), and tri-n-butyl phosphine oxide (TBFO) -- showed that all of these form americium trisolvates in nitric acid -- $\text{Am}(\text{NO}_3)_3 \cdot 3\text{TEF}$, $\text{Am}(\text{NO}_3)_3 \cdot 3\text{DBEEF}$, etc.

Activity coefficients were calculated for all the components involved, and it was found that TBFO comes closest to an ideal solution and is the best extractant.

37. Qualitative Analysis of Neptunium and Protactinium Using Chlorophosponazo-III

"Use of Chlorophosponazo-III for Photometric Determination of Pentavalent Actinide Elements. Part I. Determination of Neptunium," by E. G. Chudinov and G. N. Yakolev; Leningrad, Radio-khimiya, Vol 4, No 5, 1962, pp 601-605

Chlorophosponazo-III, a 2,7-bis-(4-chloro-2-phosponobenzeneazo)-1,8-dioxynaphthalene-3,6-disulfo acid, was successfully used in the qualitative analysis of neptunium-V by photometric methods. The use of this reagent makes it possible to analyze either mixed or pure solutions.

Physical properties of the compounds formed by reaction of chlorophosponazo-III with neptunium and the laboratory procedures are given.

"Use of Chlorophosphonazo-III for Photometric Determination of Pentavalent Actinide Elements. Part II. Determination of Prot actinium," by E. G. Chudinov and G. N. Yakolev; *ibid.*, pp 605-606

The use of chlorophosphonazo-III as an organic reagent for the qualitative analysis of protactinium is described. The reaction of the two substances occurs at a higher pH than for neptunium, and there is little dependence of the absorption spectrum on the acidity of the solutions, which makes the determination of protactinium possible without precisely knowing the pH of the acid solutions.

38. Method for Separating Thallium Developed

"Adsorption of Thallium From Solutions With Activated Charcoals and Sulfonated Coals," by V. G. Kovyshin, V. D. Ponomarev, and G. A. Keverova; Moscow, Zhurnal Prikladnoy Khimii, Vol 35, No 12, Dec 62, pp 2629-2640

Studies show that monovalent thallium is capable of being adsorbed from solution with activated charcoal. An adsorption maximum was observed at pH 12. Adsorption of thallium on sulfonated coals at pH 4, 6, and 9 is essentially an ion exchange process, while at pH 11 and higher, adsorption takes place in addition to ion exchange. The adsorption of thallium on activated charcoals is a physical adsorption process. The activation energy of thallium at pH 12 is 3,600 calories per mole, and at pH 8 the activation energy is 4,846 calories per mole. As the temperature of the solution increases, the adsorption of thallium decreases markedly at pH 8 and remains unchanged at pH 12.

Coefficients were determined for the Langmuir equations, and the manner in which these coefficients change with temperature and pH of solution has shown. Experiments were conducted on the separation of thallium from the solution after leaching out dusts from lead production with sulfonated coals. The experiments demonstrated the feasibility of thallium adsorption from solution with the aid of sulfonated coals.

39. Germanium Hydrocarbons Synthesized

"Lithium-Organic Synthesis of Germanium Hydrocarbons From Dimethyldichlorogermanium. Some Reactions With the Possible Intermediate Formation of $(\text{CH}_3)_2\text{Ge}$," by O. M. Nefedov, M. M. Manakov, and A. D. Petrov, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 6, 21 Dec 62, pp 1376-1379

It was previously shown that dimethyldichlorosilane reacts readily with lithium in tetrahydrofuran to form corresponding aryl substituted silicacyclopentanes and silica hydrocarbon polymers when the reaction is conducted in the presence of arylethylenes. In the absence of olefins, the reaction leads to the formation of a mixture of polymers having the general formula $[(\text{CH}_3)_2\text{Si}]_n$. Under these conditions, it seemed feasible that dimethylsililene, a silica analog of carbene, would form as an intermediate product.

It was found that dimethyldichlorogermanium reacts readily with lithium in tetrahydrofuran to form a cyclic hexamer which is readily soluble in most organic solvents. At a lower temperature, about 0°C, an insoluble polymer is formed in addition to the above cyclohexamer. This polymer consists of a gray amorphous powder having a melting point interval of 200-240°C.

40. Alberon -- a New Analytical Reagent for Determining Beryllium

"Study of a New Analytical Reagent -- Alberon -- and Its Reactions With Beryllium," by L. P. Adamovich, O. V. Morgul'-Meshkova, and B. V. Yutsis, Khar'kov State University, and A. N. Gor'kiy; Moscow, Zhurnal Analiticheskoy Khimii, Vol 17, No 6, Sep 62, pp 678-684

A study of a new analytical reagent -- alberon -- and its reactions with beryllium ions showed that it is quite suitable for the photometric determination of beryllium in bronzes and beryl. This new reagent, a dichlorosulphodimethylhydroxyfuchone-dicarboxylic acid, in addition to being used in beryllium determination, was investigated as to its physical and chemical properties in order to compare, evaluate, and improve known analytical methods for the photometric determination of beryllium and other metals.

Semiconductor Chemistry41. Effect of Copper on Conductivity of Semiconductors Measured

"Electrical Conductivity of the System AsSe_{1.5}-Cu in the Vitreous State," by A. V. Danilov and R. L. Myuller; Moscow, Zhurnal Prikladnoy Khimii, Vol 35, No 9, Sep 62, pp 2012-2016

The electrical conductivity of crystalline semiconductors depends greatly on the presence of admixtures whose elimination presents much difficulty. Small impurities, about one percent, have a weak effect on the conductivity of vitreous materials. The conductivity and mobility of current carriers in vitreous semiconductors are, therefore, very small in comparison to these values in a number of semiconductors. Impurities are distributed in solids in various ways. Thus, during certain stages of synthesis and firing of the glass, metallic impurities of elements may become distributed in the form of covalently bound linkages of the structure network of the glass and may be manifested as higher electrical conductivity and greater mobility of current carriers. To study this question further, glasses were synthesized from arsenic selenide containing metallic copper.

The results of this study show that introduction of copper to vitreous arsenic selenide causes a marked increase in electrical conductivity. The conductivity modulus, calculated to account for the presence of copper, maintains its value in accordance with the valency hypothesis of electrical conductivity. The conductivity energy obeys the laws previously established for polar ion-conducting glasses.

42. Effect of Impurity Redistribution on Semi-Conductor Surface Studied

"Effect of Impurity Redistribution in a Semiconductor Space-Charge Region on the Adsorption Capacity," by V. S. Kuznetsov and V. B. Sandomirskiy, Institute of Catalysis, Siberian Department, Academy of Sciences USSR, and Institute of Radio and Electronics, Academy of Sciences USSR; Moscow, Kinetika i Kataliz, Vol III, No 5, Sep/Oct 62, pp 724-727

A study was made of the effect of impurity redistribution in the space-charge region of a semiconductor during chemisorption on the adsorption capacity of a semiconductor catalyst. The results show that impurity redistribution always leads to an increase in adsorption capacity.

43. Spectrochemical Analysis of Semiconductor Silicon

"Spectral Determination of Impurities in Semiconductor Silicon After Chemical Concentration," by Yu. V. Morachevskiy (deceased), Kh. I. Zil'bershteyn, M. M. Piryutko, and O. N. Nikitina, Institute of Silicate Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Analiticheskoy Khimii, Vol 17, No 5, 1962, pp 614-620

A spectrochemical method for determining impurities in semiconductor silicon is presented.

A small portion of silicon is placed on a teflon film and decomposed by hydrofluoric and nitric acid vapors at 105-110°C. The concentrate in the form of silicon tetrafluoride is then subjected to spectral analysis. Sensitivity of the analysis is 3×10^{-8} to 3×10^{-9} grams with a mean arithmetical error of +25-35%

44. Soviets Synthesize Polymeric Semiconductors

"Synthesized Semiconductors"; Moscow, Krasnaya Zvezda, 26 Dec 62, p 3

"A group of USSR Academy of Sciences co-workers succeeded in synthesizing more than 30 new organic high-polymer compounds with electroconductivity properties as fine as those of conventional semiconductors. The scientists are also able to predict in advance the electrophysical properties these compounds will have. They behave like metals or semimetals, depending on their structure. Since these compounds can be formed into films and filaments of any configuration, they will find wide application in radioelectronic technology."

Miscellaneous45. Fluorine-Containing Organosilicon Compounds Prepared

"Addition of Fluorine Hydride Silanes to Unsaturated Organic Compounds," by I. A. Shostakovskiy, E. A. Sokolov, A. M. Grishko, K. F. Lavrova, and G. I. Kagan, Irkutsk Institute of Organic Chemistry, Siberian Department, Academy of Sciences USSR; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 12, Dec 62, pp 3882-3885

Fluorine hydride silanes of type $R-SiH_2F_3-n$ (where $n = 0, 1, 2$) were prepared by fluorination of corresponding chlorine hydride silanes with concentrated hydrofluoric acid at room temperature. The addition of fluorine hydride silanes to unsaturated organic compounds was conducted for the first time in the presence of 0.1% solution of chloroplatinic acid and isopropyl alcohol as catalysts. In the case of styrene, the addition proceeds both in accordance with and counter to Markovnikov's rule. In comparison to corresponding chlorine hydride silanes, the addition of fluorine hydride silanes to styrene takes place vigorously and gives high yields of addition products. Fifteen fluorine-containing organosilicon compounds were prepared for the first time.

46. New Polymer "Levoglucosan" Superior to Polyethylene

Riga, Sovetskaya Latvija, 9 Jan 63, p 1

"The high-polymer synthesis laboratory at the Institute of Forestry Problems and Wood Chemistry of the Latvian Academy of Sciences developed a method for making the new resin "levoglucosan" from waste products of wood and agricultural products. It can be used to make a durable synthetic fiber, tape, etc. Levoglucosan tape is superior to polyethylene tape. The new polymer is now being studied for possible uses in medicine."

47. Effect of Ionizing Radiation on Hydrocyanic Acid Synthesis

"Action of Ionizing Radiation on the Hydrocyanic Acid Synthesis Reaction," by R. Mikhail and I. Gershkovich, Institute of Chemical Research, Rumanian People's Republic; Moscow, Kinetika i Kataliz, Vol III, No 6, Nov 62, pp 836-845

A study was made of the action of ionizing radiation on the reaction of methane with ammonia to form hydrocyanic acid over a platinum catalyst both in the presence and in the absence of oxygen. The radiation affects the course of the reaction at low intensity levels and high temperatures. This effect is correlated with the nature of the intermediate compounds formed during the reaction.

48. Pentaerythritol, Glycerin Substitute in Varnish Industry, Cuts Use of Vegetable Oil

"Powder That Saves Millions," by A. Bondaryuk; Moscow, Sovetskaya Rossiya, 16 Jan 63, p 4

Russia's oldest varnish plant, "Workers' Victory," developed a method for using pentaerythritol to replace glycerin in making varnish. This substitution cuts the industry's use of vegetable oils 15-20%, and the resulting varnish -- used in automobile and machine construction -- is as fine as that made from imported tung oil and glycerin. Pentaerythritol is made cheaply from toluene and isobutylene -- by-products of oil refining.

Pentaerythritol can also be used in the synthetic rubber industry to replace costly rosin. It also increases polymerization speed.

49. New Method for Making Cellulose For Tire Cord

"Tire Durability Increases"; Leningrad, Pravda, 9 Jan 63, p 4

"The All-Union Scientific-Research Institute of the Cellulose and Paper Industry has developed a new technology for making cellulose for use in tire cord. For the first time in this country, cellulose was made by the sulfate method with the preliminary hydrolysis of wood pulp, instead of the sulfite method. The boiling is done in acid-resistant boilers to ensure maximum purity of the intermediate products.

