

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100300001-0

CIA/PB 131891-T21

UNCLASSIFIED- SCIENTIFIC INFORMATION  
REPORT

8 MAY 1959

1 OF 2

T-21

(11)

DUPLICATE  
FILE  
COPY

PB 131891 T-21

CENTRAL INTELLIGENCE AGENCY

# SCIENTIFIC INFORMATION REPORT



8 May 1959

Distributed Only By  
U.S. DEPARTMENT OF COMMERCE  
OFFICE OF TECHNICAL SERVICES  
WASHINGTON 25, D.C.

Issued semi-monthly. Annual subscription \$28.00 (\$4 additional for foreign mailing). Single copy \$2.75.

*ARCHIVAL RECORDS*  
*Return to Archives & Records Center*  
*Immediately After Use*

*JOB* \_\_\_\_\_ *BOX* *11*

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100300001-0

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

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100300001-0

PLEASE NOTE

This report presents unevaluated information extracted from recently received publications of the USSR, Eastern Europe, and China. The information selected is intended to indicate current scientific developments and activities in the USSR, in the Sino-Soviet Orbit countries, and in Yugoslavia, and is disseminated as an aid to the United States Government research.

SCIENTIFIC INFORMATION REPORT

Table of Contents

	<u>Page</u>
I. Chemistry	1
Fuels and Propellants	1
Industrial Chemistry	3
Inorganic Chemistry	7
Nuclear Fuels and Reactor Construction	
Materials	8
Organic Chemistry	18
Physical Chemistry	21
Radiation Chemistry	21
Radiochemistry	22
II. Earth Sciences	24
III. Electronics	25
Communications	25
Components	26
Computers and Automation	30
Materials	33
IV. Engineering	40
V. Mathematics	45
VI. Medicine	48
Antibiotics	48
Bacteriology	52
Epidemiology	54
Hematology	54
Immunology and Therapy	58
Instruments and Apparatus	65

	<u>Page</u>
Pharmacology and Toxicology	68
Physiology	70
Public Health, Hygiene, and Sanitation	73
Radiology	77
Miscellaneous	80
VII. Metallurgy	88
VIII. Physics	89
Acoustics	89
Atomic and Molecular Physics	94
Atomic Energy Development	95
Nuclear Physics	96
Optics	97
Plasma Physics	98
Solid State	98
Theoretical and Experimental Physics	99
IX. Miscellaneous	102

I. CHEMISTRY

Fuels and Propellants

1. A Method for the Electrochemical Synthesis of  $KO_2$

"A Direct Electrochemical Synthesis of  $KO_2$ ," by M. I. Klyash-tornyy, Donets Industrial Institute; Moscow, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 337-342

It was demonstrated that it is possible to produce  $KO_2$  by direct electrochemical synthesis. In the method in question, a potassium amalgam is subjected to anodic oxidation in a solution of potassium bromide in liquid ammonia. The solution of potassium in ammonia that is formed at the cathode is oxidized by molecular oxygen. The technical indices of the process are as follows: current density (anodic) 10 amperes per square decimeter, current used 500 ampere-hours per kilogram of  $KO_2$ , use of electric power 5 kilowatt-hours per kilogram, yield of  $KO_2$  2 kilograms per hour per square meter of anode area.

2. Formation of Lithium Superoxide

"Formation of Lithium Superoxide from  $Li_2 O_2 \cdot 2 H_2 O_2$ ," by I. I. Vol'nov and A. N. Shatunina, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 257-259

By drying in vacuum  $Li_2 O_2 \cdot 2H_2 O_2$  at 100-120° and 10 mm Hg of residual pressure, peroxide products derived from lithium have been obtained for the first time which contain in addition to  $Li_2 O_2$  an admixture of  $Li O_2$  in amounts of the order of 7-9% by weight.

3. Superoxides of Calcium and Strontium

"New Data on the Formation of the Superoxides of Calcium and Strontium," by I. I. Vol'nov, V. N. Chamova, and V. P. Sergeeva, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskiy Khimii, Vol 4, No 2, Feb 59, pp 253-256

The optimum conditions for the formation from  $\text{Ca O}_2$ ,  $2\text{H}_2\text{O}_2$  of a product containing approximately 40% by weight of  $\text{Ca (O}_2)_2$  and from  $\text{SrO}_2$ ,  $2\text{H}_2\text{O}_2$  of a product containing approximately 30% by weight of  $\text{Sr (O}_2)_2$  have been determined. It has been found that in the solid products of the decomposition of  $\text{CaO}_2$ ,  $2\text{H}_2\text{O}_2$  the content of  $\text{Ca O}_2$  decreases and the content of  $\text{Ca (OH)}_2$  increases with an increasing  $\text{Ca (O}_2)_2$  content. It was established that mixtures containing approximately 40% by weight of calcium superoxide are stable when kept in hermetically closed vessels.

4. A Solvent Extraction Method for the Dewaxing of Aviation Oil

"Application of Beta-Chloro-Ethers in Combination With Dichloro-Compounds for the Deparaffination of Aviation Oil," by A. K. Seleznev, Laboratory of Organic Chemistry, Groznyy Order of the Labor Red Banner Petroleum Institute; Moscow, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 433-435

It was established that beta-chlorethyl methyl ether in combination with dichloroethane has a minimum solvent effect for oily components at low temperatures. On the other hand, beta-chlorodiethyl ether in combination of dichloroethane dissolves oily components to a greater extent at low temperatures. A characteristic of the mixtures of beta-chloroethers with dichloro-compounds that were tested from the standpoint of their effectiveness in the dewaxing of aviation oils is absence of a temperature gradient of dewaxing. There is even a slightly positive temperature gradient, which is a highly desirable characteristic for applications in the dewaxing of lubricating oils.

Industrial Chemistry

5. Industrial Chemical Developments in the Leningrad Area

"Among Leningrad Chemists," by M. Volokhovskiy, Deputy Chief Engineer, Chemical Industry Administration of the Leningrad Sovnarkhoz; Moscow, Promyshlenno-Ekonomicheskaya Gazeta, Vol 4, No 20 (475), 15 Feb 59, p 1

Under the current Seven-Year Plan, the total volume of chemical production in the Leningrad economic region will increase by a factor of 1.5 and the production of plastics will increase by a factor of 3.5.

At the Okhta Chemical Combine and at the Cast Plastics Plant experimental bases are being created for developing industrial technological processes and obtaining data necessary for the planning of the production of polyethylene, epoxy oils, polyester oils, and other valuable materials. The work being done there will make it possible to apply improved technological methods involving a maximum degree of automatization at new chemical enterprises that are being created at present.

Particular attention is paid to the mechanization of processes involving a large amount of labor. For instance, the departments of the plant producing technical rubber products will be changed completely to continuous production. The output will increase by almost one third.

In the planned development of the Leningrad chemical chemistry, considerable emphasis will be placed on the complete utilization of shales and also of natural gas which already in 1959 will be supplied to Leningrad from the Northern Caucasus. Gas containing a large quantity of hydrocarbons can be produced from shale fines which go to waste at present.

These hydrocarbons are an essential raw material for the production of many synthetic chemicals. It is proposed to organize the production of these chemicals at the shale gasification plant. The conversion of natural gas will make it possible to produce synthetic fibers, polyethylene, and a number of fertilizers.

The construction of a phosphate rock mine combined with an enrichment plant is also planned in the Leningrad economic region. A large quantity of phosphate flour will be produced there.



6. Chemical Research at Moscow University in Connection With the Seven-Year Plan

"Chemical Science on the Threshold of New Problems," by N. M. Emanuel', Corresponding Member Academy of Sciences USSR; Moscow, Vestnik Moskovskogo Universiteta - Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii, Vol 13, No 5, Jan 59, pp 3-6

"Under the current Seven-Year Plan chemical production will be increased by a factor close to 3. The production of synthetic materials, fibers, resins, and plastics will be expanded to a particularly large extent. New types of production will be based on new crude materials. A rich source of raw materials will be formed by the by-product gases of petroleum production and natural hydrocarbon gases. The extensive use of hydrocarbon gases in the production of synthetic rubber and nitrogen fertilizers will make it possible to reduce capital investments by several billion rubles. . . .

"The chemists active at the University of Moscow will participate in work on the new major scientific problems which have arisen and also will train young chemists for work on these problems. After the May [1958] Plenary Session of the Central Committee CPSU, the Chemical Faculty placed particular stress on research in the field of polymers and monomers for the synthesis of these polymers, the utilization of natural gas as a chemical raw material, and research in the fields of chemistry of rare elements and semiconductor materials. The Scientific Council of the Chemical Faculty confirmed the plan of scientific research work to be done, work on methods for the synthesis of monomers and high molecular compounds and research on the properties of synthetic and natural polymers, as affected by their structure. Many-sided cooperative work by a number of chairs on the problems involved was organized. At present, preparations are being made for work on monomers and high-molecular compounds at a laboratory that will be subordinate to a number of chairs. A special faculty colloquium on high-molecular compounds has been initiated. At several chairs of the chemical faculty work is being conducted on the development of efficient methods for the preparation of initial substances (monomers) to be used in the synthesis of high polymers. Among these methods, an important role is played by processes for the oxidative conversion of available petroleum raw materials to diverse oxygen-containing products of value.

"Other important lines of research in chemistry have also not been neglected by the chemists. Laboratories specializing in the fields of rare metals, the separation of isotopes, and the physical chemistry of solutions are already active at the faculty. Extensive preliminary work is being done on the creation of a laboratory at which work will be conducted on frozen radicals. This field is one of the most advanced

CPYRGHT

sections of physical chemistry. Not very long ago the existence of molecular splinters representing free radicals appeared to be more or less hypothetical. Only very few investigators succeeded in establishing their presence as active centers of chemical chain reactions or were able to isolate them in low concentrations after subjecting gases to an electric discharge. At present free radicals are being studied throughout the world as a very real and actual problem. Frozen free radicals can be used for the initiation of diverse chain processes. Furthermore, free radicals can be accumulated in sufficiently large concentrations to make possible their use as a source of accumulated energy.

