

CIA/PB 131891 T-35

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100040001-0

**UNCLASSIFIED- SCIENTIFIC INFORMATION
REPORT**

4 DECEMBER 1959

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T-35

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CENTRAL INTELLIGENCE AGENCY

SCIENTIFIC
INFORMATION REPORT



4 December 1959

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Use of funds for printing this publication approved
by the Director of the Bureau of the Budget July 31, 1958.

PLEASE NOTE

This report presents unevaluated information extracted from recently received publications of the USSR. The information selected is intended to indicate current scientific developments and activities in the USSR, and is disseminated as an aid to United States Government research.

SCIENTIFIC INFORMATION REPORT

Table of Contents

	<u>Page</u>
I. Chemistry	1
Agricultural Chemistry	1
Colloid Chemistry	1
Fuels and Propellants	2
Herbicides	4
Industrial Chemistry	5
Inorganic Chemistry	9
Insecticides and Pesticides	11
Nuclear Fuels and Reactor Construction Materials	13
Organic Chemistry	18
Physical Chemistry	21
Radiation Chemistry	25
Radiochemistry	25
II. Earth Sciences	26
III. Electronics	28
Communications	28
Materials	29
Wave Propagation	32
IV. Engineering	33
Aeronautical Engineering	33
Automatic Control Engineering	33
Electrical Engineering	40

	<u>Page</u>
V. Medicine	42
Aviation Medicine	42
Contagious Diseases	44
Immunology and Therapy	45
Pharmacology and Toxicology	47
Physiology	57
Public Health, Hygiene, and Sanitation	59
Radiology	60
Veterinary Medicine	64
Miscellaneous	66
VI. Metallurgy	71
VII. Physics	74
Atomic and Molecular Physics	74
Nuclear Physics	74
Plasma Physics	84
Quantum Physics	85
Solid State Physics	86
Spectroscopy	87
Theoretical and Experimental Physics	88
VIII. Miscellaneous	90

I. CHEMISTRY

Agricultural Chemistry

1. Microelement Salt Dusting of Seeds as Preseeding Treatment

"Preseeding Dusting of Seeds with Microelement Salts," by Academician P. A. Vlasyuk and M. S. Darmenko, Ukrainian Scientific Research Institute of Plant Physiology; Kiev, Dopovidi Ukrainskoy Akademii Sil'skogospodars'kikh Nauk, No 3 (9), May/June 59, pp 3-6

As a result of their agrophysiological research, the authors propose, in place of soaking seeds in solutions, a new method of preseeding treatment for seeds which involves sprinkling them with microelement salts together with mordants and talcum.

The preseeding dusting of seeds, by contributing significantly to increasing the harvest and improving the quality of agricultural products, is convenient and economically advantageous. The authors recommended that it receive wide application in kolkhozes and sovkhoses in the future.

Colloid Chemistry

2. Preparation and Characterization of Ferrogels

"The Preparation of Ferrogels With Varying Porous Structure and Their Adsorption Properties," by I. Ye. Neymark and I. B. Slinyakova, Institute of Physical Chemistry of the Academy of Sciences Ukrainian RSR imeni L. V. Pisarzhevskiy, Kiev; Moscow, Kolloidnyy Zhurnal, Vol 21, No 3, May/June 59, pp 340-346

Gels of hydrated oxides of iron serve as catalysts in many chemical reactions. They accelerate the processes of hydrogenation, cracking, oxidation, etc. In some cases, ferrogels can be used as adsorbents for absorbing gas-forming, vapor-forming and dissolved substances.

The adsorption and catalytic properties of ferrous oxide gels to a considerable degree are determined by the character of their porosity. In this study, the authors undertook to investigate conditions in the preparation of these gels which affect their structure and adsorption properties.

In their report, they point out that the structure and sorption properties of ferrogels depend on the conditions of their preparation. Differences in the medium during preparation influence the character of the porosity of the ferrogels. On increasing the pH of the precipitation medium from 5.3 to 10 the overall and sorption pore volumes increase about two fold.

They also indicate that the nature of the intermicellar liquid of the ferrous oxide hydrogel also affects the porous structure of the specimen. On substituting isobutyl alcohol for the intermicellar liquid, ferrogels are formed with considerable over-all porosities 5-6 times those of unsubstituted specimens. The effects of various factors on the character of the porosity in the case of ferrogels are manifested similarly to silica gels. The fundamental concepts of the formation mechanism of hydrophilic sorbents may be applied to ferrogels.

Methods were developed for preparing a collection of ferrogels having total pore volumes from 0.17 to 1.88 cm³/g.

Fuels and Propellants

3. New Data Concerning Existence of Hydrogen Superoxide

"New Data on the Existence of Hydrogen Superoxide," by A. B. Tsentsiper, M. S. Danilova, A. S. Knishcheva, and A. I. Gorbanev; Moscow, Zhurnal Neorganicheskoy Khimii, Vol. 4, No 9, Sep 59, pp 1952-1957

A method has been developed for the investigation of products which form at low temperatures from water vapor dissociated in a glow discharge, from hydrogen peroxide, and also as a result of the interaction of hydrogen atoms with liquid ozone at minus 196°. It was established by X-ray diffraction analysis that independently of the method used for the synthesis, the product is obtained in an amorphous state. At minus 115° slow crystallization of the product begins. The crystallization is practically completed in 5 hours. Grinding of the substance under a layer of liquid nitrogen also brings about crystallization. In the product obtained from dissociated water vapor or hydrogen peroxide vapor the presence of two crystalline phases, namely ice and hydrogen peroxide, was observed after crystallization. A small quantity of an amorphous phase was also present. The ground product derived from ozone contained only one crystalline phase, i.e., ice, and a considerable quantity of an amorphous phase of the composition H₂O₄, which is apparently the higher peroxide (hydrogen superoxide).

4. Concentration Limits of Flame Propagation in Gas Mixtures Containing Ozone

"The Physical Chemistry of Concentrated Ozone; Part 7 -- Concentration Limits of Flame Propagation in Gas Mixtures Containing Ozone," by V. V. Yastrebov and N. I. Kobozev, Moscow State University: Moscow, Zhurnal Fizicheskoy Khimii, Vol 33, No 8, Aug 59, pp 1701-1708

The effect of inert diluents on the propagation of explosions in gaseous ozone has hitherto been investigated only in the case of ozone-oxygen mixtures. The limiting concentrations of ozone at which propagation of an explosion is still possible have been determined for mixtures of this composition by a number of investigators. In the present work the conditions were investigated under which flame propagation takes place in gaseous mixtures of ozone with oxygen and also in mixtures of ozone with carbon dioxide, argon, chlorine, and carbon tetrachloride vapor at total pressures of the gas mixture up to one atmosphere. Sharp explosibility limits were found to exist for mixtures with O_2 , N_2 , CO_2 , and Ar. Using $PO_3 - p_x$ coordinates (where p_x is the partial pressure of the diluent) the explosibility limits can be represented as monotonic functions which become nearly linear at higher pressures. The explosibility limits are somewhat indefinite (diffused) in the case of mixtures with Cl_2 and CCl_4 . Use of diatomic diluents or CO_2 results in explosibility limits which practically coincide (10.4 mol % of O_3 at one atmosphere of pressure and 20°). For Ar the limit is lower (8.8 mol %) and for CCl_4 higher than for any of the other diluents.

The explosibility limit for ozone-oxygen mixtures in the range investigated is independent of the dimensions of the vessel and of the intensity of the incendiary spark, rising rapidly with decreasing temperatures (up to 14.3 mol percent of O_3 at minus 77° and one atmosphere of pressure).

5. Thermal Decomposition of Explosives Below Their Melting Point

"Thermal Decomposition of Explosive Substances Below Their Melting Point," by G. V. Manelis and F. I. Dubovitskiy, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 126, No 4, 1 Jun 59, pp 813-816

By assuming that thermodynamic equilibrium between the solid and liquid phase is established in a system consisting of a decomposing explosive substance and the products of the reaction of decomposition, equations could be derived which describe phenomena that are observed during the thermal decomposition of explosive substances at temperatures below their melting point.

Industrial Chemistry

3. USSR Developments in Field of Synthetic Fibers Under Seven-Year Plan

"Prospects of and Basic Trends in the Development of the Chemical Fiber Industry During 1959-1965," by G. Ye. Birger, All-Union Scientific Research Institute of Synthetic Fibers, and A. L. Borisov, State Committee on Chemistry at the Council of Ministers USSR; Moscow, Khimicheskiye Volokna, No 1, Jan 59, pp 3-8

At present the USSR produces on an industrial scale the following fibers: capron, the perchlorovinyl fiber khlorin, and (to a minor extent) anid, lavsan, and nitron. It has been definitely established that polyamides, polyesters, and polyacrylonitrile are the most promising fiber materials from the standpoint of future development. There is no universal fiber capable of satisfying all possible requirements and it is not to be assumed that such a fiber will be developed. For this reason, different types of synthetic fibers must be produced. However, the diversity should not be as great as in capitalist countries, where by reason of commercial competition an extensive range of fibers that differ from each other only slightly is produced.

The primary emphasis placed on the production of capron is due to the considerable improvement of the process for the production of caprolactam, lowering of the cost of caprolactam, and the lower capital investment necessary for the construction of plants producing capron. There is every reason to believe that as far as textile applications are concerned, capron is not inferior to nylon or any other polyamide fiber. On the other hand, anid [a fiber of the nylon type] appears to be superior to capron as a material for tire cords.

Under the Seven-Year Plan, the relative amount of fibers for technical applications will increase until it approaches 25.5% of the total production of chemical fibers. This trend is justified, because only synthetic fibers exhibit physical and mechanical properties which make them suitable to the exclusion of other materials for a number of important applications, such as the manufacture of cords for airplane and automobile tires, nets, gears and ropes, electrical insulation, etc.

The technical processes for the production of the polyamide fiber anid and the new fiber enant [polyamide of aminoanthic acid], which has been developed by USSR chemists, are approximately the same as those for the production of capron, so that the technological developments connected with the production of these fibers are quite similar to those characteristic for the production of capron. Anid has a higher thermal stability and greater elasticity than capron. Because of this it is better suited for technical applications, specifically the production of tire cord. Enant is greatly superior to capron in resistance to the action of light and elasticity.

The polyester fiber lavsan is produced in the USSR to only a minor extent at this stage. In the form of staple fibers, it will be produced for textile uses. Supplied as a continuous filament fiber, it can presumably be applied to advantage in the production of tire cord and of other technical products. The process of wet drawing of nitron fibers in aqueous solutions has been mastered in the USSR; a fiber of satisfactory quality is obtained by this method. During the next few years, this method of treatment will be applied preferentially. At the same time, research on the possibilities of applying other methods of treatment will be continued. The production of acrylic copolymer fibers rather than those consisting of acrylonitrile polymerized in the absence of any other monomer is promising.

Serious attention will be paid to the development and production of other new types of synthetic fibers besides those mentioned above. There is an adequate raw material basis for the production of polypropylene and polyethylene fibers, which have valuable characteristics primarily from the standpoint of their application for technical purposes.

In connection with the expansion of the production of synthetic fibers under the Seven-Year Plan, there will be increased production of caprolactam, AG salt, dimethylterephthalate, polyacrylonitrile, dimethylformamide, and some other products at existing plants and new plants to be constructed.

9. Research On Refractories Reported at Eighth Mendeleev Congress

"The Mendeleev Congress of General and Applied Chemistry,"
by V. A. Kopeykin; Moscow, Ogneupory, Vol 24, No 8, Aug 59,
pp 379-381

Five hundred persons participated in meetings and discussions conducted by the Section of the Chemistry and Technology of Silicates at the Eighth Mendeleev Congress on General and Applied Chemistry held in April 1959 at Moscow. Among the participants in the meetings and discussions of this section were delegates from Moscow, Leningrad, Kiev, Khar'kov, Riga, Novorossiysk, Krasnoyarsk, Sverdlovsk, Gor'kiy, Minsk, Tbilisi, and other cities of the USSR and also representatives of the Hungarian People's Republic, the GDR, and the Czechoslovak Republic. The meetings of the section were opened by Academician P. P. Budnikov, Academy of Sciences Ukrainian SSR. In his opening address, Budnikov outlined the most important problems in the field of the chemistry and technology of silicates, solution of which will contribute to carrying out the program of economic development set by the 21st Congress of the CPSU.

Among the problems in question are those pertaining to the synthesis of refractory materials exhibiting superior thermal and chemical stability; the development of new materials consisting of highly refractory pure metal oxides, nitrides, borides, cermets, etc.; continued investigation of physico-chemical processes which take place during the interaction of solids; and research on phase equilibria.

The thermodynamic analysis of solid-phase reactions occurring in different silicate systems makes it possible to determine ways by which new chemically stable and heat-resistant silicates can be synthesized. The investigation of constitutional diagrams of binary, ternary, and multicomponent systems formed by refractory substances with products encountered in some industrial processes will make it possible to approach in a more scientific manner the solution of problems arising in connection with the development of new refractories that are more stable toward the action of metals during smelting and refining. Consideration of the underlying relationships will also facilitate the selection and scientific investigation of many technological processes applied in metallurgy and some other fields of technology.

Of importance is investigation of the mechanism of the sintering of pure oxides with particular attention to material transfer during sintering.

It is necessary to expand work on the combination of ceramic and cermet refractories with metals under different conditions as far as the effects of the external medium are concerned.

More than 60 reports were presented at meetings of the Section of Chemistry and Technology of Silicates. A report by P. S. Mamykin and N. V. Zinov'yev reported results obtained in the investigation of refractory and ceramic characteristics within the system chromite-alumina. Saranov chromite and technical alumina were used as the initial materials. It was established that products made from powders obtained from briquettes fired at a low temperature have superior characteristics. However, manufacture of these products is complicated by their very uneven setting. For this reason, material obtained from briquettes fired at a high temperature should be used. To find conditions under which the technological process can be carried out with greater facility, the authors of this report conducted experiments on the granulation of mixtures in a plate granulator. Positive results were obtained in these experiments. Using powders of a definite composition which had been fired at $1,450^{\circ}$, products were obtained at $1,650^{\circ}$ which exhibited the following properties: an apparent porosity of 15.4%, a compressive strength of 735 kilograms per square centimeter, and an initial deformation taking place under a load of 2 kilograms per square centimeter at $1,520^{\circ}$.

P. P. Budnikov and V. G. Savel'yev presented a communication on the use of barium monoaluminate ($BaO \cdot Al_2O_3$) as a binder for the production of heat-resistant concrete. Chamotte and chromomagnesite are used as fillers. The tensile strength of the concrete produced in this manner does not change up to $1,200^{\circ}$ and increases by a factor of approximately two at $1,350^{\circ}$. The coefficient of linear heat expansion is lower than in the case of calcium concretes.

A report on carborundum refractories with a nitride binder was made by N. I. Voronin, N. I. Krasotkina, and V. A. Smirnova. Refractories of this type are produced by adding crystalline silicon and firing the products in an atmosphere of nitrogen. The authors of this report confirmed that it is possible to produce carborundum articles with a nitride binder by firing them in ordinary flame furnaces after the material has been imbedded in coke powder. The refractories produced in this manner exhibited a tensile strength as great as 3,080 kilograms per square centimeter, which is explained by the formation of a new phase (presumably a silicon nitride phase) of great strength during the firing in the coke bed.

Ye. Ya. Antonova and A. A. Appen reported on a new type of refractory glass-metal coating for steel to protect the latter from oxidation by air at high temperatures. As the metal component, the authors of the report used chromium and nickel powders while specially developed alkali-free glasses were used as the binding material. A coating 0.1 millimeter thick, which consisted of glass and chromium in the proportion of 1:4, was found to protect steel from oxidation at 850-900° for a period longer than 300 hours.

In a paper by Ya. V. Klyucharov, S. A. Levenshteyn, and Ch'en Ti-chien problems were considered pertaining to the mechanism of the formation of the spinels $MgO \cdot Al_2O_3$ and $MgO \cdot Cr_2O_3$. It was established that the formation of magnesium chromite begins at 520° and ends at 800°. A considerable degree of recrystallization accompanied by agglomeration was observed at 1,400°. The degree of dispersion of the mixture, the pressure, and the temperature at which the synthesis is carried out affect the velocity of the formation of the spinel. The favorable effect of an addition of TiO_2 was noted.

A report given by K. S. Kutateladze and N. G. Dzhincharadze contained information in regard to the development of a new type of binders based on alunite ($K_2O \cdot 3 Al_2O_3 \cdot 4SO_3 \cdot 6H_2O$) and use of a binder of this type for the preparation of a heat-resistant concrete. By using alunite cement and chromomagnesite brick broken into small pieces, a heat-resistant concrete is obtained which can be used up to a temperature of 1,600°. N. K. Antonevich reported on the results of work on the electric dehydration of ceramic suspensions. A paper was given by M. G. Manvelyan concerning work on the complete conversion of natural alkali aluminosilicates (nepheline syenites). For the purpose of enrichment, the disintegrated rock is subjected to treatment in an autoclave at 220° for 10 minutes. During this treatment 43% of the silicon dioxide of the rock are transferred into the alkaline solution and a finely dispersed concentrate is precipitated which contains 28-30% of Al_2O_3 , 20% of alkalis, and 38-40% of SiO_2 . This material is sintered with limestone. It can then be easily converted into alumina, soda, potash, and cement.

Starting with nepheline syenite the so-called erevanite was obtained and, also pure silicon dioxide [with a content of impurities not exceeding $10^{-4}\%$]. This silicon dioxide is used for the production of high-purity quartz and as a luminophore in the production of fluorescent lamps [sic].

Of interest was information given by N. N. Sinel'nikov, who disputed that quartz recrystallizes into tridymite only in fusions.

Inorganic Chemistry

10. Synthesis of Chromium Hexacarbonyl

"A Synthesis of Chromium Hexacarbonyl in the Presence of Reducing Metals," by A. N. Nesmeyanov, Ye. P. Mikheyev, K. N. Anisimov, and N. P. Filimonova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 9, Sep 59, pp 1958-1960

It was established that as a result of the simultaneous action of reducing metals (Li, Na, or Mg) and carbon monoxide under pressure on a solution of chromium tetrachloride in pyridine, chromium hexacarbonyl is formed with a yield of 35-37%. It was established that when the pressure of the carbon monoxide is raised, passivation of magnesium takes place; when the initial pressure is increased from 70-220 atmospheres, the yield of chromium hexacarbonyl at 170° drops from 35% to 1.7% notwithstanding the fact that a crystal of iodine has been added. Under these conditions, the major part of the magnesium does not participate in the reaction.

11. New Method for Synthesis of Chromium Hexacarbonyl

"A Synthesis of Chromium Hexacarbonyl by the Interaction of Chromium Trichloride With Lithium Aluminum Hydride and Carbon Monoxide Under Pressure," by A. N. Nesmayanov, K. N. Anisimov, V. L. Volkov, A. E. Fridenberg, Ye. P. Mikheyev, and A. V. Medvedeva; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 8, Aug 59, pp 1827-1828

It was established that when chromium trichloride is reacted with carbon monoxide at the temperature of 65° and the pressure of 100 atmospheres in ether in the presence of lithium aluminum hydride, chromium hexacarbonyl is formed with a yield amounting to 65% of the theoretical.

12. Decomposition of Magnesium Borates and Sodium Borates With Sulfuric Acid

"Solubility Isotherm of the Quaternary System $H_3VO_3 - Mg SO_4 - Na_2 SO_4 - H_2O$ at 15° ," by A. B. Bekturov and V. I. Litvinenko, Laboratory of Inorganic Fertilizers, Institute of Chemical Sciences, Academy of Sciences Kazakh SSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1677-1681

The isotherm of the three-component system $H_3BO_3 - Na_2SO_4 - H_2O$ was investigated at 15° . The isotherm of the four-component system $H_3VO_3 - Mg SO_4 - Na_2 SO_4 - H_2O$ was also investigated at 15° . This isotherm makes it possible to determine the limiting concentrations of sodium sulfate and magnesium sulfate which result under technical conditions in connection with the crystallization of boric acid. The results obtained in the investigation described are of importance because boric acid is produced in the USSR by the sulfuric acid method. The raw materials for the production of boric acid are borates of the Inder deposit. Although the borates in question vary considerably in chemical composition, they consist mainly of magnesium and magnesium-calcium salts of boric acid. At present some sodium-calcium borate is also being supplied for conversion.

13. Crystal Structure of Titanium Silicides and Germanides

"X-Ray Diffraction Investigation of the Crystal Structure of Titanium Silicides and Germanides," by N. V. Ageyev and V. P. Samsonov, Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, p 1590-1595

X-ray diffraction investigation of powders showed that the compounds $Ti Si_2$ and $Ti Ge_2$ have the same structure; it was also established that the compounds $Ti_5 Si_3$ and $Ti_5 Ge_3$ have an identical structure. Although the identity of the structure of $Ti Si$ and $Ti Ge$ is not readily apparent from the Debye X-ray diagrams, thorough analysis of the diagrams showed that these two compounds actually have the same structure.