C-C-H-F-I-D-E-N-T-I-A-L

"Cellulose made by the new method produces cord twice as durable as by the old method, and its breaking length is 44 kilometers," G. S. Kosova, head of the sulfate cellulose laboratory, informed the Leningrad Tass correspondent. "This cord increases the life of automobile tires several times."

"This new technology will be first applied at the sulfate-cellulose plants being built in Bratsk and Baykal."

50. Academician Dubinin Discusses Large-Scale Chemical Industry

"New Horizons for the Large-Scale Chemistry Industry," by Academician M. M. Dubinin; Moscow, Krasnaya Zvezda, 22 Dec 62, p 6

In discussing the chemical industry, Dubinin especially mentions the many possible future applications of fluorine plastic. This plastic withstands temperatures ranging from -269 to +250° C and resists the action of acid and alkaline solutions. It is often used to replace platinum, for it is 20 times lighter than the metal and much cheaper.

Silicon-organic plastics are excellent for use as insulators and do not absorb water. Electric motors using silicon-organic insulators last longer and work under water.

Iron-exchange resins are used for purifying water and for removing valuable elements from sewage.

The article also mentions the importance of silicon rubber which retains its elasticity in temperatures of from -90 to +350° C.

51. A. Korotkov Discusses Research and Development of Synthetic Rubber

"Synthetic Rubber Will Be Better Than Natural," by A. Korotkov, corresponding member of the Soviet Academy of Sciences; Moscow, Pravda, 9 Dec 62, p 3

The author discusses research leading to the development of "SK-1" [synthetic rubber, type 1], a rubber having the same qualities as natural rubber. Two groups worked to develop synthetic rubber: the first and largest elected to use conventional polymerization methods and proceed by small alterations to an approximation of rubber; the second group decided to search for new catalysts and polymerization methods -- and was successful. The SK-1 which this second group developed was not put immediately into production because the Ministry of the Chemical Industry considered the technological and production risks too great. Their timidity delayed the widespread use of SK-1 5 years, the author feels.

Experience of the SK-1 researchers convinced them that synthetic rubber could be made not only to equal, but also to surpass natural. A rubber, "SK-D" was developed which is more durable in some respects than natural rubber and, for example, makes longer-lasting automobile tires. This rubber is made from butadiene rather than from isoprene, as is SK-1.

52. New Process Eliminates Need for Huge Casting Machines in Making Nylon Machine Parts

"Machine Parts From Nylon"; Leningrad, Leningradskaya Pravda, 20 Dec 62, p 2

Workers at the All-Union Scientific-Research and Design Technology Institute of Carbon Machine Building, in collaboration with Czechoslovak academician O. Vikhterle developed a new process for making such nylon machine parts as cog-wheels, bearings, etc. without using huge casting machines. A monomer solution mixed with a little sodium metal is poured into a form. The presence of sodium causes it to harden.

53. Director Grigoryan Discusses Work of Kirovakan Chemical Research Institute

"Science, Plans and Life," by Kh. Grigoryan, Director of the Kirovakan Scientific-Research Institute of Chemistry; Yerevan, Komunist, 4 Dec 62, p 2

Kh. Grigoryan, director of the Kirovakan Chemical Research Institute, mentions that the Institute is currently developing new methods for processing natural gas and petrochemicals. They are also working on new synthetic glues and masticated rubbers for use in the furniture and electrical engineering industries and on anticorrosion construction materials to replace rustproof steel in the manufacture of acetic acid. The institute plans to change over from producing synthetic ammonia to producing natural gas.

54. Armenian Sovmarkhoz Chemical Director Mentions New Products and Technologies

"Great Horizons of the Chemical Industry," by K. Rukhikyan, acting director of the chemical industry of the Armenian Sovmarkhoz; Yerevan, Kommunist, 18 Dec 62, p 2

In discussing the status of the Armenian chemical industry, K. Rukhikyan observes that research work of the Plant imeni Kirov has expanded the number of products turned out by the All-Union Synthetic Rubber Institute. New products include "Nairite NT" and latex "L-NT," which are used as adhesives in making shoes.

The electric insulating varnish VL-7, made by the "Polyvinylacetate" plant, makes possible a reduction in the size and cost of electric motor.

A significant change in the chemical industry will be a shift to using natural gas instead of carbides in the production of acetylene.

55. New Heat-Insulating Ice Foams Developed by Hydraulic Engineering Institute Imeni B. Ye. Vedenev

"In the Country's Laboratories: Ice Foam -- A Heat Insulator"; Moscow, Nedelya, 18-24 Nov 62; p 7

The All-Union Scientific-Research Institute of Hydraulic Engineering imeni B. Ye. Vedenev developed a method for making ice foam which is 15 times lighter than the usual variety. The method involves adding a "chemically active" substance to foaming water. The Bratsk Hydroelectric Power Station used this ice foam successfully to protect a construction material quarry from freezing.

The same laboratory has made quick solidifying foam from water and a resin. It can be used as a heat insulator for laying concrete in cold weather.

56. Pyrolysis Tars Used for Building Materials

"Furniture From Tar"; Moscow, Nedelya, No 50, 1962, p 5

"The Chemistry Institute, Academy of Sciences, USSR Ural Branch, is preparing building tiles for use on floors and walls of living quarters and kitchens. The tiles are made from pyrolysis tars -- a by-product of the synthetic alcohol industry -- which is also used for fuel.

"Concrete containing pyrolysis tar will not absorb water and can withstand a wide range of temperatures. This concrete is being used to make bathtubs. Wood-shaving and wood-fiber tiles treated with pyrolysis tars are being used to make moisture- and fire-resistant furniture."

57. Porous Ceramics Used for Oil Filters and Sound-Proofing

"Porous Ceramics," by D. Sasorov; Kiev, Rabochaya Gazeta, 23 Jan 62, p 4

A porous ceramic oil filter was developed at the Scientific-Research Institute of Construction Ceramics in the laboratory headed by Klavdiya Smirnova. According to the article, the filter material is made from a mixture of chamotte or quartz sand with soluble glass and industrial sodium fluosilicate. The mixture is calcined at a very high temperature. Depending on the raw material, the pores vary in size from 0.1 micron to 0.5 millimeter. The ceramic has very high chemical stability and can be used to replace stainless steel and brass for reservoir gratings. It is resistant to acids, alkalis, and liquefied gases. Slabs of this ceramic can be used to distribute air evenly for air lifting of cement, phosphorites, etc.

Also prepared in this laboratory is a sound-proofing ceramic made from a mixture of sawdust, chamotte, and liquid glass.

58. Soviets Use Radiation for Welding

"Atomic Welding;" Moscow, Krasnaya Zvezda, 26 Dec 62 p 3

A group of co-workers from the USSR Academy of Sciences' Institute of Chemical Physics developed a method for welding materials previously impossible to weld by the action of slow neutron radiation. The surfaces of the materials to be welded are coated with either lithium or boron. The intense heat caused by radiation from these elements causes welding of such strength that a welded piece no thicker than a fingernail can support 150 kilograms.

The article mentions the need for welding such materials as glass and plastic, two different synthetic plastics, and rubber and synthetic fibers. A method using a thin film of polystyrene with a little boron has been used successfully in experiments to join rubber with nylon cord. This combination produces automobile tires of great durability.

59. Magnetic Susceptibility of Some Copper and Vanadyl Compounds

"Stereochemistry of Copper and Vanadyl Compounds Having Abnormal Magnetic Properties," by V. V. Zelentsov, Moscow Physical and Technical Institute; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 6, Jun 62, pp 1299-1304

Six new vanadyl and two divalent copper compounds were synthesized for the first time. Compounds of vanadyl with salicylal-o-oxyaniline, 5-chloro- and 5-bromo-salicylal-o-oxyaniline, dibenzoyl-o-oxyaniline, and 5-bromo-salicylal-5'-nitro-2'-oxyaniline (mono- and polyhydrate forms) plus complexes of divalent copper with dibenzoylmethane-o-oxyaniline and salicylal-2'-oxy-5'-sulfonaphthylimine were prepared.

A study of the magnetic susceptibility of these compounds in the solid state showed that they have an effective magnetic moment of less than 1.73 (0.77-1.55 B) for the vanadyls and less than 1.59 (1.66 B) for the copper compounds. This was explained by the exchange activity between the paramagnetic ions of those compounds having a dimer bridge structure.

60. Determination of Radioactive Elements by Aerial Spectrometry

"An Experiment on the Determination of Radium, Thorium, and Potassium in Rocks From an Aircraft With a Spectrometer," by L. I. Boltneva, V. N. Vasilenko, A. V. Dmitriyev, V. A. Ionov, I. M. Nazarov, and I. V. Yagodovskiy; Moscow, Atomnaya Energiya, Vol 13, No 3, Sep 62, pp 280-282

Determination of the radium, thorium, and potassium content in rocks with a multichannel gamma spectrometer installed in an aircraft is described. Tests of this method, using a thallium-energized NaI crystal in the spectrometer, were made by flying over simple geologic formations of known radioactivity at altitudes of 25, 50, and 100 meters. Data from the aerial tests were correlated with data from ground tests to determine accuracy, altitude limits, and other parameters. The possibility of using photogrammetry as a means of establishing reference points for coordinating radiation data with topography was mentioned.

Tables are given for aerial and ground tests, statistical error, and counting rate coefficients. Equations for determining the content of natural occurring radioactive elements from test data are also given.

61. New Catalysts for Desulfurization of Petroleum Products

"High Activity Iron-Alumina-Silica Catalysts for Thermal Desulfurization of Petroleum Products," by V. S. Komarov, M. F. Yermolenko, V. I. Varlamov, and I. N. Volneyko, Institute of General and Inorganic Chemistry, Academy of Sciences Belorussian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 6, 21 Dec 62, pp 1413-1416

Previous work has shown that bauxite serves as a very effective catalyst for vapor phase desulfurization of straight-run gasolines, allowing almost complete removal of mercaptans, sulfides, and disulfides from the gasoline. In view of this, the authors undertook to develop similar catalysts from Byelorussian clays.

The catalysts are prepared by a method which consists basically of the following: following activation with acids, the clay is filtered and washed; the wash water and one fifth of the activated clay (by volume) are added to the acid filtrate and stirred carefully. An ammonia solution of pH 7-7.5 is added gradually so that the iron and aluminum salts present in the filtrate are precipitated as hydroxides together with the added clay. The hydroxide precipitate is washed free of ammonia salts, pelleted or extruded, and dried at 600°C for 2 hours.

Experiments show that the sulfur content in kerosene following thermal desulfurization in the vapor phase is decreased by 95 percent.

62. Sulfuric Acid Produced Microbially

"Microbes Production"; Tbilisi, Zarya Bostoka, 10 Jan 63, p 4

"If a colony of microbes is placed in a large reservoir containing liquid wastes from some industry, in one hour the water will be pure; within 2-3 hours the microbes are capable of consuming 1,000 times their weight. It would be difficult to imagine life on earth without bacteria. Without them, our rivers would become polluted, while the surface of the earth would be covered with the carcasses of dead organisms.

"Would it be possible to 'train' microbes to treat waste material into useful products? The answer turns out to be 'yes.' At the present time, scientists are engaged in the 'education' of bacteria for the benefit of man. Czechoslovakian scientists, for example, were recently successful in 'training' so-called sulfur bacteria, which feed on lean sulfur ores, to produce sulfuric acid."

Meetings and Conferences

63. Conference on Mineral Fertilizer Production Held in Leningrad

"Intervuz Scientific Conference on Developing New Methods for Mineral Fertilizer Production," by V. L. Varshavskiy; Leningrad, Zhurnal Prikladnoy Khimii, Vol 35, No 12, 1962, pp 2805-2806

"An intervuz conference of inorganic chemistry technology departments was held in the Leningrad Technological Institute imeni Lensovet, on May 22-26. The conference dealt with the development of new methods for producing mineral fertilizers. Participating were representatives from 29 vuzes, 12 fertilizer industries, 6 project organizations, and 15 branch scientific institutes -- including the State Nitrogen Industry Institute, the Scientific-Research Institute of Fertilizers and Insectofungicides, the Institute of Chemistry of the Uzbekistan Academy of Sciences, and the All-Union Scientific Research Institute of Halurgy -- and from the committees on chemistry and on the coordination of scientific research work of the Soviet Council of Ministers."