"It is only 5 years since work at the chemical faculty has been conducted in laboratories at which first-class modern equipment is available. During these 5 years, new equipment was developed which the chemists of Moscow University must have. This refers to devices used for measuring electronic and nuclear paramagnetic resonance, mass spectrometers for radicals, electron microscopes of high resolving power, and the most modern spectroscopic equipment. The methods of neutronography, X-ray analysis, and some others must be used on a more extensive scale."

CPYRGHT

#### 7. Hydrothermal Conversion of Apatite

"Hydrothermal Conversion of Natural Phosphates to Fertilizers," by S. I. Vol'fkovich; Moscow, Vestnik Moskovskogo Universiteta-Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii, Vol 13, No 4, Nov 58, pp 215-221

The hydrothermal process of the conversion of natural phosphates, which was originally developed in the US and applied after World War II at an industrial plant in Florida, is now being adapted for application on a large scale in the USSR. One of the advantages of this method is that natural phosphates are converted into citric acid -- soluble fertilizers without the use of acids or of large amounts of electric power. When applied to apatites, the hydrothermal method results in defluorination. Hydrogen fluoride is evolved as a result of the hydrolysis of fluoroapatite. In the presence of silicon dioxide, this hydrogen fluoride is partly converted into silicon fluoride. Under suitable conditions, the principal part of the fluorine can be converted into hydrofluoric acid and another part into fluorosilicic acid. Salts of these acids can also be obtained. Laboratory experiments carried out by I. M. Meskin (Moscow State University) and R. Ye. Remin (Scientific Research Institute of Fertilizers and Insectofungicides) confirmed that it is possible to defluorinate apatite with products of the combustion of methane derived from natural gas. In this case the gas serves both as a source of heat and of water vapor, just as liquid fuel does when it is applied for this purpose.

8. USSR Organizational Measures and Conferences in Connection With Treatment and Desalination of Water

"Prospects of the Development of Scientific Investigations Aimed at Increasing the Efficiency of Thermal Power Plants in the USSR," by M. S. Shkrob, Doctor of Technical Sciences and B. I. Morozov, Candidate of Technical Sciences; Moscow, Teploenergetika, Vol 6, No 3, Mar 59, pp 85-87

During 1958, work on the improvement of technical methods for the treatment of water, elimination of silicic acid from water, the demineralization and desalination of water, and the desoxygenation of water was done at the All-Union Heat Engineering Institute imeni F. Dzerzhinskiy (VTI), the All-Union Scientific Research Institute of Water Supply, Sewerage, Hydraulic Structures, and Engineering Hydrogeology (VODGEO), the Central Committee for Heavy Industry (TsKTI), the Moscow Branch of the Central Committee for Heavy Industry (MO TsKTI), the State Trust for the Organization and Improvement of the Efficiency of Electric Power Plants (ORGRES), and the All-Union Trust for Improving the Efficiency of the Power System and the Fuel Supply in the Ferrous Metallurgy Industry (Orgenergochermet). Work on the synthesis of new grades of ion-exchange resins and investigations of ion-exchange resins were conducted in 1958 at the Institute of Physical Chemistry and the Institute of Vaccines and Sera of the Academy of Sciences USSR, the State Institute of Applied Chemistry, the Scientific Research Institute of Plastics, the Moscow Chemico-Technological Institute imeni D. I. Mendeleev, VTI, and VODGEO.

To discuss the results of investigations that had been carried out, the Commission on High-Parameter Steam, Institute of Power Engineering imeni G. M. Krzhizhanovskiy, conducted the following scientific-technical sessions in Moscow in 1958: Session on Water Treatment at Thermal Electric Power Plants Operating on Steam of Intermediate, Superhigh, and Supercritical Parameters (24-27 June, Section of Water Treatment of the Commission jointly with the Ministry of Electric Power Plants, the Moscow Regional Power System Administration, and the Moscow Branch of the Scientific Technical Society of Power Industry [MONTSEP], Session on Conditions of the Use of Water (Water Regime), Water Treatment, and Safeguarding of the Purity of Steam at Nuclear Electric Power Plants (26-28 May, Boiler Section and Section of Water Treatment of the Commission); and session on the Chemical Demineralization (Desalination) of Water (3-6 Feb, Section of Water Treatment of the Commission Jointly with the Commission on Chromatography at the Department of Chemical Sciences, Academy of Sciences USSR).

In the second quarter of 1959, a Conference on the Desalination and Desalting of Salty and Saline Waters will be held at Moscow by the Section of Water Treatment together with VODGEO, the Council on Problems of the Management of Water Resources (Academy of Sciences USSR) and the Interdepartmental (Mezhduvedomstvennaya) Commission on Arid Zones (Academy of Sciences USSR).

The preliminary program of this conference is as follows:

Status of the problem of desalination of salty and saline waters (Council on Problems of the Management of Water Resources, Academy of Sciences USSR);

Thermal desalting (Baku Polytechnic Institute); Desalting by electrodialysis with the use of ion-exchange agents (VODGEO, Black Sea Steamship Co, Scientific Research Institute of Plastics, Moscow Aviation Technological Institute [MATI], etc.)

Desalting by sunlight (Institute of Power Engineering imeni G. M. Krzhizhanovskiy, Academy of Sciences USSR);

Chemical desalting (VTI and All-Union Scientific Research Institute of Hydrotechnical and Sanitary Engineering [VNIIGS]).

#### Inorganic Chemistry

##### 9. Vapor Pressure of Lithium Chloride

"Measurement of the Pressure of Saturated Vapor of Lithium Chloride," by A. N. Nesmeyanov and L. A. Sazonov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 1, Jan 59, pp 231-233

Measurements of the vapor pressure of lithium chloride were carried out by the Knudsen method. The lithium chloride was determined in the condensate by titrating the chloride ion with silver nitrate. The degree of molecular association in the vapor is discussed.

##### 10. Permolybdates of Strontium, Calcium, and Cobalt

"The Permolybdates of Strontium, Calcium, and Cobalt," by V. A. Shcherbinin and G. A. Bogdanov, Moscow Power Engineering Institute; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 260-271

Permolybdates of strontium, calcium, and cobalt have been prepared for the first time. Their composition was clarified and methods for their preparation were developed. The complex peroxy-compounds that were isolated formed as intermediate products in the process of the decomposition of hydrogen peroxide catalyzed by the combined action of sodium molybdate and salts of strontium, calcium, or cobalt.

Nuclear Fuels and Reactor Construction Materials

11. Fluorescence Spectra of Uranyl Compounds

"Spectroscopic Investigation of Uranyl Compounds," by A. N. Sevchenko and L. V. Volod'ko, Belorussian State University imeni V. I. Lenin; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 2, No 2, Feb 59, pp 63-71

New experimental data obtained by the authors of the article and other USSR investigators on the fluorescence spectra of complex uranyl compounds in the crystalline form and in solutions indicate that conclusions made by other investigators in regard to the spectroscopic properties of uranyl salts, which were based on a consideration of transitions between electron vibrational levels in isolated uranyl ions only, are faulty. B. I. Stepanov and A. N. Sevchenko proposed a procedure for the analysis of spectra of uranyl salts which at present must be regarded as the most reliable. This procedure is based on the assumption that changes in the electronic state of the uranyl ion are accompanied by changes in the vibrational state within this ion, the vibrational state within the total molecule of uranyl salt, and also the state of intermolecular vibrations in the crystal as a whole. The experimental data presented in the article are based on investigations of the behavior of uranyl nitrate and uranyl acetate in complexes involving organic molecules.

It is pointed out that spectroscopic investigation of uranyl compounds is of importance, because uranyl salts represent a raw material for the production of uranium ore concentrates.

12. Plutonium

"Plutonium," (unsigned article) Kratkaya Entsiklopediya, Atomnaya Energiya, (Concise Encyclopedia, Atomic Energy), Gosudarstvennoye Nauchnoye Izdatel'stvo "Bol'shaya Sovetskaya Entsiklopediya" Moscow, 1958, pp 295-297

The text of the entry of Plutonium reads as follows:

Plutonium, Pu is a radioactive chemical element of the actinide series, element number 94, mass number of its longest lived isotope is 244. Discovered in 1940 in the products of neutron irradiation of uranium. In nature Pu is formed in quantities of the order of 10<sup>-11</sup> part to one part of U by means of the absorption of cosmic ray neutrons by U nuclei, spontaneous fission, and ( $\alpha, n$ ) - reaction. Known isotopes of Pu have mass numbers from 232 to 246. Of practical importance is the

isotope  $\text{Pu}^{239}$ ; an  $\alpha$ -emitter with a  $T_{1/2}$  [half-life] of 24,410 years and  $\alpha$ -particle energies of 5.1474, 5.1342, and 5.0974 Mev. Long-lived isotopes of Pu with  $T_{1/2}$  greater than 2 years are  $\text{Pu}^{236}$ ,  $\text{Pu}^{238}$ ,  $\text{Pu}^{240}$ ,  $\text{Pu}^{241}$ ,  $\text{Pu}^{242}$ , and  $\text{Pu}^{244}$ . The role of Pu in nuclear engineering and power engineering is exceptionally great. This is explained by the ability of the isotope  $\text{Pu}^{239}$ , under action of neutrons of all energies to fission into 2 fragments with the release of a large amount of energy and a certain number of secondary neutrons capable of sustaining fission by a nuclear chain reaction. In the early years of utilization of atomic energy, Pu was one of two [isotopes] ( $\text{Pu}^{239}$  and  $\text{U}^{235}$ ), but at present it is one of three isotopes ( $\text{Pu}^{239}$ ,  $\text{U}^{235}$ , and  $\text{U}^{233}$ ) capable in such a process. Therefore, the first atomic reactor was created for the production of Pu, and one of the two atomic bombs that were dropped on Japan in 1945 was a plutonium bomb. Pu is produced by the nuclear reaction:  $\text{U}^{238} (\text{n}, \gamma) \text{U}^{239} \xrightarrow{\beta^-} \text{Np}^{239} \xrightarrow{\beta^-} \text{Pu}^{239}$ . This is more expeditious than separating the U isotopes with the objective of producing  $\text{U}^{235}$  which has the same properties in the matter of fission that Pu has. Consequently, the cost of Pu is less than half that of  $\text{U}^{235}$ . Besides, the possibility exists, in principle, of converting all uranium, that is, the isotope  $\text{U}^{238}$ , into Pu by utilizing the above reaction. For this purpose, perhaps, plutonium reactors with increased production with fast neutrons were used, in which Pu is produced faster than it is used up as a result of fission. In the future, possibly, powerful neutron fluxes in nuclear synthesis equipment will be utilized to convert U into Pu. Pu is a strategic material inasmuch as it serves as the explosive material of atom bombs and the igniter of hydrogen bombs. In the USA alone, 13 industrial reactors are in operation producing Pu. At atomic electric power stations, significant quantities of Pu are produced in addition to the production of electric power.