Insecticides and Pesticides

14. Toxicity Study of Some Chlorine-Containing Insecticides

"An Evaluation of the Toxicity of New Organochlorine Insecticides for Garden Beet Curculionidae," by Ye. F. Granin, Soobshch. o Nauchno-Issled. Rabotakh i Novoy Tekhn. Nauchn. In-t po Udobr. i Insektofungisidam (Report of Scientific Research Works and New Technology. Scientific Institute of Fertilizers and Insektofungicides), No 9, 1958, 16-25 (from Referativnyy Zhurnal -- Khimiya, No 18, 25 Sep 59, Abstract No 65514, by A. Grapov).

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"By means of laboratory tests and actual applications, it was established that according to the strength of their toxic action on the garden beet curculionida *Bothynoderus punctiventris* Germ. preparations of the diene synthesis can be arranged in the following order: endrin isodrin dieldrin aldrin heptachlor "chlorten" DDT "chlorindane" hexachlorocyclohexane dihydroaldrin. With an increase in temperature, the difference in toxicity between endrin and DDT is increased. In the chlorinated terpene group, the most active compound is "Chlorphen."

15. Dieldrin Used for Disinfestation of Ships

"Tests Using Dieldrin and Aldrin for Disinfestation," by V. N. Plyater-Plokhotskaya, Central Scientific Research Laboratory of Hygiene and Sanitation of Water Transport; Moscow, Gigiyena i Sanitariya, No 2, Feb 59, pp 85-87

Observations have shown that DDT and hexachlorocyclohexane have not given completely satisfactory results in controlling *Blattella germanica* L. In searching for new, more effective insecticides, the Central Scientific Research Laboratory of Hygiene and Sanitation for Water Transport (TsNILGIS) tested a 25% dust of aldrin and a 50% dust of dieldrin.

Comparative tests of the toxicity of dieldrin and DDT suspensions, conducted by TsNILGIS, showed that dieldrin was 150 times more effective against *Blattella germanica* L. than DDT.

An aqueous suspension containing 0.2-0.3% technical dieldrin was 100% effective against these pests and was effective for 2 months; a 0.4% concentration prolonged the insecticidal activity to 3 months, and 0.5% concentration, to 4 months.

Tests with aldrin showed that although it possessed high toxicity in relation to these pests, it did not exhibit sufficient insecticidal activity.

Since dieldrin is five times more toxic to man than DDT, only 0.1 and 0.1% concentrations of dieldrin suspensions were used in actual tests on ships.

16. Recommended Fungicides for Film Mold-Protection

"Fungicidal Treatment of Films Attacked by Mold," by K. F. Yeremenko and V. P. Shapiyevskaya, Tr. Vses N.-I. Kinofoto In-ta (Works of the All-Union Scientific Research Cinematographic Institute), No 3(26), 1958, 27-36 (from Referativnyy Zhurnal -- Khimiya, No 16, 25 Aug 59, Abstract No 58265, by A. Grapov)

CPYRGHT

"As a result of the study of 25 fungicides for the protection of photographic films from attack by mold, the following were recommended: 1% alcoholic solutions of dinitrochlorobenzene, dinitrothiocyanobenzene and TMTD, and a 1% aqueous solution of C_6H_5ONa . The recommended fungicides have no effect on the physicomachanical properties and the silver image of white-and-black photographic films, but do cause some distortion of the color image of multilayered photo copies."

17. Insecticidal Control of Biting Pests

"Testing of Preparations for Systemically-Acting Insecticides Against Pests Having Biting Organs," by L. P. Bocharov, Soobshch. o Nauchno-Issled. Rabotakh i Novoy Tekhn. Nauch. In-ta Udobr. i Insektofungisidam (Report on Scientific Research Works and New Technology. Scientific Institute of Fertilizers and Insectofungicides), No 9, 1958, 34-40 (from Referativnyy Zhurnal -- Khimiya, No 18, 25 Sep 59, Abstract No 65523, by A. Grapov)

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"In the search for systemic insecticides against biting pests, the following were tested. The concentrations which cause 50% death (LD-50) to the third and fourth stage larvae of *Phytonomus variabilis* Hbst. on alfalfa are given in parentheses (in percent). The thiol isomer of

systox (I) (0.026), the thiono isomer of systox (0.066), methylethylsystox (II) (0.036), preparation M-74 (III) (0.038), methylsystox (0.042), a mixture of the thio and thiono isomers of systox in a ratio of 1:3 (0.054), thiophos (0.185), triethyldimethylamidemonothiopyrophosphate -- preparation No 6 (IV) (0.009), acetylcarbamide (0.5), α -diethylphosphono- β, β, β -trichloroethyldiethylphosphate (0.5), α -diethylphosphono- β, β, β -trichloroethyldiisopropylphosphate (V) (0.5-LD-40), DDF (VI) (0.5 -- LD-38), dieldrin (0.5 -- LD-13), $(C_2H_5O)_2PSSC(=NH)NH_2$ (0.5 -- LD-8) and $CaCN_2$ (0.5 -- LD-40). The first and second stage larvae of *P. variabilis* were more sensitive than the larvae of the older stages. *Sitona cylindricollis* beetles were more resistant to the insecticide activity than *P. variabilis* beetles. Preparations I-VI in a 0.5-0.2% concentration are phytoncidal for alfalfa; compound IV is phytoncidal even in a concentration of 0.05%."

Nuclear Fuels and Reactor Construction Materials

18. Conditions Under Which Uranium Is Reduced and Precipitated by Minerals

"Experimental Investigation of the Conditions for the Reduction and Precipitation of Uranium by Minerals," by R. P. Rafal'skiy and K. F. Kudinova; Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 333-337

The article reports the results of an experimental investigation of the reduction and precipitation of uranium by some minerals which commonly occur in hydrothermal uranium deposits. It is assumed that the iron, sulfur, and arsenic which enter into the composition of these minerals reduced U (VI) present in hydrothermal solutions. As a result of this, deposition of primary uranium minerals took place. An experimental investigation of the processes involved, which so far have scarcely been studied, is of great importance, because it extends the available knowledge of physicochemical conditions which favor the localization of uranium ore occurrences.

The experimental data obtained indicate that as a result of the reduction of U (VI) to U (IV) in acidic solutions at temperatures in the range of 100-350° C, there is formation of crystalline uraninite, colloidal pitchblende [i.e., pitchblende in the form of aggregates which have passed through the colloidal state], and carbon-like uranium black. The type of the neogenic formations that are deposited depends on the composition of the precipitating mineral, the temperature at which the interaction takes place, and in some cases the initial concentration of uranium in the solution.

The results of experiments which have been carried out confirm in principle the possibility of the formation of primary uranium minerals under natural conditions as a result of the interaction of solutions containing U (VI) with ore and vein minerals.

19. Thermodynamics of Reduction of Uranium Tetrafluoride With Magnesium

"The Thermodynamics of the Reduction of Uranium Tetrafluoride With Magnesium," by I. M. Dubrovin and A. K. Yevseyev; Moscow Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 379-382

The thermodynamics of the magnesium-thermic reduction of uranium tetrafluoride in a system consisting of condensed phases (uranium, magnesium fluoride, and uranium tetrafluoride) and magnesium vapor are considered. An equation is derived describing the isotherm of this reaction. By using this equation, the free energy changes at different temperatures have been determined. The values obtained for this variable that correspond to individual temperature intervals within the range of 298-1690° are listed. Furthermore, curves expressing the dependence of the free energy change, the logarithm of the equilibrium constant, and the magnesium pressure on the temperature have been plotted.

20. Compounds Formed in System $UO_2(NO_3)_2 - K_2CO_3 - H_2O_2 - H_2O$

"Compounds Which Form in the System $UO_2(NO_3)_2 - K_2CO_3 - H_2O_2 - H_2O$," by Ye. V. Komarov, L. D. Preobrazhenskaya, and A. M. Gurevich; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1667-1673

Investigation of the system $UO_2(NO_3)_2 - K_2CO_3 - H_2O_2 - H_2O$ by measuring the absorption of light and carrying out cryoscopic measurements established that the following compounds and complex ions exist: $H_2U_2O_9$, $[UO_2(CO_3)_2(OH)]^{3-}$, $[UO_2(CO_3)(OO)]^{4-}$, and an anion containing 2 peroxy groups per uranium atom. It was established that the absorption of light by the solutions of the compounds in question depends almost entirely on the bonding between the uranyl ion and the peroxy groups. On the basis of spectrophotometric data, the concentration constant of the dissociation reaction $[UO_2(CO_3)_2(OOH)]^{3-} = H^+ + [UO_2(CO_3)_2(OO)]^{4-}$ was estimated and found to be approximately equal to 2.5×10^{-11} .

21. Precipitation of Uranium as Uranyl Iodate

"Equilibria in the System $UO_2(IO_3)_2 - KIO_3 - H_2O$," by A. Ye. Klygin, I. D. Smirnova, and N. A. Nikol'skaya; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1674-1676

The solubilities in the system $UO_2(IO_3)_2 - KIO_3 - H_2O$ were determined at $\mu = 0.2$ and the temperatures of 250 and 600. The dissociation constants of the ion $UO_2(IO_3)_3$ and the compound $UO_2(IO_3)_2$ and also the solubility product of $UO_2(IO_3)_2$ were calculated. It was found that precipitation of uranium in the form of uranyl iodate cannot be used for precise determinations of uranium because the precipitate is too soluble.

22. Growth of Uranium Rods in Corrosive Gaseous Media

"The Growth of Uranium Rods in Corrosive Gaseous Media," by I. V. Batenin, A. N. Rudenko, and B. Sharov; Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 329-332

The growth (increase in length) of uranium rods as a result of exposure at elevated temperatures to air, nitrogen, and carbon dioxide was investigated. The dependence of the growth on the temperature, the pressure of the gas, the diameter of the rods, and the initial degree of oxidation of the surface of uranium was determined. The growth of samples of copper wire was also investigated. A possible mechanism for the growth of uranium rods is proposed.

23. Separation of Splinter Elements

"Methods of Separation Employed in the Analysis of Mixtures of the Most Important Splinter Elements," by Yaromir Bar, Zavodskaya Laboratoriya, Vol 25, No 8, Aug 59, pp 917-926

The analysis of mixtures of ultra-microquantities of radioactive elements formed as a result of fission of U^{233} , U^{235} , and Pu^{239} is reviewed on the basis of USSR and Western publications. A bibliography consisting of 26 USSR and 115 non-USSR publications is appended to the article. The subject-matter is arranged under subdivision headings comprising coprecipitation methods, methods of extraction with organic solvents, distillation methods, electrolysis methods, chromatographic procedures, and methods involving scintillation γ -spectrometry.

24. Formation of Complexes by Ion of Pentavalent Neptunium

"The Problem Concerning the Tendency of the Ion of Pentavalent Neptunium to Form Complexes," by Yu. A. Zolotov and Yu. P. Novikov, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1693-1697

Changes in the absorption spectrum of pentavalent neptunium indicate that the ion $Np O_2^+$ forms complexes with tartaric, trihydroxyglutaric, citric, salicylic, 2,3-dihydroxyteraphthalic, acetic, phthalic, and ethylenediaminetetracetic acids.

25. Some Results of Investigation on Chemistry of Protactinium

"Some Data on the Chemistry of Protactinium," by A. V. Nikolayev, A. G. Kurnakova, and Z. G. Rumyantseva; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1682-1686

It was established in the investigation described that protactinium is adsorbed by almost all thorium precipitates, even by thorium chromate and thorium salicylate. When thorium is precipitated as a fluoride, almost all protactinium may remain in the mother liquid if the precipitation is carried out under definite conditions. The cation of the precipitating reagent has an effect on this separation. By using the method of similar carriers (for instance, $Ca CO_3$ and $CaC_2O_4 \cdot H_2O$) one can separate quantitatively protactinium from thorium oxycarbonate and thorium oxalate and transfer it to other carriers, for instance, ferric hydroxide. A number of data have been obtained on the adsorption of protactinium by manganese dioxide in an acidic medium, specifically when two successive precipitations are carried out. A method is described for the quantitative extraction of multivalent ions (thorium, uranium, zirconium, and plutonium) with salicylic acid and acetone. It was established that protactinium can be extracted readily by this method, because its salicylate is easily soluble in acetone.

The protactinium-233 used in the investigation was obtained by irradiation of thorium nitrate. Some of the results published in this instance have been confirmed in parallel work done outside of the USSR.

26. Alloys of Zirconium With Tin and Molybdenum

"Transformations of Ternary Alloys of the Zirconium Corner of the System Zr-Sn-Mo as a Result of Hardening and Tempering," by O. S. Ivanov and A. T. Semenchikov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1625-1629

The article by O. S. Ivanov and A. T. Semenchikov published in Zhurnal Neorganicheskoy Khimii, Vol 4, No 6, June 1959, pp 1420-1427, described the zirconium corner of the constitutional diagram of the system Zr-Sn-Mo. The structure of zirconium-rich alloys in a state of equilibrium was characterized in that article. The present article gives information of the structure of the same alloys in the nonequilibrium states which develop as a result of hardening and tempering.

27. USSR Standards for Spectral Analysis of Rare Metals and Rare-Metal Ores and Concentrates

"Standards for Spectral Analysis," by L. N. Filimonov and V. V. Polyakova; Moscow, Zavodskaya Laboratoriya, Vol 25, No 8, Aug 58, pp 972-980

New standard reference samples supplied by USSR institutions and standard reference samples which will be available in the near future are described. Methods for the preparation and testing of standard samples are discussed. A bibliography consisting of 26 USSR items and 4 non-USSR items is given at the end of the article.

It is stated that the Institute of General and Inorganic Chemistry of the Academy of Sciences Ukrainian SSSR has planned the release of the following standard samples to be used for reference in the analysis of rare metals and ores of rare metals: standard samples for the determination of the hafnium content in pure zirconium (HfO_2 concentrations of 0.015-0.25%); standard samples for the determination of zirconium and hafnium in mixtures of their oxides (0.25-99.9% of HfO_2); standard samples for the analysis of pure zirconium and pure hafnium for nine impurities; standard samples for the determination of calcium in pure zirconium and pure hafnium (0.01-0.2% of Ca); standard samples for the analysis of technical zirconium dioxide for five impurities; standard samples for the determination of niobium and tantalum in ores (concentrations of 0.02-1.0%); and standard samples for the determination of indium and thallium in ores (concentrations of 0.00025-0.01%).

It is also stated that standard samples for the analysis of the following ores and concentrates are being supplied by the Irkutsk State Institute of Rare and Minor Metals: eudialyte ore (niobium pentoxide content); eudialyte ore (zirconium dioxide and niobium pentoxide contents); zirconium placer concentrate (zirconium dioxide content); zirconium ore (niobium pentoxide content); mill concentrate (zirconium dioxide, niobium pentoxide, and tantalum pentoxide contents); beryllium ore (beryllium oxide content); beryllium ore (beryllium oxide and lithium oxide contents); and lithium ore (lithium oxide content).

28. Analytical Separation of Tantalum From Other Metals by Solvent-Extraction Method

"Determination of Tantalum Present as an Impurity in Zirconium, Hafnium, and Niobium," by R. S. Lauer and N. S. Poluektov, Laboratory of the Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zavodskaya Laboratoriya, Vol 25, No 8, Aug 59, pp 903-905

A method is described whereby tantalum is determined quantitatively by measuring photometrically the concentration of methyl violet fluorotantalate in a benzene solution. The optimum conditions for the extraction of tantalum with benzene when zirconium, hafnium, or niobium is present were established.

Organic Chemistry

29. Starting Materials for Penicillin Analogs Synthesized

"Synthesis of α -N-(S-n-Butyl)- and α -N-(S-Phenyl)thioglycolylaminoacrylic Acids," by A. K. Purenas and L. P. Ras-teikiene, Kaunas Polytechnic Institute; Vilnius, Trudy Akademii Nauk Litovskoy SSR. Series B, No 3(19), 1959,

pp 83-89

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"The objective of this research was to synthesize the corresponding α -N-acylaminoacrylic, and especially α -N-(S-n-butyl)- (I) and α -N-(S-phenyl) thioglycolylaminoacrylic (II) acids, as possible starting substances for the synthesis of penicillin analogs.

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The acids of (I) and (II) were synthesized by reacting S-n-butyl- and S-phenylthioglycolylamides with pyrrolacetic acid. The reaction conditions for the formation of α -N-(S-phenyl)thioglycolylaminoacrylic acid (II) were studied in detail, as a result of which it was possible to increase the yield of the acid (II) to 65%.

Attempts were made also to combine several sulfamides and phthalimide with pyrrolacetic acid; however, these endeavors did not yield the desired results."

"Chemical Properties of α -N-(S-Phenyl)Thioglycolylaminoacrylic Acid," by A. K. Purenas and L. P. Rasteikiene, Kaunas Polytechnic Institute; Vilnius, Trudy Akademii Nauk Litovskoy SSR, Series B, No 3(19), 1959, pp 91-95

In this work, the properties of α -N-(S-phenyl)thioglycolylaminoacrylic acid which the authors had synthesized earlier are presented.

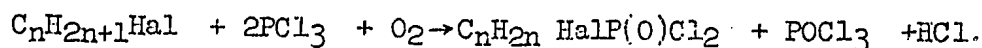
Bromine converts it to α,β -dibromo- α -N-(S-phenyl)-thioglycolylamino-propionic acid which upon heating in dry benzene easily loses HBr and is converted into β -bromo- α -N-(S-phenyl)thioglycolylaminoacrylic acid.

By the action of aniline or methanol on α,β -dibromo- α -N-(S-phenyl)-thioglycolylaminopropionic acid, the bromine in the α position is exchanged for a phenylamino- or methoxy-group, respectively.

30. Results of Oxidative Chlorophosphination of Halogenated Alkanes

"Synthesis of Organophosphorus Compounds from Hydrocarbons and Their Derivatives. XII. Oxidative Chlorophosphination of Halogenated Alkanes," by Yu. M. Zinov'yev and L. Z. Soborovskiy; Leningrad, Zhurnal Obshchey Khimii, Vol 29, No 8, Aug 59, pp 2643-2646

In this study, the authors investigated the reaction of phosphorus trichloride and oxygen with 1,1-di- and 1,1,1-trichloroethanes, 2-chlorobutane and 1-fluoro-2-chloroethane and with certain monofluoro-, bromo and iodo derivatives of paraffins. It was possible to subject all the enumerated haloidalkanes to oxidative chlorophosphination and to obtain the acid chlorides of the corresponding halogenated alkanephosphinic acids. The general reaction equation was:



Specific results of this investigation were: (1) the oxidative chlorophosphination of bromo- and fluoro-substituted paraffins and also the mono-, di-, and trichloroalkanes was realized; (2) the acid chlorides of 1-bromobutane-, 2-fluoropropane-1, fluoro-2-chloroethane-, 2-chlorobutane-, 2,2-dichloroethane-, and 2,2,2-trichloroethane-phosphinic acids were synthesized; (3) 1-iodobutane not only does not enter into the oxidative chlorophosphination reaction, but also hinders the oxidation of phosphorus trichloride by oxygen; (4) the diethyl esters of 2,2-dichloro- and 2,2,2-trichloroethane-phosphinic acids were obtained.

31. Synthesis of Di- β, β' -dichloroisopropyl Esters of Substituted α -Hydroxymethylphosphinic Acid

"The Interaction of Dialkylphosphorous Acids With Aldehydes and Ketones. XXI. Di- β, β' -dichloroisopropyl Esters of Substituted α -Hydroxymethylphosphinic Acid," by V. K. Khayrullin, A. I. Ledeneva, and V. S. Abramov, Kazan Chemicochemical Institute; Leningrad, Zhurnal Obshchey Khimii, Vol 29, No 8, Aug 59, pp 2551-2553

The condensation of di- β, β' -dichloroisopropylphosphorous acid with aldehydes and ketones was conducted by mixing equimolecular quantities of reacting components. The reactions proceeded without a catalyst at room temperature. The reaction time, the physical constants, and analysis of the five newly obtained esters are presented tabularly. Data are also presented for di-tert-(1,1,1-trichloro)-butyl esters of α -hydroxy- β -chloroisopropylphosphinic acid and α -hydroxy- β, β' -dichloroisopropylphosphorous acid, which the authors had reported earlier.

All of the new esters are white crystalline substances, odorless, insoluble in water but readily soluble in organic solvents.

The authors mentioned that they obtained the condensation products of di- β, β' -dichloroisopropylphosphorous acid with acetic, propionic, butyric and isovaleric aldehydes, cyclopentanone, and others as syrupy liquids which were very difficult to purify.

Physical Chemistry

32. Some Papers Presented at Meetings of Physicochemical Section of Eighth Mendeleev Congress

"Work of the Physicochemical Section, Eighth Mendeleev Congress of General and Applied Chemistry," by L. A. Nikolayev; Moscow, Zhurnal Fizicheskoy Khimii, Vol 33, No 8, Aug 59, pp 1895-1900

A brief review is given below of some papers which were presented at meetings of the Section of Physical Chemistry and the Section of Electrochemistry.

Ya. S. Bobovich and V. V. Perekalin reported data on the structure of nitrocompounds; these data were obtained by the investigation of Raman spectra. V. V. Zelinskiy and V. P. Kolobkov and also L. I. Reznikova reported on results which enabled them to establish correlations between the luminescence and structure of organic compounds. Specifically, they established that the effect of the medium on desactivation often amounts to an effect by it on the levels of the excited and the basic states. A. A. Bundel' reported on the effect which deviations from the stoichiometric composition have on the appearance and disappearance of characteristic bands in the luminescence spectrum.