64. New Industrial Devices and Processes Displayed at Trade Exhibition

"Exhibition of Achievements of the Soviet Economy," by G. O. Tatevos'yan; Moscow, Plasticheskiye Massy, No 12, 1962, pp 1-2

"The Leningrad Textile Institute developed a tensiometer for measuring longitudinal and transverse deformations and a torsion meter for measuring the angle of twist in mechanical tests of polymers. The tensiometer is easily attached to the test sample by an electric circuit. The size of the distortion is registered on a special dial. The sensitivity of the instrument for measuring longitudinal deformation is 0.25 micron; for transverse deformation, 0.1 micron. Its sensitivity for determining the angle of twist is 0.00001 radian; its input voltage is 4 volts; and its available power, one watt.

"The Moscow Chemical Machine-Building Institute developed a device for drying suspensions and solutions in a fluidized layer of an inert granular material. It is designed for continuous drying of suspensions to form finely dispersed solid products. The dispersion is evenly dispersed over the surface of an inert granular material. The vigorously developed surface and small mass of this layer intensify the drying process. The dried particles are removed by dust-extractors, carried off by a desiccating current, and collected. The intense drying process of this device produces 700-1,000 kilograms of water per square centimeter of granular layer, but expends little heat and electric energy (700 calories and 0.04 kilowatt for each kilogram of water.)"

[The article goes on to describe a process developed by the Leningrad Technological Institute for making glazed aluminum. The coated aluminum has great resistance to damage from machines, heat, and chemicals. Enamel with a calcination temperature of 530-550°C is used for the coating.]

"The Kuybyshevskiy Aviation Institute developed a gauge for measuring the thickness of galvanic coverings on the metal IGP-2. It consists of a high-frequency generator, a sensory device, and an electron stabilizer. It is applied to metals with various thicknesses of galvanic coverings and measures the contour parameters, fed by high-frequency current."

[Next described is a thermoelectric hygrometer developed at the Leningrad Polytechnic Institute for measuring the moisture content of dispersed and fibrous materials. It is made of a sensory device (225 x 85 x 12 millimeters; weight, 3.5 kilograms) which converts the moisture of the substance to an electric magnitude, an indicator (270 x 225 x 160 millimeters; weight, 3.5 kilograms), and a block (140 x 90 x 260 millimeters; weight, 4 kilograms) which maintains contact between the sensory device and the test material.]

C-O-N-F-I-D-E-N-T-I-A-L

"The device operates by a well-defined correlation between the water content of the material and the rate of heating of a low heat-resistant substance in the contact. The accuracy of the instrument is not impeded by temperature changes or an excess of electrolytes in the test material.

"Its accuracy for moisture in finely dispersed materials is 0.03-0.05%; in fibrous materials, 0.1-0.15%. The measurement takes 10 seconds. The available power is 15 watts. Voltage of the system is 15 volts.

"At Moscow State University, a device, UIT-2, was developed for cleaning metals, insulators, and semiconductors by ion-bombardment. Ions, formed in a gas discharge and highly accelerated, destroy the weakest particles on the surface and expose the structure of the solid.

"This method is superior to others because (1) it exposes the surface structure of the solid at any temperature, (2) it does not oxidize the surface, and (3) it shows up structures of substances which are otherwise difficult to determine (certain alloys, for example).

"Also, this device can simultaneously clean three samples in various conditions, can study materials in broad temperature ranges, and can display the condition of samples while they are being manufactured. Right after the material has been cleaned, it can be coated by the vaporization method with a film of metal or quartz for further study of the contour with an electron microscope.

"The maximum discharge voltage is 10 kilowatts, maximum working current is 20 milliamperes, and voltage during cleaning of the heated sample is 3 kilowatts; the number of samples which can be cleaned at a time -- 3; the maximum temperature of the heated sample -- 1,000°C. It cleans 6-9 plates per hour of, for example, untempered austenitic steel and can cover ten samples per hour with a powdered metal or quartz film. The voltage of the system (frequency of 50 hertz) is 220; capacity, 25 kilowatts; cooling of the diffusion pump with water, 60 liters per hour; its dimensions, 900 x 720 x 1350 millimeters; and its weight, 35 kilograms."

55. All-Union Chemical Society at Design Institute Discusses Measures Taken To Carry Out Plan of March Plenum

"On the Participation of the Primary Organization of the All-Union Chemical Society imeni D. I. Mendeleeva in Fulfilling the Decision of the March (1962) Plenum of the Central Committee of the Soviet Communist Party." by Ya. I. Kil'man; Moscow, Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 689

The primary organization of the All Union Chemical Society imeni D. I. Mendeleev of the State Planning and Design Institute of the Nitrogen and Organic Compound Industry discussed with the other personnel of the institute measures it has sponsored to carry out the plan of the March 1962 Plenum of the CPSU.

56. Hydrochemical Conference Discusses Water Exploitation and Conservation

"XVI Hydrochemical Conference," by V. G. Datsko, I. F. Ponomarev, H. G. Posenko, and L. V. Erashnikova; Moscow, Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 690

The 16th All-Union Hydrochemical Conference met in May 1962k in Novocherkassk, to discuss water exploitation and conservation. The conference included 209 representatives, from various parts of the country, who heard 44 reports.

57. Conference on Paint Pigments Held in Leningrad

"Conference on Pigments for the Paint and Lacquer Industry," by A. A. Belovitskiy, P. V. Serb-Serbin, and D. Ya. Gershan; Moscow, Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 684-686

A conference on pigments for the paint and lacquer industry, called by the All-Union Chemical Society imeni D. I. Mendeleev and the State Committee on Chemistry of the Council of Ministers, USSR, was held in Leningrad in April 1962. The 436 members of the conference listened to 80 reports. B. R. Mirenskiy, chairman of the State Committee on Chemistry, in commenting on the status of the industry, noted several deficiencies -- for example, a lag in construction of titanium dioxide plants -- which have led to insufficient paint and lacquer production.

68. Conference Discusses Use of Chemical Methods in Agriculture

"Third Conference on the Introduction of Chemistry to Agriculture of the Orenburg Oblast", " by G. M Udovin and A. Kh. Batalin; Moscow, Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 687-688

The third conference on the introduction of chemistry to agriculture of the Orenburg Oblast met last March to discuss the progress of using chemical methods in agriculture. The conference heard 26 reports on soil analysis and on the influence of mineral and organic fertilizers, trace elements, and various soil, weather, and farming conditions on plant growth.

69. Symposium on Lubricants To Be Held in East Germany

"Fifth Symposium on 'Lubricants and Lubrication'"; Berlin, Chemische Technik, No 12, Dec 62, p 764

The Scientific and Technical Center (Wissenschaftliches Technisches Zentrum) for Lubrication and Lubricants at the VEB Mineraloelwerk (Mineral Oil Plant) in Luetzkendorf, in collaboration with the Combustion Fuels Technical Society (Brennstofftechnische Gesellschaft), announces that the Fifth Symposium on Lubricants and Lubrication will be held at the end of August 1963.

According to the announcement, the symposium will treat not only the application of, but also the physical and chemical problems connected with, lubricants. In the announcement, the organizers draw the reader's attention to the following problems which will be on the agenda of the symposium:

1. Material problems of lubricants, primarily contributions to a clarification of the relationship between composition of oils and their usefulness;
2. Production problems relating to the manufacture of lubricants;
3. Application investigations pertaining to a wide variety of machines and equipment, including combustion engines, testing installations, and test machines.
4. Contributions on the question of technically justified oil-change periods under varying conditions of use.
5. Problems connected with the manufacture of special oils, i.e., cold machine oils, hypoid greases, hydraulic fluids, etc.

C-O-N-F-I-D-E-N-T-I-A-L

The announcement states that persons who wish to present papers at the symposium should so indicate by 28 February 1963 and send a brief synopsis of their lecture to the WZ (Scientific-Technical Center) of the Chemical Industry for Lubricants and Lubrication, Krumpal (Geiseltal), East Germany. The briefs should not exceed 3-4 typewritten pages and should be submitted in duplicate, since they are to be reproduced in the symposium program. The announcement concludes by stating that planned individual lectures should be limited to 40 minutes and group lectures held to 20 minutes' duration.

II. METALLURGY

Corrosion70. Corrosion-Fatigue Studies of Metals in Alkaline Solutions

"Mechanism of Corrosion-Fatigue Failure," by S. G. Vedenkin and V. S. Sinyavskiy, Central Scientific-Research Institute of the Ministry of Railways; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 10, Oct 62, pp 2209-2214

The purpose of this work was to study the electrochemical mechanism of corrosion fatigue which at the present has not been confirmed by experimentation. Corrosion-fatigue tests were conducted on samples of St. 3 steel, the Al-Mn-Si alloy AMg6, and an Al+1%Zn alloy subjected to cyclic loading in NaCl solutions of various concentrations.

It was found that the de-nobilizing of a metal by cyclic loading is the consequence rather than the cause of crack formation, and the protective action of the cathodic current is not due to the suppression of local currents from the stressed to the unstressed sites, but to the formation of an alkaline medium on the specimen.

Oding's dislocation theory of the accumulation of vacancies forming micropores and the Rehbinder effect regarding the decrease in metal strength due to the adsorption of surface active agents were believed to be the best explanation for the mechanism of crack formation and subsequent rupture of metals from corrosion fatigue.

71. Corrosion of Kh17T and YalT Stainless Steels in Nitric Acid

"Passivity and Intergranular Corrosion of Stainless Steel in Nitric Acid," by I. K. Burtseva, V. D. Flyasunov, and A. I. Krasil'shchikov, State Institute of the Nitrogen Industry; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 12, Dec 62, pp 2687-2692

The passivity and intergranular corrosion of austenitic stainless steels Kh17T and YalT in nitric acid pre studied. The steady state and passivation potentials of stainless steel in nitric acid depend upon the acid concentration. The potential of a specimen completely immersed in the acid is more positive than that of the same specimen only half immersed. An electric current arises between the two differently immersed specimens, with the partially immersed specimen serving as the anode. Also, within the surface of the steel there are micro-cracks where air bubbles can become lodged and initiate corrosive action.

72. Corrosion of 1Kh18N9T Steel and Nickel by $ZrCl_4$ Vapor

"Corrosive Action of Zirconium Tetrachloride Vapors on Steel 1Kh18N9T and Nickel at High Temperatures," by V. I. Tsirel'-nikov, L. M. Kouissarova, and Viktor I. Spitsyn; Moscow, Atomnaya Energiya, Vol 13, No 1, Jul 62, pp 51-53

In connection with the purification of zirconium from hafnium and the processes involved, a side study was made on the corrosion of 1Kh18N9T stainless steel and nickel by $ZrCl_4$ vapors at high temperatures ($370-630^\circ C$ for 1Kh18N9T, 450° and 750° for Ni) for periods of 10-100 hours.

At the lower temperatures, both materials are vigorously attacked by the vapors. At higher temperatures, the steel is almost completely corroded within 20 hours, whereas the nickel, although severely attacked, is somewhat protected by a nickel chloride film.

73. Hydrogen Embrittlement of 1Kh18N9T Austenitic Stainless Steel

"Tendency of Austenitic Steel Toward Hydrogen Embrittlement in Relation to the Hydrogen Content, Deformation Rate, and Temperature," by Ye. P. Nechay and K. V. Popov, Institute of Petroleum and Carbo-Chemical Synthesis, Siberian Department, Academy of Sciences USSR; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 271-274

To study the hydrogen embrittlement of stainless steel, tensile bars of 1Kh18N9T steel were subjected to hydrogen gas impregnation at $500^\circ C$ and 500 atmospheres pressure for 24, 48, 72, and 96 hours. The hydrogen content after exposure was 15, 25, 50, and 100 ml/100 g.