Plutonium of mixed isotopic composition is produced in operation of a reactor inasmuch as successive neutron capture reactions take place,  $\text{Pu}^{239} (\text{n}, \gamma) \text{Pu}^{240} (\text{n}, \gamma) \text{Pu}^{241} (\text{n}, \gamma) \text{Pu}^{242}$  etc. Mass-spectrographic analysis of the produced Pu indicated the presence of the following isotopes:  $\text{Pu}^{239}$  - 95%;  $\text{Pu}^{240}$  - 4%;  $\text{Pu}^{241}$  - .3%;  $\text{Pu}^{238}$  - .01%. Upon lengthy irradiation in a high density neutron flux, formation of the higher isotopes are observed up to  $\text{Pu}^{246}$ . The quantity of the main isotope  $\text{Pu}^{239}$  accumulated in uranium apparently does not exceed .8 kilogram per ton of uranium. Maximum value of Pu accumulation is equal to, approximately, 7 kilograms per ton; in practice, the content of Pu per ton of U can reach about 3 kilograms [per ton].

The pure isotope  $\text{Pu}^{239}$  has the following constants for reaction with thermal neutrons: cross section of fission --  $720 \pm 15$  barns; cross section of capture -- 312 barns; number of neutrons emitted upon fission -- 2.88; energy released upon fission -- of the order of 200 Mev. Pu has the ability to fission under action of neutrons of very low energy. Therefore, when handling it, the possibility always exists of a chain reaction occurring. A quantity of Pu less than 460 grams is safe under any conditions.

Pu is a silvery metal. At various temperature it exists in the form of 6 modifications -  $\alpha$ -at low temperature, and  $\beta$ -,  $\gamma$ -,  $\delta$ -,  $\eta$ -, and  $\epsilon$ -modifications at high temperatures; melting point is  $637^\circ$ . Plutonium alloys with many metals and forms a large number of intermetallic compounds; of these  $\text{PuBe}_{13}$  is the source of neutrons with an intensity of  $6.7 \times 10$  n/sec. kg [sic, possibly  $6.7 \times 10^7$  n/sec  $\cdot$  kg is meant] and a spectrum close to the neutron spectrum of a radium beryllium source.

The chemistry of plutonium is quite complex. In aqueous solutions Pu exists in 3-, 4-, 5-, and 6-valency states in the form of the ions  $\text{Pu}^{3+}$ ,  $\text{Pu}^{4+}$ ,  $\text{PuO}_2^+$ ,  $\text{PuO}_2^{2+}$ , respectively. Valence of 4 is the most stable. Pu VI is prepared by oxidation of Pu IV in acid solutions by the oxidizers:  $\text{Cr}_2\text{O}_7^{2-}$ ,  $\text{S}_2\text{O}_8^{2-}$ ,  $\text{MnO}_4^-$ ,  $\text{MnO}_2$  and others, and in carbonate solutions-with ozone! Nitric acid also partially oxidizes Pu IV to Pu VI. The latter is quite stable. Metallic Zn,  $\text{SO}_2$ ,  $\text{NH}_2\text{OH}$ , FeII reduce it to Pu III, but NaI reduces it to Pu V. Pentavalent Pu in nitric acid and hydrochloric acid solutions at pH 3.5 does not undergo any changes in the course of several days; in moderately acidic solutions disproportionation takes place according to the scheme  $\text{Pu V} + \text{Pu V} \rightarrow \text{Pu VI} + \text{Pu IV}$ . The position of the equilibrium and the rate of disproportionation depend upon the pH; increase of temperature and addition of complex forming compounds accelerates disproportionation. Tetravalent Pu is obtained both from hexavalent and trivalent [Pu] by the action of  $\text{NaNO}_2$ . Pu IV forms complex compounds with many anions. In dilute sulfuric acid solutions Pu exists in the form of  $\text{PuSO}_4^{2+}$ , and in more concentrated [ $\text{H}_2\text{SO}_4$  solutions] forms  $\text{Pu}(\text{SO}_4)_2$  and  $\text{Pu}(\text{SO}_4)_3^-$ . In concentrated nitric acid solutions,  $\text{Pu}(\text{NO}_3)_4$ ,  $\text{Pu}(\text{NO}_3)_5$ ,  $\text{Pu}(\text{NO}_3)_6^-$  are known to exist. In acetic, oxalic, and hydrochloric acids Pu IV is present as an anion; tetravalent Pu is easily hydrolyzed [out] and develops radio-colloidal substances. Colloidal Pu is, apparently, a polymer of the type  $[\text{Pu}_x(\text{H}_2\text{O})_y(\text{OH})_2]$ . It is difficult to depolymerize Pu. Fe II, U IV,  $\text{H}_2$  in the presence of Pt etc reduces Pu IV to Pu III. In moderate acidic solutions Pu III is stable in the absence of air but in alkaline solutions is very rapidly oxidized by the oxygen of the air to Pu IV. The fluorides  $\text{PuF}_3$  and  $\text{PuF}_4$  are important compounds of Pu, which precipitate upon the action of hydrofluoric acid on solutions of tri- and tetravalent Pu. Under action of the fluorides of the alkali metals, the salts  $\text{NaPuF}_4$ ,  $\text{NaPuF}_5$ ,  $\text{Li}_2\text{PuF}_6$ , [Sic. possibly  $\text{Li}_2\text{PuF}_6$  is meant]  $\text{LPuF}_9$  [again, possibly  $\text{LiPuF}_9$  is meant] precipitate out. Pu fluorides coprecipitate with the fluorides of the rare earth elements, particularly of La which is used for the separation and purification of Pu, for example, from uranium which remains in solution. Separation of Pu from its carrier-Ka [Sic. possibly La or the cations of some other rare earth metals is meant] and coprecipitated elements, is carried out by means of oxidation of Pu to the hexavalent [state] and repeated precipitation of  $\text{K}_2\text{F}_3$ . In this process Pu VI remains completely in solution.

In exactly the same way Pu is separated from its nearest analog, neptunium, for which one utilizes the great facility of Np to oxidize to the hexavalent state:  $\text{KBrO}_3$  at room temperature converts Np IV and Np III to Np VI whereas Pu remains in the tetravalent state and coprecipitates with the carrier.

The anhydrous fluoride  $\text{PuF}_6$ , similar to  $\text{UF}_6$ , is a highly volatile substance with a b.p. of  $54^\circ$ ; it is hydrolyzed very easily in the presence of negligible quantities of moisture. The proposal to utilize  $\text{PuF}_6$  as a gas to charge the cylinder of a reciprocating engine is of interest. The parameters of the engine can be so selected that upon compression: the gas attains a critical volume; this leads to the formation of a fission chain reaction; the liberation energy; heating of the gas; and expansion of it when the piston moves, to a subcritical state.

Plutonium nitrates,  $\text{Pu}(\text{NO}_3)_4$  and  $\text{PuO}_2(\text{NO}_3)_2$ , are crystalline substances, easily soluble in water and oxygen-containing organic solvents. The nitrate of tetravalent Pu is extracted by tributyl-phosphate (TBP) with the formation of the solvate  $(\text{Pu}(\text{NO}_3)_4 \cdot 2 \text{TBP})$ . This is utilized for the separation of Pu from irradiated U and fission fragments. U and Pu are extracted from the nitrate solution containing these components by a TBP solution in an inert diluent. At the same time, the majority of fragments remain in the waste aqueous solution. The organic phase containing U and Pu is passed through an aqueous solution of bivalent Fe, which reduces Pu to an unextractable trivalent state; Pu goes into solution but U remains in the organic phase. Next, repeated purification cycles are carried out. There are reports in the literature of several extraction plants for the processing of irradiated U for the extraction of Pu, in which TBP, and some other organic solvents, methylisobutylketone, dibutylcarbitol, etc., are used as the extracting agents.

Apparently, all or the majority of foreign plutonium plants use extraction processes. Separation of Pu from irradiated uranium is a difficult task since in view of the cost of Pu, a very high degree of extraction of it is required together with thorough purification of it from uranium and fission fragments, i.e., from half the elements of the periodic system. Processing is begun about 100 days after the end of irradiation, since that amount of time is required for the full conversion of the isotope  $\text{Np}^{239}$  to Pu. At this time, one ton of treated U contains about .8 kilograms of Pu, .8 kilograms of fission fragments with  $\beta$  - activity of 500,000 curies and  $\gamma$  - activity of 200,000 curies. The purification factor of Pu from fragments required for further safety of operations must be of the order of  $10^6$ . Other methods of processing irradiated U are known for the solution of this problem in addition to the extraction and precipitation methods. In recent years, operations for extraction of Pu from molten metal has received wide development. In the event of a positive solution, this promises significant cost reduction of plutonium since costs incurred in solution and repeated extraction



of metal is eliminated. Extraction of Pu from molten U is very tempting. Pu is extracted best by molten silver or a molten mixture of uranium, lithium, and calcium fluorides. The methods of distillation of metallic Pu from molten U at 1680 degrees also yields positive results. These methods have not been utilized on an industrial scale owing to difficulties connected with working at very high temperatures.