V. V. Tarasov investigated the structure of organic polymers, glass, and semiconductors by employing the quantum theory of chain and laminary structures which he had formulated.

G. I. Kobazev and L. I. Nekrasov reported on results obtained by them in the investigation of the physicochemical characteristics of hydrogen superoxide. According to their paper, this compound is stable only at temperatures below minus 71°. The activation energy of the decomposition of the compound amounts to 8 kilocalories per mol. The heat of formation of the superoxide equals 22.5 kilocalories per mol.

B. P. Pavlov reported on results obtained in the investigation of thermal cracking and of the accelerating effect of azomethane and ethane on the process of cracking. V. L. Tal'roze and V. S. Nikol'skiy detected by the mass-spectrometric method the presence of free radicals after the passage of a pulse discharge through methane. N. N. Kobozev, V. P. Lebedev, G. P. Zykova, and V. P. Yegorov reported results obtained in the investigation of the mechanism of explosive oxidation of nitrogen during explosions of ozone-nitrogen mixtures.

In reporting results of an investigation of the intensity of the thermal decomposition of explosives, K. K. Andreyev described various possible mechanisms of explosions. The mechanism of the stepwise oxidation of methane was investigated by A. V. Nalbandyan, who confirmed the correctness of N. N. Semenov's hypothesis concerning the isomerization and decomposition into formaldehyde and hydroxyl of the peroxide radical that is formed. The kinetics of the oxidation of methane and the mechanism of this reaction were discussed in a report by L. V. Karmilov, N. S. Yenikolopyan, A. B. Nalbandyan, and N. N. Semenov.

Reports by I. I. Barenblat, I. A. Lovachev, A. S. Sokolik, and S. M. Kogarko dealt with phenomena of combustion and flame propagation. Results of investigations of the conditions under which ozone "ignites" were reported in papers by S. Ya. Pzhezhetskiy, S. A. Kamenetskaya, S. I. Gribov, A. V. Pankratov, I. N. Pospelova, A. Ya. Apin, V. N. Skryatskaya, and V. A. Slavinskaya.

V. M. Cherednichenko brought out in a paper presented by him that "ignition" of ozone is a thermal explosion. By using data obtained by him, one may determine the conditions under which ozone can be applied in oxidation processes.

In a report presented by A. A. Balandin new data were summarized which support the basic concepts of the multiplet theory. The results obtained by the author of this report and his co-workers (Ye. I. Klabunovskiy, O. K. Bogdanova, A. P. Shcheglova, and others), who investigated structural factors, indicated that molecules of alcohols are oriented in such a manner that their reacting atoms are turned toward the surface of the catalyst while the magnitude of the valency angle is preserved. The active centers of the catalyst represent protuberances on the surface. The projecting parts of molecules being hydrogenated ("gydriruyemye") fit into depressions which are located next to the protuberances. Balandin's report presented an extensive array of data on changes in free energy, the heat content, and entropy which correspond to adsorption at active centers. These data were obtained by using the kinetic method developed by the author of the report.

S. C. Roginskiy analyzed in a paper given by him the problems which arise when attempts are made to correlate catalytic properties with the position of elements in the periodic system. Two types of chemical catalysis were considered: catalysis of the redox-electronic type and acid-base catalysis. Roginskiy demonstrated that the periodic law is of great help in the solution of important problems pertaining to the selection of catalysts and the control of their characteristics.

A paper by G. K. Borekov pointed out the importance of taking into consideration interactions between the reacting system and the catalyst. Interactions of this type bring about changes in the composition and properties of the catalyst. The author of the paper regards as incorrect consideration of the properties of the catalyst independently of the reacting system which exerts an influence on it. When interpreted from the point of view advocated by Borekov, analysis of kinetic curves makes it possible to explain the forms which kinetic equations may take. These were formerly explained starting from the assumption that the energy of adsorption is different at different points of the surface of the catalyst.

The problem in regard to the effect of solvents on the velocity of heterogeneous catalytic reactions was discussed in a report by D. V. Sokol'skiy, who summarized a number of investigations conducted by him on this subject. L. A. Nikolayev gave a report on the catalytic functions of coordination compounds and indicated that the catalytic activity of these compounds can be increased by adsorption on carriers of a definite type. N. A. Shishakov reported data on the crystal chemistry of oxygen compounds that form on the surface of gold and platinum. Ya. V. Gorokhovatskiy reported that the energy required for conversion is changed after oxygen and ethylene have been adsorbed on the surface of a silver catalyst. Electrochemical ion exchange and acid catalysis at oxidized carbon surfaces formed the subject of a report by V. N. Strazhesko. V. I. Kurilenko and N. V. Kul'kova investigated the effect of sulfur on the catalytic properties of silver in the oxidation of ethylene. These authors established that the activity of the silver catalyst is at a maximum when the ratio of sulfur atoms to silver atoms amounts to 10^{-3} . A further increase in the sulfur content lowers the activity of the catalyst. O. V. Krylov, V. M. Frolov, S. A. Fokina, and Yu. N. Rufov reported on characteristics of the catalytic decomposition of hydrazine on the surface of alkaline catalysts and semiconductors.

Work by Yu. V. Shlyapnikov and V. V. Shushunov on the subject of the kinetics of the decomposition of aryl-alkyl hydroperoxides by acid catalysis enabled these investigators to formulate equations which describe quantitatively the kinetic relationship underlying the reactions in question. M. G. Slin'ko and Ye. N. Khar'kovskaya reported on the results of an investigation of the kinetics of the reaction of hydrogen with oxygen on platinum. P. M. Stadnik reported on the application of the method of chilling in the investigation of the catalytic oxidation of methanol.

A considerable number of papers dealt with electrolysis and with processes taking place at electrodes. For instance, V. V. Losev reported on the effect of anions in electrode processes taking place at the surface of an indium amalgam. V. I. Veselovskiy, T. I. Borisova, A. A. Yakovleva,

and D. M. Shub reported results of an investigation of electrochemical processes taking place at semiconductor electrodes, e.g., electrodes consisting of oxides of silver, copper, and uranium and also of germanium. In the work described, electrochemical, electrical, and photoelectric relationships were investigated.

The problem in regard to hydrogen exchange between a palladium electrode and an electrolyte was discussed in a report by G. N. Trusov and N. A. Aladzhhalova, who applied tritium as a radioactive tracer.

A paper by N. T. Kudryavtsev, G. N. Smolenskaya, V. V. Karatayev, and R. G. Golovchanskaya described conditions under which one can produce mechanically strong surface coatings by plating with titanium, zinc, nickel and other metals. In the paper mentioned, methods for titanium plating were described. A. M. Ozerov described applications of alternating currents for electrolytic deposition and the electrolytic polishing of metals.

B. S. Markov considered the mechanism of the cathodic reduction of titanium tetrachloride.

N. Ya. Lantratova, V. M. Berenblit, and A. I. Shultin presented a report dealing with the mechanism of the inhibiting effect exerted by nitrate ions on the corrosion of aluminum in hydrogen peroxide solutions.

A report by V. G. Levich dealt with the theory of disk-shaped electrodes which he had developed. L. A. Sokolova and V. M. Novakovskiy described a corrosion test procedure developed by them in which a rotating disk electrode is used.

33. Rhenium as Dehydrogenation Catalyst

"The Catalytic Properties of Rhenium; Part I -- Rhenium as a Dehydrogenation Catalyst," by A. A. Balandin, Ye. I. Karpeyskaya, and A. A. Tolstopyatova, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk, No 8, Aug 59, pp 1365-1371

Notwithstanding the high degree of dispersion of the rhenium occurring in nature and its low content in the earth's crust, the use of this metal as a promoter in catalysts will presumably be of interest, because rhenium is becoming available to an increasing extent. In the work described in this paper, it was established that rhenium deposited on carbon is an active catalyst of the dehydrogenation of cyclohexane. It was furthermore established that the nature of the carrier has a considerable effect on the activity of the rhenium catalyst. As a result of conversion on rhenium deposited on carbon, n-heptane undergoes dehydrocyclization while cumene is subjected to dehydrogenation with the formation of methylstyrene.

Radiation Chemistry

34. Determination of Moisture Content of Concrete by Measuring Gamma-Ray Transmission

"News Items -- USSR" (unsigned item); Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, p 401

To measure the heat insulation capacity of local concrete produced from local cements (foam kukersite and foam silicocalcite), the Institute of Construction and Construction Materials, Academy of Sciences Estonian SSR, has developed a method for the determination of the moisture content of the types of concrete in question on the basis of gamma-ray transmission. A bundle of gamma-rays emitted by a Co^{60} installation passes through the sample of the material being investigated and on being weakened by transmission impinges on the gamma-quanta counter. The percent of moisture contained in the material is determined by measuring the degree of weakening of the intensity of gamma-radiation. By using the same method one may investigate the dynamics of the migration of moisture in different materials and models of different constructions. The data obtained in this manner are of particular importance for the calculation of possible heat losses that will occur when the constructions and installations subjected to investigation are actually used. The method of investigation described is more rapid and reliable than the gravimetric analysis which has been applied hitherto.

Radiochemistry

35. Measurement of Diffusion Coefficients

"Measurement of Diffusion Coefficients by the Methods of Radioactivation Analysis and Isotope Dilution," by G. Ya. Ryskin, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 1, No 6, Jun 59, pp 952-954

The advantages and disadvantages are considered of determining coefficients of diffusion in solids on the basis of the total quantity of substance that has diffused. It is proposed that isotope dilution or radioactivation analysis be applied to determine quantitatively the amount of diffused substance. It is brought out that the method proposed makes it possible to measure very small diffusion coefficients, i.e., those of an order of 10^{-17} centimeters square per second and smaller.

[For additional information on radiochemistry, see Section I, Nuclear Fuels and Reactor Construction Materials.]

II. EARTH SCIENCES

36. Apparatus for Airborne Electrical Prospecting

"On the Development of Apparatus for Aeroelectrical Prospecting," by K. B. Karandeyev and L. Ya. Mityuk, Institute of Automatics and Electrometry, Siberian Branch of the Academy of Sciences USSR; Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 7, 1959, pp 16-25

The article explains that, at present, there are two general methods of aerial prospecting. In the first, based on the principle of a cable of infinite length, the field is formed by a low-frequency current from a ground source which is led to the earth by a cable 10-20 kilometers long grounded at both ends. The parameters characterizing the field are measured by the apparatus mounted in an aircraft flying along profiles transverse to the cable. In the second method, called the induction method, a low-frequency electromagnetic field is formed by a loop mounted in an aircraft flying at the lowest possible altitude over the earth's surface. The measuring apparatus located in the same or a second aircraft records the anomalies of the secondary field which are influenced by the change of conductivity of geologic formations.

Development of methods and apparatus for aerial electrical surveys was conducted by the Institute of Physics of the Earth, Academy of Sciences USSR; the Ministry of Geology and Mineral Conservation USSR at VITR (All-Union Institute of Prospecting Methods and Techniques); and IMA (Institute of Machine Science and Automatics), Academy of Sciences Ukrainian SSR. The apparatus described here for the aerial prospecting method employing the principle of a cable of infinite length and for the induction method was developed and built at IMA under the direction of the author and with the aid of V. N. Goncharskiy, N. I. Kalashnikov, L. A. Sinitskiy, L. D. Gik, A. N. Yermakov, V. L. Zmudikov, Yu. B. Nikolayenko, A. S. Lutsishin, V. P. Boyko, N. S. Umerinkov, B. P. Seliverstov, and others. Flight tests were conducted in 1958 with the cooperation of VITR.

This article discusses the methods and gives certain results of flight tests on the equipment.

The apparatus is considered in two groups; the ground equipment which produces the low-frequency electromagnetic field, and the airborne equipment which measures and records certain parameters of the field, namely, the phase angle and one of the quadrature components (reactive or active) of the horizontal component of the magnetic field in relation to the current of the cable.

To guarantee the possibility of conducting a wider range of operational methods, the generator unit was designed to form fields using any of four fixed frequencies: 81, 244, 976, and 3,904 cycles per second.

III. ELECTRONICS

Communications

37. New Television Receiver "Mayak"

"Television Receiver 'Mayak'" (unsigned article); Moscow, Vestnik Svyazi, No 10, Oct 59, cover page

The Radio Engineering Industry has developed a new-model 12-tube television receiver, "Mayak." The receiver is intended to operate on 12 channels; it can be hooked up to a sound pickup, magnetic tape recorder, or FM radio adapter. The screen size is 285x215 mm, sensitivity of the set is 250 microvolts, and image resolution at the center of the screen is 500 lines. The set will operate satisfactorily even at line voltage fluctuations of 180 to 250 v and 90 to 150 v, due to an efficient voltage regulating device at the primary coil of the power transformer. The power consumption of the set is about 120 w. The set is built with printed circuits. The over-all size of the set is 485 x 365 x 195 mm, and it weighs 22 kg.

38. Research at Institute of Ministry of Communications USSR

"Most Important Researches at the Scientific Institute of the Ministry of Communications USSR in the Fields of Radio Communications and Television," by L. A. Kopytin; Moscow, Vestnik Svyazi, No 10, Oct 59, pp 7-8

CPYRGHT The article contains the following passages:

"As a result of scientific research conducted during the past few years, it was possible to expand considerably our knowledge in the field of electric properties of the troposphere and ionosphere, and to formulate and outline methods for building new systems of communications based on utilization of scientific data obtained. Such developments will have a prominent place in the schedule of scientific work of the Scientific Research Institute. A modern network of trunk communications will be built on the basis of complex utilization of radio-relay and cable lines of various types. The principal requirement presented for the new systems will be capability of operating on a wide band, permitting simultaneous transmission of television programs and hundreds of telephone conversations.

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"Computer and programing devices also will find proper use in the field of communications. Several projects are now in the process of development at the institute, which will utilize devices permitting increase in the transmitting capacity of equipment and in labor productivity. Simplest example of application of these devices is the equipment for automation of short-wave lines of communications now being developed at the Scientific Research Institute. It is expected that the equipment will possess the capability for automatic selection of most efficient conditions for transmission and the most effective frequency range for a particular period of time. This is especially important from the point of view of utilizing the new multiplex equipment now being developed at the institute, which will permit, during the hours of favorable radio-wave transmission, a considerable increase in the amount of information transmitted through a single radio link. This equipment is based on utilization of high-stability synchronous systems with single-band transmitters. The new terminal equipment will have provision for automatic correction of errors caused by irregularities of the coupling medium. This will considerably improve the performance indexes of the line in general. On the basis of the results of recently conducted research, new equipment will be developed for short-wave lines which will permit more efficient utilization of transmitting and receiving equipment.

"Extensive work was done at the institute in the field of color television. During the past few years, the institute designed a complete set of equipment for color television, which was demonstrated at the Exposition of Achievements of the National Economy."

Materials

39. Ferrites Research in USSR

"Expansion of Scientific Research Work on Ferrites" (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 8, Aug 59, p 74

The study of ferrites is one of the principal problems of solid state physics. Investigations in this field are of special interest since the phenomena observed in ferrites lie in the zone between the physics of semiconductors and the physics of magnetic phenomena.

Successful development of many important fields of technology (computers, radioelectronics, electroacoustics), as well as of some fields of experimental physics (radioastronomy, radio spectroscopy, elementary particle acceleration, etc.), depend to a considerable degree on application of ferrite components.

The Presidium of the Academy of Sciences USSR reported on decided success in the field of investigation, development, and production of ferrite materials. The Presidium has initiated several measures for further expansion of theoretical and experimental works in the field of ferrites. The Laboratory for Ferrites and Ferroelectrics of the Institute of Semiconductors has been entrusted with the problem of development and study of ferromagnetic semiconductors.

The Institute of the Physics of Metals has been entrusted with the theoretical investigation of ferromagnetic semiconductors and materials with square hysteresis loop, as well as experimental study of ferrite properties. Further expansion in research on ferrites is anticipated in a number of other scientific research institutes.

40. Soviet Research in Semiconductors

"Expansion of Scientific Research Work in the Field of Semiconductors" (unsigned article), Moscow, Vestnik Akademii Nauk SSSR, No 8, Aug 59, p 74

The Presidium of the Academy of Sciences USSR has reported successful completion of a series of chemical, physicochemical, and physical investigations in the field of semiconductors. Specific measures were worked out to intensify investigations in the field of high-purity refining and synthesis of semiconductor materials, processes of semiconductor metallurgy, surface properties of semiconductors, etc. At the institutes of the Academy of Sciences.

A laboratory for structural study of semiconductor alloys is being organized at the Institute of Metallurgy imeni A. A. Baykov.

The Presidium has found it expedient to increase the personnel engaged in the semiconductor research in divisions and laboratories of the Academy of Sciences during 1959.

41. Lead-Bismuth and Tin-Antimony Tellurides

"Investigation of the Systems Pb Te-Bi₂ Te₃ and Sn Te-Sb₂Te₃" by Ye. I. Yelagina and N. Kh. Abrikosov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 7, Jul 59, pp 1638-1642

The constitutional diagrams of the systems of Pb-Bi-Te and Sn-Sb-Pb were investigated along the sections Pb Te-Bi₂ Te₃ and Sn Te-Sb₂ Te₃. The existence of the compounds Pb Te .2 Bi₂ Te₃ and Sn Te .Sb₂ Te₃ was established. Investigation of the systems in question is of importance from the standpoint of the development of semiconductor materials.

42. Photoconductivity of Antimony Selenide

"The Photoconductivity of $Sb_2 Se_3$ " by B. T. Kolomiyets and P. Kh. Zeynally, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 1, No 6, Jun 59, pp 979-980.

The spectral distribution of the photosensitivity of polycrystalline and monocrystalline $Sb_2 Se_3$ was determined. The data obtained are presented in the form of curves.

The results obtained in the investigations show that the sensitivity of single crystals of antimony selenide is much higher in the region of maximum absorption than that of layers of this substance or of polycrystalline material. Reasons for the higher sensitivity of single crystals are advanced.

43. Converters of Ultraviolet Radiation

"Investigation of Converters of Ultraviolet Radiation in a Gas Scintillation Counter," by A. N. Protopopov, Yu. A. Selitskiy, and S. M. Solov'yev, Radium Institute of the Academy of Sciences USSR; Moscow, Pribery i Tekhnika Eksperimenta, No 4, Jul/Aug 59, pp 66-69

The operation of a gas scintillation counter containing different converters of the ultraviolet radiation of xenon was investigated. The compounds converting this radiation were quaterphenyl, tetraphenylbutadiene, sodium salicylate, and 1,4-di-2 (5-phenyloxazolyl-1,3)-benzene (POPOP). The relative duration of the excitation when the substances enumerated above were used has been determined. The results are given of experiments in which fission splinters were recorded that formed on irradiation of U^{235} with neutrons having an energy of 15 Mev.

44. Conference on Rare and Semiconductor Elements

CPYRGHT "Announcement" (unsigned article); Moscow, Zhurnal Analiticheskoy Khimii, Vol 14, No 5, Sep/Oct 59, p 641

"A Conference on the Analysis of Rare and Semiconductor Elements, called by the Academy of Sciences USSR jointly with Gosplan USSR and the State Scientific-Technical Committee of the Council of Ministers USSR, will be held in Moscow on 7-11 December 1959.

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"The purpose of the conference will be to throw light on the present state, prospects, and problems of the analytical chemistry of rare and semi-conductor elements and to critically examine, systematize, and discuss the factual material obtained in research and educational institutes and plant laboratories on the analysis of lithium, beryllium, cesium, rubidium, scandium, yttrium, rare earths, thorium, gallium, indium, thallium, silicon, germanium, titanium, zirconium, hafnium, vanadium, niobium, tantalum, molybdenum, tungsten, selenium, tellurium, and rhenium.

"All suggestions and requests concerning the work of the conference should be directed to the Organizational Committee at the address: Moscow, Vorob'yevskoye Shosse, 47a, tel. V-2-05 08 dob. 52, 1-23."

Wave Propagation

45. Design of a Spiral Wave Guide

"Diffraction of Electromagnetic Waves on the Open End of a Spiral Wave Guide," by B. S. Mikazan; Moscow, Doklady Akademii Nauk SSSR, Vol 128, No 3, Sep 59, pp 502-506

It is attempted to derive equations for a spiral wave guide, presenting some special interest with regard to antenna design. A previously applied method (L. A. Vaynshteyn, Diffraktsiya elektromagneticheskikh i zvukovykh voln na otkrytom kontse volnovoda (Diffraction of Electromagnetic and Sound Waves on the Open End of a Wave Guide)) is used for the derivation of equations of functionals for solving problems of diffraction for semi-infinite wave guides.

IV. ENGINEERING

Aeronautical Engineering

46. Recent Soviet Patent in Field of Aviation

"Authorship Certificates" (unsigned article); Moscow, Byulleten' Izobreteniy, No 6, 1959, p 47

Class 62b, 1602. No 118705 (600230 from 24 May 1958). V. S. Shishov. Mechanism for Turning the Movable Horizontal Tail Surfaces of an Airplane as a Unit.