Ductility (% elongation) tests were made in the temperature interval of -195° to $10^\circ C$. The % elongation of 1Kh18N9T steel, which has good ductility at the lower temperatures (in the neighborhood of 50%) for both embrittled and nonembrittled specimens, drops to a minimum (20%) at $-20^\circ C$. Also, when testing both embrittled and nonembrittled specimens in relation to temperature and stress rate, the slower the stress rate, the lower the ductility which reaches a minimum of 20% at a rate of 0.08 mm/min.

In the tensile tests, there was little difference noted in the strengths of the embrittled and nonembrittled specimens. However, embrittled specimens have a greater yield strength than their nonembrittled counterparts.

One final conclusion noted was that neither metals with a f.c.c. structure nor those with a b.c.c. structure are resistant to the effects of hydrogen embrittlement.

74. Oxidation of Titanium in Water Vapor and Air at High Temperatures

"The Mechanism in the Oxidation of Titanium," by D. I. Layner and A. S. Bay, Institute Giprotsvetmetobrabotka [Gosudarstvennyy Nauchno-Issledovatel'skiy i Proyektnyy Institut Po Obrabotke Tsvetnykh Metallov, State Scientific-Research and Planning Institute for the Processing of Nonferrous Metals]; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 283-286

Microstructure studies of titanium oxidized in air at 900, 1,020, and 1,150°C and in water vapor at 800, 850, and 900°C disclosed that the oxidation of titanium occurs more rapidly and at lower temperatures in the presence of water vapor.

In the vapor medium, a fine-grained, uniform oxide is formed initially, followed by the formation of coarser columnar-shaped grains. In the presence of air, the formation of the initial acicular oxide crystals was not observed.

As in most oxidation processes, there is a double-diffusion process taking place, and at higher temperatures the diffusion of titanium atoms into the oxide layer is more predominant than diffusion of oxygen atoms in the titanium.

Comparison of the oxidation of titanium in air and oxygen showed that a thicker layer of oxide is formed in the presence of air. This is the result of defects in the lattice structure caused by the nitrogen atoms which enables the oxidation process to proceed at a faster rate for a given period of time.

Crystallography75. Creep Mechanism Studies in Ni-Al and Ni-Co Alloys

"Relationship of the Mechanism of Plastic Deformation During Creep to the Conditions of Deformation in Ni-Al and Ni-Co Alloys," by V. A. Pavlov, M. G. Gaydukov, and V. V. Mel'nikov, Institute of Metal Physics, Academy of Sciences USSR: Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 275-282

In the study of plastic deformation during creep, three different mechanisms were found to occur: slip, diffusion, and slip in conjunction with a process of relaxation. These mechanisms occur at various conditions to temperature and stress. In a region of relatively low temperatures and high stresses, the deformation mechanism is predominantly one of slip, and the relationship of creep to temperature and stress can be determined by Zhurnakov's equation.

At low temperatures and high pressures, the mechanism of plastic deformation is a diffusion process. In this region, the deformation rate is a linear function of the applied stress.

In the intermediate region of temperature and stress, the third mechanism, slip in conjunction with relaxation, occurs, and the rate of deformation can be approximated by Weertman's equation:

$$\dot{\epsilon} = C (\sigma^{\alpha} RT)^{-\beta} e^{-\frac{Q}{RT}}$$

where Q -- energy of diffusion activation, σ -- stress, and α -- coefficient equal to 3 or 4.

In this study, relationships of deformation rate to alloy concentration, energy of activation of deformation to stress, and deformation rate to temperature and stress were studied for Ni-Al and Ni-Co alloys and the data graphically compared to Al-Mg and Ni-Cu alloys from previous investigations.

In contradiction to Herring's theory, which states that the boundaries of slightly disoriented blocks have no notable effect on the development of diffusion creep, the present study showed that fragment boundaries are involved in the diffusion process. This was explained by evidence of a high degree of fragment disorientation in which the fragment boundaries have the same properties as grain boundaries and consequently have much influence on diffusion creep.

76. Critical Shear Stress in Single Crystals of Aluminum

"The Effect of the Mosaic Structure of Cast Single Aluminum Crystals on Its Critical Shear Stress," by D. Ye. Ovsienko and Ye. I. Sosnina, Institute of Metal Physics Sverdlovsk Fizika Metallov and Metallovedeniye, Vol 14, No 2, Aug 62, pp 252-258

In the study of the effect of the original internal structure of single crystals of pure aluminum on the critical shear stress of these crystals, it was shown that the critical shear stress increases linearly with increases angle of cell disorientation and proportionally with the square root of the cell size. This change in the critical stress is associated with the density of the dislocations and the elastic interaction between the mobile dislocations and the dislocations in the original structure. Thus the dislocations formed in the process of crystal growth play an important role in the process of plastic flow of the crystals.

77. Dislocation Climb in Silicon Crystals Containing Gold

"Edge Dislocation Climb in Silicon Under the Action of Gold," by L. S. Milevskiy, Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 9, Sep 62, pp 2447-2449

The climb of edge dislocations of opposite signs under the influence of dissolved gold was studied. It was shown that dislocations vacate these particles containing the second phase and climb in the direction of increasing size of extra atomic planes. This was accomplished with the use of microphotographs taken before and after application of stress which showed the old and new dislocation positions and their direction of climb.

78. Dislocation Strengthening by Accumulation

"Conditions of Dislocation Strengthening by Accumulation," by E. A. Grinberg, Institute of Metal Physics, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 9, Sep 62, pp 2591-2596

The condition of strengthening dislocations with impurity atoms which migrate to the dislocations were investigated. Dislocations are surrounded by elastic stress fields, and the stress fields of different

C-O-N-F-I-D-E-N-T-I-A-L

dislocations interact strongly and lock the dislocation into a metastable configuration. To determine the number of impurity atoms migrating to a dislocation, the Cottrell-Bilby age-hardening theory was used.

79. Domain Structure of Mn₅Ge₃ Intermetallic Compounds

"Domain Structure of Mn₅Ge₃ Intermetallic Compounds," by A. Vrzhetsiono, Ferromagnetics Laboratory, Physical Institute of the Polish Academy of Sciences, Poznan'; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 182-185

The domain structure of Mn₅Ge₃ compounds was studied by examining the crystal planes oriented from 0-90° to the horizontal axes of the crystals in the presence of an external magnetic field in order to evaluate the magnetic charge which accumulates and to determine its sign.

All the Mn₅Ge₃ samples except one were produced in a vacuum furnace or quartz ampule. The one sample was produced at the Institute of Magnetic Materials at Jena.

80. Electrical Conductivity of Metals With Vacancies

"Concerning the Electrical Conductivity of Metals With Vacancies," by S. I. Masharov, Ural State University imeni A. M. Gor'kiy; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 288-290

In a work (now being published), the author determined the frequency spectrum for the acoustic vibrations of a crystal containing a small number of vacancies. The present work uses data from the earlier report for calculating the electrical resistance of a crystal containing vacancies with respect to temperature. To accomplish the desired objective, a wave function for describing the thermal vibration of a crystal lattice with vacancies was used and the possible transformations of the electron-phonon interaction were calculated. These calculations were made for electron scattering with and without conservation of quasi-pulses, after which it was possible to determine the electrical resistance of a metal with vacancies by calculating the phonon and phonon-hole resistances, and consequently, to find the difference between change of resistance at high and low temperatures (numerical values for gold were used for lattice constants, Fermi energy, and Debye temperature of a pure metal).

Investigation of the change in resistance of a metal with vacancies led to the conclusion of the existence at low temperatures of two temperature intervals where the difference in the resistance increments due to thermal vibration of the disturbed structure in one interval is

positive, and in the other interval, negative. However, the changes in lattice structure surrounding vacancies, which are a function of temperature, were completely neglected and should be taken into consideration.

81. Formation of Dendrites in Aluminum Single Crystals

"Internal Structure of Single Crystals of Aluminum in Relation to Conditions of Crystallization," by G. B. Indenbaum and D. N. Popov, Krasnoyarsk Institute of Nonferrous Metals named M. I. Kalinin; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 205-211

Grown crystals of 99.994 and 99.96% aluminum were investigated and their crystal structure examined for different cooling rates employed. In most instances, the internal structure of these crystals showed dendritic structures formed, parallel to the direction of growth, especially for faster cooling rates. Naturally, the dendritic structure was more predominant in the samples of higher impurity content (99.96%). The size and extent of dendrites were concluded to be a function of the recrystallization temperature for the particular aluminum sample and the cooling rate.

82. Heat Capacity Measurements of Tungsten at High Temperatures

"Energy of Formation and Concentration of Vacancies in Tungsten," by Ya. A. Kraftmakher and P. G. Strelkov, Institute of Thermal Physics, Siberian Branch Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 8, 1962, pp 2271-2274

Energy of formation and concentration of vacancies in tungsten were determined by measuring its heat capacity at high temperatures, utilizing reliable data on temperature-resistance relationships for tungsten.

Tests were conducted on tungsten wire samples (0.03-0.05 mm dia.) annealed at 3,400 K. Heat capacity measurements were made in the range (2,000-3,600°K). A plot of the heat capacities at constant pressure and volume (C_p and C_v) versus temperature showed that C_p for tungsten rises exponentially above 2,400°K, while C_v remains constant up to 3,000 K, after which it remains constant with increasing temperature.

Energy of formation for tungsten in the temperature range (2,400-3,600°K) was calculated to be 72.5 kcal/g-atom, and vacancy concentration at 3,600°K was 2.7%.

83. Interaction of Edge Dislocations With Vacancies

"Interaction of Edge Dislocations With Vacancies in Silicon,"
by L. S. Milevskiy, Institute of Metallurgy imeni A. Baykov;
Leningrad, Fizika Tverdogo Tela, Vol 4, No 7, Jul 62,
pp 1878-1881

The interaction of edge dislocations of opposite signs with point-type defects was studied, and the question concerning the movement of dislocations with the absorption of excess vacancies is discussed.

Single crystals of silicon were elastically stressed and the movement of dislocations along the slip planes studied. Data on dislocation density necessary for full absorption of excess vacancies can be combined with information on dislocation climb to estimate the limiting solubility of vacancies at a temperature near the melting point of silicon.

84. Multiplication of Dislocations in the Surface Layers of LiF Crystals

"Dependence of the Strength of Fracture Whiskers to Size," by
P. G. Strelkov and A. A. Shpunt, Institute of Thermal Physics,
Siberian Branch, Academy of Sciences USSR; Leningrad, Fizika
Tverdogo Tela, Vol 4, No 3, Aug 62, pp 2258-2261

A study of the whiskers resulting from the compressive fracture of LiF crystals showed that the unusually high strength of these whiskers, which are equivalent to the high strengths of grown whiskers, is a result of development and multiplication of dislocations in the surface layers by mechanical interaction.

The positions of the dislocations and the dislocation densities in the crystals before and after stressing were studied by selective etching. The number of dislocations per cm^2 before stress was 10^7 and after fracture this number was 10^7 . In a crystal with a diameter of 4 microns, the dislocation density was found to be $10^8 (\text{cm}^2)^{-1}$.

In the case of a single whisker, it was assumed that the dislocations are uniformly distributed, and the number of these escaping the surface layer decreases with decreasing diameter. Therefore, it was concluded that a whisker with a diameter of one micron cannot contain any dislocations and, consequently, will possess the high strength predicted by theoretical calculations.