As a result of carrying out existing technological processes Pu is produced in the form of nitric acid solutions. Pu is precipitated from this, usually in the form of oxalate that permits additional refinement. By calcining the oxalate, the oxide  $\text{PuO}_2$  is prepared, which is treated by HF and is converted to the fluoride. By reduction of the fluoride by calcium silicide at 1550° metallic Pu is produced. Pu is extremely toxic. Having gotten into an organism Pu, for all practical purposes, is not removed, since it is retained in bones very strongly. Not weakening in time, the internal irradiation by a flow of high density ionizing  $\alpha$  - particles leads to disturbance of blood formation in the bone marrow. Pu easily forms aerosols during mechanical processing of the metal and by evaporation of its salts. Pu entering the lungs gives rise to lung cancer. Therefore, all work with Pu is carried out in gloved chambers (gloved box, gloved cabinet) which prevent contaminated air from entering a room.

### 13. Solvent Extraction of Plutonium

"Mechanism of the Extraction of Plutonium Nitrate with Monobutyl Phosphate and Dibutyl Phosphate," by V. B. Shevchenko and V. S. Smelov; Moscow, Atomnaya Energiya, Vol 6, No 2, Feb 59, pp 140-144

In a preceding report by the same authors (Atomnaya Energiya, Vol 5, No 5, 1958, p 542) the effects of MBP (monobutyl phosphate) and DBP (dibutyl phosphate) on the extraction of plutonium nitrate with tributyl phosphate were discussed. In the work described at present the mechanism of the extraction of plutonium with MBP and DBP is elucidated. The mechanism of the extraction of plutonium nitrate with MBP and DBP having an ionic strength equal to 6 was investigated experimentally. It was found that plutonium is extracted in the form of  $\text{PuK}_4$  where  $\text{K} = [(\text{C}_4\text{H}_9)_2\text{PO}_4]^-$  or  $[\text{C}_4\text{H}_9\text{HPO}_4]^-$ . It has been calculated that the equilibrium constant of the reaction of plutonium nitrate with MBP is  $(1.5 \pm 0.25) \times 10^3$  and with DBP,  $(6.15 \pm 0.85) \times 10^3$ .

14. A Double Uranium-Ammonium Fluoride

"Investigation of the Analytical Characteristics of the Double Fluoride of Uranium (IV) and Ammonium," by Ye. R. Nikolayeva; Chair of Analytical Chemistry Moscow State University, Moscow, Vestnik Moskovskogo Universiteta - Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii, No 4, Nov 58, pp 193-196

The effects of acidity, concentration of the precipitating agent, and other conditions on the completeness of the precipitation of tetravalent uranium with ammonium fluoride was investigated. V. N. Zvenigorodskaya's method for the reduction of uranium with ferrous iron was used. It was established that it is possible to separate small quantities of uranium (0.5-2 mgs) from vanadium, molybdenum, and iron by precipitating uranium with ammonium fluoride if the quantity of the elements mentioned does not exceed 10, 15, and 50 mgs, respectively, per ten milliliters of solution. On the basis of the investigation which has been carried out, one may conclude that in comparison with the double fluoride of tetravalent uranium and sodium, the compound of uranium with ammonium precipitates in a less acidic medium and thus is less suitable for the separation of uranium from extraneous elements.

15. Nonaqueous Solutions of Uranyl Nitrate

"Investigation by the Method of Infra-Red Spectroscopy of the State of Water in Non-Aqueous Solutions of Uranyl Nitrate," by Ya. I. Ryskin, V. I. Zemlyanukhin, A. A. Solov'yeva, and N. A. Derbeneva; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 393-396

It was found in the work described that two molecules of the water of hydration of uranyl nitrate are strongly deformed because of the firm bond between the molecules of water and the uranyl nitrate. The degree of deformation depends on the nature of the solvent. The remaining molecules of water present in solutions of uranyl nitrate in organic solvents are deformed to a considerably lesser extent. One may conclude, therefore, that the bond between them and uranyl nitrate is weaker.

16. Properties of a Complex Compounds Formed by Thorium With 2-Hydroxy-1,4-Naphthoquinone

"Investigation by the Distribution Method of the Formation of Complex Compounds in the System 2-Hydroxy-1, 2-Naphthoquinone-Th<sup>4+</sup> — CHCl<sub>3</sub> — H<sub>2</sub>O," by A. P. Zozulya and V. M. Peshkova, Moscow State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 379-392

The method of distribution between water and organic solvents was used for the investigation of the formation of complex compounds of tetravalent thorium with 2-hydroxy-1, 4-naphthoquinone. The properties and dissociation constants of the complex compounds formed were determined.

17. Complex Compounds of Trivalent Plutonium With Ethylenediaminetetraacetic Acid

"Determination of the Composition and Dissociation Constants of Ethylenediaminetetraacetic Acid Complexes of Pu (III) by the Method of Ion Exchange," by A. I. Moskvin and P. I. Artyukhin, Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 3, Mar 59, pp 591-595

The distribution of trivalent plutonium between a monomolar solution of NH<sub>4</sub> Cl and KU-2 cation-exchange resin was studied in the pH range of 1.6 - 3.3. The distribution of trivalent plutonium between a monomolar solution of NH<sub>4</sub> Cl and KU-2 in the presence of 0.001 mols of Trilon B [ethylenediaminetetraacetic acid] was investigated in the pH range of 1.25 - 3.4. It was established that in the solutions investigated there is formation of the complexes Pu Y<sup>-</sup> and Pu HY<sup>0</sup> (where Y is ethylenediaminetetraacetic acid), the concentration constants of the dissociation of which are equal to  $4.4 \times 10^{-18}$  and  $6.2 \times 10^{-10}$ , respectively.

18. Investigation of Complex Oxalates of Plutonium, Zirconium, and Hafnium by the Ion-Exchange Method

"Application of the Ion-Exchange Method for the Investigation of Complex Oxalates of Pu (IV), Zr, and Hf," by A. N. Yermakov, V. K. Belyayeva, I. N. Marov, and M. K. Chmutova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 493-496

It was established by the method of ion exchange that complex ions of Pu (IV), Zr, and Hf<sub>6-</sub> with a composition corresponding to the formula  $[M^{IV} (C_2 O_4)_5]$  exist in solution.

19. Methods for the Volumetric Determination of Zirconium

"Volumetric Determination of Zirconium; Part I. Titration with  $\text{KMnO}_4$  in an Alkaline Solution," by A. Schneer and H. Hartmann, Institute of General and Inorganic Chemistry, Lorand Eotvos University of Science at Budapest; Budapest, Magyar Kemiai Folyoirat, Vol 65, No 1, Jan 59, pp 31-36

A method for the titrimetric determination of mandelic acid or p-bromomandelic acid with potassium permanganate in an alkaline solution was developed. This method was used for the determination of zirconium. Precipitated zirconium tetramandelate was dissolved in sodium carbonate and the mandelic acid bound to zirconium oxidized to benzoic acid. The amount of potassium permanganate used is proportional to the quantity of zirconium. According to the empirical data obtained by the authors, 1 milliliter of an 0.1 N potassium permanganate solution corresponds to 0.5136 milligrams of zirconium. The method is suitable for the determination of 2-20 milligrams of zirconium. The results obtained are precise within  $\pm 1\%$ . A single precipitation suffices even in the presence of large quantities of extraneous ions.

"Volumetric Determination of Zirconium; Part II. Oxidation of Zirconium Tetramandelate with Chromic Acid," by A. Schneer and H. Hartmann, Institute of General and Inorganic Chemistry, Lorand Eotvos University of Science at Budapest; Budapest, Magyar Kemiai Folyoirat, Vol 65, No 2, Feb 59, pp 64-69

Zirconium tetramandelate that has been selectively precipitated with mandelic acid from a hydrochloric acid solution is filtered and dissolved in concentrated sulfuric acid. The mandelic acid residues bound to the zirconium are oxidized completely with sodium bichromate to water and carbon dioxide in a sulfuric acid solution containing 70-90% of  $\text{H}_2\text{SO}_4$  by weight.

This oxidation requires 20 minutes at  $115^\circ$ . The excess of sodium bichromate is titrated back with a ferrous sulfate solution using ferroin as the indicator. One milliliter of an 0.1 N  $\text{Na}_2\text{Cr}_2\text{O}_7$  solution corresponds to 67.07  $\mu\text{g}$  of zirconium.

20. Vapor Pressure of Lanthanum Chloride

"Measurement by the Radioactive Tracer Method of the Vapor Pressure of Saturated Vapor of Anhydrous Lanthanum Chloride," by A. N. Nesmeyanov and L. A. Sazonov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 1, Jan 59, pp 230-231

The vapor pressure of lanthanum chloride was determined by the Knudsen method with the use of  $\text{La}^{140}$  as a tracer. It is pointed out that no reliable data have been published as yet in the literature on the vapor pressures of chlorides of rare-earth elements.

21. Lanthanum Salicylates

"The Salicylates of Lanthanum," by Ya. A. Fialkov (deceased) and V. I. Yermolenko, Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 359-366

The compounds formed by rare-earth elements with aromatic hydroxy acids may be of interest in connection with the separation of these elements by absorption on ion-exchange resins. By measuring the electrical conductivity and the volume of precipitates, it was confirmed that lanthanum salicylate is formed in the system  $\text{LaCl}_3\text{-NaSal-H}_2\text{O}$ . The molecular conductivity of lanthanum salicylate was determined and the first constant of the dissociation of this compound calculated. The solubility of lanthanum salicylate in water and in aqueous solutions of sodium salicylate were determined. The solubility product  $[\text{La}^{3+}] \cdot [\text{Sal}']^3$  was calculated under consideration of the values of dissociation constants.