Mechanism consists of a cylinder which houses two telescoping shafts. Distinguishing feature is the fact that the cylinder is constructed to rotate and the shafts to move reciprocally to provide either movement of control surfaces for in-flight horizontal control or movement of control surfaces perpendicular to the impinging air flow for aerodynamic braking during run-out after landing. (Information given is not conclusive as to whether "movable horizontal tail surfaces" denotes a conventional stabilizer-elevator construction or a high-speed single-unit movable surface.)

Automatic Control Engineering

47. Analysis of Control Systems With Many Degrees of Freedom

"Analysis of Periodic Process Stability of Nonlinear Control Systems With Many Degrees of Freedom," by V. A. Taft; Moscow, Avtomatika i Telemekhanika, No 9, Sep 59, pp 1163-1170

The article attempts to arrive at an exact solution of periodic process stability without resorting to assumption of the presence of an ideal filter, as has generally been done in previous works. Such a precise solution is reduced to transformation of the characteristic equation of a system of equations with periodically changing coefficients in the form of a finite determinant, to a finite form by utilizing a method analogous to one used in the derivation of the characteristic equation for Hall's equation.

In the initial stage of solution, a system with many degrees of freedom and one nonlinear parameter is examined. After the characteristic equation is transformed to finite form, the frequency criteria can be applied for the analysis of system stability. The described method can

then be generalized for cases of several equations with periodic coefficients. Mikhaylov's criterion was applied for stability analysis of the periodic regime.

48. Corrective Networks of Automatic Control Systems

"Calculation of Corrective Networks of Automatic Control Systems After the Criterion of Mean-Square Error Minimum," by V. I. Kukhtinko; Moscow, Avtomatika i Telemekhanika, No 9, Sep 59, pp 1180-1187

The problem of design of optimal control systems is generally divided into two parts: the first is concerned with determination of optimal transfer function in compliance with the selected criterion, and the second is concerned with synthesis of the optimal transfer function with the aid of available real components. These two parts of the problem differ in physical and mathematical essence and are therefore solved separately.

The article examines a method for obtaining the optimal transfer function on the basis of a criterion similar to the Zadel and Rapazzini criterion. The control system in its entirety, or its separate components is considered physically feasible if the corresponding transfer functions have the form of a rational fraction in which the order of the numerator is lower or equal to that of the denominator.

The relationship of the considered problem with respect to the physical plausibility of corrective networks is discussed in some detail.

49. Scientific and Technical Conference, Computer Center, Academy of Sciences Ukrainian SSR

"New Developments in the Field of Computer Mathematics and Computer Engineering," by A. I. Kondalev; Moscow, Uspekhi Matematicheskikh Nauk, Vol 14, No 4(88), Jul/Aug, 1959, pp 237-241

Fundamental investigations of electronic computers are conducted at the Computer Center of the Academy of Sciences Ukrainian SSR. The theoretical problems of synthesis of digital automata are developed, the problems of reliability of computers are studied, investigations on mathematical methods and the theory of programing are conducted, and high-speed computers for calculations and control are developed.

A scientific and technical conference of the Computer Center of the Academy of Sciences Ukrainian SSR, held in Kiev 1-3 December 1958, was devoted to new developments in computer mathematics and computer engineering.

Scientists, engineers, and mathematicians from a number of cities of the Soviet Union, including Moscow, Leningrad, Minsk, Tbilisi, Riga, Baku, Yerevan, L'vov, and others, participated in the conference. There were more than 300 delegates at the conference.

Four sections functioned at the conference: (1) section on mathematical methods, (2) section on programming, (3) section on digital computers, and (4) section on analog computers.

A total of 59 papers and one report were presented at the plenary and sectional sessions.

V. M. Glushkov (Kiev), in a paper entitled "Concerning the Works of the Computer Center, Academy of Sciences Ukrainian SSR, on Computer Mathematics and Computer Engineering," reviewed the status and trend of scientific investigations of the Computer Center on the problem "high-speed digital computers." Together with an analysis of completed works, Glushkov dealt with the problems in the field of computer mathematics and computer engineering to be considered over the next 7 years. He considered coordination of scientific investigations and conduct of comprehensive developments, one of the important conditions for success in the work.

The principles of synthesis, basic parameters, elementary structure, and logic circuit of the general-purpose, automatic digital computer "Kiev" of the Computer Center of the Academy of Sciences Ukrainian SSR were presented in a paper written by V. M. Glushkov, L. N. Dashevskiy, A. I. Kondalev, S. B. Pogrebinskiy, Ye. A. Shkabara, and Ye. L. Yushchenko (Kiev).

M. A. Kartsev and Yu. A. Lavrenyuk (Moscow) discussed the second modernization of the M-2 electronic computer.

The paper of K. S. Neslukhovskiy (Moscow) was devoted to the problem of construction of digital computers for purposes of statistics, particularly for the processing of data of the all-union census.

Speakers and their subjects in the section on mathematical methods were as follows:

V. Ye. Shamanskiy (Kiev): "Concerning the Construction of Solutions of Boundary Value Problems for Equations of the Elliptical Type for Complicated Regions From Solutions for Simple Regions."

V. N. Ostapenko (Kiev): The theory and methods of solution of general equations for the cathodic protection of conduits from corrosion.

Yu. V. Blagoveshchenskiy (Kiev): Several methods of successive approximations.

A. N. Kostovskiy: "Application of the Lemer Method for the Numerical Solution of Equations on Electronic Digital Computers" and "On One Modification of the Gorak method."

V. V. Ivanov (Kiev): Approximation methods of solution of singular equations.

Ye. Ya. Remez (Kiev): Analysis of computer methods for the Chebyshev approximation in connection with several programing problems.

L. N. Karamzina and E. A. Chistova (Moscow): The work of the Division of Mathematical Tables of the Computer Center of the Academy of Sciences USSR.

V. G. Bodnarchuk (Kiev): Projection methods for the solution of equations.

G. S. Khovanskiy (Moscow): The application of nomograms for the investigation of functional relations.

A. I. Khor (Khar'kov): Several problems of approximations for conformal mappings.

P. S. Bondarenko (Kiev): Error estimates for and stability of numerical methods for the solution of the Cauchy problem for ordinary differential equations.

Three papers were read on probability methods: V. S. Mikhalevich (Kiev), "Concerning the Optimum Utilization of Statistical Information"; D. M. Golenko (Moscow), "Calculation of the Characteristics of Several Probability Processes by the Monte-Carlo method", and A. A. Alekseyev, V. S. Mikhalevich, and N. Z. Shor (Kiev), "Concerning the accuracy of calculation of a Correlation Function."

The section on programing heard the following:

V. S. Korolyuk and Ye. L. Yushchenko (Kiev): "On Address Programing," presenting the notion of the method and its merit in making up programing programs.

A. A. Letichevskiy (Kiev): "Equivalent Transformations in One Class of Address Algorithms."

L. N. Ivanenko (Kiev): A programing program for the "Kiev" computer.

Bratchikov (Leningrad): "On the structure of a Dictionary for Machine Translation and Means of Representing It in Electronic Digital Computers."

N. A. Kachanova and V. V. Umed'yan (Kiev): "Programing for Calculations of Economical Load Distribution in a Power System on a Digital Computer."

S. Ya. Fitialov (Leningrad): The work of the Experimental Laboratory for Machine Translation of Leningrad State University.

N. A. Krinitskiy (Moscow): Equivalent transformations of logical systems in programing.

E. I. Arin' (Riga): "Concerning Self-Instruction of Electronic Computers."

Two papers were devoted to the programing of the "Ural" computer: V. N. Igolkin (Leningrad), "System of Standard Subroutines of the Computer Center, Leningrad State University for the 'Ural,'" and M. N. Belkina and Gavrilenko (Moscow), "New Variants of the Standard Compiler Program of the 'Ural.'"

The section on digital computers heard the following:

I. V. Lebedev (Minsk): Structure and technical characteristics of the electronic computer "Luch" of the Institute of Physics and Mathematics of the Academy of Sciences Belorussian SSR.

Yu. I. Sharapov (Moscow): an asynchronous arithmetic device made of semiconductor triodes.

Z. S. Zorina, A. M. Samofalova, and Ye A. Shkabara (Kiev): Peculiarities in the adjustment of an Electronic Computer Asynchronous Control System."

M. A. Kartsev (Moscow): A method of accelerating binary division.

A. G. Kukharchuk and N. M. Protsenko (Kiev): A method of accelerating multiplication of a multiplier with high orders.

N. P. Brusentsov (Moscow): Principles of construction and technical data of the "Setun" computer of Moscow State University using ferrite elements.

M. N. Posnov (Leningrad): Equipment for processing perforated tape from the "Ural" on the T-5 tabulator.

V. D. Rozenknop (Moscow): "Experience in Operating the M-3 Electronic Digital Computer and Several Questions on Programing for the M-3 Computer."

L. M. Abalyshnikova, V. I. Dvortsin, S. B. Pogrebinskiy (Kiev): Peculiarities of adjustment of an autonomous arithmetic device.

G. A. Ososkov and V. G. Sragovich (Moscow): The simulation of random numbers on electronic computers.

Z. L. Rabinovich (Kiev): "Principles for Construction of Small Computers With the Utilization of a Magnetic Drum."

K. S. Neslukhovskiy (Moscow): "Specialized Attachments for General-Purpose Computers."

Yu. A. Chernyshev (Moscow): Printer for a general-purpose discrete computer, using the MTKh-90.

Three papers devoted to storage units: Ye. F. Berezhnoy (Moscow), "Storage Unit Using Magnetostrictive Delay Lines"; O. V. Bachin (Moscow), "Utilization of Transfluxors in Instruction and Storage Units"; and A. Ya. Zubatenko and A. I. Kondalev (Kiev), "Investigation of the Operating Conditions of a Diode-Capacitor Memory and Some Experimental Results".

Z. V. Alferova and A. A. Spirin (Moscow): Several types of electronic computers with programed control for economic calculations.

B. I. Kal'nin (Moscow): "Elements of a General-Purpose Computer."

Yu. K. Cherevychnik (Moscow): Equipment for the input of data using TKhZB $\sqrt{\text{TKh 3 B?}}$ cold-cathode tubes.

A. G. Shigin (Moscow): A mathematical machine for working out the technicoeconomic indexes of heat and electric power central stations operation.

O. K. Shcherbakov (Moscow): An analysis of direct-current sources for computers.

Two papers devoted to ferrite core circuit design: Yu. M. Shamayev (Moscow), "Bases for the Calculation of High-Speed Ferrite-Diode Switching Systems"; and A. I. Pirogov (Moscow), "A Measuring Method for and the Dynamic Characteristics of Magnetic Cores With Rectangular Hysteresis Loop."

Ye. I. Mamonov (Moscow): Switching characteristics of several new semiconductor devices with a hysteresis loop.

Medical specialists from Kiev were invited for the joint paper of V. D. Losev, A. G. Semenovskiy, and V. I. Sokrut (Kiev), "Several Devices for the Objective Investigation of Cardiac Activity," and the joint paper of V. M. Glushkov, L. Z. Zabludovskaya, Ye. L. Shkabara, and Ye. L. Yushchenko (Kiev), "Concerning the Mathematical Bases for Construction of a Machine for Diagnosing Heart Ailments." The works provoked keen discussion.

The section on analog computers included the following:

G. Ye. Pukhov (Kiev): The electrical simulation of rod systems.

V. M. Samus' (Kiev): Electrical simulation of thin-wall constructions of airplane wing type.

N. P. Khazankina (Kiev): Method of approximation of variable coefficients in the solution of problems on the MPT-9.

V. M. Bondarenko (Kiev): "On the problem of Electrical Simulation of Algebraic Equations of High Orders."

L. A. Tel'ksnis (Moscow): Statistical analysis of automatic control systems with the application of electronic simulation devices.

V. N. Ostapenko and A. A. Yushchenko (Kiev): A method of solving boundary-value problems on electronic analog computers.

Discussions were held on many of the papers.

At the final plenary session a resolution was adopted proposing an increase in investigations on problems of computer mathematics and computer engineering.

The participants unanimously noted the worth of the conference. In accordance with a resolution of the conference, a one-volume book containing the works presented at the conference will be published in mid-1959.

Electrical Engineering

50. Propulsion System of Icebreaker Lenin

"Electric Drive of Propulsion System of the Atomic Icebreaker Lenin," by V. L. Bershadskiy, V. K. Kalashnikov, V. V. Kryazhevskiy, and G. A. Popov; Moscow, Elektrichestvo, No 10, Oct 59, pp 50-56

The icebreaker Lenin is equipped with four steam turbogenerator units with a total capacity of 44,000 hp, supplying 1,200 v dc power to three propeller-driving motors. Maximum speed of propeller rotation is 195 rpm for the middle propeller and 215 rpm for the two side propellers. The middle-propeller motor is a 19,600-hp two-armature machine. The side-propeller motors are 9,800-hp two-armature machines. All motors have forced air cooling. The dc generators are of two-armature construction operating at 595 rpm and are rated at 3,840 kw each. The voltage impressed across each armature is 600 v. The generators are self-ventilating and are equipped with air coolers. Two of these generators are connected by a reduction gear to each of the turbines; one of these two generators has its armatures connected in parallel, thus forming actually a 3,840-kw generator. The generator with armatures connected in parallel supplies power to the middle-propeller motor, and the armatures of the second generator supply power to the side-propeller motors. Thus each turbogenerator unit supplies power simultaneously to the three propeller motors. Each propeller motor armature is supplied with power from two series-connected generators. Cross-connected balancing windings are provided in the generators to effect correct distribution of load between the series-connected generators. Each of the four generators is connected with one of the four turbines, making it possible for the middle propeller to operate even if only one of the turbines is running. The armatures of the propeller motors with their generators from two independent circuits, thus increasing the reliability of the electric system. In case of failure of one of the circuits, the propeller motor continues to run with the aid of one circuit.

51. Very Long Electric Transmission Power Lines

"Long-Range Electric Power Transmission Lines Tuned to Half Wave Length," by V. K. Shcherbakov, Transport-Power Engineering Institute, Siberian Branch, Academy of Sciences USSR; Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 7, 1959, pp 3-15

The problem of transmission of cheap electric power, generated at the East Siberian hydraulic and thermal stations, to the Urals, a distance of over 2,000 km, requires a detailed study of the operating characteristics

and stability of such high-voltage transmission lines. The Laboratory of Electric Power Systems of the Siberian Branch of the Academy of Sciences USSR has conducted a careful study of the behavior of a 2,400-km power line operating at 600 kv. A 3,000-km power line is practically equal to half wave length and, therefore, does not require any supplementary equipment to maintain desired stability of power distribution, because stability is an inherent characteristic of such a line. However, if the length of the power line is somewhat less than 3,000 km, it can be artificially elongated to the half wave length with the aid of certain auxiliary equipment. Such an artificial elongation of the power line is accomplished by means of "tuning" with the aid of supplementary inductance and capacitance.

So little is known even now about the advantages of half wave length lines that I. S. Bruk, corresponding member of the Academy of Sciences USSR, in 1958 expressed an opinion that synchronous operation of power systems via half-wave-length power lines is impossible.

In the final analysis, it is shown that electric power lines of the order of 2,500 km are well adaptable, after appropriate tuning, to operate as stable half-wave-length power lines.

V. MEDICINE

Aviation Medicine

52. Problems of Space Flight Discussed

"Man in Cosmic Flight," by G. I. Kositskiy; Moscow, Zdorov'ye, No 10, Oct 59, pp 4-6

Following an introductory paragraph in which he praises recent achievements of the Soviet space program, the author describes conditions which will be encountered in space flight.

According to this article, Soviet science has shown that a rocket with a cabin equipped to maintain life can be launched successfully. Dogs and rabbits recently sent into upper layers of the atmosphere in a geophysical ballistic rocket containing special instruments to record their vital functions were returned to earth in good condition by a special rescue system. Valuable data were collected in this experiment, but many complex questions must be solved before a man can be sent into interplanetary space. The theoretical and practical aspects of these problems are discussed in three sections of this article.

The first section, entitled "How the Weight of the Body Changes," deals with the physiological effects of weightlessness and high G forces, and means of counteracting them with centrifugal force and special anti-G suits. Sechenov's theory that brain activity is impossible without a continuous flow of nerve impulses from the sensory organs is reviewed; the author states that centrifugal force would provide the necessary vigorous stimulation of the sensory organs. According to recently obtained data on respiration and heart function in experimental animals, the absence of gravity alone does not seem to affect these functions in any special way; however, it is not yet clear how the activity of the higher branches of the brain would be affected under similar conditions.

The second section, entitled "Insidious Dangers," discusses the oxygen-carbon dioxide balance necessary for the smooth functioning of the human organism and means of establishing and maintaining this balance in a rocket cabin. The use of algae is considered an acceptable solution to this problem.

Special arrangements for eating and drinking in a weightless state are mentioned. Other dangers discussed include possible collision with meteorites large enough to pierce the cabin and cause a rapid pressure drop and the necessity for designing an individually fitting garment to compensate for the absence of external pressure is pointed out.

The third section, "In the Zone of Cosmic Radiation," discusses the possible effects of cosmic rays on the human organism. It is pointed out that these particles carry energy amounting to billions of electron volts, and that the "most powerful apparatus in the world," the synchrophasotron at the Joint Institute of Nuclear Research in Dubno, makes it possible to transmit only 10 billion electron volts. An experiment in which Prof N. N. Petrov and his associates injected very small doses of a radioactive substance into monkeys, which then developed tumors and died after several years, is mentioned. The author states that the problem of the most effective and least cumbersome system of protection from cosmic particles is to be solved, and that this system must embrace not only the walls of the cabin, but also the convolutions of the individual garment.

The proper preparation of an astronaut for re-entry after a prolonged state of weightlessness is emphasized. In speculating on the preliminary training which will best equip a man to be the first to explore interplanetary space, the author points out the need to choose a person who can act as both experimental subject and experimenter. He considers it possible that the first man to inaugurate the era of cosmic flight will be a physicist, geophysicist, astronomer, radiologist, machinist, or meteorologist; it is also possible that he will be a physician-physiologist.

53. Speed and Altitude Effects on Human Organism Studied

"On the Threshold of Great Altitudes," by A. Golikov; Moscow, Ogonek, No 42, Oct 59, pp 14-15

In introducing his discussion of the difficulties which confront flyers attempting to penetrate the upper layers of the atmosphere, the author cites altitude records established by two Soviet flyers: Vladimir Kokkinaki attained an altitude of 14,575 meters above sea level in a serial Soviet airplane in 1935, and test pilot Vladimir Il'yushin recently reached 28,852 meters above sea level.

In an interview with Modest Ivanovich Vakar, Candidate of Medical Sciences, the author was shown various tests of special costumes to be used in high-altitude flights. Vakar demonstrated the effects of very low atmospheric pressure on a dog in a steel altitude chamber. Commenting that the dog had apparently suffered no ill effects at the termination of the experiment, Vakar stated that boiling seems to be harmless if it does not last long. In another experiment, Alexey Grachev, wearing a pressure suit and helmet, was subjected to the effects of reduced pressure in the chamber; his heart activity, blood pressure, respiration, and other physiological functions recorded by instruments remained normal. The suit and equipment also protected him effectively during "descent." The effects of explosive decompression are discussed briefly. Another man in a pressure suit and helmet, Alexey Belokonev, showed how water rises in a glass inside a decompression altitude chamber, a model of an airplane cabin.

In the acceleration laboratory, Scientific Associate Eduard Vaganovich Marukhanyan explained the effects of many Gs on the human organism and demonstrated a special anti-G suit worn by Ivan Kachur. He stated that G forces can be combated by training on a centrifuge. In Response to a query concerning the adequacy of the suit later as the flying speed increases, Marukhanyan stated that the problem has not yet been solved completely; he mentioned that K. Ye. Tsiolokovskiy has recommended placing a man in a liquid for protection against accelerations. Experiments have shown that animals in liquid can tolerate tremendous G forces for short periods. Marukhanyan remarked in conclusion that "as a result of many experiments it is already possible to say with sufficient conviction that a human being will be able to tolerate the G forces which he may experience in flights at very great speeds."

Contagious Diseases

54. Camels Infected With Plague Experimentally

"The Pathological Anatomy of Experimental Plague in Camels," by V. N. Lobanov, Saratov State Institute of Microbiology and Epidemiology of the Far Eastern USSR; Moscow, Arkhiv Patologii, Vol 21, No 7, Jul 59, pp 37-42

On the basis of previous observations that camels infected with plague can transmit the disease to humans who kill them for meat and hides, the author studied the anatomical and histological changes which occur in camels infected experimentally.

Eleven camels were infected (ten intracutaneously and one subcutaneously) with highly virulent strain 100, one microbial body of which killed a guinea pig. The infective doses given to three groups of camels were: 1-5 billion, 3-10 billion, and 45-52 billion microbial bodies. The animals were sacrificed within 13-48 days. The results of post-mortem dissection, histological studies, seedings, and biological tests are discussed. Four illustrations show the progression of the disease in the lymph nodes.

CPYRGHT The conclusions presented on the basis of these results are as follows:

"1. Bubonic plague developed in camels after their intracutaneous and subcutaneous infection with the plague pathogen. The disease was manifested chiefly by involvement of the subcutaneous lymph nodes, fever, and abscesses at the infection site which heal by forming scars.

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"2. The disease course was mild and the animals recovered within 2-3 weeks after infection. Bubonic plague with cachexia occurred in only one case in an animal which was infected with a very large dose (50 billion microbial bodies).