85. Specialized Computer Developed in Czechoslovakia

[Caption to photograph], Prague, Rude Pravo, 8 Feb 63,
p 1

The Institute of the Physics of Solid Materials (Ustav fyziky pevných látek) of the Czechoslovak Academy of Sciences, in Prague-Stresovice, has designed a specialized, single-purpose relay computer, the "Eliška I A," for performing calculations necessary for determining the breakdown of the crystalline structure of some solid materials, the caption states. An operator, identified as Assistant I. Hadinec, is shown beside the computer.

86. Studied of Dislocations in Iron at Low Temperatures

"Investigation of the Temperature Dependence of the Yield Point of Iron in Connection With the Interaction Between the Dislocations and Interstitial Atoms," by V. J. Sarrak and R. I. Entin, Institute of Metallography and Metal Physics and the Central Scientific-Research Institute of Ferrous Metallurgy imeni I. P. Bardin; Moscow, Doklady Akademii Nauk USSR, Vol 146, No 4, 1 Oct 62, pp 810-812

An investigation of the effect of temperature on the resistance to plastic deformation was conducted to study the role of interstitial atoms and the mechanism of their effect on the yield point of iron wire samples (one-mm diameter x 50 mm length) containing 0.042% C and 0.005% N. These were annealed at 1000°C, after which one batch of specimens was furnace cooled to 800°C and then air cooled, while the other batch was water quenched from 730°C. After straining, the specimens were aged (without removing from the tensile holders) in water at 60°C for one hour.

Testing was done by the method of reciprocal deformation at two temperatures. One batch of specimens was strained initially at -196°C to an arbitrary value and then strained to the yield point at -20°C. The other batch was strained initially at -20°C to the same arbitrary value and then to the yield point at -196°C. The differences in the strain values at the different temperatures ($\Delta\sigma$) showed that $\Delta\sigma$ decreases with increase of deformation.

The change in the resistance to deformation when increasing the temperature from -196 to -20°C is greater than for the opposite case. This was explained as a result strain hardening at -196°C.

C-O-N-F-I-D-E-N-T-I-A-L

The specimens aged at 60°C were found to be totally free of any strain from prior deformation; this was the result of the interaction of the dislocations and interstitial atoms in the iron. It was also proposed that at the outset of plastic deformation, the dislocations are partially freed from the atmosphere of impurity atoms. Hence further aging reduces the obstruction of dislocations. As increases to the value for unstrained iron and simultaneously increases ~~the resistance~~ toward brittle rupture.

It was concluded that the presence of interstitial atoms in the solid solution is not associated with dislocations and, consequently, does not show any noted effect on the strength at low temperatures. The upper yield point is the stress required to move the obstructed dislocations, and the lower Y. P. is the stress required to move the free dislocations. Therefore, the temperature relationships of the upper and lower yield points are essentially the same.

87. Study of the Slip Mechanism in a Plastically Deformed Metal

"Concerning the Structure of Slip Bands," by S. V. Zatsenin and V. Ye. Kochnev, Chelyabinsk Scientific-Research Institute of Metallurgy; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol. 14, No 5, Nov 62, pp 673-677

It has been established by electron-microscope research that the structure of slip bands of face-centered cubic metals in one of progressive action by simple shear. However, use of the electron microscope to study changes in the structure along the slip bands in unsatisfactory and dark-field metallography is required.

Kh20N80 Nichrome, which has a small elastic range, was used to study the slip mechanism. At 0.02% elongation, distinct slip bands were observed, while at 0.04-0.05% elongation traces of plastic deformation were observed in practically all the grains.

It was found that initially most of the slip occurs along the grain boundaries. This causes increased stress within the grains themselves, which leads to the initiation of twinning and an overall reduction in the strength of the metal.

New Electric Furnaces88. New Electric Furnaces in Operation in the USSR

"The OKB-850 High-Temperature Vacuum Electric Furnace for Sintering, Annealing, and Degassing Parts Made of Refractory Metals, Highly Refractory Oxides, Cermets, and Other Materials," by G. U. Dashevskaya; Moscow, Metallovedeniye i Termicheskaya Obrabotka Metalloy, No 11, Nov 62, p 49

An OKB-850-type high-temperature vacuum electric furnace, developed by VNIIEITO [Vsesoyuznyy Nauchno-Issledovatel'skiy Institut Elektrotérmicheskogo Oborudovaniya, All-Union Scientific-Research Institute of Electrothermal Equipment] and manufactured by the Moscow Electrothermal Equipment Plant, has been put into industrial operation.

This furnace is equipped with a cooling compartment. Loading and unloading of parts are fully mechanized. An elevator mechanism conveys the parts from the heating compartment to the cooling compartment and returns them without disrupting the vacuum.

Given below are the technical specifications for the OKB-850-type furnace:

Power (kw)	260
Voltage (v).....	29
Max Temp (°C).....	2200
Vacuum (mm Hg).....	5×10^{-4}
Charge wt (kg).....	300
Length of working area (mm).....	250
Height of working area (mm).....	600
Furnace wt (tons).....	9.5

"Vacuum Shaft Electric Furnace OKB-857," by G. U. Dashevskaya; Ibid., p 50

The OKB-857 -type electric furnace is designed for vacuum heat treatment of parts and pipes which oxidize very easily. This furnace consists of a preheating compartment and a heat-treating compartment. Parts are removed from pits and placed in a vacuum container for conveyance to the preheating compartment, where they are preheated to 1,100°C. Following the preheating compartment, the parts are treated at 1,450°C in the heat-treating compartment. Cooling is expedited in a container with argon gas and then air cooled.

C-O-N-F-I-D-E-N-T-I-A-L

VNIIEITO developed the OKB-857 furnace and the Moscow Electro-thermal Equipment Plant produced it. Technical specifications for the OKB-857/I-(preheating furnace) and the OKB-857/II-types (heat-treating furnace) are given below:

	<u>OKB-857/I</u>	<u>OKB-857/II</u>
Power (kw)	104	210
Voltage (v)	57.2	73.2
Operating temp (°C)	1100	1450
Vacuum (mm Hg)	10^{-4}	10^{-4}
Furnace diameter (mm)	300	300
Furnace height (mm)	5240	5240

"Vacuum Shaft Muffle Electric Furnace SKB-5097," by F. U. Dashevskaya; Ibid., p 51.

The SKB-5097 -type furnace was designed for diffusion degassing of long parts of high alloy steels and alloys in a vacuum or inert atmosphere. Regulation and control of the heat-treating process are automatic. The furnace was developed by VNIIEITO and manufactured by TsNIIIMash [Tsentral'nyy Nauchno-Issledovatel'skiy Institut Tekhnologii i Mashinostroyeniya, Central Scientific Research Institute for Heavy Machine Building]. Technical specifications for the SKB-5097-type furnace are:

Power	120
Operating temp (°C)	1,150
Furnace vacuum (mm Hg)	20
Muffle vacuum (mm Hg)	5×10^{-4}
Working areas (mm)	
Muffle diameter	100
Muffle height	1,000
Furnace diameter	300
Furnace height	2,000
Furnace weight (tons)	7.3

"Roller-Conveyer OKB-854A -Type Electric Furnace for the Heat Treatment of Stainless Pipe," by G. U. Dashevskaya; Ibid., p 51.

The first roller-conveyer electric furnace for heat treating stainless steel pipe in the Soviet Union has been put into operation at the Moscow Pipe Plant.

C-O-N-F-I-D-E-N-T-I-A-L

The OKB-854A -type furnace is fully mechanized and automated and equipped with a spraying device for quenching the pipe after heat treatment.

The furnace was developed by VNIIEFO and manufactured by the Moscow Electrothermal Equipment Plant. Working parts of the furnace were produced by the Buzuluk Machinery Plant.

Technical specifications for the OKB-854 -type furnace are:

Power (kw)	1,380
Voltage (v)	380, 185
Max operating temp (°C)	1,150
Max productivity (meters/hour)	2
Speed of moving pipe (meter/min)	0.14 - 1.77
Dimensions of operating area (mm)	1,200 x 23,940 x 370
Dimensions of furnace (mm)	8,390 x 45,000 x 4,350

Phase Studies

89. Heterogeneous Equilibrium in the Ge-In-Sb System

"Heterogeneous Equilibrium in the Ge-In-Sb System," by V. S. Zemskov, A. D. Such'ova, and B. G. Zhurkin, Institute of Metallurgy imeni A. A. Baykov; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 9, Sep 62, pp 1914-1918

Heterogeneous equilibrium in the crystallization of germanium from its indium and antimony alloys was investigated. It was shown that the quasi-binary section of germanium-indium antimonite does not possess all the properties of a binary system because it does not reflect the true equilibrium between the solid and liquid phases. It was also shown that the solubility of indium or antimony in germanium is very low if only one is present, while if they are both present the solubility of both elements is increased.

90. Iron-Germanium Alloys Studied

"Phase Components of the Iron-Germanium System," by A. K. Shtol'tz and P. V. Gel'd, Ural Polytechnic Institute; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 11, Nov 62, pp 2400-2405

X-ray and metallographic studies of phase components in the iron-germanium system show that phase diagrams ordinarily used are of little reliability. It was shown that the higher iron-germanide $FeGe_2$ has an appreciable area of homogeneous existence. It was also shown that iron forms the compound $Fe_{1-X}Ge_X$, where X is greater than 0 but less than 0.3. This compound has not been described previously and is structurally similar to $Kn_{3.25}Ge$. The solubility of germanium in alpha-Fe approaches 16.13 percent at 1,000°C. The formation of a solid solution is accompanied by a considerable increase in the parameter of the body-centered lattice for iron.

91. Phase Diagram Studies of the Os-Ru, Os-Re, and Pd-Ir Systems

"Constitution Diagram of the Osmium-Ruthenium System," by M. A. Tylkina, V. P. Polyakova, and Ye. M. Savitskiy; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 6, Jun 62, pp 1467-1468

The first constitution diagram for the osmium-ruthenium system was constructed. Powdered osmium and ruthenium (99.8% pure) were separately pressed into tablets and sintered in a vacuum. Alloys were made by melting in an electric-arc furnace with a nonconsumable electrode in a water-cooled copper hearth at a helium pressure of 200-250 mm Hg. Hardness tests and phase analyses were made on samples in the as-cast and annealed conditions. The as-cast alloys had a dendritic structure throughout the entire diagram, whereas the annealed specimens (2,000°C for one hour, 1,000°C for 500 hours) had the polyhedral microstructure typical of solid solutions. Some grain growth was experienced by those alloys annealed at the longer periods.

"Constitution Diagram of the Osmium-Rhenium System," by M. A. Tylkina, V. P. Polyakova, and Ye. M. Savitskiy; *ibid.*, pp 1469-1470

The first constitution diagram for the osmium-rhenium system was constructed. Alloys were prepared under the same conditions and tested in the same manner as given for the osmium-ruthenium system. Alloys of this system form a continuous series of solid solutions. No dendritic structures were noted in the as-cast samples.

"Constitution Diagram of the Palladium-Iridium System," by M. A. Tylkina, V. P. Polyakova, and Ye. M. Savitskiy; *ibid.*, pp 1471-1473

The first constitution diagram for the palladium-iridium system was constructed. Preparation of the briquettes was conducted in the same manner as for the osmium-ruthenium system described above. Melting was done by two methods: (1) alloys for the entire concentration range were melted in an induction furnace in corundum crucibles under a layer of borax and (2) alloys containing 40-80% iridium were melted in the same manner as for osmium-ruthenium alloys described above. Various heat treatments were conducted prior to testing and analysis.

This particular system was found to be a peritectic type with two limited solid solutions. The peritectic reaction occurs at 1,760± 25°C at approximately 40% iridium.