22. Vapor Tension of Hafnium Tetrachloride

"Vapor Tension of Hafnium Tetrachloride," by Sung In-chu and I. S. Morozov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, p 492

The vapor tension of hafnium tetrachloride in the temperature range of 200-312° was determined by the gas-stream method, using chlorine as the inert gas. It was found that the dependence of the vapor tension on the temperature can be described by the following equation:

$$\lg P = -\frac{5390}{T} + 12.00$$

23. Effect of Irradiation With Neutrons on Ferrite-Perlite Steels

"The Effect of Irradiation with Neutrons on the Structure and Properties of Ferrite-Perlite Steels," by V. S. Lyashenko and Sh. Ibragimov; Moscow, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 277-280

Samples of the steels 1Kh17N2, 2Kh13, and 30KhMa, which are sensitive to heat treatment, and of the steel 1Kh17 containing niobium, which is not sensitive to heat treatment, were subjected to irradiation with fast neutrons at the temperatures of 70° and 500-600°. It was established that as a result of irradiation at 500-600° the mechanical characteristics of the steels 1Kh17N2, 2Kh13 and 30KhMA are change considerably. No such changes take place when the steel 1Kh17 is irradiated. Results obtained in a metallographic investigation indicate that the increase in the mechanical strength of the steels in question as a result of irradiation at 500-600° is associated with structural changes. It is suggested that the observed changes in the microstructure are due to the formation of displacement peaks in the material that has been irradiated.

24. Economics of Nuclear Power

"Some Problems of the Economics of Nuclear Power," by Ye. P. Anan'yev; Moscow, Atmnaya Energiya, Vol 6, No 3, Mar 59, pp 245-252

The economics of nuclear power generation are subjected to consideration on the basis of papers presented at the second International Conference on Peaceful Uses of Nuclear Energy (Geneva, 1958). The capital investment required, operational aspects, the economics of fast neutron reactors, and the possibilities of using nuclear power for the generation of heat are discussed. It is pointed out that the ways in which applications of nuclear energy for power generation will develop in individual countries depend on the structure of the power production balance of the countries in question. As far as the USSR is concerned, the development of nuclear power generation in that country, which has large supplies of coal and extensive possibilities as far as development of hydroelectric power is concerned, will proceed along different ways than that in countries which lack coal. The fact that the USSR program provides for acquisition of experience in this field by operating nuclear power plants with a high output is stressed. The special conditions in Czechoslovakia are discussed. Because of the conditions in that country which has large supplies of uranium, and will have to increase the production of electric power without augmenting the production of coal, the decision was made to build an industrial nuclear power plant there that uses natural uranium as fuel.

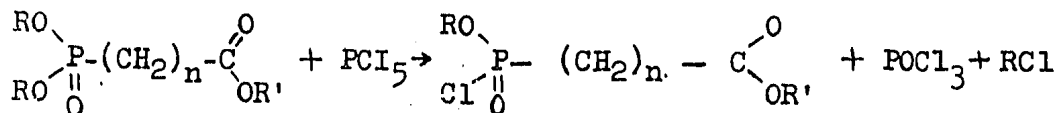
[For additional information on nuclear fuels and reactor construction materials see Item No 58.]

Organic Chemistry

25. Organophosphorus Research

"Acid Halides of Esters of Phosphonocarboxylic Acids. I. Synthesis of P-Acid Monochlorides of Dialkyl Esters of Phosphonocarboxylic Acids," by K. A. Petrov, F. L. Maklyayev, and M. A. Korshunov, Military Academy of Chemical Defense; Leningrad, Zhurnal Obshchey Khimii, Vol 29, No 1, Jan 59, pp 301-5

The authors reacted phosphorus pentachloride with esters of phosphonocarboxylic acid to obtain twelve previously unknown P-acid monochlorides of dialkyl esters of phosphonoformic, phosphonoacetic, phosphono- and thiophosphono-propionic acids, according to the following reaction:



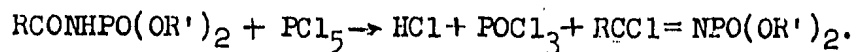
where n equals 0, 1, 2. They also showed that P-acid monochlorides of dialkyl esters of phosphonoformic acid result from the reaction of phosphorus trichloride and chlorine with the esters of this acid.

They established that upon reacting esters of phosphonocarboxylic acids with thionyl chloride, only the P-acid monochlorides of the dialkyl esters of these acids are obtained.

Four previously unknown esters of phosphonoformic and phosphono-propionic acids were synthesized and characterized. The data concerning these esters and the P-acid monochlorides are presented in the text.

"C-Chloro-P, P-Dimethoxy- and C-Chloro-P, P-diaryloxyisophosphazoacyls," by G. I. Derkach, Institute of Organic Chemistry, Academy of Sciences, UkrSSR; Leningrad, Zhurnal Obshchey Khimii, Vol 29, No 1, Jan 59, pp 241-5.

By reacting phosphorus pentachloride with the diesters of acylamido-phosphoric acids, the C-chloro-P, P-dimethoxy- and C-chloro-P, P-diaryloxyisophosphazoacyls were obtained. This reaction can be formulated as follows:



In all, 16 compounds not previously described were synthesized and characterized. Physical data concerning them is presented in the text.

Upon thermal cleavage, C-chloro-P, P-dimethoxy- and C-chloro-P, P -- diaryloxyisophosphazacyls form the corresponding nitriles and acid chlorides of dimethyl and diaryl esters of phosphoric acid.

Water reacts with these compounds to form the corresponding diesters of acylamidophosphoric acids.

The author believes these compounds will be of great interest in the synthesis of new types of phosphoric acid derivatives.

#### 26. New Insect Repellents

"New Insect Repellents for the Protection of Humans and Animals from Blood-Sucking Diptera," by K. P. Andreyev, G. I. Yanovich, G. A. Kudryavtseva, and R. G. Soboleva, Tr.Vses. N. -I. In-t Vet. Sanitarii i Ektoparazitol (Works of the All-Union Scientific Research Institute of Veterinary Sanitation and Ectoparasitology) 1958, 13, pp 152-172 (from Referativnyy Zhurnal -- Khimiya, No 2, 25 Jan 59, Abstract No 5850 by I. Mil'shteyn)

"The methyl ether of beta-naphthol (I), terpineol (II) and diphenyl oxide (III) are suitable for the protection of farm animals from blood-sucking diptera. Treatment of the integument of adult cattle with solutions of I—III in either solar or vaseline oil guarantees protection from these insects for 1—4 days; aqueous emulsions offer protection for several hours. An oily solution of I protects humans from attacks by flies and mosquitoes, correspondingly, for 2-4 hours and 90 minutes; oily and alcoholic solutions of II offer protection from mosquitoes for more than 3 hours. Analogous solutions of III protect from housefly bites for a 6-hour period."

CPYRGHT



27. New Substance for the Control of Ticks

"Substance for the Control of Ticks," (unsigned article);  
Moscow, Meditinskiy Rabotnik, 13 Feb 59, p 4

The Laboratory for the Search for New Preparations of the All-Union Scientific Research Institute of Insectofungicides and Fertilizers has found another valuable property of dibutyladipinate: a substance which can repel the carrier of tick-borne encephalitis -- Ixodes ticks.

"Investigations in the natural foci of tick-borne encephalitis, conducted by Central Scientific Research Disinfection Institute in Perm Oblast, indicated that dibutyladipinate when applied to the cotton clothing of workers, gave protection from ticks for an entire month.

"The Section of Disinfection of the institute also tested new repellent substances (Kuyzol and RP-99) which were synthesized by A. N. Kost and L. G. Yudin at the Laboratory of special organic synthesis Chemical Faculty of Moscow University imeni Lomonosov. The preparations possess acaricidal activity swiftly killing ticks. These preparations can be prepared from the by-products of the coke chemical industry."

CPYRGHT

28. Research on Isoquinoline Carboxylic Acids

Investigations in the Field of Isoquinoline Carboxylic Acid.  
III. Preparation of a Number of 1-Alkoxy-Substituted Acids of the Isoquinoline Group, Their Esters and Hydrazides and Certain Data on the Mobility of Alkoxy Groups in the Isoquinoline Ring," by L. I. Linevich, Laboratory of Physiological Chemistry, Academy of Sciences USSR; Leningrad, Zhurnal Obshchey Khimii, Vol 29, No 1, Jan 59, pp 202-8

The purpose of this research was to synthesize a number of trialkoxy-substituted acids of isoquinoline group and several of their derivatives, and to test the physiological activity of those compounds, which appeared to be of interest. A number of these compounds not previously described in the literature were obtained and characterized. Data concerning them is presented in the text.

A number of homologous trialkoxy-substituted acids of the isoquinoline group were obtained. They are characterized by an alkoxy group in the 1 position of the isoquinoline ring. A number of esters and hydrazides of these acids were obtained.

It was established that in 1-alkoxy-, 8-dimethoxyisoquinoline-3-carboxylic acids, the alkoxy group in the 1 position of the isoquinoline ring is mobile in an acidic medium and is easily hydrolyzed.

[For additional information on organic chemistry see items No 1, 2 and 3.]

Physical Chemistry

29. Physical-Chemical Changes Resulting From High-Velocity Charged Particles

"Research Work at the Physicochemical Institute, (unsigned article); Moscow, Sovetskaya Aviatsiya, 22 Mar 59, p 1

At the Scientific Research Physicochemical Institute imeni L. Ya. Karpov, according to the Seven-Year Plan, changes in the physical and chemical properties of substances, resulting from their irradiation with high-velocity charged particles, are being studied.