"3. Changes in the lymph nodes are always multiple, and vary in nature and duration in the same animal. In the majority of cases, the regional nodes are affected earlier and more intensely than the remote ones.

"4. On the basis of clinical observations and data from the dissections, it is possible according to severity to distinguish two basic forms of changes in the subcutaneous lymph nodes: (a) typical plague buboes with necroses, suppuration, and scarification; and (b) nonsuppurative lymphadenitis, which is terminated by reverse development or scarification. The latter form is not observed in other animals susceptible to plague or in humans.

"5. The following forms and stages of changes are observed by histological investigation: acute and subacute nonsuppurative lymphadenitis, acute and subacute suppurative lymphadenitis, and fibrous induration. The formation of scar tissue occurs primarily by means of noncellular sclerosis in subacute nonsuppurative lymphadenitis. Collagen and collagen fibers are formed from fused argyrophilic substances.

"6. Solitary nodes with signs of acute and subacute nonsuppurative lymphadenitis were observed in 3 out of 11 camels on investigation of the lymph nodes of the chest and abdominal cavity and the parietal nodes.

"7. Changes in the internal organs (hemorrhage in the mucous and serous membranes, and moderately pronounced dystrophic changes in the parenchymatous organs) were observed in six camels. Cachexia and secondary plague pneumonia along with lymphatic involvement occurred in only one camel, which had been infected with 50 billion microbial bodies."

Immunology and Therapy

55. Immunization Methods Described in Medical Encyclopedia

"Immunization," by I. Bezdenezhnykh and M. Gannushkin; Bol'shaya Meditsinskaya Entsiklopediya (Great Medical Encyclopedia), State Scientific Publishing House; Moscow, Vol 11, 1959, pp 227-258

This chapter on immunization in the medical encyclopedia, No 11, defines immunization as "a method of creating artificial immunity for the specific prophylaxis of infectious diseases among humans and animals or for obtaining immune sera from animal producers."

The chapter is organized under the following subheadings: Methods of Immunization, Characteristics of Preparations and Evaluation of Their Quality, Contraindications to Immunization, the Technology of Immunization, Immunization Against Different Infectious Diseases, Infections of the Respiratory Tract, Systemic Infections, Cutaneous Infections, Immunization of Soldiers, and Immunization of Animals.

In the section on immunization methods, a table of preparations is given; their contents and shelf life are indicated. The following preparations are included: Typhoid-paratyphoid-dysentery tetravaccine for subcutaneous introduction, cholera monovaccine for subcutaneous introduction, poliomyelitis vaccine for intramuscular introduction, BCG vaccine for oral administration, BCG vaccine for cutaneous administration, dry live antitularemia vaccine for cutaneous administration, dry live brucellosis vaccine for subcutaneous administration, antianthrax vaccine for cutaneous administration, dry live antiplague vaccine for intracutaneous and subcutaneous administration, dry anti-influenza vaccine for nasal introduction, dry live vaccine against mosquito fever for cutaneous administration, polyvalent vaccine for subcutaneous introduction (typhoid, paratyphoid A and B, dysentery), whooping cough vaccine for subcutaneous introduction, whooping cough-diphtheria vaccine for subcutaneous introduction, adsorbed whooping cough-diphtheria-tetanus vaccine for subcutaneous introduction, depoted typhus vaccine for subcutaneous introduction, vaccine against Q fever for subcutaneous introduction, vaccine against spring-summer tick-borne encephalitis for subcutaneous introduction, vaccine against Japanese encephalitis for subcutaneous introduction.

Other preparations included are vaccine against Qmsk hemorrhagic fever for subcutaneous introduction, leptospirosis vaccine for subcutaneous introduction, smallpox calf lymph for cutaneous introduction, dry smallpox vaccine for cutaneous introduction, dry smallpox ovovaccine for cutaneous introduction, natural diphtheria anatoxin for subcutaneous introduction, purified adsorbed diphtheria anatoxin for subcutaneous introduction, purified adsorbed diphtheria and tetanus anatoxin for subcutaneous introduction, tetanus anatoxin for subcutaneous introduction, combined antitoxin, anatoxin for subcutaneous introduction, trianatoxin for subcutaneous introduction [a filtrate of a tetanus bacillus culture, *Cl. perfringens*, and *Cl. oedematiens*], tetra-anatoxin for subcutaneous introduction [the same as above plus *Vibrio septique*], powder-form anti-influenza serum for nasal introduction, antimeasles serum for intramuscular introduction, gamma globulin for intramuscular introduction, antidiphtheria serum for intramuscular introduction, antitoxin serum for intramuscular introduction, antigangrene serum for intramuscular introduction, antitetanus serum for intramuscular introduction, and antiplague serum for intramuscular introduction.

56. Therapy of Infectious Hepatitis

"On the Therapy of Infectious Hepatitis With Adrenocorticotrophic Hormone," by Jaroslav Jindra, Vnitrni Lekarstvi (Czechoslovakia), Vol 4, No 10, 1958, pp 921-927 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 65099)

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"Patients (52) suffering from acute infectious hepatitis received adrenocorticotrophic hormone daily in doses of 12.5 milligrams per 500 milliliters of glucose for a period of 10 days. Improvement was noted in most of the patients (rapid disappearance of jaundice and a diminution in bilirubinemia within a week). In five of the patients, the therapy was ineffective. No side reactions or relapses were observed."

Pharmacology and Toxicology

57. Ganglioblocking Substances

"Comparative Investigation of Ganglioblocking Substances," M. Wilimowski and H. Djaczyszyn, Arch. Immunol. i Terap. Doswiadcz. (Poland), No 4, 1956 (1957), pp 413-438 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 64978)

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"The hypotensive and ganglioblocking action of hexamethonium (I), pentamethonium (II), pentiomid (III), ansolysen (IV), haplegine (V), the new synthetic preparation azopyperonium (VI), dibromide methylbis-(beta-N-methylpyperidinethyl)-amine) when administered in doses of one gamma to 10 milligrams was studied in rabbits and cats. It was found that the blockage of the ganglia induced by these substances was of longer duration than the decrease in blood pressure. A decrease in blood pressure of brief duration was produced by (I), (II), and (III); of prolonged duration, by (IV), (V), and (VI). (VI) was found to be no less effective than (IV). All the preparations after repeated administration rapidly induced tachyphylaxis."

58. Comparative Study of Ganglioblocking Substances

"Comparative Study of the Effect of Some Ganglioblocking Drugs on the Sympathetic and Parasympathetic Ganglia," by Ya. Shuster, Gangliolitiki i Blokatory Nevromyshechn. Sinapsov (Gangliolytics and Blocking Agents of Neuromuscular Synapses), L., 1958, pp 50-53 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 17, 10 Sep 59, Abstract No 23436, by S. Dolina)

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"The effect of pentapyrrolidinium, hexonium, tetraethyl ammonium, and certain derivatives of the bis-ammonium series on the sympathetic and parasympathetic ganglia was studied. It was found that substances containing quaternary nitrogen atoms in heterocycles have a greater ganglioblocking activity than hexonium and tetraethylammonium. The ganglioblocking activity of a series of bis-ammonium compounds depends not only on the distance between the quaternary nitrogen atoms, but on the total length of the molecule as well. The parasympathetic ganglia are more sensitive to tetraethylammonium than the sympathetic ganglia; the latter are more sensitive to bis-ammonium compounds with quaternary nitrogen atoms included in the heterocycles."

59. Xylylene as Ganglioblocking Agent

"Ganglioblocking Action of Xylylene Derivatives," by M. Wilimowski, H. Dzacyszyn, and J. Gieldanowski, Arch. Immunol. i Terap. Doswiadcz. (Poland), No 4, 1956 (1957) pp 407-412 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 64977)

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"The following synthetic preparations which are close to hexamethonium were studied: dibromide of p-bis-(N-methyl piperidine)-xylylene (I); dibromide of p-bis-(N-methylpyrrolidine)-xylylene (II); and dibromide of p-bis-(N-methyl morpholine)-xylylene (III). (I) and (II) were found to be more toxic and (III) less toxic to mice than pendiomid (pentamin) (IV). The hypotensive and ganglioblocking action of (I) is double the strength, while that of (III) is a third of the strength of that of (IV). All the preparations depress or inhibit respiration, (III) to a lesser degree than (I) and (II)."

60. Action of Organophosphorus Anticholinesterase Compounds

"Concerning the Mechanism of the Action of Organophosphorus Anticholinesterase Compounds," by Yu. D. Fedorchuk, Laboratory of Pharmacology of the Institute of Toxicology, Academy of Medical Sciences USSR, Leningrad; Moscow-Leningrad, Fiz-iologicheskiy Zhurnal SSSR imeni M. Sechenov, Vol 45, No 8, Aug 59, pp 1004-1008

Cats were used in experiments which were carried out to determine the mechanism of the action of phosphacol and tetraethyl pyrophosphate -- organophosphorus anticholinesterase compounds -- on ganglia, and to establish the elements in these substances which inhibit cholinesterase and the elements which have no connection with this process. The experiments established that there is a definite connection between the degree with which phosphacol inhibits the cholinesterase and the functional state of the ganglia; phosphacol and tetraethyl pyrophosphate while fully inhibiting the enzyme at the same time have a stimulating effect on the ganglia, a fact which points to their possible direct stimulating effect on the noncholinoreactive systems within the ganglia. In experiments on perfused ganglia it was found that phosphacol and tetraethyl pyrophosphate may increase the flow of acetylcholine into the perfusion liquid as a result of their nonanticholinesterase action. It is assumed that the stimulating action of these compounds may be connected with their effect on the acetylcholine which is present in the nonactive protein-lipoid complex.

61. Effect of Dipterex on Organism

"On the Pharmacology of Dipterex," by A. Hasik and M. Bargar, Biologia (Slovakia), Vol 13, No 6, 1958, pp 428-439 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 65233)

CPYRGT

"The insecticide dipterex has a strong anticholinesterase action which is of brief duration, and anticurare as well as muscarine-like effects. The muscarine-like effect is removed by atropine. Atropine has no effect on the nicotine-like action of dipterex."

52. Effect of Atropine Sulfate on Cholinesterase Activity

"Phase Changes in the Activity of Cholinesterase of the Blood Serum Caused by the Subcutaneous Administration of Atropine Sulfate," by Yu. I. Sakharov; Moscow, Farmakologiya i Toksikologiya, Vol 22, No 2, Mar/Apr 59, p 190

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"Literary data on the effect of atropine sulfate on cholinesterase activity are highly contradictory. Most of the authors (D. Danelopolu. M. Ya. Mikhel'son, Sekiya, Atsushi, and others) group atropine with cholinesterase inhibitors. There are some who indicate (N. A. Romantsev) that atropine enhances the activity of the enzyme.

"The lack of special literature dealing with the analysis of this process in time and the great interest shown by toxicologists in the dynamics of the change in cholinesterase activity in cases of intoxication by anticholinesterase compounds, as well as in the therapy of such intoxications, evoked the need for corresponding experiments. The experiments were conducted on 15 young cats. Cholinesterase activity of the blood serum was determined by the P. V. Pravdich-Neminskaya titrimetric method modified by A. A. Pokrovskiy. Atropine sulfate was administered to the animals subcutaneously in therapeutic doses of one milligram per kilogram of body weight (highest therapeutic dose of atropine for cats is 5 milligrams, State Pharmacopeia VII, 1929; R. Keshni, Handbook of Pharmacology, Vol 2, 1931, p 943). Blood specimens were taken from the animals' ears after 10 and 30 minutes, and one, 2, 3, 4, 5 and 24 hours after the administration of the alkaloid. The activity of the enzyme was expressed in quantities which were required to carry out the titration of the blood serum 1/100 N NaOH and in percentages in relation to the initial value.

"Ten minutes after the administration of atropine, the cholinesterase activity of the blood serum increased to 152 percent, and by the 30th minute, to 154 percent of the initial value. By the end of the first hour, the activity of the enzyme decreased to 112 percent, while 2 hours later it decreased to 107 percent. By the end of the third hour, it decreased to its initial value. Four, 5, and 24 hours after the subcutaneous administration of atropine, the activity of the enzyme was correspondingly equal to 98, 79, and 75 percent of its initial value.

"A parallelism between the literary data on this problem and the results obtained by us may be noted, inasmuch as some of the authors group atropine with drugs which stimulate the enzymatic activity of cholinesterase, while others group it with drugs which inhibit the activity of the enzyme. Factually, these are but fragmentary reports of a continuous phase process. There are indications that atropine is prophylactically most effective against anticholinesterase compounds during the first 2-3 hours after its administration, and this period coincides with the period of increased activity of cholinesterase in the blood serum.

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"Thus, the changes which take place in the activity of cholinesterase of the blood serum of cats in response to the subcutaneous administration of a therapeutic dose of atropine have a phasic character: an initial rise in activity (first 2 hours), restoration to normal (2-3 hours), and inhibition (after the third hour)."

63. Gangliolytic Properties of Phenylenediamine Derivatives

"Gangliolytic Properties of Mono- and Diiodomethylates of Tetramethyl o- and m-Phenylenediamines," by Yu. I. Lisunkin, Gangliolitiki i Blokatory Nervnomyshechnykh Sinapsov (Gangliolytics and Blocking Agents of Neuromuscular Synapses), L., 1958, pp 113-121 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 17, 10 Sep 59, Abstract No 23437, by the author)

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"It was established that methylated derivatives of o- and m-phenylenediamines possess gangliolytic properties; o-phenylenediamine is more active than m-phenylenediamine. It is the author's opinion that a reduction in the distance between the nitrogen atoms enhances their gangliolytic action. It was found that quaternary-tertiary derivatives of p-phenylenediamine possess sympathomimetic and ephedrine-like properties."

64. Effect of Cholinolytic Poisons on Sialorrhea

"Effect of Some of the New Cholinolytic Poisons (Anicaine, Difacil, and Tetamone-i) on Sialorrhea," by T. A. Melnikova, Sb. Nauchn. Tr. Leningr. Khim-Farmatsevt. In-t, (Collection of Works of the Leningrad Chemicopharmaceutical Institute), No 3, 1957, pp 251-253 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 64938, by S. T. Skorodelov)

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"Anicaine [diphenylacetic ester of piperidine ethanol, Ref. Zhur. -- Biol. No 14, Abstract No 64939] administered intravenously to dogs in a dose of 5 milligrams per kilogram of body weight depresses unconditioned sialorrhea by blocking the various chains of the reflex arc. Difacil [the hydrochloride of the beta-diethylaminoethyl ester of diphenylacetic acid, Lekarstvennyye Sredstva, by M. D. Mashkovskiy, Moscow, Medgiz, 1957, p 209] in a dose of 5 milligrams per kilogram of body weight acts in an analogous manner, but to a lesser degree, affecting mainly the central reflex chain and blocking the peripheral cholinoreactive systems. Tetamone [the iodide of tetraethylammonium, Lekarstvennyye Sredstva, by M. D. Mashkovskiy, Moscow, Medgiz, 1957, pp 131-132] in a dose of 10 milligrams per kilogram of body weight has no effect on unconditioned sialorrhea."

65. Spasmolytics and Local Anesthetics

"Investigation of Local Anesthetics. XVIII. Quaternary Salts of Certain Basic Carbamates," by L. Novacek, J. Salac, and C. Vrba, Ceskosl. Farmac. (Czechoslovakia), 1958, Vol 7, No 3, pp 132-135 (from Referativnyy Zhurnal -- Khimiya, Biologichskaya Khimiya, No 17, 10 Sep 59, Abstract No 23421, by N. Turkevich)

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"Quaternary bases with the general formula $R_1R_2N \cdot COOCH_2CH_2 \cdot N + (C_2H_5)_3X$, in which X=I or Cl, have been synthesized. Substances of the aliphatic series (R_1 and $R_2 = H$ or C_2H_5) do not act as anesthetics, but exhibit a parasympathomimetic action. The anesthetizing action of iodides with aromatic substitutes is weak. The corresponding chlorides are more active because of their greater solubility in water. Their action as local anesthetics was investigated on a rabbit's cornea, while their action as infiltrating anesthetics was tested on guinea pigs. The LD₅₀ of the quaternary salts when administered to white mice was found to be 76-430 milligrams per kilogram of body weight, while of the corresponding tertiary bases, 175-610 milligrams per kilogram of body weight. All the investigated substances with aromatic substitutes were found to possess a strong curare-like activity, while some of them were also capable of spasmolytic action. Report XVII, see Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, 1959, No 12, 16244."

66. Psychosis Induced by Benactizine

"Experimental Psychosis Induced by a Single Administration of 200 Milligrams of Benactizine," by Stansilav Grof and Milos Vojtechovsky, Ceskosl. Psychiatr. (Slovakia), Vol 54, No 6, 1958, pp 369-376 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 64918, by the authors)

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"Psychic derangement with delirium and optical and auditory hallucinations followed by amnesia were the result of the intake of 200 milligrams of benactizine by one of the authors. It was noted that while the picture of intoxication by lysergic acid diethylamide simulates psychic disturbances of a functional character, intoxication by benactizine is characterized by psychic symptoms of an organic disturbance."

67. Effect of Anicaine on Nervous Functions

"On the Effect of Anicaine (Diphenylacetic Ester of Pyperidine Ethanol) on Higher Nervous Functions," by T. A. Melnikova, Sb. Nauchn. Tr. Leningr. Khim-Farmatsevt. In-ta (Collection of Works of the Leningrad Chemicopharmaceutical Institute), No 3, 1957, pp 254-259 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 64939, by U. G. Gasanov)

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"Anicaine even in small doses has a depressing effect on the cerebral cortex. In a dose of 10 milligrams per kilogram of body weight, anicaine has no appreciable effect on the motor-digestive conditioned reflexes of rats. In doses of 20-100 milligrams per kilogram of body weight, anicaine depresses or completely inhibits positive reflexes in rats. When administered to dogs in doses of one milligram per kilogram of body weight, it depresses positive conditioned and unconditioned reflexes, upsetting the force of their intensities."

68. Tetrafluoroethylene Intoxication

"Data on the toxicology of Tetrafluoroethylene," by A. I. Zhemerdey, Tr. Leningr. San-Gigiyen. Med. In-ta (Works of the Leningrad Sanitary-Hygienic Institute), No 44, 1958, pp 164-176 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 65246, by T. A. Shtessel)

CPYRGHT

"The toxicity of the monomer of tetrafluoroethylene was studied on rats and rabbits following their 2-hour intoxication in a chamber. The lethal concentration of tetrafluoroethylene for rats was 2.5 volume percent, and for rabbits, 4 volume percent. Microscopical examinations of the dead animals revealed hyperemia in the organs, the brain in particular; hemorrhages in the lungs and spleen; and dystrophic renal modifications. Acute intoxication of different animals by products of the depolymerization and pyrolytic fission of the polymer of tetrafluoroethylene was noted when a plastic mass was heated to a temperature of 600 degrees in a crucible furnace installed in the chamber. It is assumed that when the thermic decomposition of the polymer of tetrafluoroethylene takes place anhydrous hydrofluoric acid, fluorophosgene, and cyclic compounds are liberated in addition to the monomer of tetrafluoroethylene, and that these produce the following pathological anatomical picture: acute irritation of the upper respiratory organs; edema of the lungs if the animals die early, and pneumonia if they die at later periods. Dystrophic renal changes were found in cats."

69. Toxic Effects of Manganese

"Role of Neurohumoral Disorders in the Mechanism of the Toxic Effects of Manganese," by V. A. Mikhaylov, Vopr. Gigiyeny Truda, Profpatol. i Prom. Toksikol. (Problems of Labor Hygiene, Occupational Pathology, and Industrial Toxicology); Sverdlovsk, Vol 2, 1958, pp 282-300 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 65256, by R. S. Vorob'yeva)

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"The administration of $MnCl_2$ to animals intravenously, with food, and suboccipitally produced a depression of the central nervous system and of some of the vegetative functions and deep vascular and degenerative-dystrophic modifications in the internal organs and endocrine glands. Decreased blood pressure, muscular hypotonia, hyperkalemia, a decrease in the blood content of adrenalinlike substances, modifications of the processes of absorption and secretion of radioactive iodine by the thyroid gland were observed. An investigation of the functional condition of the nervous system disclosed changes in the amplitude of the cerebral biocurrents, the prolongation of reflex time to electrical irritation, and an increase in chronaxy with disturbed subordination. In small doses, $MnCl_2$ increased the secretion of vitamin B_1 , while in large doses, it sharply decreased it. The administration of vitamin B_1 in combination with lactate prevented the death of 70 percent of the mice intoxicated with an LD_{100} of $MnCl_2$. Data on clinical observations of industrial intoxications by Mn are presented."