92. Phase Transformation of Cerium at High Pressures

"Phase Diagram for Cerium in the Range 20-350 C Up to a Pressure of 80,000 kg/cm²," by L. D. Livshits, Yu. S. Genshaft, and V. K. Markov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1262-1267

The diagram for the gamma-alpha phase transformation was extended to 350 C. It was found that the boundary between these two phases in the region of 200 C deviates nonlinearly toward the temperature axis, and it was established that the relative variation of resistance in the transformation retains a finite magnitude up to 350 C but diminishes with increasing temperature above 170-180 C, thus making it impossible to extrapolate to zero. Therefore, the data obtained did not confirm the existence of a critical point up to 350 C, and the existence of such a point is very doubtful. There was confirmed the existence of minimum and maximum values on the resistance-pressure curve at pressures slightly higher than 50,000 and 70,000 kg/cm², respectively.

Special Processes93. Extra-Fine Cadmium Oxide From Electrolytic Cadmium

"Electrolytic Method of Producing Highly Dispersed Cadmium Oxide," by D. N. Grytsan, Scientific-Research Institute of Chemistry, Khar'kov State University; Kiev, Khimichna Promyslovist', No 4, Oct-Dec 62, pp 12-13

A new process for obtaining highly dispersed cadmium oxide based on oxidation of the cadmium powder produced by electrolysis of a nitrate solution is described. It is claimed that the cadmium powder from electrolysis, which contains 50% cadmium oxide after washing and drying, can be completely transformed into the oxide by heating in air at 500-600 C for 30 min. The new process is said to be less complicated and cheaper and results in a product of higher purity and finer particle size (83% of 0-6 micron size as compared to 63%) than that now produced by the chemical industry.

94. Growing Single-Crystal Films of Germanium

"Semiconductor Films"; Riga, Sovetskaya Latvija, 31 Dec 62, p 4

"Thin single crystal films of germanium can be grown directly on a metallic base -- this is the conclusion derived by research men of the Laboratory of Semiconductor Physics, the Latvian State University ineni

C-O-N-F-I-D-E-N-T-I-A-L

P. Stuchki. In the opinion of these specialists, encouraging results have been achieved which point the way to simplification of the manufacture of semiconductorized instruments.

"The present technology, as is well known, is connected with tedious manual labor and does not lend to complete automation. Germanium ingots, which are 'cured' in special furnaces, are subjected to cutting, grinding, etching, and polishing before they are transformed into fine crystals which are brazed to metallic electrodes. Improving this process is a task which promises remarkable possibilities.

"The semiconductor film is grown directly on the metal with the aid of an electron beam in a vacuum. Such a beam, obtained from an 'electron gun,' heats up a layer of germanium, creating physical conditions for the formation of a single crystal. Experiments are continuing. An expanded program of research in this field is planned."

95. Iron Powder by a Fluidized Bed Method

"Metal, Born of Hydrogen..."; Dushanbe, Kommunist Tadzhikistana, 3 Jan 63, p 2

"... A method of making iron powder in a fluidized bed reactor was experimentally tested in a laboratory of the Central Scientific-Research Institute of Ferrous Metallurgy imeni I. P. Bardin.

"The reactor consists of a tube made of stainless steel containing a screen within. On this screen is placed a layer of fine ore and rolling-mill scale. Then preheated hydrogen is fed under high pressure. The ore particles 'boil,' and the ferric oxide is reduced to a metallic powder.

"The metal which is recovered with hydrogen does not contain such impurities as phosphorus, sulfur, or carbon. Also, the reactor, which operates at low temperature, does not require expensive refractory materials and can be used for a long time. This process for making iron powder can be fully mechanized.

"This system for producing metal from oxides in a fluidized bed reactor was used by the Dnepropetrovsk institute 'Ukrgiprometz' [Ukrainskiy Gosudarstvennyy Institut Proyektirovaniya Metallurgicheskikh Zavodov, Ukrainian State Institute for the Design and Planning of Metallurgical Plants] in developing the plans of a pilot plant installation for production of iron powder."

96. Moscow Scientist Reportedly Doubles or Triples Steel Strength Through Magnetism

Bonn, Die Wirtschaft des Ostblocks, 9 Jan 63, p 4

According to a Soviet announcement, a Moscow scientist named Bernsh-teyn is said to have succeeded in doubling and even tripling the tensile strength of steel by a new process based on the fact that it [steel] in a magnetic field changes its size slightly as the field varies. Bernsh-teyn is said to have placed steel into a magnetic field of several thousand oersteds thereby putting the steel grains into motion in such a way that they pulverize each other. Machines made of the steel produced by the Bernsh-teyn process are said to be lighter in weight and to have better elastic properties.

97. Rolling Stainless- and Nickel-Clad Sheet

"At the Ukrainian Scientific-Research Institute of Metals -- Development and Testing of a Technology for Manufacturing Clad Sheet (jointly with the Kommunarsk Metallurgical Plant and the Central Scientific-Research Institute of Ferrous Metallurgy)," by V. I. Dorokhov; Moscow, Stal', No 12, Dec 62, p 1106

"Inserts are placed around the perimeter of a pack consisting of a steel-slab base layer and a plate of cladding metal, and then a dense, gas-tight seam is deposited by electric welding so that the internal surfaces will not oxidize and the pack can be rolled without separating.

"Rolled steel slabs for the base layer are milled on one side. Trimmed plates of the cladding steel are nickel-plated on the face side. A refractory dividing layer is deposited between the plate pairs to prevent them from welding together. After rolling, the plates are heat treated and cut into sheets of prescribed dimensions. Next, the sheets are pickled and the surfaces dressed.

"Two-layer sheets made of low-carbon steel with a cladding layer of stainless steel 1Kh18N9T and NP-2 grade nickel were manufactured in accordance with the technology developed. Dimensions of the sheet were (6-35) x (1,200-1,700) x 4,000-10,000) mm (acceptable).

"Properties of the sheet produced met the requirements of technical specifications. The shear resistance, which characterizes the weld condition of the layers, was 16.5-30 kg/mm² (specifications call for 15 kg/mm²).

C-O-N-F-I-D-E-N-T-I-A-L

"In the pack method, as opposed to the cast method of cladding, preliminary preparations are performed outside of the main metallurgical line of the plant. Rolling and all subsequent technological operations proceed without complications (as with ordinary metal) and without decreasing the productivity of the mill and other rolling equipment. A high-grade surface is obtained (in accordance with GOST 5520-50). Pickling and dressing of the surfaces is accomplished with more facility than in the case of the two-layer steel produced by cast cladding.

"Construction of a pack shop has begun at the plant."

98. Vacuum Condensation of Zinc and Cadmium

"Position of the Triple Point and Its Effect on the Condensation of Metals in a Vacuum Plus Some Properties of Zinc and Cadmium Condensates," by L. S. Palatnik and N. T. Gladkikh, Khar'kov State University imeni A. M. Gor'kiy; Leningrad, Fizika Tverdogo Tela, Vol 4, No 8, 1962, pp 2227-2232

Vacuum condensation of zinc and cadmium on a condensing plate with a temperature gradient of 20-300°C at the rate of 10^{-4} to 10^{-8} g/cm²-sec was investigated. Eighteen metals, including Zn, Cd, Bi, Pb, and Sn, were investigated and the results for zinc and cadmium reported.

It was established that the formation of Zn and Cd condensates is a sublimation process within certain temperature intervals (20-2700°C for Zn, 20-200°C for Cd) at the given condensation rate.

Determination of the critical condensation (sublimation) temperatures and subsequent location of the triple point on the P-T diagrams for Zn and Cd was made by studying the crystals formed on the condensing plate. Three crystal microstructures were noted corresponding to three temperature regions of the P-T diagram. Analysis of these structures showed a distinct difference in crystal size, orientation, and physical appearance (luster, color, etc). Boundaries between the three regions, which were not distinct, were able to be determined by the sharp increase in microhardness with increasing temperature at these boundaries.

99. Zone Refining of Aluminum and Lead

"Zone Refining of Aluminum and Lead," by B. N. Aleksandrov and I. G. D'yakov; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 2, Aug 62, pp 267-270

Zone refining of aluminum and lead was conducted to determine the minimum number of meltings required to obtain maximum purity.

C-O-N-F-I-D-E-N-T-I-A-L

The refining process was carried out in resistance furnaces. Lead was refined in a vacuum (0.1 mm Hg) and aluminum, in an atmosphere of helium. Rates of travel of the liquid zones were 10 mm/hr for aluminum and 25 mm/hr for lead.

Purity of the refined metals was measured by measuring the specific resistance with respect to the refined end of the ingot. The value of the specific resistance for aluminum were small and constant for the first 300 mm of a 600-mm ingot. From the 300-mm mark, the change in resistance increases sharply, noting an increase in impurity content. These measurements were made on an aluminum ingot recrystallized 16 times. A lead ingot required 85 recrystallizations before the specific resistance-length curve took on the same character as the curve for aluminum.

In this investigation, purity of the metals was defined as the ratio of the resistance of the metal at 4.2°K to the resistance at 293°K. For aluminum $R_{4.2}/R_{293} = 3.4 \times 10^{-5}$, and for lead, this ratio was 6.2×10^{-5} .

100. Zone Refining of Bismuth

"Production of Pure Bismuth," by B. N. Aleksandrov; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 5, Nov 62, pp 733-736

A means of producing pure bismuth (99.999%) by a simpler and less expensive process was investigated. The optimum process described consists of three operations: (1) preheating and melting at 1,000°C for 4 hours, (2) vacuum distillation at 950-1050°C for 2-6 hours, and (3) zone refining at a rate of 25 mm/hr in 60 passes. The refining process was expedited by using five resistance furnaces, thereby giving five liquid zones simultaneously and reducing the refining time by 80%.

This process produced bismuth with a purity of above 99.999%, as determined by the resistance ratio: $R_{4.20K}/R_{293.40K} = 2 \times 10^{-3}$.

WELDING

101. Stress Relieving Welded Seams of OT4-1 Titanium Alloy

"Relieving Residual Welding Stresses in Thin-Sheet Elements Made of Titanium Alloys," by S. A. Kurkin, Candidate of Technical Sciences, and Engr Guan' Tsao, Moscow Higher Technical School imeni Bauman; Moscow, Svarochnoye Proizvodstvo, No 10, Oct 62, pp 1-5

Results of investigations are given on the use of rolling and heat treatment for relieving residual welding stresses as a means of preventing possible fracture in welded joints of titanium alloys. Data are given on measurements of these stresses in alloy OT4-1 and for establishing the optimum conditions for rolling and the general rules of heat treatment.

102. Weldability of Stainless Steel Strip

"Welding of Stainless Steel Strip in the Rolling Industry," by Engr I. G. Gorin, Moscow Serp I Molot Plant; Moscow, Svarochnoye Proizvodstvo, No 10, Oct 62, pp 28-30

Results of tests conducted on the weldability and rollability of welded stainless steel strip are given. The mechanical properties (tensile strength, impact strength, and ductility) of the welded specimens are compared to those properties of whole specimens. Welding methods, heat treating, and other factors involved in the improvement of mechanical properties of welded joints are discussed.

The 22 grades of stainless tested were: EYa-2, EI steels -100, -400, -417, -435, -602, -629, -702, -703, -811, -835, -868, -898, -904, and -925, EP grades -168, -169, and -225, Kh17, N65, and EI-654.

Steels Eya-2, EI-100, and EI-629 were subjected to corrosion tests according to GOST 6032-58 [No data are given].

103. Welded Joints of Alloys OT4-1 and VT5-1

"Mechanical Properties of Welded Joints of Titanium Alloys OT4-1, and VT5-1," by Engr I. F. Kobylanskiy and Technician V. D. Peshekhonov; Moscow, Svarochnoye Proizvodstvo, No 10, Oct 62, pp 12-14

C-O-N-F-I-D-E-N-T-I-A-L

Tables are given for the mechanical properties of titanium alloys OT4-1, VT5-1, and VT1 and for mechanical properties of welded joints of OT4-1 and VT5-1 prepared by automatic and manual argon-arc (with or without filler), spot, and roller welding in the temperature interval of 20-800°C.