The results of these investigations will permit a completely new approach to many problems in the field of chemistry. For conducting the experiments at the institute, instruments and equipment employing radioactive cobalt and a charged particle accelerator are being used. At the present time, a new electrostatic generator is being installed.

A photograph accompanying the article shows senior scientific worker V. A. Kozlov checking the assembly of a new accelerator.

Radiation Chemistry

30. Formation of Free Radicals in Solids Irradiated With Fast Electrons

"Investigation of Free Radicals Formed in Solids Subjected to Irradiation With Fast Electrons," by Yu. N. Molin, A. T. Koritskiy, N. Ya. Buben, and V. V. Voyevodskiy, Corresponding Member Academy of Sciences USSR, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 123, No 5, 11 Dec 58, pp 882-883

Using the method of electronic paramagnetic resonance, the formation of radicals in 20 different solid substances as a result of irradiation with fast electrons was investigated. The substances irradiated included polymers (polyethylene, nylon, capron, polymethylmethacrylate, teflon, and different types of rubber), solid organic acids and their salts (oxalic acid and its salts, succinic acid and its sodium salt, stearic acid, and citric acid), and aromatic compounds (naphthalene, alpha-naphthol, beta-naphthol, benzoyl peroxide, and methol). In all samples investigated, the maximum

concentration of radicals was observed after a dose of the order of several tens of megarads had been applied. In the majority of cases, the radicals proved to be rather stable. Radicals with a relatively short half-life at room temperature (all experiments were carried out at room temperature) formed in polyethylene, oxalic acid, benzoyl peroxide, and one of the rubber samples. After irradiation of polyethylene, the radical  $-\text{CH}_2 - \dot{\text{C}}\text{H} - \text{CH}_2 -$  had formed, which is unstable at room temperature. By carrying out the irradiation at minus  $18^\circ$ , the velocity of the transformation of this primary radical into the secondary radical could be reduced (i.e., the primary radical was stabilized).

It is assumed that in experiments with the majority of the substances investigated the formation of stable radicals in considerable concentrations could have interfered with the observation of less stable radicals with a half-life of the order of seconds or shorter. To observe the paramagnetic resonance spectra of such radicals, a periodically modulated electron ray bundle will be used. To observe short-lived radicals in solids and particularly in liquids, a pulse method will also be applied.

#### Radiochemistry

31. Neutron Activation Analysis of Aluminum, Magnesium, Vanadium, and Indium

"The Neutron Activation Analysis of Samples of Rocks and Ore Concentrates," by D. I. Leypunskaya, Z. Ye. Gauer and G. N. Flerov; Moscow, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 315-320

A method for the determination of aluminum, magnesium, vanadium, and indium by the neutron activation analysis in ores when these elements are present in concentrations that are not too low is discussed. The method in question consists of irradiation with a Po-Bo source of samples of rocks, ores, or concentrates being analyzed and subsequent determination of the resulting activity with scintillation counters or other counters. It is brought out that application as a tracer of a short-lived isotope of the element being determined make it possible to apply a rapid method of analysis. The high sensitivity and precision of the method make it promising as far as practical applications are concerned.

32. Conversion of the Carbon of Calcium Carbonate Into Acetylene

"Synthesis of Acetylene From Calcium Carbonate," by A. V. Trofimov, N. G. Markova, and E. I. Dobkina, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR; Moscow, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 399-404

It was found that it is possible to convert calcium carbonate into calcium carbide by heating a mixture of calcium carbonate with magnesium in a tightly closed steel test tube at a temperature of about 700-800°. The calcium carbide can then be converted into acetylene. This procedure eliminates the carburization of calcium carbonate in a hydrogen stream, in vacuum, or in a sealed test tube. In this manner the process is simplified and accelerated considerably. The purpose of the investigation was development of a simple method for the conversion of the carbon of calcium carbonate into acetylene so that the radioactivity of the carbon contained in carbonate rocks may be determined in work on the geological age of rock formations. Determination of the content of radioactive carbon in acetylene is preferable to its determination in solid carbon.

[For additional information on radiochemistry see Item No 20.]

II. EARTH SCIENCES

33. Terrestrial Corpuscular Radiation

"Study of Cosmic Rays and Terrestrial Corpuscular Radiation by Cosmic Rocket," by S. N. Vernov, A. Ye. Chudakov, P. V. Vakulov, and Yu. I. Logachev; Doklady Akademii Nauk SSSR, Vol 125, No 2, 11 Apr 59, pp 304-307

The cosmic rocket launched in the direction of the Moon on 2 January 1959 was equipped for recording cosmic rays and terrestrial corpuscular emission. The latter is understood to consist of streams of charged particles reaching very high altitudes, where the terrestrial magnetic field secures a "magnetic trap" causing a high intensity of emission. A preliminary processing of data obtained within an altitude range of 8,000 to 150,000 kilometers from the Earth's center is presented. The spatial distribution of the high intensity zone is found to lie at 26,000 km from the Earth's center. At 55,000 km the terrestrial corpuscular emission is zero. The composition of the emission in the outer zone of high intensity was recorded by scintillators. It indicated x-rays of 100 kev or below. The measured energy flux does not quite concur with data by Van Allen from the fourth American satellite. The intensity of cosmic radiation appeared constant starting with 66,000 km altitude, up to 150,000 km. It indicates that at this altitude the terrestrial magnetic field has no more effect.

III. ELECTRONICS

Communications

34. Pocket Type Radio Receiver "Syurpriz"

"Radio Receiver 'Syurpriz,'" by L. Levin, G. Katunin, and B. Kotov; Moscow, Radio, No 3, Mar 59, pp 40-42

The radio industry of the Saratov Industrial-Economic Region has completed preparations for serial production of the miniature (pocket type) radio receiver "Syurpriz." This is the smallest transistorized superheterodyne type of receiver so far developed in the USSR. The set utilizes printed circuits.

The receiver operates in the frequency range of 150-415 kc and 520-1,600 kc; its sensitivity varies from 10 millivolt/m to 7 millivolt/m, depending on the reception frequency range; selectivity with respect to the adjacent channel is about 10 db; attenuation of image channel varies from 10 db to 15 db depending on the frequency range of reception. The set has automatic volume control and its efficiency is about 35%. The power supply consists of four alkaline cadmium-nickel storage batteries of the KNP-0.42 type having a capacity of 0.4 amp hr. The battery is 14 x 50 mm and assures continuous operation of the receiver for about 14 hr. The receiver consumes about 30 milliamps of current.

Seven transistors of the P-14 type are used in the set. The two-stage IF (465 kc) amplifier uses two of the P-14 transistors. Another P-14 type transistor is used as a detector. Three transistors are used in the power amplification stage. The overall dimensions of the set are 150 x 80 x 32 mm and it weighs 520 g. The dynamic loudspeaker has a diameter of 57 mm and a depth of 30 mm; it develops a sound pressure of about 1.5 bars. The frequency response range of the speaker is from 300 to 7,000 cycles. The magnetic antenna is built with a ferrite rod 123 mm long and 7.8 mm in diameter.

35. Phase-Difference Modulation

"Simplex System Noise Immunity When Transmitting Binary Signals With Phase-Difference Modulation [Angle Modulation]," by N. P. Bobrov; Moscow, Radio, No 3, Mar 59, pp 27-31

The system of transmission of discrete signals by means of various modifications of phase modulation is of great interest. One such system is the simplex system of binary signal transmission utilizing

phase-difference modulation, originally suggested by Petrovich. The advantages of phase-difference modulation over frequency modulation is particularly apparent in high-speed transmission systems when for a given frequency channel it is required to transmit the greatest number of binary signals (bits) in a unit of time.

The author thanks M. V. Yakovlev for assistance.

#### Components

#### 36. Electropneumatic Transducer

"Electropneumatic Transducer Developed at Institute of Automation and Telemechanics, Academy of Sciences USSR," by Yu. V. Krementulo; Moscow, Avtomatika i Telemekhanika, No 2, Feb 59, pp 211-219

In automation of technological processes sometimes it is advantageous to utilize electric systems for measurement and pneumatic systems for actual control of the process.

At the Institute of Automation and Telemechanics of the Academy of Sciences USSR very accurate and reliable transducers were developed for conversion of measurement voltages into proportional air pressure at the pneumatically actuated control devices. The electropneumatic transducers were designated as EPP-1 and EPP-2.

The EPP-1 electropneumatic transducer is comprised of the following units: rheostat data pick-up unit, slide-wire electropneumatic transducer, electronic amplifier, power-supply pack, reduction gear, two-phase reversing motor, line and control windings, cam, baffle, feed-back unit, fixed inductor and nozzle of the primary pneumatic relay, inter-choke chamber, compressed air supply. The air pressure supply to the transducer is at 1.3 kg/cm<sup>2</sup>. The electric power supply to the device is drawn from a 220 v, 50 cycle line. The accuracy of the device is about  $\pm 0.7\%$ .

A series of experiments have proven the suitability of the device for automatic controls of certain technological processes.

#### 37. Cathode Circuit Detection in Reflex Klystron

"Cathode Circuit Detection in an Underexcited Reflex Klystron," by S. A. Kornilov and O. N. Kazbekova; Moscow, Radiotekhnika i Elektronika, No 3, Mar 59, pp 475-481

The cathode circuit detection characteristics (response, transfer constant) of an underexcited reflex klystron were determined experimentally for frequencies of 3,000 and 10,000 Mc.

The investigation has shown that the cathode circuit detection has sensitivity equal to that of a crystal detector and a transfer constant several decibels higher than that for a crystal detector.

38. New Oscillator Triodes

"Electrical Calculation of Performance of New Oscillator Triodes," by V. A. Khatskelevich; Moscow, Radiotekhnika, No 3, Mar 59, pp 58-68

In recent years a number of triode oscillator tubes were designed with power output ranging from a few kilowatts to several hundred kilowatts, which were designated GU-5A, GU-10A, GU-21B, GU-22A, GU-23A, GU-30A, GU-4A, GU-11A, GU-12A and G-433. The power output of the enumerated tubes in kw is as follows: 3.5, 15, 15, 30, 100, 40, 10, 30, 40, and 80 respectively; the plate voltage in kv is 5, 8, 9, 9, 11, 8, 6, 10, 10.5 and 11.