70. Effect of Manganese Intoxication on Organism

"Significance of Endocrine and Neurovegetative disorders in the Pathogenesis of Industrial Toxicoses. 1. On the Problem of the Neuroreflex Mechanism of the Morphological Changes in Some of the Endocrine Glands in Manganese Intoxication," by V. A. Mikhaylov, I. A. Kusevitskiy, and O. I. Komarova, Vopr. Gigiyeny Truda, Profpatol. i Prom Toksikol. (Problems of Labor Hygiene, Occupational Pathology, and Industrial Toxicology), 1958, pp 208-220 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 59, Abstract No 65257, by R. S. Vorob'yeva)

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"Single or repeated administrations of $MnCl_2$ in doses of 0.5 milligram per kilogram of body weight in 0.2 milliliter of a warmed physiological solution were given to rabbits. The animals were killed by bleeding from one to 56 days later. Histological examinations of the thyroid gland, suprarenals, hypophysis, and testis were conducted. Expressed toxic changes in the endocrine glands, the thyroid gland in particular (edema of interstitial tissue, thickening and fragmentation of argyrophil fibers, infiltration of the round cells), were noted on the first day after

the administration of $MnCl_2$. By the 12th-14th day, the toxic symptoms in all glands decreased and a moderately expressed proliferation of the mesenchymal elements was noted. By the 30th day, remains of the proliferation process were found in the thyroid gland only. The vascular reaction was less pronounced and was limited to plethora and disturbed permeability. Repeated administration of $MnCl_2$ led to the development of sclerosis affecting primarily the thyroid gland and the necrobiotic processes in the suprarenals."

71. Toxicity of Aminazine

"On the Toxicity of Aminazine," by G. N. Dukareva, Laboratory of Industrial Toxicology of the Institute of Labor Hygiene and Occupational Diseases, Academy of Medical Sciences USSR; Moscow, Farmakologiya i Toksikologiya, Vol 22, No 2, Mar/Apr 59, pp 189-190

Experiments conducted on mice established that the absolute lethal dose of aminazine when administered to the animals intraperitoneally was 200 milligrams per kilogram of body weight; the minimum lethal dose was 40 milligrams per kilogram of body weight; the maximum tolerated dose was 20 milligrams per kilogram of body weight. The preliminary administration of aminazine intraperitoneally in nonlethal doses for some period of time increased the tolerance of the organism to relatively large doses of the drug. Aminazine in powder form or in the form of a 3-percent solution irritates the skin and the mucous membrane of the eyes. It penetrates the skin when applied in 3-10-percent solutions.

72. Therapy of Internal Diseases With Aminazine

"Aminazine in the Therapy of Internal Diseases," by T. A. Nezvorova, Psychiatric Clinic imeni S. S. Korsakov, First Moscow Order of Lenin Medical Institute imeni I. M. Sechenov; Moscow, Klinicheskaya Meditsina, Vol 37, No 9, Sep 59, pp 32-37

Clinical observations carried out in the course of 4 years indicate that aminazine and other phenothiazine derivatives can be beneficially applied in the therapy of a number of internal diseases. It can be recommended for use in the therapy of bronchial asthma, anorexia, hypertonia, neurasthenic syndromes, acute psychomotor irritation, epilepsy, and other disorders. The application of aminazine is contraindicated in diseases of the gastrointestinal tract; chronic spastic colitis; cirrhosis of the liver; acute, subacute, and chronic Botkin's disease; cholelithiasis; chronic cholangitis; acute and chronic nephritis, and a number of other diseases. Tolerance of the patients to aminazine should be established before the drug is administered. Only qualified personnel should be in charge of the administration of aminazine.

73. Biomycin in Therapy of Cholecystoangiocholitis

"The Application of Biomycin in the Treatment of Patients Suffering From Cholecystoangiocholitis," by K. I. Simbiryakova, Chair of Second Therapy of the Kiev Institute for the Advanced Training of Physicians; Moscow, Terapevticheskiy Arkhiv, Vol 31, No 8, Aug 59, pp 74-78

Biomycin was administered to 45 patients suffering from chronic cholecystoangiocholitis. The majority of these patients failed to respond to the usual means of therapy. The results were as follows:

Biomycin was found to be a highly useful therapeutic agent when used in combination with the normally accepted methods of therapy of cholecystoangiocholitis.

The addition of biomycin to the other modes of therapy of the disease led to an improvement of the general condition of the patients, diminution or complete disappearance of pain in the right hypochondrium, reduced temperature, and improved morphological composition of the bile.

Doses recommended are 0.2 gram six times in 24 hours or 0.3 gram four times in 24 hours for a period of 12-15 days. This may be repeated within 7-10 days if necessary.

Physiology

74. Oxygen Insufficiency Discussed

"The Problem of Oxygen Insufficiency," by Prof I. Petrov, Corresponding Member of the Academy of Medical Sciences USSR; Moscow, Meditinskiv Rabotnik, No 58 (1806), 21 Jul 59 p 3

The author of this article states that pathological physiology is becoming immensely important. Further investigation of oxygen starvation, a field which has been attracting the attention of Russian pathologists for the past 60 years, is one of the most fundamental tasks of this branch of science.

The extraordinary significance of this problem lies in the fact that a human being is born experiencing oxygen insufficiency, and dies because the flow of oxygen to the brain is insufficient. Oxygen insufficiency may be observed during the entire life of a human organism. Oxygen starvation may also arise during pathological changes in the functions of organs which participate in supplying a living organism with oxygen, and also when there is some disturbance in internal respiration.

Various scientific establishments in the USSR have been conducting extensive research in the field of oxygen insufficiency. The Military Medical Academy imeni S. M. Kirov has one of the oldest chairs of pathological physiology, which has contributed greatly to the effort. The use of the term "oxygen starvation" was first proposed at the above-mentioned academy, and an appropriate section was added to the course of study of pathological physiology (V. V. Pashutin).

Academician P. M. Al'bitskiy discovered as early as 1884 that if the oxygen content in the ambient air is reduced even 9%, the metabolic processes remain at a high level of activity. On the basis of this information, it can be deduced that an organism has the capacity to compensate for oxygen insufficiency. This was confirmed by investigations conducted by Ye. A. Kartashevskiy, who also noted that the course of oxygen insufficiency is more severe when the oxygen content of the inspired air and the temperature of the immediate environment are low.

It was previously noted that the volume of blood which can be lost varies greatly in dogs. This loss of blood may be fatal and depends on the effects of various environmental factors which change the general condition of the animals. It was subsequently shown that chilling, overheating, irritations that cause pain, heterosensitization and autosensitization, radiation sickness, etc. increase organism's sensitivity to oxygen insufficiency of varying origin. It can be concluded from this that the volume of blood lost may be large or small depending on the functional condition of the organism.

Soviet pathophysiologists devoted much time to the study of changes in the function of the central nervous system when there is oxygen insufficiency. Oxygen insufficiency may cause disturbances in psychic activity, a decrease in efficiency, incoherence in writing, the onset of convulsions, etc. The results of experimental research demonstrate that the central nervous system is very sensitive to an insufficient oxygen supply.

I. P. Petrov and P. N. Vesel'chin investigated the central regulation of circulation during oxygen insufficiency. They found that the respiratory center plays an important part. The respiratory center constantly tones the vasomotor center by means of "intracentral" irradiation of excitation and receives and transmits both humoral and reflex irritations to it. Investigations of the reflex regulation of circulation during oxygen insufficiency showed that the depressor reflex does not occur when irritation of the sinocarotid nerve takes place at the peak of arterial pressure. Results of a systematic study conducted during the past 10 years revealed that phase transitions take place in conditioned and unconditioned reflexes during anemia of the brain, loss of blood, asphyxia, and the effects of exposure to rarefied atmosphere.

An effective complex therapy of oxygen deficiency of the brain was developed experimentally. The administration of urethan with veronal and of air with 50% oxygen content, and the repeated injection of glucose containing vitamins C and B₁ provided a good therapeutic effect in all cases of anemia of the brain in white rats. This group of drugs made it possible to save the lives of 60%-80% of the white rats. The mortality rate in the control group was 100% (I. R. Petrov)

Soviet scientists are confronted with the problem of clarifying the role played by the endocrine glands during oxygen starvation, and how these glands react to measures taken to treat and prevent the harmful consequences of oxygen insufficiency. The combined efforts of pathophysiologists, biochemists, neurohistologists, pathological anatomists, surgeons, and therapists are needed to solve these problems. There is great need for supplying research laboratories with appropriate modern instruments.

75. Conditioned Reflex Research

"The Physiological Mechanism of the Conditioned Reflex in Time," by M. I. Rozin; Minsk, Doklady Akademii Nauk. BSSR No 7, Jul 59, pp 318-321

The author of this article states that a saliva reflex to food in higher animals must be viewed not only as an unconditioned reflex due to which mechanical and biochemical action on food takes place in the mouth, but also as a food-getting reflex, developed to suit environmental conditions. The food-getting reflex becomes the initial component

of the entire chain of the food reaction. In the chain of successive links of this reaction, noted in experiments on dogs, it is possible to observe a turning of the head in the feed box, movements of extremities leading to the feed box, opening of the doors to the feed box, movements of the maxillae, and salivary secretion, swallowing, and licking. This indicates that the development of a reflex in time begins only after a positive reaction to an effective experimental situation has been formed.

Public Health, Hygiene, and Sanitation

76. Express Analysis of Minute Impurities of Butyl Nitrate in Air

"Rapid Determination of Butyl Nitrate in Air," by K. G. Parfenova. Uch. Zap. Ukr. N.-I. In-t Gigiyeny Truda i Profzabolevaniy (Scientific Notes of the Ukrainian Scientific Research Institute of Labor Hygiene and Occupational Diseases), No 27 1958, pp 131-132 (from Referativnyy Zhurnal-Khimiya, No 18, 25 Sep 59, Abstract No 64882, by T. Solov'yeva)

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"The rapid method for determining butyl nitrate in air is based on the formation of a red color in silica gel, which is saturated with Griess reagent, after drawing air which contains vapors of butyl nitrate (25 ml of air is drawn in one minute) through it. The NO₂-group of butyl nitrate or HNO₂, which was formed on hydrolyzing the butyl nitrate with moist air, appears to be the diazotizing agent. The concentration of butyl nitrate is determined by comparison with a constant scale of standards (2.5-100 γ/l.), which is prepared by saturating silica gel with Co. solutions of various concentration. The sensitivity of the method is 2.5 γ/l. The proposed apparatus consists of a rubber bulb in a metal housing which has a metallic capillary and a movable graduated scale."

77. Determination of Minute Impurities of Dichlorobenzene in Air

"Quantitative Determination of Dichlorobenzene in the Atmosphere," by V. A. Kulik, (Uch. Zap. Ukr. N.-I. In-t Gigiyeny Truda i Profzabolevaniy (Scientific Notes of the Ukrainian Scientific Research Institute of Labor Hygiene and Occupational Diseases), No 27, 1958, pp 133-134 (from Referativnyy Zhurnal-Khimiya, No 18, 25 Sep 59, Abstract No 64879, by T. Solov'yeva)

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"A method is proposed for determining dichlorobenzene (I) in the atmosphere, based on the nitration of (I) to dinitrodichlorobenzene (II). On the addition of C₂H₅OH, H₂O and a 40% solution of KOH to (II), a yellow-orange solution of dinitrophenolate is formed which is compared with a scale of standards (the scale is stable). The sensitivity of the method

is 7% of (I) in 10 ml. Accuracy is $\pm 15\%$. The selection of an air sample is done in evacuated flasks with ground stoppers. Capacity of a flask is 0.3-0.5 liters. Nitration is conducted in these flasks. A variation of the photolorimetric method was developed for determining (I), which is more accurate and objective, sensitive to 5.8/l and has an accuracy of $\pm 5\%$."

78. Minute Impurities of Benzene Detected by Polarography

"Polarographic Determination of the Vapors of Benzene and Its Homologs in the Atmosphere," by E. M. Stepanenko, Tr. Nauchn. Sessii Leningr. N.-I. In-ta Gigiyeny Truda i Profzabolevaniy. Posvyashch Itogam Raboty za 1956 g. (Works of the Scientific Session of the Leningrad Scientific Research Institute of Labor Hygiene and Occupational Diseases, Dedicated to the Results of Work During 1956); Leningrad, 1958, pp 273-277 from Referativnyy Zhurnal -- Khimiya. No 18, 25 Sep 59, Abstract No 64877, by Ye. Deyanova

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"A polarographic method has been described for determining the vapors of benzene and its homologs in air, which is based on the absorption of their nitro mixtures and the polarographic determination of the dinitro derivatives after neutralization of the nitro mixtures with 10% NaOH solution. An equal quantity of buffer solution is added to the neutralized solution before the polarographic determination. Polarographic determination is conducted at the sum of the heights of the two waves which correspond to the two reductions of the nitro groups on the dropping mercury cathode. This method guarantees a high degree of sensitivity (0.1/ml for C_6H_6 and $C_6H_5CH_3$ and 0.2/ml for $C_6H_4(CH_3)_2$)."

Radiology

79. Hygienic Measures on Atomic Icebreaker Lenin

CPYRGHT

"The Atomic Ship Lenin, by Ye. Osipov; Moscow, Meditzinskiy Rabotnik, No 75 (1823), 18 Sep 59, p 2

"The atomic icebreaker Lenin is now in the great port of Kronshadt. The Soviet shipbuilders, in creative cooperation with scientists and technologists, have built this remarkable ship and have provided for the reliable protection of the crew from the effect of ionizing radiations. For this purpose, they have constructed original apparatuses and instruments which have never been used before. Proven means of protective technology also have been used. Reactor control is completely automatized. The reactors are arranged in a central compartment which is hermetically isolated from all other compartments of the ship. This constitutes the

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so-called restricted zone. Only a limited number of people who service the power equipment have the right to be in this zone. Entrance into this area is possible only through special sanitary passages. To enter, each person wears a protective costume.

"On leaving the central compartment, the service personnel are subjected to dosimetric control and undergo sanitary treatment. One sanitary passage is equipped with a washing machine for laundering protective clothing.

"Mooring tests of the icebreaker have shown that the complex of protective measures which have been adopted completely protect the compartments, equipment, and the clothing of the crew from radioactive contamination. Physiological investigations have confirmed that the means of individual protection meet all the medical requirements.

"In the vicinity of the icebreaker, numerous measurements have been systematically conducted on the level of radioactivity in the soil, water, and air. Results of these experiments have confirmed the accuracy of the calculations of the physicists and hygienists: no deviations from the normal level of natural radiation were detected.

"The protective measures work faultlessly. Regardless, the ship has a group of people with the single duty of radiation safety. Furthermore, the crew is provided with therapeutic and prophylactic aid. The icebreaker is supplied with therapeutic, X-ray, and dental offices, a sick bay, and a surgical unit. A systematic medical check of the health of the crew is conducted by experienced specialists.

"The flagship of the polar fleet -- the remarkable creation of Soviet scientists, engineers, technicians, and workers -- will depart on a long voyage. The Soviet people wish the crew of the icebreaker, bearing the name of the great Lenin, great successes in their work for the glory of the Motherland in the name of peace to the whole world."

Captions for accompanying photographs read as follows: "Meeting at Admiralteyskiy factory on the occasion of the completion of the construction of the atomic icebreaker Lenin; central dosimetric point of the atomic ship; machine for laundering plastic protective clothing."

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80. Content and Biosynthesis of DNA in Mucosa of Small Intestines During Radiation Sickness

"The Content of Desoxyribonucleic Acid in the Mucous Membrane of the Small Intestine in Experimental Radiation Sickness," by V. A. Kareva, Biochemistry Laboratory of the Ukrainian Scientific Research Institute of Nutrition; Kiev, Ukrainskiy Biokhimicheskiy Zhurnal, Vol 31, No 4, 1959, pp 525-533

The purpose of this research was to explain the degree of disturbance of nucleic acid metabolism during the first 3 days after X irradiation of animals. The author studied the renewal rate of nucleic acids by determining the radioactive phosphorus level at 24, 48, and 72 hours after a single whole-body irradiation of guinea pigs by 500 r doses. Data on the rate of inclusion of P^{32} into desoxyribonucleic and ribonucleic acids were expressed in the form of relative specific activity.

Results of these experiments showed that one day after total X irradiation of guinea pigs, the relative specific activity of DNA is sharply decreased in the mucous membrane of the small intestine. Later (during the 2nd-3rd day) this process returns to and even exceeds normal. Under these same conditions, the relative specific activity of RNA is changed only slightly.

The author also presents data on the effect of ascorbic acid, RNA, adenosine triphosphoric acid, and copper on the DNA content in the mucosa of the small intestines of organisms subjected to whole-body X irradiation. It was shown that ascorbic acid, RNA, ATP acid, and copper exert a stimulating effect on the biosynthesis of DNA in the cellular nuclei of tissues of such animals.

Copper in conjunction with ascorbic acid and RNA is the most effective combination for stimulating the biosynthesis of DNA.

81. Preliminary Hemorrhage Stimulates Erythropoiesis in Radiation Sickness

"The Study of Iron Metabolism in Irradiated Dogs With Increased Erythropoietic Function," by L. L. Shepshelevich, Central Order of Lenin Institute of Hematology and Blood Transfusion, Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 10, Oct 59, pp 9-14

The purpose of this research was to study the changes in erythropoiesis during radiation sickness in dogs against a background of preliminary hemorrhage. Tagged iron (Fe^{59}) was used as the index.

CPYRGHT The author presents the following conclusions:

"1. Preliminary repeated hemorrhages of dogs subjected to whole-body irradiation by LD₉₅ doses caused increased bone marrow erythropoietic function during the first 10 days.

"2. A single preliminary hemorrhage of dogs subjected to whole-body irradiation by LD₇₅ and LD₉₅ contributes to the maintenance of normal bone marrow erythropoietic function.

"3. The study of the metabolism of tagged iron in dogs irradiated by an LD₉₅ dose after a single preliminary hemorrhage also confirms the presence of more intensive erythropoiesis in these dogs."

82. Serum and Gastric Erythropoietic Factor in Acute Radiation Sickness

"The Study of the Erythropoietic Factor of the Stomach and Blood During Acute Radiation Sickness," by M. G. Kakhetelidze and L. S. Rogacheva, Central Order of Lenin Institute of Hematology and Blood Transfusion, Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 10, Oct 59, 14-19

The purpose of this research was to study the effect of various doses of roentgen rays on the dynamics of the hemopoietic factor. The hemopoietic factor content was determined simultaneously in the gastric juice and in blood serum by using a hemoculture method over a 44-day period. Tests were conducted on three dogs subjected to a single whole-body X irradiation with 300, 400, and 600 r doses respectively. The authors discuss the various facets of the problem.

Results showed that both in Addison-Biermer's disease and in radiation sickness it is possible to note leukopenia, dissociation of nucleus and cytoplasm during maturation, and the appearance of band-shaped nucleated and polynuclear neutrophils; in addition, megaloblastic hemopoiesis appeared after radiation injuries. CPYRGHT

The authors suggest that "the substances which impede cellular activity in hemocultures both during radiation sickness and during radiation sickness and during Addison-Biermer's disease are identical."

CPYRGHT

83. Ionizing Radiations Aggravate Sequelae of Incompatible Blood Transfusion

"The Effect of Whole-Body Irradiation on the Iso-Agglutinating Properties of Dog Blood," by M. N. Novikova, Central Order of Lenin Institute of Hematology and Blood Transfusion, Ministry of Health USSR; Moscow, Problemy Gematologii i Pereli-vaniya Krovi, Vol 4, No 10, Oct 59, pp 7-8

The purpose of this research was to study the changes in the isoagglutinating properties of the blood of dogs subjected to the effect of various doses of ionizing radiation from X rays.

The blood of 125 dogs was matched for compatibility before and at various periods (2, 7, 14, and 21 days) after irradiation with that of six donor dogs. A small amount of incompatible blood was administered by drip infusion to the experimental dogs which had been subjected to a single whole-body X irradiation by 300 r. Various pathological tests revealed marked multiple hemorrhages into the internal organs in two dogs.

Considering that there would have been no symptoms of hemorrhagic diathesis if the general condition of the dogs had been satisfactory before the transfusion, it may be deduced that the transfusion of the small amount of incompatible blood (20 ml) was exacerbated by radiation sickness and was accompanied by the hemorrhagic syndrome. It is known that in blood transfusion shock it is possible to detect a paralytic condition of the blood vessels, decreased blood coagulation, and erythrocyte hemolysis. Evidently, in this case, the effect of transfusing incompatible blood was superimposed on the comparatively poorly manifested symptoms of the effect of ionizing radiation.

Analogous results were obtained when dogs were irradiated by 400 r.

Veterinary Medicine

84. Diagnosis of Infectious Equine Encephalomyelitis

"The Use of the Complement-Fixation Reaction for the Diagnosis of Infectious Equine Encephalomyelitis on Threatened Farms in Western Oblasts of the Ukraine," by M. V. Revo, V. I. Rotov, V. P. Obrastsov, and O. A. Primak, Nauchn. Tr. Ukr. N.-I. In-t Eksperim. Vet. (Scientific Works of the Ukrainian Scientific Research Institute of Experimental Veterinary

Medicine), No 24, 1957 (1958), pp 23-30 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 59, Abstract No 80304, by A. Ya. Shapiro)

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"The reaction was tested on 231 sera from horses of the following groups: (1) 7 with IEL (infectious encephalomyelitis); (2) horses which had recovered from IEL; (3) 150 which were in contact with horses with IEL; (4) 42 healthy horses from farms threatened with IEL; and (5) 10 horses with other diseases from farms threatened with IEL. Results: sera from all the horses of the first group gave positive reactions; 90% of sera from horses of the second group gave positive reactions, and 10% gave negative reactions; 76% of the sera from horses of the third group gave positive, 16% -- doubtful, and 8% -- negative reactions; sera from horses of the fourth group gave negative reactions in 85% of the cases; the number of negative reactions in the fifth group did not exceed 70%. The authors assume that the RSK [complement fixation reaction] is specific for the diagnosis of IEL."