A minimum amount of pores was observed in joints automatically welded by an argon-arc without filler and a maximum of pores in manual argon-arc welds. Porosity of the welds was established to depend on the purity of the parent and filler materials, amount of filler wire, and the method and conditions of welding.

In the specified temperature interval, the strength of the welded joints is equivalent to that of alloy OT4-1, and the ductility bending is greater than that of VT5-1.

104. Welding Problems Laboratory at the Dushanbe Polytechnic Institute

"New Scientific Center"; Dushanbe, Kommunist Tadzhikistana,
30 Oct 62, p 3

A welding problems laboratory has been set up at the Dushanbe Polytechnic Institute by the institute, jointly with the Tadzhikistan Sovnarkhoz. Purpose of this laboratory is to develop, perfect, and put into production new welding methods, processes, and equipment with the goal of increasing productivity and decreasing consumption of costly nonferrous metals and high-quality alloy steels. Special attention is being given to the new methods of welding by ultrasound, electron beam, and plasma arc and to the programming of automatic welding devices.

105. Welding Titanium in an Enclosed Argon-Filled Fabric Chamber

"A 'Soft' Chamber for Welding Titanium and Its Alloys," by
Engr L. M. Berson; Moscow, Svarochnoye Proizvodstvo, No 10,
Oct 62, pp 36-38

The design and operating procedures for an inflatable balloon-cloth welding chamber are described. The chamber is inflated with argon until all the air is forced out. The air-argon exhaust valve is closed and the argon-recycling valve is opened. Flow of argon is automatically controlled by relays connected to the power source.

It is claimed that introduction of this chamber will, in addition to giving better welded joints, reduce the consumption of argon. It is easy to operate and transport and quite suitable for use in welding laboratories.

MISCELLANEOUS106. Effect of Ultrasound on Hardening of Steel

"On the Question of Hardening Steel in an Ultrasonic Field," by G. V. Zemskov, R. L. Kogan, Ye. V. Smekh, V. L. Zdanovich, L. K. Gushchin, and A. V. Kostenko, Nauchnyye Zapiski, Odesskiy Politekhnicheskiy Institut (Scientific Reports, The Odessa Polytechnic Institute), Vol 37, 1962, pp 41-44 (from Referativnyy Zhurnal--Avtomatika i Radioelektronika, No 11, Nov 62, 11-5-33 ts)

A study was made of the influence of ultrasonic vibrations in a quenching medium (oil or water) on the hardening process of U8 and 12KhF steels (specimen diameter 20 millimeters). Vibrations at a frequency of 23 kilocycles per second were produced in the bath and sustained by a permendur vibrator with a radiating surface of 40 square centimeters. The intensity of the vibrations, according to acoustic probe measurements, ranged from one to 2 watts per square centimeter. It was found that the hardenability and hardness of the U8 steel, quenched in oil, increased as a result of the ultrasonic effect and the hardness near the surface of the specimen increased from 37-42 (R_C), without the ultrasonic treatment, to 54-60 (R_C). No appreciable increase of hardness was observed, however, when the specimens were quenched in water.

In case of the 12KhF steel, no appreciable effect of ultrasonic exposure during quenching was detected, but after a threefold tempering (at 510-530 degrees centigrade), the hardness of specimens exposed to ultrasonic vibrations was higher ($R_C = 56$, as against $R_C = 52$) than that of the unexposed.

107. Elastic Properties of Titanium-Aluminum Alloys

"Elastic Properties of Titanium-Aluminum Alloys," by S. G. Fedotov, T. T. Nartova, and Ye. P. Sinodova, Institute of Metallurgy imeni A. A. Baykov; Moscow, Doklady Akademii Nauk USSR, Vol 146, No 6, 21 Oct 62, pp 1377-1379

Purpose of this investigation was to study the effect of aluminum on the elastic properties of Ti-Al alloys in the range of 0-40% Al.

TGOO-grade sponge titanium and AB000-grade aluminum were melted in an arc furnace with a nonconsumable tungsten electrode. Alloys containing up to 12% Al were made from forged blanks and the rest from blanks cast under an argon atmosphere.

C-O-N-F-I-D-E-N-T-I-A-L

The curves for modulus of elasticity and shear modulus showed that with increased aluminum content up to 9% Al, there is a gradual increase in moduli values. A sharp increase was noted between 9-10% Al, suggesting the possible formation to Ti_2Al . The curve continues to rise up to 16% Al, where the compound Ti_3Al is formed. After this, the moduli values drop off until the transformation occurs and there is a continuous sharp rise in values throughout the remaining portion of the phase diagram studied.

At 16% Al, the modulus of elasticity value was 15,700 kg/mm², and at 40% Al, this value was almost 20,000 kg/mm².

Which of these alloys is best suited for use as high-strength and heat-resistant alloys claimed to be unknown at present, and other properties will have to be investigated to form definite conclusions. The high modulus of elasticity for these alloys at 40% Al is very desirable, but a look at the density of the alloys over the investigated range showed that from a density of 4.5 g/cm³ for pure titanium, the density decreases almost linearly to a value of 3.8 at 40% Al.

108. High-Temperature Creep Testing of Copper-Nickel Alloys

"Mechanical Properties of Copper-Nickel Alloys at Elevated Temperatures," by B. Ya. Pines and I. G. Ivanov, Khar'kov State University imeni A. M. Gor'kiy; Leningrad, Fizika Tverdogo Tela, Vol 4, No 8, Aug 62, pp 2109-2115

Results are given for experiments conducted on copper-nickel alloys at elevated temperatures and applied stresses in order to gain some knowledge of such processes as self-diffusion, dislocation movement, and the relationships between creep rate, stress, and composition.

The prime objective of the tests was to achieve a minimum creep rate, i.e., combinations of temperature and stress at which creep would be initiated. Both as-cast and vacuum-melted alloys, some of which were rolled and/or annealed, were tested at temperatures from 700° to 1150°C with applied stresses ranging from 400 to 1100 g/mm².

(No specific conclusions are stated.) Frenkel's self-diffusion theory, Cottrell's "atmosphere of impurity atoms," and the effects of vaporization, formation of pits, and other defects at high temperatures are discussed.

109. New Milling Tool Invented at the Leningrad Kirov Plant

"A New Milling Tool"; Moscow, Ekonomicheskaya Gazeta, No 28,
24 Nov 62, p 32

A group of inventors at the Leningrad Kirov Plant, headed by V. Ya. Karasev, have invented a new spiral-shaped milling tool with irregularly spaced cutting edges. This new tool differs from existing tools in that the slope angle of the cutting teeth is 24° or greater and the chip groove was designed so as to obtain maximum strength of the teeth. These features reduce the vibrations caused by the cutting forces and ensure a smoothly milled surface. Reduction of vibrations reduces the chances of breakdown, and the large size of the cutting edges makes it possible to resharpen the tool many, many times.

An author's certificate was given for this new tool which it is claimed will save the plant 54,636 rubles annually, to V. Karasev, A. Shtukaturov, N. Romanov, L. Shekhtman, P. Fomenkov, A. Moksakov, P. Bykov, A. Mitrofanov, Ye. Savich, and N. Nazarenko.

110. Strengthening of Steels by Cold Working at Cryogenic Temperatures

"Heat and Mechanical Treatment of Austenitic Steels," by
V. I. Grigorkin, Siberian Metallurgical Institute imeni
S. Ordzhonikidze; Sverdlovsk, Fizika Metallov i
Metallovedeniye, Vol 14, No 2, Aug 62, pp 212-217

Austenitic stainless steel 1Kh18N9T and manganese steel 120G13 were investigated to find a process which would increase the strength of the two steels. Combinations of dynamic and static compression at various temperatures and agings were tested. Results of the tests showed that the process best suited for these steels were: 1Kh18N9T -- cold worked at -196°C , aged for 12 hours at 400°C , and 120G13 -- cold worked at 20°C , aged at $180-200^\circ\text{C}$ for 12 hours.

With these operations, the strength of 1Kh18N9T is increased (over the next best thermal-mechanical treatment) from 187 to 203 kg/mm², and steel 120G13, from 276.5 to 325.7 kg/mm². In both steels no ductility was lost at the expense of increased strength.

111. Stress Concentration Studies of Alloy EI-437B

"Susceptibility of Alloy EI-437B to Stress Concentrations During Long-Time Tensile Testing," by Engrs V. P. Dubinin and G. S. Pisarenko, Institute of Powder Metallurgy and Special Alloys, Academy of Sciences Ukrainian SSR; Kiev, Mashinostroyeniye, No 6, Nov/Dec 62, pp 90-92

In the selection of materials to be used in the production of parts which will be subjected to high temperatures and continuous stress, a thorough study of stress-concentration susceptibility is required, especially in the development of new, large stream and gas turbines. For this purpose, EI-437B, an austenitic class alloy used for manufacturing turbine blades and discs, was subjected to long-time tensile tests.

Prior to testing, the alloy was heat treated at 1080°C for 8 hours, air cooled, aged at 750°C for 10 hours, and air cooled. Mechanical properties of the alloy after heat treatment were:

Tensile strength (kg/mm ²)	87.3
Elongation (%)	10.3
Reduction in area (%)	11.2
Brinell hardness	302

Alloy specimens were notched to depths of one, 2, and 3 mm and stressed for 300 hours at 830°C. In all cases, the notched specimens showed a greater long-time tensile strength than the smooth specimens, thus signifying a degree of unsusceptibility to concentrated stresses. [Chemical composition, specimen and notch dimensions are given in text.]

112. Study of Rare-Earth Silicides

"Chemistry of Rare-Earth-Metal Silicides," by G. V. Samsonov, Institute of Powder Metallurgy and Special Alloys, Academy of Sciences Ukrainian SSR; Moscow, Uspekhi Khimii, Vol 31, No 12, Dec 62, pp 1478-1495

In the search for high temperature materials with special physical and chemical properties, much attention is being given to the study of rare-earth silicides. This report discusses the crystal structure and properties, methods of production, and uses of rare-earth silicides.

The basic methods of obtaining rare-earth silicides are similar to those for borides and can be subdivided into three groups: (1) direct production of a fused or sintered silicide, (2) reduction of the rare-earth oxide with silicon, and (3) electrolysis of molten media containing rare-earth metals and silicon.

Those rare-earth silicides which are extremely heat-resistant and have a high nuclear cross section can be used as a material for the various neutron-adsorbing elements in nuclear-power engineering, and there are many prospects for their application in the field of semi-conductors.

113. Technical Advances in Uranium and Rare-Metal Extraction Equipment

"Extractors for the Recovery of Uranium and Rare Metals From Aqueous Solutions," by B. N. Laskorin, I. A. Yakubovich, G. P. Zuyev, V. G. Krasov, V. F. Smirnov, and V. Ye. Pivovarov; Moscow, Atomnaya Energiya, Vol 12, No 6, Jun 62, pp 503-513

Advances in the development and possible small-scale operation of mixer-settler type extractors for the recovery of uranium and rare metals from aqueous solutions were discussed. Extraction processes, design, and test results were compared to present-day mechanical and aereated mixers. Durability, ease of maintenance, high efficiency, and possibilities of further improvements were also discussed.

It is concluded that the development of these extractors will lead to the invention and industrial use of more complex, but considerably more efficient, ultrasonic and centrifugal extractors.

114. Thermal E.M.F. and Electroconductivity of V_2O_5 and Nb_2O_5

"Thermal E.M.F. and Electrical Conductivity of Vanadium and Niobium Pentoxides," by A. I. Manakov, O. A. Yesin, and B. M. Lepinskikh, Urals Polytechnic Institute, Urals Affiliate Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 12, Dec 62, pp 2734-2740

The electroconductivity and thermal E.M.F. of V_2O_5 and Nb_2O_5 in the solid and liquid state were measured and Hall's constant for V_2O_5 determined. These particular oxides are impurity semiconductors in the solid state and natural semiconductors in the liquid state.