These new oscillator triodes have a number of constructional peculiarities which change considerably their internal characteristics and performance. The current distribution in these tubes, their parameters and static and dynamic characteristics are different from those of the old series.

A new method is proposed for calculation of the static and dynamic characteristics of these new tubes. The author thanks Z. I. Model', B. P. Bytov, and S. G. Rud' for assistance.

39. East German Tropicalization Efforts

"Climatization, a Necessity Where Overseas Export Is Involved," by F. Boberski, Berlin; Berlin Nachrichtentechnik, No 3, Mar 59, pp 97-101

This lead article, on East German tropicalization measures, includes the following information:

Dr Boer, head of the East German Main Office for Climatology, Potsdam, has studied climatic conditions on the basis of geophysical investigations in China and in East Germany. He comes to the conclusion that six climates should be differentiated.

A climatization testing station, approved by the Office for Technology, was erected at the Scientific-Technical Office for Motor Design, Berlin-Adlershof, and, since 1958, has been under the DAMW (German Office for the Testing of Materials and Products), Berlin. The testing area is 14 meters long. The DAMW thus has taken over all direction and coordination of climatization problems for all branches of industry, including research and development assignments.



After Czechoslovakia had finished research work in China in 1955, East Germany sent to China, in 1956, a delegation of climatization experts, including one climatologist, one microbiologist, one electrical engineer, and two chemical engineers, one of which was a specialist in cable and wiring. This delegation tested about 1,500 sample products of various branches of industry at five experimental stations erected by Czechoslovaks and Chinese.

In 1957, a new delegation went to China to continue the work.

The DAMW is preparing another trip which will extend through 1959-1960, and will include the testing of tropicalized instruments in India and Indonesia.

The Chamber of Technology of East Germany is faced with the responsibility of supporting the procurement of documentation on tropicalization by industry and of contributing to the standardization of testing and delivery specifications. The DAMW has suggested climatization-test markings for equipment for special areas of application under the general headings of: temperate climate, moist-hot climate, moist-dry climate, cold climate, mountainous climate, and oceanic climate.

The following publications are already available:

- DIN 50010: Pruefung von Klimaeinwirkungen (The Testing of Climatic Effects)
- DIN 40040: Klimaschutz von Bauelementen der Nachrichtentechnik (Climatization of Components of Communications Engineering)
- VEM 11001: Richtlinien fuer den Klimaschutz elektrotechnischer Erzeugnisse (Instructions for Climatization of Electrical Engineering Products)
- VEM 12701: Galvanische Ueberzuege (Galvanic Coatings)
- Der Bericht der China-Delegation 1956 (The Report of the 1956 China Delegation)

40. Tropicalization of East German Relays

"Climatized Communications Relays," by B. Thiel and W. Reiser, Central Laboratory for Communications Engineering; Berlin, in VEB RFT Fernmeldewerk, Arnstadt; Berlin, Nachrichtentechnik, No 3, Mar 59, pp 117-122

This article gives detailed suggestions for "type 2 protection" of the various parts of DC relays of communications equipment for operation in such areas as Vietnam, South China, India, Indonesia, UAR, Iraq, Sudan, and Northwest China. The conditions under which "type 2 protection" is satisfactory are: air temperature from plus 55 to minus 25 degrees C (plus 131 to minus 13 degrees F); relative humidity from 95% at 35 degrees C to 10% at 40 degrees C, and vapor pressure from 40 to 5 mm Hg.

"Type 1 protection," i.e., tropicalization for any and all weather conditions, is rejected by the article because of the difficulties involved with respect to insulation. Of the modern plastics, only the expensive chlorinated or unchlorinated fluorocarbons, and of the traditional insulation materials, only ceramics, the use of which requires design changes, can be considered for such a protection. The article suggests that all parts, standard and tropicalized, be of the same design, and recommends measures for processing relay parts of standard design so that they will satisfy the requirements for "type 2 protection."

41. Tropicalization of East German Capacitors

"Climatization of Capacitors of Communications Engineering and the Testing Methods Required for Them," by H. Koerner, Gera; Berlin, Nachrichtentechnik, No 3, Mar 39, pp 122-124

Various types and designs of capacitors used in communications engineering are discussed with respect to their possibilities of application under various climatic conditions. A comparison is also made of the two current designation systems represented by the testing regulations, DIN 40040 and IEC-80 and IEC-68.

42. Tropicalization of East German Resistors

"The Climatization of Carbon Coated Resistors for Electrical Communications Engineering and Measurements," by H. J. Goldschmidt, Teltow; Berlin, Nachrichtentechnik, No 3, Mar 59, pp 125-128

The article discusses the equipment, methods, and results of tests conducted at the climatization laboratory of VEB RFT Werk fuer Bauelemente der Nachrichtentechnik, Teltow, for the tropicalization of carbon coated and boron-carbide coated resistors manufactured in East Germany.

Computers and Automation

43. Universal Digital Computer LEM-1

"Small Universal Digital Computer LEM-1 with Magnetic (Ferrite) Components," by Yu. A. Makhmudov; Moscow, Radiotekhnika, No 3, Mar 59, pp 47-57

The article discusses some problems connected with the design and construction of the LEM-1 universal digital computer incorporating contactless magnetic (ferrite) and capacitive "DYEZU" (high-retentivity capacitive storage devices) components. The LEM-1 computer was developed at the Laboratory for Electromodeling of the All-Union Institute of Scientific and Technical Information, Academy of Sciences USSR, under the direction of Prof. L. I. Gutenmakher.

This digital computer operates with a fixed point placed before the most significant digit. One binary column is reserved for sign representation of the numbers. The machine operates with 15-column binary members. The internal storage device of the machine has 8,191 addresses, of which 7,167 addresses are in permanent storage and 1,024 addresses in the operating storage. The LEM-1 computer is composed of the following units: permanent storage, operating storage, arithmetic unit, command analyzer, input unit, magnetic tape external storage, output unit and central control unit. The computer incorporates about 3,000 magnetic (ferrite) elements, about 80 electronic tubes in the pulsed-power circuit, about 500 transistors and about 16,000 selenium rectifiers. The computer is designed to perform several operations simultaneously. At 30 kc frequency of pulsed-power supply the computer performs, 1,200 additions or subtractions, 600 multiplications or 200 divisions. At present, work is being conducted at the laboratory for the development of pulsed-power supply at 300 kc frequency, which should considerably increase the speed of the computer.

This is the first computer incorporating contactless magnetic and capacitive components that has been developed at the Laboratory for Electromodeling.

44. Computers Constructed in Tbilisi

"Tbilisi Computers," (unsigned article); Moscow, Izvestiya Sovetov Deputatov Trydyashchikhsya SSSR, 26 Mar 59, p 4

In the center of Tbilisi there is located a new scientific research institute of instrument construction and means of automation of the national economic Council of the Georgian SSR. Original mathematical machines are constructed in its laboratories for example, a controlling computer for regulating the electric operating conditions for ferroalloy furnaces.

The machine has successfully passed the laboratory tests and at present is undergoing industrial tests at the Zestafonskiy ferroalloy plant.

A second computer is intended for determining the weight of individual forms of raw material entering into a cupola furnace. In this particular machine, constructed in the laboratory, the calculation of important parameters stabilizing the heating system of the ferroalloy plant is possible. The machine determines the delivery of coke and supply of draft as a function of the given temperature of the metal and the composition of the flue gases.

A computer is also ready for automation of the calculation of voltage and power losses in power transmission lines.

45. Autopilot Vibration Servomechanism

"Dynamics of a Vibration Servomechanism in Electric Autopilot," by I. N. Krutov; Moscow, Avtomatika i Telemekhanika, No 2, Feb 59, pp 115-126

Analyzes the performance of an electric vibration servomechanism which automatically actuates the aircraft controls. An electromagnetic clutch is utilized for shifting of speeds in this system. The dynamics of such a servomechanism was investigated with the aid of a phase plane. This method of examination was demonstrated for two specific cases: when the servomechanism motion is described by a first order equation and when it is described by a second order equation. The parameter relations defining the limits of stability of such a vibration servomechanism are defined. Due to the low inertia of the servomotor, speed shifting is effectively performed by an electromagnetic clutch which connects the output shaft with a continuously rotating motor.

The method described also permits calculating whether complex self-oscillations would be set up in the system for given values of the parameters.

46. Method of Programing Discussed

"On One Method of Programing," by V. S. Kurolyuk, Mathematics Institute, Academy of Sciences, Ukrainian SSR; Kiev, Dopovidi Akademii Nauk Ukrainskoi RSR, No 12, 1958, pp 1292-1295

Presents a method of programing, not associated with the technical peculiarities of specific digital computers, which makes it possible to introduce formal conversions of programs, permits automatic translation into programs for specific machines, and enables recommendations for the technical improvement of the machines to be formulated.

47. Continuous Strong Markov Processes of One Dimension

"One-Dimensional Continuous Strong Markov Processes," by Ye. B. Dynkin; Teoriya Veroyatnostey i yeye Primeneniya; Moscow, Vol 4, No 1, pp 3-54

One-dimensional temporarily homogeneous strong Markov processes with continuous path functions are considered. No regularity conditions are assumed. Infinitesimal operators for all these processes are calculated. These calculations are based on a preliminary analysis of the local behaviour of path functions. The general results of sections 1-3 are used in sections 4-5 for conducting a more detailed investigation of the process in intervals of its regularity.