85. Fowl Plague Vaccine Tested

"Testing of a Vaccine Against Fowl Plague From Strain B₁ Under Production Conditions," by M. T. Prokof'yeva, I. N. Doroshko, V. P. Golubnichiy, and V. M. Georgiyevskiy, Byul. Nauchno-Tekhn. Inform. Ukr. N.-I. In-ta Eksperim. Veterinarii (Bulletin of Scientific-Technical Information of the Ukrainian Research Institute of Experimental Veterinary Medicine), No 4-5, 58, pp 19-20 (from Referativnyy Zhurnal--Biologiya, No 18, 25 Sep 59, Abstract No 80356, by L. S. Kirichenko)

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"Some 839,232 fowl of different ages, beginning with one-day-old chicks, were vaccinated intranasally and orally. In the first case, it was diluted with water (1:25-1:50), and two or three drops were administered simultaneously. In the second case, the vaccine was given with drinking water in a concentration of 1:1,000-1:2,000 on two subsequent days one hour before feeding; 5 and 10 ml or 10 and 15 ml were given depending on the age of the bird. It was established that the vaccine is harmless and has high immunogenicity when it is introduced by either method."

86. New Method of Immunizing Against Hog Cholera Announced

"A New Method of Immunizing Against Hog Cholera," by I. Okuntsov and G. Yepifanov, S. Kh. Sibiri (Agriculture of Siberia), No 10, 58, pp 69-70 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 59, Abstract No 80333)

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"Positive results of the immunization of swine against hog cholera by means of introducing glycerinized crystal violet vaccine subcutaneously in the ear in a dose of one ml is described."

87. Antiplague Serum and Antibiotics Used to Treat Hog Cholera

"The Use of Hyperimmune Serum in Conjunction With Certain Antibiotics, and Chemical Preparations in the Treatment of Hog Cholera," by G. F. Pogonyaylo, P. D. Yevdokimov, V. P. Zelenskiy, and A. B. Teryukhanov, Byul. Nauchno-Tekhn. Inform. Leningr. N.-I Vet. In-ta (Scientific-Technical Information Bulletin, Leningrad Scientific Research Veterinary Institute) No 5, 58, pp 16-18 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 59, Abstract No 80326)

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"The use of serum (2 ml/kg) in conjunction with aureomycin, which was given orally in 10-12 mg/kg doses, was found to be most effective in the authors' experiments (all 17 of the animals subjected to this therapy recovered). Thirty-two out of 45 animals treated recovered when serum (2 ml/kg) was used in conjunction with penicillin and streptomycin (5,000-8,000 units per kg three to four times at intervals of 10-12-18 hours)."

Miscellaneous

88. New Medical Periodical of Ministry of Health RSFSR

Moscow, Meditsinskiy Rabotnik, 27 Oct 59

Beginning with January 1960, a new medical periodical will be published titled Byulleten' Uchenogo Meditsinskogo Soveta Ministerstva Zdravookhraneniya RSFSR (Bulletin of the Scientific Medical Council of the Ministry of Health RSFSR). The periodical will appear bimonthly at a cost of 24 rubles per year.

The periodical will contain material reflecting the status of scientific research in the fields of medicine and biology within the RSFSR and other union republics. A prominent place will be given to problems concerning the planning and organization of research, institutes, and laboratories. Summaries of conferences, congresses, and plenums on either the all-union or republic level concerned with all aspects of medicine will also be included.

89. Ministers of Health Conference

"A Conference of the Ministers of Health of Socialist Countries" (unsigned article); Moscow, Meditsinskiy Rabotnik, 22 Sep 59, No 76 (1824), p 4

This article reports that the Fourth Conference of the Ministers of Health of Socialist Countries was opened in the public conference hall of Sofia on 18 September 1959. The main topic under discussion was medical service to the rural population.

The conference was called to order by Dr. P. Kolarov, the Bulgarian Minister of Health and Social Welfare. The first deputy chairman of the Council of Ministers of Bulgaria, Georgi Traykov, delivered the welcoming speech in the name of the government of the Bulgarian People's Republic. He was followed by Minister of Health USSR S. V. Kurashov, Chinese Vice-Minister of Health Ho Piao, Minister of Health of Poland Prof P. Baran'skiy, Minister of Health of Hungary F. Doleschall, Minister of Health of the German Democratic Republic M. Sefrin, Deputy Minister of Health of the Democratic People's Republic of Korea Chòe Chàng-sok, Minister of Health of Czechoslovakia I. Plojhar, Minister of Health of Rumania V. Marinescu, Deputy Minister of Health of Albania Csirill Pistolli, Minister of Health of the Democratic Republic of Vietnam Pham Ngoc Thach, and Deputy Minister of Health of the Mongolian People's Republic O. Radnadorj.

Dr Kiril Ignatov, Deputy Minister of Health and Social Welfare of Bulgaria, read a report on the status of health service to the rural population in socialist countries and discussed the long-range view of such service in rural areas.

The organization and structure of rural medical service and the function of rural medical establishments was discussed in various sections of this international symposium. F. G. Zakharov, Chief of the Directorate of Specialized Medical Aid of the Ministry of Health USSR, read a report on the subject of "The Oblast Hospital as an Organizational and Methodological Center of Specialized Medical Aid to the Rural Population." A. P. Diskalenko, Minister of Health Moldavian SSR, discussed the work of rural medical district hospitals and the work of the rural rayon health service in Moldavia. Members of the Hungarian delegation reported on the food supply problem in the rural areas. Guarding the health of mothers and children in villages was discussed by the Czechoslovak delegation; tuberculosis control was discussed by members of the German Democratic Republic delegation; and the Bulgarians spoke on educational work in sanitation in rural areas.

Members of delegations from socialist countries spent a day inspecting the rural medical establishments of Bulgaria.

90. Statistical Data on Development of Public Health in RSFSR

"Fundamental Indexes on the Development of Public Health in the RSFSR Toward the Beginning of 1959" (unsigned article); Moscow, Zdravookhraneniye Rossiyskoy Federatsii, No 10, Oct 59, pp 46-48

The following figures give the number of active physicians in the RSFSR according to specific specialties as of 1958:

Therapists (including therapists, physiotherapists, and infectionists) -- 45,380; surgeons -- 18,332; obstetricians-gynecologists -- 13,262; pediatricians -- 27,268; oculists -- 4,744; otolaryngologists -- 4,209; neuropathologists -- 4,781; psychiatrists -- 3,047; phthisiatrists -- 7,192; dermatovenereologists -- 4,411; roentgenologists -- 7,255; sanitary-antiepideology physicians (including sanitation physicians, epidemiologists, malarialogists, bacteriologists, helminthologists, and disinfectionists) -- 14,039. The over-all total is 183,228, as compared with 157,062 for 1955, 129,927 for 1950, and 70,793 for 1940.

The following figures give the number of rest homes and sanitoriums as of 1958: The over-all number of sanatoriums in the RSFSR for adults and children is 1,126 with a total of 162,000 spaces; total number of sanatorium for children, 610 with a total of 61,000 spaces; total number of rest homes, 530 with a total of 106,000 spaces.

The following figures give the number of independent ambulatorium-polyclinic institutions as of 1958:

Polyclinics and ambulatoriums (excluding children's and physiotherapy) -- 773 in urban areas and 940 in rural areas; children's polyclinics and ambulatoriums -- 19 in urban areas and none in rural areas; children's consultation polyclinics -- 90 in urban areas and one in rural areas; independent consultation points for women -- 41 in urban areas and 2 in rural areas, for children -- 34 in urban areas and 4 in rural areas, for both -- 6 in urban areas and 6 in rural areas; other similar institutions -- 9 in urban areas and one in rural areas. The total number is 972 in urban areas and 954 in rural areas, as opposed to 921 in urban areas and 1,270 in rural areas for 1955.

The following figures give the number of patients hospitalized during 1958: Number hospitalized in urban institutions -- 13,858,100; number of rural patients hospitalized in urban institutions -- 2,626,800; number hospitalized in village and town hospitals -- 5,762,900.

91. Public Health in Uzbek SSR

"One Hundred Buildings Are Ready for Medical Institutions,"
by R. Sagatov, Minister of Health Uzbek SSR; Moscow, Medit-
sinskiy Rabotnik, No 85 (1833), 23 Oct 59

The 1959 public health budget for the Uzbek SSR amounted to 1,259,000,000 rubles. In 1960, the budget will be increased by 200 million. At present, there are more than 9,000 hospitals, polyclinics, ambulatoriums, and other medical institutions, where some 10,000 physicians and over 30,000 intermediate medical workers are employed. In urban and rural areas nearly 50,000 hospital beds are available, of which 15,000 are in rural areas. Also, there are 130 ambulatoriums in rural villages, and nearly 3,000 feldsher-obstetrical stations.

During the Seven-Year Plan, the number of hospital beds is to increase by 20,000 and, 500 new nurseries containing 27,850 spaces will be built. Some 672 million rubles will be spent in new construction for all types of medical establishments.

During the past months, efforts have been made to make some 100 buildings available for medical purposes. The buildings are now ready and they increase available bed space by 3,500. Other buildings will be used for nurseries, sanatoriums, polyclinics, and ambulatoriums.

92. Irkutsk Medical Institute Celebrates 40th Anniversary

"The Irkutsk Medical Institute Is 40 Years Old" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 86 (1834), 27 Oct 59

The Irkutsk Medical Institute during its 40 years of existence has trained over 7,000 physicians and 750 pharmacists. At present, the Irkutsk Medical Institute is considered the largest medical institution in the eastern part of the USSR. The institute has 46 chairs, 7 clinics, and a staff of 260 professors, docents, assistants, and instructors.

93. Soviet Medical Students Urged to Study Foreign Languages

"A Physician Must Know a Foreign Language," by N. Nagaychuk; Moscow, Meditsinskiy Rabotnik, No 85 (1833), 23 Oct 59

At present, Soviet medical students for the most part are not taught foreign languages, although its need is well recognized. The primary reason is the lack of good, lucid grammar texts. In addition, medical students rarely have had language training in secondary schools.

The author recommends that all medical students in Soviet medical vuzes (higher educational institutions) and secondary schools be taught either English, German, or French. A speaking knowledge of the language studied would also be desired. Plans for adopting this recommendation in all vuzes has not yet been announced.

94. Prof O. M. Rudenko, Soviet Surgeon and Institute Director, Dies

"In Memory of O. M. Rudenko" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 85 (1833) 23 Oct 59

Prof Oleg Mikhaylovich Rudenko, Doctor of Medical Sciences, outstanding Soviet surgeon, and director of the Riga Scientific Research Institute of Traumatology and Orthopedics, died in his 59th year.

Rudenko graduated from a medical institute in 1924 and worked until World War II as a surgeon in various hospitals and medical institutes of the Ukrainian SSR. After the war, he served as chief surgeon of the Baltic Military District and later was appointed director of the Riga Scientific Research Institute of Traumatology and Orthopedics.

Rudenko was largely responsible for the organization of public health in Latvian SSR and was awarded nine orders and medals.

VI. METALLURGY

95. Recent Soviet Patents in Field of High-Temperature Metallurgy

"Authorship Certificates" (unsigned article); Moscow, Byulleten' Izobreteniy, No 6, 1959, pp 41 and 44

Class 48a. No 118674 (603019 from 1 Jul 1958). T. I. Ustinov and A. Ya. Ishchenko. Method for Nitriding Stainless and Heat-Resistant Steels.

The new method for nitriding stainless and heat-resistant steels at high temperatures, for example 600°C, is distinguished by the fact that the worked surface is activated by products from the dissociation of ammonium chloride to ensure increased thickness and quality of the nitrided layer. Ammonium chloride is introduced in quantities of 100 to 200 grams per cubic meter into the working volume of the apparatus used for performing the nitriding process.

Class 49h, 26. No 118690 (595697 from 23 Mar 1958) V. S. Rastorguyev, I. S. Surikov, Ye. P. Rogozhkin, and A. A. Bukhmanova. High-Temperature Braze.

Braze consist of nickel, chromium, manganese, iron, silicon, and copper, and is used for joining stainless and high-temperature steels. It is distinguished by the fact that to impart high mechanical properties to the braze in temperature ranges up to 800° C the following chemical composition has been established: 35 ± 3% Ni, 3.3 ± 0.5% Cr, 3 ± 0.5% Mn, 3 ± 0.5% Fe, 1.6 ± 0.1% Si, and the balance Cu.

96. New High-Speed Steel for Machining High-Temperature Materials

"Durability Tests of a New High-Speed Steel," by I. S. Amosov; Leningrad, Nauchno-Tekhnicheskiiy Informatsionnyy Byulleten' -- Mashinostroyeniye, No 11, 1958, pp 44-49

Comparison cutting tests on a Kh23N13T type high-temperature steel ($H_B = 160$) were conducted for cutters made of the new high-speed steel RUK8F5 (containing 1.25-1.35% C, 16-18% W, 1.2-1.5% Mo, 7.5-8.5% Co, 3.5-4.5% V and redesignated in subsequent works as R18F4K8M) and the standard high-speed steels R18, R18M, and R9K5. Geometry of tools set in 100-mm diameter milling cutters was identical: side-cutting-edge angle = 45°, end-cutting-edge angle = 10°, side-rake angle = 15°, side relief angle = 10°, back-rake angle = 0°, and nose radius = 2mm. Basic comparison cutting tests were performed at a cutting speed of 30m/min, depth of 2 mm, and feed rate of 0.316 mm/tooth. Tool life for cutters made of steel RUK8F5 was 1.5 times greater than for those of steel R18M and several times greater than for those of steels R18 and R9K5. Tool geometry tests for cutters of

steel RUK8F5 indicated that best stability is obtained with a side-cutting-edge angle of 45° and a side-rake angle of 15° . Recommended heat treatment for cutters of the new steel consists of three-stage annealing at 580° C and subsequent annealing at 500° C for a period of one hour.

A detailed study on the preparation of cutters of steel R18F4K8M, heat treatment, physical and mechanical properties, and cutting performance is presented in a later article: "A High-Tungsten, Cobalt-Vanadium, High-Speed Steel," by Engr A. N. Popandopulo, Leningrad Polytechnic Institute; Stalinsk, Izvestiya Vysshikh Uchebnykh Zavedeniy -- Chernaya Metallurgiya, No 5, May 59, pp 83-89. In this article steel R18F4K8M is indicated as containing from 4.4 to 5.0% chromium, as compared with no chromium in the above-indicated RUK8F5 steel, although both tested out with practically identical results.

97. Ilmenite Concentrates Substituted for Ferrotitanium in Steel Making

"Making Titanium-Containing Stainless Steel Without Utilization of Ferrotitanium," by N. I. Shutkin and M. S. Goncharenko, "Electrostal" Plant; Moscow, Metallurg, No 10, Oct 59, pp 12-14

An aluminothermic mixture containing a Ural ilmenite concentrate (41.6 to 43.05% TiO_2) was substituted for ferrotitanium in the process of making chemical resistant steel LK18N9T. Amount of titanium extracted from the concentrate in different melts ranged from 38.0 to 54.0% and the content of titanium in steels from different melts ranged from 0.33 to 0.49%. Making steel LK18N9T with ilmenite concentrates cost 100 roubles less per ton and was 5 to 10 minutes faster than with ferrotitanium.

98. Effect of Sigma-Phase on Mechanical Properties

"Effect of Sigma-Phase on the Mechanical Properties of High-Temperature Alloys," by Ye. Ye. Levin and Ye. M. Pivinsk, Candidates of Technical Sciences, and Engr P. M. Libman, Central Scientific Research Boiler and Turbine Institute imeni Polzunov; Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 9, Sep 59, pp 17-19

Study of the breakdown mechanism in a two-phase 18-8 type steel (0.05% C, 0.52% Si, 0.86% Mn, 20.36% Cr, 10.5% Ni, 0.80% Mo, 1.45% W, 0.50% Nb, 0.25% Ti) containing a sigma-phase in conditions of deformation in a vacuum at temperatures from 650 to 800° C indicated that the sigma-phase becomes ductile at high temperatures, which in turn results in a sharp increase in ductility of the metal. Cracks in Test specimens appeared at boundaries of austenite grains and propagated along the limits of these grains.

99. Composite Low-Temperature Deformation of 18-8 Type Steels

"Change of Phase Composition in 18-8 Type Steels in Relation to Temperature and Degree of Deformation," by A. N. Chukhleb, Candidate of Technical Sciences, and Engr V. P. Martynov, Khar'kov Aviation Institute; Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 9, Sep 59, pp 44-46

Deformation tests of industrial steels 1Kh18N9, 1Kh18N9T, and EI654 were conducted at 20° and -183°C. Phase studies were made directly during deformation using an apparatus measuring magnetic permeability under different temperature conditions. Optimum strength and ductility for the above steels were achieved by composite deformation (at 20° and -180°C). Insignificant amounts of alpha-phase were detected in deformation at 20°C, whereas a large quantity was noted under the simultaneous effect of deformation and deep cooling. Results showed that preliminary deformation at room temperature improved deformability under conditions of deep cooling.

For additional information on metallurgy, see Section I, Nuclear Fuels and Reactor Construction Materials.

VII. PHYSICS

Atomic and Molecular Physics

100. Surface Ionization of Alkali Metals

"The Mechanism of Surface Ionization of Atoms of the Alkali Earth Metals," by Yu. K. Szhenov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 336-339

The concurrent surface ionization of the alkali earth metals Ba, Sr, Ca, and Mg and the alkali metal Na on incandescent tungsten was investigated with a mass spectrometer. The ionization coefficients were found to be significantly higher when oxygen was circulated about the tungsten. The surface ionization of atoms of the alkali earth metals was found to be specific under the indicated conditions. Along with the concepts of the Saha-Langmuir theory, some new assumptions regarding the mechanism of formation and evaporation of the oxides of these metals from the surface are made to explain the observed phenomena.

Nuclear Physics

101. Electron Energy Losses by Reflection

"Discrete Electron Energy Losses and Secondary Emission From CdO," by N. B. Gornyy, Leningrad Electrotechnical Institute of Communications; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 340-348

It is shown that the discrete energy losses of electrons reflected from a CdO surface are determined by the crystal structure of CdO. The spectra of the discrete losses in CdO and MgO which have identical crystal lattices (face-centered cube) are similar, the differences in the spectra being determined by differences in the lattice constants. The groups of genuine secondary electrons from CdO possessing discrete energies are produced by a single type of mechanism yielding the discrete electron energy losses indicated above. The maximal value of the secondary electron emission coefficient for CdO is only $\delta_{\max} = 1.25$. The small magnitude of this quantity confirms the suggestion made earlier regarding the dependence of δ_{\max} on the relation between the minimal discrete energy loss and the electron work function.

102. Formation of Electron-Positron Pairs

"On Direct Formation of Electron-Positron Pairs by High-Energy Electrons," by V. A. Tumanyan, G. S. Stolyarova, and A. P. Mishakova; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 353-365

The absolute number of spurious tridents due to 10^{10} , 10^{11} , and 10^{12} eV primary electrons is computed by the Monte Carlo method for two types of bremsstrahlung spectrum; for that described by the Bethe-Heitler formula and that described by the Migdal formulas which take into account the Landau-Pomeranchuk and Ter-Mikaelyan effects. It is shown that it should be feasible to measure the energy of fast electrons by determining the energy dependence of the mean transverse distance between the vertexes of electron-positron pairs produced by bremsstrahlung gamma-quanta. The value computed by Ehabha for the cross section of direct formation of electron-positron pairs is confirmed experimentally.

103. Study of Recoil Nuclei

"Recoil Nuclei Produced in the Disintegration of Silver by Fast Protons," by N. I. Borisova, M. Ya. Kuznetsova, L. N. Kurchatova, V. N. Mekhedov, and L. V. Chistyakov; Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 366-373

The angular and energy distribution of the Ag^{106} , $Ag^{103+104}$, Nb^{90} , Zr^{89} , Rb^{81+82} , and Se^{73} recoil nuclei produced in the disintegration of silver by 480 Mev protons is studied. The above-mentioned isotopes in the reaction product mixture were identified by radiochemical methods. The exponential nature of the energy distribution of the recoil nuclei has been established and the distribution parameters at an angle of approximately 90° have been derived. A qualitative explanation of the observed distribution is proposed. The results confirm the mechanism of Se^{73} , Rb^{81+82} , Zr^{89} , and Nb^{90} formation by evaporation of alpha-particles protons, and neutrons.

104. Photoprotons Produced by Gammas

"Investigation of the Spectrum of Photoprotons Produced by Gamma-Quanta with Energies Lying in the Narrow Range of 82-89 Mev," by Ye. B. Bazhanov, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 374-379

Energy spectra were investigated for protons ejected from C^{12} and Al^{27} by gamma-quanta from bremsstrahlung spectra possessing peak energies of 82 and 89 Mev. The experimental data are compared with the curves computed on the basis of Dedrick's data. Although the agreement is not very good, it may nevertheless be possible that there is a contribution of a quasideuteron mechanism to the interaction between the gamma-quanta and indicated nuclei.