The width of the forbidden zones increases with increased ionic electrostatic interaction. The activation energies and number of current carriers were calculated.

Based on the values for the thermal E.M.F. and Hall's constant, it was concluded that V_2O_5 in the liquid state belongs to the type of semiconductors for which the mobilities of the vacancies are greater than that of the electrons.

115. Thermodynamic Properties of Indium Tellurides

"Investigation of the Thermodynamic Properties of Indium Tellurides," by Ya. I. Gerasimov, Corresponding Member Academy of Sciences USSR; A. S. Abbasov; and A. V. Nikol'skaya, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk USSR, Vol 147, No 4, 1 Dec 62, pp 835-838

An investigation was made of the thermodynamic properties of indium tellurides as noted in phase diagram studies. Four telluride compounds were found to exist in this system: InTe , In_2Te , In_2Te_3 , and In_2Te_5 . In the study of the reactions which occur in the formation of these compounds, it was noted that a number of the tellurides are characterized by a comparatively low heat of formation.

From the data of the experiment lattice parameters of the telluride crystals were determined and calculations were made for changes in e.m.f. potential, enthalpy, and entropy.

116. Thermodynamic Studies of Some Rare-Earth Metal Chlorides

"Saturation Vapor Pressure of Trivalent Lanthanum, Cerium, Praseodymium, and Neodymium Chlorides," by G. I. Novikov and A. K. Bayev, Leningrad State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 6, Jun 62, pp 1349-1352

The saturation vapor pressure and boiling points of La, Ce, Pr, and Nd chlorides were measured in the temperature intervals 1124-1220°, 1093-1224°, 1041-1192°, and 962-1194°C, respectively. From the data obtained, enthalpy and entropy of evaporation, enthalpy of sublimation, and entropy of melting and sublimation were calculated. Boiling points of the above mentioned chlorides were found to be 846, 807, 781, and 750°C, respectively.

117. Ultrasonics for Sharpening High-Speed Tools

"On the Influence of Ultrasonic Oscillations on the Process of Cutting Heat-Resistant Alloys," by A. I. Markov, Kuybyshev, Promyshlennoye Primeneniye UL'trazvuka. Kuybyshevskiy Aviatsionnyy Institut (Industrial Use of Ultrasonics. The Kuybyshev Aviation Institute -- a collection of articles), 1961, pp 84-96 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 10, 1962, Abstract No 10-5-44 t)

A brief survey is given of work done on the use of ultrasonics to improve the productivity of machining of difficult materials, particularly heat-resistant steels. The effect of the forced ultrasonic oscillations was studied in two operations, the sharpening of heat-resistant steels and the grinding of refractory alloys and high-speed tools. A magnetostriction-type vibrator and GUZ-5P generator were used to produce the ultrasonic vibrations at frequencies of 13-30 kilocycles per second and maximum output power of about 3.5 kilowatts.

It was found that the effect of the ultrasonics is complex and, depending on the intensity, can have either a positive or negative result.

For the sharpening of a heat-resistant steel, the characteristics of the oscillatory process were established which will guarantee increased strength of the high-speed tools by a factor of 4-10. In all cases where high-frequency, but low-amplitude, oscillations were used, the effect on the grinding of tools was evident. The strength of cutting tools of R-18 steel and the alloy VK8 were increased by a factor of three to eight.

CONFERENCES118. Conference on Aluminum Scheduled in Hungary

"Metallurgical Highlights"; Brno, Slevarenstvi, No 12, Dec 62, p 508

On 9-11 May 1963, a conference will be held in Budapest and Szekesfehervar, at which will be reported the theoretical and practical findings of producers of aluminum and of semifinished aluminum alloy products and (of personnel in the aluminum) processing industry. Various plants and aluminum foundries will be visited in the course of the conference. Suggestions for lectures to be presented at the conference are to be submitted to: Orszagos Magyar Banyaszati Es Kohaszati

C-O-N-F-I-D-E-N-T-I-A-L

Egyesulet, Budapest, V., Szabadsag ter 17. III. em. 307; any further information on the conference may also be obtained at this address. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the State Publishing House for Technical Literature, Prague, 1962)

119. Recent Soviet Conferences on Chemistry and Metallurgy

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. Unless otherwise noted, it is assumed that there was no non-Soviet participation in the conferences.

a. 16th All-Union Hydrochemical Conference; May 1962, Novochoerkassek. (Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 690)

b. Second All-Union Conference on the Problem of Fracture Reservoirs; 23-27 October 1962, Groznyy; sponsored by the Groznyy Scientific-Research Petroleum Institute and the Administration of the Petroleum Production and Gas Industry of the Checheno-Ingushskiy Sovnarkhoz; third conference to be held in L'vov in 1964. (Geologiya Nefti i Gaza, No 1, Jan 63, p 64)

c. Fourth Scientific-Technical Conference on Problems of the Chemistry and Technology of Caoutchouc and Rubber; 30 May-1 June 1962, Yaroslavl'; sponsored by the Yaroslavl' Oblast Board of the All-Union Chemical Society imeni Mendeleev, the Central Bureau of Technical Information of the Yaroslavl' Sovnarkhoz, and the Yaroslavl' Technological Institute. (Kauchuk i Rezina, No 12, Dec 62, p 48)

d. Scientific-Technical Conference on Mechanization of the Production of Molded Rubber Parts; 24-26 July 1962, Sverdlovsk; sponsored by the Administration of Tires and Technical Rubber Products of the State Committee of the Council of Ministers USSR on Chemistry, the Scientific-Research Institute of the Rubber Industry, the Sverdlovsk Sovnarkhoz, the Sverdlovsk Technical Rubber Products Plant, and the Rubber Section of the Central Board and Sverdlovsk Branch of the All-Union Chemical Society imeni Mendeleev. (Kauchuk i Rezina, No 12, Dec 62, p 53)

e. All-Union Conference on Pigments for the Paint and Varnish Industry; April 1962, Leningrad; sponsored by the Central and Leningrad Oblast Boards of the All-Union Chemical Society imeni D. I. Mendeleev and the State Committee of the Council of Ministers USSR on Chemistry. (Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 684.)

C-O-N-F-I-D-E-N-T-I-A-L

f. Scientific-Technical Conference on "Progressive Methods of Heating Metals Before Forging and Stamping and the Rational Design of Heating Equipment"; February 1962, Moscow (announcement); sponsored by the Moscow House of Scientific-Technical Propaganda imeni F. E. Dzerzhinskiy, the Moscow City Scientific-Technical Society of the Machine Building Industry, the Central Bureau of Technical Information of the Moscow City Sovnarkhoz, and the Exhibition of the Achievements of the National Economy of the USSR. (Kuznechno-Shtampovochnoye Proizvodstvo, No 12, Dec 62, back cover)

g. Kazakh Republic Conference of Welders; 5-7 September 1962, Alma-Ata; sponsored by the State Committee of the Council of Ministers Kazakh SSR for the Coordination of Scientific Research Work, the Kazakh Sovnarkhoz, and the Republic Council of Scientific-Technical Societies of the Kazakh SSR. (Svarochnoye Proizvodstvo, No 1, Jan 63, p 44)

h. Thematic Conference on Welding in a Steam Medium; 18-19 September 1962, Kramatorsk; sponsored by the Coordination Council on Welding. (Svarochnoye Proizvodstvo, No 1, Jan 63, p 45)

i. Third Conference on the Chemization of Agriculture of the Orenburg Oblast; end of March 1962, Orenburg; sponsored by the Orenburg Board of the All-Union Chemical Society imeni D. I. Mendeleev, the Orenburg Agricultural Institute, and the Orenburg Oblast Board of the Scientific-Technical Agricultural Society. (Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleeva, Vol 7, No 6, 1962, p 687)

* * *

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,



Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)



Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0335308	78-03117A	194	1	23	4363	Scientific Information Report Chemistry And Metallurgy (26)	3/7/1963	71	Approved For Release	3/25/2004
AD0335625	78-03117A	197	1	3	4460	Scientific Information Report Chemistry And Metallurgy (27)	4/4/1963	51	Approved For Release	3/25/2004
AD0336825	78-03117A	199	1	26	4562	Scientific Information Report Chemistry And Metallurgy (28)	5/9/1963	70	Approved For Release	3/25/2004
AD0332150	78-03117A	183	1	5	3916	Scientific Information Report Chinese Science (11)	10/4/1962	52	Approved For Release	3/29/2004
AD0332434	78-03117A	183	1	40	3951	Scientific Information Report Chinese Science (12)	10/19/1962	59	Approved For Release	3/29/2004
AD0332795	78-03117A	184	1	37	3988	Scientific Information Report Chinese Science (13)	11/5/1962	48	Approved For Release	3/29/2004
AD0333069	78-03117A	186	1	7	4028	Scientific Information Report Chinese Science (14)	11/16/1962	30	Approved For Release	3/29/2004
AD0333148	78-03117A	187	1	19	4078	Scientific Information Report Chinese Science (15)	11/29/1962	44	Approved For Release	3/29/2004
AD0333835	78-03117A	189	1	6	4144	Scientific Information Report Chinese Science (16)	12/21/1962	65	Approved For Release	3/29/2004
AD0334108	78-03117A	190	1	2	4179	Scientific Information Report Chinese Science (17)	1/10/1963	56	Approved For Release	3/29/2004
AD0334105	78-03117A	191	1	12	4230	Scientific Information Report Chinese Science (18)	1/18/1963	25	Approved For Release	3/29/2004
AD0334378	78-03117A	192	1	21	4277	Scientific Information Report Chinese Science (19)	2/1/1963	27	Approved For Release	3/29/2004
AD0334433	78-03117A	193	1	22	4322	Scientific Information Report Chinese Science (20)	2/15/1963	28	Approved For Release	3/29/2004
AD0335021	78-03117A	194	1	37	4377	Scientific Information Report Chinese Science (21)	3/8/1963	59	Approved For Release	3/29/2004
AD0335847	78-03117A	198	1	33	4526	Scientific Information Report Chinese Science (22)	4/18/1963	61	Approved For Release	3/29/2004
AD0336327	78-03117A	200	1	3	4578	Scientific Information Report Chinese Science (23)	5/2/1963	68	Approved For Release	3/29/2004
AD0337167	78-03117A	201	1	26	4643	Scientific Information Report Chinese Science (24)	5/23/1963	95	Approved For Release	3/29/2004
AD0337777	78-03117A	202	1	27	4687	Scientific Information Report Chinese Science (25)	6/6/1963	52	Approved For Release	3/29/2004
AD0338474	78-03117A	203	1	27	4727	Scientific Information Report Chinese Science (26)	6/20/1963	83	Approved For Release	3/29/2004
AD0338687	78-03117A	204	1	32	4772	Scientific Information Report Chinese Science (27)	7/5/1963	80	Approved For Release	3/29/2004
AD0339386	78-03117A	206	1	4	4820	Scientific Information Report Chinese Science (28)	7/17/1963	32	Approved For Release	3/29/2004
AD0339147	78-03117A	207	1	11	4862	Scientific Information Report Chinese Science (29)	7/30/1963	48	Approved For Release	3/29/2004
AD0340927	78-03117A	208	1	35	4924	Scientific Information Report Chinese Science (30)	8/21/1963	53	Approved For Release	3/29/2004
AD0341855	78-03117A	209	1	43	4974	Scientific Information Report Chinese Science (31)	9/5/1963	46	Approved For Release	3/29/2004
AD0342464	78-03117A	210	1	38	5013	Scientific Information Report Chinese Science (32)	9/16/1963	43	Approved For Release	3/29/2004
AD0342608	78-03117A	211	1	36	5054	Scientific Information Report Chinese Science (33)	9/27/1963	41	Approved For Release	3/29/2004