105. Disintegration of Carbon Nuclei

"Result of a Study of Disintegration of Carbon Nuclei by 660 Mev Protons," by A. P. Zhdanov and P. I. Fedotov, Radium Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 393-398

Disintegration of the carbon nuclei of a suspension of diamond particles introduced in nuclear emulsions was investigated. The yield cross sections of the various reactions have been obtained. An analysis of the angular and energy distributions of the disintegration has been carried out under the assumption of the existence of two stages in the interaction between high-energy particles and light nuclei.

106. Spontaneous Uranium Fission

"Some Features of Spontaneous Fission of U-238," by B. D. Kuzminov, L. S. Kutseyeva, V. G. Nesterov, L. I. Pokhorova, G. P. Smirenkin, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 406-412

The mean number of neutrons emitted per event of spontaneous fission of U^{238} , $\bar{\nu} = 2.1 \pm 0.1$ and also the quantity $(\bar{\nu}^2 - \bar{\nu})/\bar{\nu}^2 = 0.95 \pm 0.05$ which characterizes the neutron distribution were measured by the double coincidence method. The values thus obtained, as well as the results of previous studies of neutron emission in spontaneous fission of U^{238} , do not agree with the semiempirical laws valid for most investigated nuclei. The number of neutrons emitted per gram of uranium was determined and found to be $(64.5 \pm 2.0) g^{-1} hour^{-1}$. The decay constant and spontaneous fission period computed on the basis of the data obtained in the present investigation are respectively $(31 \pm 1.5) g^{-1} hour^{-1}$ and $(6.5 \pm 0.3) \cdot 10^{15}$ years.

107. Polarized Recoil Protons

"Polarization of Recoil Protons Produced in Elastic $\pi^+ - p$ -Scattering at 307 Mev Energy," by Ye. L. Grigor'yev and N. A. Milin, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 413-421

Results are presented of investigation of the polarization of recoil protons appearing in elastic $\pi^+ - p$ scattering through an angle of $140 \pm 8^\circ$ in the c.m.s. at an energy of 307 ± 5 Mev. A polarization value $P_1 = -0.19 \pm 0.17$ has been derived from the data on the magnitude of the left-right asymmetry in elastic scattering of recoil protons on nuclei of the photographic emulsion. Phase shifts satisfying the indicated polarization value and consistent with the differential cross section for elastic scattering of π^+ -mesons by protons are given.

Problems connected with the use of various phase shift sets for analysis of the experimental data are discussed.

108. Analysis of a Proton-Electron-Positron System

"Application of the Variational Principle for Determination of the Binding Energy of a Proton-Electron-Positron System," by V. P. Shmelev, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 458-466

The energy of a system consisting of the three particles, proton, electron, and positron, has been determined by the variational method and found to be $E \leq 0.563$ Ry. The system can only dissociate into a proton and positronium atom, the dissociation energy being $E \geq 0.063$ Ry.

109. Analysis in Indefinite Metric

"On Schemes With Indefinite Metric," by V. G. Vaks; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 467-469

Unitarity and macro-causality conditions are investigated for the Lee model with an indefinite metric.

110. Analysis of Rest Masses

"Wave Equations With Zero and Nonzero Rest Masses," by V. I. Ogiyevetskiy and I. V. Polubarinov, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 470-476

It is proved that wave equations with a nonzero rest mass are invariant with respect to a 15-parametric group of transformations which is the representation of a conformal group.

111. Relativistic Momenta

"On the Relativistic Momentum and Angular Momentum Operators," by A. P. Gel'man; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 477-481

Correct expressions for the relativistic operators of the momentum and angular momentum components in orthogonal curvilinear coordinates are derived on the basis of systematic application of spinor theory.

112. Velocity Distribution of Electrons

"Effect of Inelastic Collisions on the Velocity Distribution of Electrons," by L. M. Kovrizhnykh, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 490-500

The velocity distribution function for electrons in a weakly ionized plasma has been found with account of inelastic collisions. It is found that at electron energies exceeding the excitation (ionization) energy inelastic collisions lead to a sharp drop in the distribution function.

113. Determination of Meson Charge

"The Possibility of Determining the π^- -Meson - π^- -Meson Charge Exchange Amplitude by Analyzing the $\pi^- + p = N + \pi^+ + \pi^-$ Reactions Near the Threshold," A. A. Anselm and V. N. Gribov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 501-503

It is shown that an analysis of the experimental data on the energy distribution and angular correlations in the reactions $\pi^- + p \rightarrow n^+ + \pi^+ + \pi^-$, $n + \pi^0 + \pi^0$, $p + \pi^- + \pi^0$ permits one to determine the amplitude for charge exchange of charged π^- -mesons involving their transformation into neutral ones: $\pi^+ + \pi^- \rightarrow 2\pi^0$.

114. "Elementary Length" in Relativistic Theory

"Introduction of an 'Elementary Length' in the Relativistic Theory of Elementary Particles," by Yu. A. Gol'fand, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 504-509

The pseudo-Euclidian momentum space is replaced in the theory by momentum space of constant curvature. The diagram technique of Feynman (Phys. Rev., 76, 796 (1949)) is generalized in the corresponding manner. Finite results are obtained in the lowest order perturbation theory approximation for the fermion and boson self-energy.

115. Electron Scattering on Deuterons

"Polarization Effects in Elastic Scattering of Electrons on Deuterons," by G. V. Frolov, Radium Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 522-526

The scattering differential cross section and the variation of electron polarization during elastic scattering of polarized electrons on polarized deuterons are calculated.

116. Energy Losses of Particles

"Transition Effect in the Theory of Energy Losses of Particles," by G. M. Garibyan, Physics Institute, Academy of Sciences Armenian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2 (8), Aug 59, pp 526-533

Energy losses experienced by a particle passing through a layer of finite thickness are calculated. It is shown that the losses of high energy particles due to traversal of a boundary between two media may be very significant.

117. Nonspherical Odd Nuclei

"Ground States of Nonspherical Odd Nuclei According to the Independent Particle Model," by D. A. Zaikin, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 540-545

The level scheme of nucleons in a spheroidal well with vertical walls is computed by using the asymptotic expansions of the spheroidal wave functions. The results are in good agreement with the experimental data on the spins and parities of the ground and isomeric states of nonspherical odd nuclei.

118. Transuranium Elements

"Proton Subshell $Z = 100$," by N. N. Kolesnikov and A. P. Krylova, Institute of Nuclear Physics, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2 (8), Aug 59, pp 550-552

G. N. Flerov and his associates and Seaborg and Giorso in the US synthesized short-lived isotopes 102^{253} and 102^{254} , both decaying by alpha emission (Reports of the Eighth Mendeleev Conference in Moscow, March 1959). It is attempted to clarify the anomalous properties of the isotopes of element 102 observed in the relation of the energy of the alpha decay to the neutron number.

119. Photoproduction of π^0 Mesons

"Check of the Dispersion Relations for the Photoproduction of π^0 Mesons," by A. M. Baladin and B. B. Govorkov; Moscow, Doklady Akademii Nauk SSSR, Vol 127, No 5, Aug 59, pp 993-996

It has been found that experimental data on photoproduction of π^0 mesons from the reaction : $\gamma + p \rightarrow p + \pi^0$ are at variance with some conclusions based on dispersion correlations of this reaction. The main reason for the discrepancy seems to consist in the suggestion that the amplitude of a single photoproduction tends fast to zero if the energy tends to infinity.

120. Ternary Fission of U-235

"The Mean Number of Neutrons Emitted in Ternary Fission by U-235," by V. F. Apalin, Yu. P. Dobrynin, V. P. Zakharova, I. Ye. Kutikov and L. A. Mikaelian; Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 375-376

It is attempted to improve the results of studies by K. Allen and J. Dewan (Phys. Rev., 80, 181 (1950)) covering triple splitting of U-235. More accurate data on the distribution of kinetic energy of triple fragments have been obtained. The data indicate that at triple splitting the kinetic energy distribution of the fragments not only is shifted, but also differs in form, pointing to a mass distribution differing from that at double splitting.

121. Albedo to Gamma Rays

"The Albedo Presented by Various Substances to Gamma Rays From Isotropic Sources of Co-60, Cs-137, and Cr-51," by B. P. Bulatov; Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 369-371

A report presented by the author in this periodical (Vol 5, No 6, p 631 (1959)) related his previous studies of the albedo values to gamma ray energy from Co-60 and Au-198 by various substances at incident angles of the primary rays of 0, 45, and 60°. These studies are continued by measuring the albedo to gamma rays emitted by an isotropic source in contact with the surface of the scatterer. The values of albedos to gamma rays from isotropic sources 0.320 Mev Cr-51, 0.661 Mev Cs-137, and 1.25 Mev Co-60 obtained experimentally as well as theoretically are plotted in graphs.

122. Transitions at Thermal Neutron Capture

"Type M1 Transitions From Highly Excited States," by L. V. Groshev and A. M. Demidov; Moscow, Atomnaya Energiya, Vol 7 No 4, Oct 59, pp 321-328

Probabilities of M1 transitions from states formed at capture of thermal neutrons are analyzed for even-odd and odd-odd radiating nuclei with A from 20 to 60. In the one-particle model, such transitions are forbidden on l . A comparison with E1 transitions indicates that in even-odd nuclei, the probabilities of observed forbidden M1 transitions do not much differ from probabilities of l -resolved M1 transitions for lighter nuclei. In the case of odd-odd nuclei, some of the M1 transitions are conspicuous by a higher amount of quanta for one capture of neutron and by a high value of

$$\frac{|M|_{M1}^2}{(\sum |M|_{E1}^2)_{\max}}$$

123. Passage of Neutrons

"The Passage of Fast Neutrons Through Lead and Iron," by D. L. Broder, A. A. Kutuzov, V. V. Levin, V. V. Orlov and A. V. Turusova; Moscow, Atomnaya Energiya, Vol 7, No 4, Oct 59, pp 313-320

The results of measurements of spatial distribution of fast neutrons in lead and iron originating from sources of monoenergetic neutrons $E_0 = 4$ Mev and $E_0 = 14.9$ Mev and of neutrons from atomic reactors are presented. For the computation of the spatial energetic distribution of fast neutrons at far distances from the source, a special method of solving the kinetic equation in media slowing down neutrons, due to inelastic scattering on nuclei, is devised. (See Report No 2147, presented at the Second International Conference on Peaceful Uses of Atomic Energy, Geneva, 1958, by the authors.) Allowance is made for the anisotropy of elastic scattering. The neutron energy losses at elastic scattering are neglected.

124. Formation of π -Mesons

"Formation of π^+ Mesons by Positive 280 Mev Pions on Nuclei in a Photoemulsion," by Yu. A. Batusov, N. P. Bogachev, V. M. Sidorov, and I. Chulli; Moscow, Doklady Akademii Nauk SSSR, Vol 128, No 3, Sep 59, pp 490-494

Reactions $\pi^+ + p \rightarrow \pi^+ + n$ and $\pi^+ + n \rightarrow \pi^+ + \pi^- + p$ have been studied at interactions of fast π^+ -mesons with nuclei of photoemulsions. Charged π mesons have been searched in split photoemulsions. It has been found that in most cases the formed mesons have been absorbed in the same nucleus. Conclusion was made that the primary π^+ and π^- mesons, formed in the interaction of the primary meson with one of the nucleons, probably undergo secondary collisions with nucleons of the same nucleus.

125. Primary Cosmic Radiation at 31° N Latitude

"Heavy Nuclei Flux in the Primary Cosmic Radiation at a Geomagnetic Latitude of 31° N," by K. I. Alekseyeva and N. L. Grigorov, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 380-388

The flux of primary heavy particles in the stratosphere was measured with an apparatus consisting of a telescope surrounded by hodoscope counters and two pulse ionization chambers placed between the trays of the telescope counters. The ionization produced in each of the chambers by single particles with a charge $Z \geq 1$ traversing the telescope was measured. The flux of primary alpha particles at the top of the atmosphere at a geomagnetic latitude of 31° N was found to be equal to 0.335 ± 0.035 particles $\text{cm}^{-2} \text{min}^{-1} \text{sterad}^{-1}$ which is $(16 \pm 2)\%$ of the total particle flux. The flux of primary particles with $Z > 2$ under similar conditions was found to be equal to 0.019 ± 0.006 particles $\text{cm}^{-2} \text{min}^{-1} \text{sterad}^{-1}$ which is $\sim 6\%$ of the number of alpha particles and about one percent of the total particle flux at the top of the atmosphere at a geomagnetic latitude of 31° N.

Plasma Physics

126. High-Frequency Discharge

"Localization of High-Frequency Induction Discharge," by M. D. Rayzer and S. Ye. Grebenshchikov, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 564-565

An induction high-frequency discharge in an axially symmetrical magnetic field was studied at a pressure range of 1-100 mm Hg in air, H, and He. It has been established that at an induction high-frequency discharge at a pressure over one mm Hg, a plasma coil is clearly formed, separated from the walls of the vacuum chamber, and existing for the pulse duration of the high-frequency magnetic field.

127. Kinetic Equations of Plasma

"Solution of the Kinetic Equation for a Plasma in a Variable Magnetic Field," by Yu. N. Barabanenkov, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 427-429

The motion of a totally ionized plasma (collisions being neglected) along a narrow magnetic tube of an axially symmetrical magnetic field is considered by means of the kinetic equation. The equation is solved under the assumption of sufficiently slow variation of the magnetic field. Canonical variables are chosen as the independent variables of the distribution function.

128. Plasma Oscillations

"Ionic Oscillations in a Plasma," by T. F. Volkov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 422-426

The effect of a high-frequency electromagnetic field on ionic oscillations in a plasma is considered. It is shown that the frequencies of the longitudinal quasi-acoustic oscillations of the plasma begin to depend on the amplitude of the field. Possible mechanisms of appearance of instabilities are discussed.

Quantum Physics

129. Heisenberg's Theory

"Electromagnetic Interaction in Heisenberg Theory," by Ya. I. Granovskiy, Institute of Nuclear Physics, Academy of Sciences Kazkh SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 442-451

Long-range nucleon interaction is considered on the basis of a non-linear Lagrangian of the general form. The existence of forces possessing a Coulomb dependence on distance and a fine structure constant of $1/138$ (scalar theory) is demonstrated with the aid of the Heisenberg commutation function. The causes of absence of electromagnetic forces in the vector, tensor, and axial theories are considered. Deviations from the Coulomb law and their effect on renormalization of the charge are discussed.

130. Thermoelectric Phenomena in Magnetic Fields

"Thermoelectric Phenomena in Strong Magnetic Fields in Metals Possessing Various Fermi Surfaces," by Yu. A. Bychkov, L. E. Gurevich, and G. M. Nedlin, Institute of Physical Problems, Academy of Sciences USSR, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 534-539

The asymptotic behavior of the thermoelectric force, Peltier coefficients, and Thomson coefficients for metals with closed Fermi surfaces and open surfaces of the "corrugated cylinder" and "space net" type is investigated on the basis of the quasi-classical theory of kinetic phenomena in metals located in strong magnetic fields as developed by Lifshits, Azbel', and Kaganov (ibid., 31, 63 (1956)) and Lifshits and Peschanskiy (ibid., 35, 1251 (1958)).

Solid State Physics

131. Waves of Light in a Crystal

"Light Waves in Crystals in the Region of Exciton Absorption and the Impurity Photoeffect," by I. M. Dykman and S. I. Pekar, Institute of Physics, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 510-521

The amplitude of waves appearing in a crystal (ibid., 33, 1022 (1957); 34, 1176 (1950)) for a given amplitude of the incident wave from vacuum is calculated in the region of exciton absorption of light on the basis of the new theory of electromagnetic waves in a crystal. The case of cubic crystals is considered. It is shown that in the frequency region in which the refractive index is much smaller than unity, the amplitudes of the normal and longitudinal waves in the crystal greatly (by hundreds of times) exceed the amplitude of the incident wave. Photoionization of impurities in this frequency range is therefore much more intense than in the neighboring regions. This explains the sharp maximum, repeatedly observed experimentally, of the external and internal photoeffects in the frequency range corresponding to exciton absorption. It is shown that waves possessing amplitudes which increase linearly with penetration into the crystal may appear in the crystal.

132. Magneto-Elastic Vibrations

"Coupled Magneto-Elastic Vibrations in Antiferromagnetics," by S. V. Peletninskiy, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 451-457

A phenomenological theory of coupled magneto-elastic vibrations in antiferromagnetics is given (coupling between the elastic and magnetic waves is due to magnetostriction and spontaneous magnetization). The velocities of sound in the antiferromagnetic are determined. They are found to depend on the magnetization and applied magnetic field. Absorption coefficients for sound are determined.

133. Destruction of Superconductivity

"Destruction of Superconductivity in Thin Films by a Field and by a Current," by N. I. Ginzburg and A. I. Shal'nikov, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 399-405

The critical magnetic fields and currents which disrupt the superconductivity of thin cylindrical tin films have been measured. Qualitative agreement with the Ginzburg-Landau theory is demonstrated. The structure of the investigated films is discussed.

Spectroscopy

134. Radiation From a Spark

"Short-Wave Radiation From a Vacuum Spark," by S. V. Lebedev, S. L. Mandel'shtam, and G. M. Rodin, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 349-354

It is established that the spectroscopic light source, the vacuum "hot spark," emits soft X-rays of less than 6 Å wave length. The intensity of the radiation remains quite high in the arc stage of the discharge when the potential difference on the electrodes does not exceed 100 V. Spectroscopic measurement of the electron temperature according to the Al VII lines yielded the value $T_e = 200,000^\circ$.

135. K-Edge in Absorption Spectrum of Fe

"Investigation of the Temperature Dependence of the Fine Structure of the Main K-Edge in the Absorption Spectrum of Fe," by I. B. Borovskiy and V. V. Schmidt, Institute of Metallurgy imeni Baykov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 127, No 5, Aug 59, pp 997-1000

A double calcite crystal spectrometer, previously described by the authors (Izv. AN SSSR Ser. Fiz., 21, 1413 (1957)), of resolving power $\lambda/\delta\lambda = 11\ 000$ has been used for the investigation. The reflecting curve 11.6" wide for a wave length of 1740 XE (K-edge of Fe absorption) has been obtained. The effect of plasma oscillations of the metal's electrons

on the fine structure of the main F-edge of Fe absorption has been established and the real shapes of α and γ -Fe could be separated. It has been shown that the frequency of plasma oscillations depends essentially on the structure of the crystalline lattice.

Theoretical and Experimental Physics

136. Paramagnetic Resonance

"Theory of Paramagnetic Resonance in Systems Containing Two Types of Magnetic Moments," by A. A. Kokin and G. V. Skrotskiy, Ural Polytechnic Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 482-489

Equations of motion for the partial magnetizations of a system containing two types of interacting magnetic moments located in a weak variable magnetic field are obtained by methods of thermodynamics of irreversible processes. The same equations can be derived from the microscopic theory in the case of sufficiently fast thermal fluctuations of the local fields. The relaxation times and shift of the resonance frequency are computed. It is shown that a universal relation similar to the Kramers-Kronig relations exists between the quantities determining the transverse relaxation time and resonance frequency shift.

137. Dispersion in Crystals

"Dispersion of Electromagnetic Waves in Crystals," by V. M. Agranovich; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 430-441

A quantum microscopic theory of dispersion of electromagnetic waves in molecular crystals is developed. An expression is derived for the index of refraction due to the contribution of the excited states of the electrons. Interaction between the exciton states and the field is considered without making recourse to perturbation theory.

138. Quantum Oscillations of Magnetic Susceptibility

"Investigation of the Influence of Unilateral Compression on Quantum Oscillations of the Magnetic Susceptibility of Bismuth," by N. B. Brandt and G. A. Ryabenko, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 37, No 2(8), Aug 59, pp 389-391

The influence of unilateral compression for pressures up to 340 kg/cm^2 along the trigonal axis on the frequency and amplitude of the quantum oscillations of the magnetic susceptibility of bismuth is investigated at temperatures between 1.6 and 4.2° K . The results obtained are discussed on the basis of Kosevich's semiphenomenological theory.

VIII. MISCELLANEOUS

139. Krasnoyarsk Established as New Soviet Forestry Center

"A New Forestry Center," by N. Melikov; Moscow, Lesnaya Promyshlennost', 17 Sep 59

The center of scientific forestry has been moved to Krasnoyarsk from Moscow, Leningrad, and Arkhangel'sk. A number of major scientific institutions have already been established in this city. Among them are: the Institute of Forestry and Wood Processing, Siberian Department of the Academy of Sciences USSR; the Siberian Scientific Research Institute of Forestry Management and Exploitation, Siberian Technological Institute (Sibirskiy Tekhnologicheskii Institut) (formerly the Siberian Forestry Engineering Institute); the East Siberian Institute for Raising the Qualifications of Leading Workers of the Timber Industry (Vostochno-Sibirskiy Institut Povysheniya Kvalifikatsii Rukovodyashchikh Rabotnikov Lesnoy Promyshlennosti); and the Forestry Engineering Technical School.

The Institute of Forestry and Wood Processing was moved from Moscow in the spring of 1959 to Krasnoyarsk, where it is now carrying on research in the physics and chemistry of wood, wood pulp, and cellulose. The institute has a staff of eight doctors and 40 candidates, and an additional 252 scientific and technical personnel.

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