48. New Zeiss ZRA-1 Computer

"The New Zeiss Automatic Computer ZRA 1," by H. Kortum, W. Kaemmerer, and F. Straube, Jena; Berlin, Feingeratetechnik, No 3, Mar 59, pp 97-104

The article gives a description, block diagram, explanation of the operating procedure and programing, and photographs of certain components of the ZRA 1.

The ZRA 1 is a digital computer. The numbers fed into the machine and the results produced by the machine are in decimal arrangement. The programing is done by means of ordinary punched cards, each card holding up to 12 lines. Each decimal point represents a tetrad in direct dual coding. The scanning speed is 80 cards per minute, corresponding to 960 program lines per minute. The magnetic storage drum has a capacity of 4,096 words and rotates at a rate of 12,000 rpm; it can be filled in less than 4 minutes. The computer output is in the form of a line printer, maximum 2.5 lines per second. All the pulse storage devices of the computing and mechanical devices, all control and logical circuits are

based on switching circuits with ferrite cores having an almost rectangular hysteresis loop. The circuits are fed with a 200-kc voltage in series, the operating pulses being produced by electron tubes modulated by synchronizing tracks on the storage drum. All switching circuits have germanium diodes.

The ferrite cores were developed at the Jena Institute for Magnetic Materials and produced at VEB Keramische Werke, Hermsdorf. The diodes were developed at VEB Werk fuer Bauelemente der Nachrichtentechnik, Teltow. The storage drum was developed by J. N. Lehmann of the Institute for Machine Computer Engineering, Dresden Technische Hochschule, and H. Lotz of ZIL, Fraureuth. The punched card unit and printer were developed at VEB Rheinmetall, Soemmerda.

#### Materials

#### 49. Energy Transport in Cadmium Sulfide Crystals

"Investigations On the Carrier Diffusion and Other Forms of Energy Transport in CdS," by J. Auth and R. Ridder, Physics Institute, Humboldt University, Berlin; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 351-364

An investigation was made of the concentration distribution of the charge carriers in partially illuminated CdS crystals at room temperature and at 80 degrees centigrade. Two exponential concentration decreases, with different characteristic lengths, were found. For the first, more abrupt decrease of concentration, the diffusion lengths were found to be 3-15 microns for crystals not known to be activated, 3 microns for Mn-activated crystals, and 27 microns for Ag-activated crystals. This decrease depends on the intensity and direction of the applied voltage. For the second, smoother decrease of concentration, diffusion lengths of 0.2 - 1.25 mm were found for crystals not known to be activated, and 0.15-0.3 mm for Ag-activated crystals. The incipience of the second concentration decrease varied from crystal to crystal, and is clearly dependent on temperature. The concentration decrease is lacking entirely in crystals of one particular origin. The first, more abrupt concentration decrease is interpreted as an "ambipolar" diffusion of the charge carriers. The life of the holes then amounts to  $10^{-9}$ - $10^{-7}$  second (assuming  $D_p \approx 5 \text{ cm}^2/\text{sec}$ ). The second, flatter drop is caused essentially by reabsorption of light produced by luminescence. Special experiments show that the light produced by luminescence in the case of CdS can produce photoconductivity.

50. Results of an Investigation of the Piezoelectric Activity of Various Substances

"Experimental Research on New Piezoelectrics," by I. S. Rez, A. S. Sonin, Ye. Ye. Tsepelevich, and A. A. Filimonov, Central Scientific Research Laboratory of Piezoelectrics; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 65-68

On the basis of research done at the Central Scientific Research Laboratory of Piezoelectrics (TsNILP) in 1956-1957, 39 inorganic and complex compounds are listed which exhibit a pronounced piezoelectric effect, 43 inorganic and complex compounds which have an insignificant piezoelectric activity, 90 organic substances which exhibit a pronounced piezoelectric effect, and 184 organic substances which exhibit an insignificant piezoelectric effect.

51. Domain Structure of Lead Titanate Crystals

"Optical Investigation of Single Crystals of Lead Titanate," by Ye. G. Fesenko and R. V. Kolesova, Rostov-on-Don State University; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 62-64

Single crystals of lead titanate were investigated with particular attention to their domain structure. The characteristics of lead titanate are compared with those of barium titanate. It was found that the domain structure of lead titanate sometimes disappears spontaneously for no apparent reason. This phenomenon requires additional investigation.

52. Observation of the Domain Structure of Barium Titanate

"Observation of the Domain Structure of Barium Titanate With the Aid of an Electron Mirror," by G. V. Spivak, E. Igras I. A. Pryamkova, and I. S. Zheludev, Moscow State University; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 123-125

The design and application of the electron mirror used are described. Results of determining the micro-relief on the surface (and the domain structure) of barium titanate crystals are reported.

53. Dielectric Properties of Triglycine Sulfate Crystals

"The Twinning and Dielectric Properties of Triglycine Sulfate Crystals," by V. P. Konstantinova, I. M. Sil'vestrova, and V. A. Yurin, Institute of Crystallography, Academy of Sciences USSR; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 125-129

The twinning of triglycine sulfate crystals was investigated by the method of etching. The dependence of the dielectric permeability of triglycine sulfate crystals on the temperature, the intensity of an alternating electric field, and the frequency was investigated.

54. Twinning of Domains in Triglycine Sulfate Crystals

"The Problem of the Domain Structure of Triglycine Sulfate Crystals," by L. A. Shuvalov, K. S. Aleksandrov, and I. S. Zheludev, Institute of Crystallography, Academy of Sciences USSR and the Krasnoyarsk Institute of Physics, Academy of Sciences USSR; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 130-132

It is pointed out that triglycine sulfate and also triglycine selenate and triglycine fluoroberyllate as well as several other recently discovered seignettelectrics which are isomorphous with triglycine sulfate, undergo changes of point symmetry when they pass through the Curie point. Because changes of symmetry of this type in connection with seignettelectric phase transitions are unusual and have been encountered for the first time in this instance, the domain structure in crystals of this group must exhibit a number of interesting peculiarities. The twinning of domains in triglycine sulfate crystals and similar crystals is considered from the theoretical and geometric standpoints: no new experimental results are reported.

55. A Method for the Polarographic Determination of Germanium

"Polarographic Determination of Germanium," by N. V. Stashkova and A. I. Zelyanskaya; Novosibirsk, Izvestiya Sibirskogo Otdel'eniya Akademii Nauk SSSR, No 1, Jan 59, pp 59-66

In an investigation carried out with the use of different inert electrolytes, it was found that tetravalent germanium is reduced at a mercury dropping electrode in many solutions with the formation of a pronounced wave. It was found that addition of Trilon B to the solutions improves the shape of the germanium wave. The applicability of the polarographic method for the determination of germanium against a background of sodium acetate and borax in practical analytical work was established.



The colorimetric method with the application of phenylfluorone is suitable for the determination of small quantities of germanium (up to several hundredths parts of 1%). The polarographic method is suitable for the determination of germanium present in higher concentrations (in the range of 0.01 - 0.1% and higher).

56. Lithium-Cadmium Ferrites

"The Characteristics of  $(\text{Li}_2\text{O} \cdot 0.5 \text{Fe}_2\text{O}_3)_{1-x} \cdot (\text{CdF}_2 \text{O}_4)_x$ "  
by N. A. Smol'kov and S. A. Dovba, Chair of Magnetism,  
Moscow State University; Moscow, Vestnik Moskovskogo  
Universiteta -- Seriya Matematiki, Mekhaniki, Astronomii,  
Fiziki, Khimii, No 4, Nov 58, pp 155-161

It was established that as the concentration of cadmium ferrite increases in solid solutions of  $(\text{Li}_2\text{O} \cdot 0.5 \text{Fe}_2\text{O}_3)_{1-x} \cdot (\text{CdF}_2 \text{O}_4)_x$ , there is reduction of the electric resistance, lowering of the Curie point, reduction of the coercive force, an increase in the initial and maximum magnetic permeabilities, and an increase in the maximum and residual [intrinsic] inductions [intensities of magnetizations]. The existence of a complex dependence of the angle of rotation of the plane of polarization on the composition of the solid solutions was established.

57. Manganese-Magnesium Ferrites

"The Magnetic Characteristics of Solid Solutions in the System  $\text{Mg Fe}_2 \text{O}_4 - \text{Mn Fe}_2 \text{O}_4$ ," by N. A. Smol'kov and V. F. Belov, Chair of Magnetism, Moscow State University; Moscow, Vestnik Moskovskogo Universiteta -- Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii, No 4, Nov 58, pp 163-169

After annealing of  $\text{Mg Fe}_2 \text{O}_4 - \text{Mn Fe}_2 \text{O}_4$  solid solutions there is reduction of the initial and maximum magnetic permeabilities and of the residual magnetic induction. There is also an increase of the coercive force in solutions with a high content of the manganese ferrite. The angle of rotation of the plane of polarization and the extinction increase for all ferrites in solutions with a low content of the manganese ferrite. There is a much greater increase of the former than of the latter.

58. Lithium Scintillation Glass for the Detection of Slow Neutrons

"A Scintillation Glass for the Detection of Slow Neutrons,"  
by V. K. Voytovetskiy, N. S. Tolmacheva, and M. A. Arsayev;  
Moscow, Atomnaya Energiya, Vol. 6, No 3, Mar 59, pp 321-326

A scintillation glass that had been developed was investigated. It was found that this glass, which has the composition  $\text{Li}_2\text{O} \cdot 0.2 \text{SiO}_2 (\text{Ce})$ , can be used for the detection of slow electrons. The scintillation efficiency of the glass when excited with electrons was found to be equal to 1.4% of that exhibited by Na I. (Tl). The scintillation yield for alpha particles was found to be 3.8 - 4 times smaller than that for electrons. The constant of the deexcitation time was determined and found to be approximately 0.15 microseconds. It was established that the scintillation efficiency of glass 0.1 cm thick containing lithium with a concentration of the  $\text{Li}^6$  isotope amounting to 90.5% comprises 82% for thermal neutrons. For neutrons with an energy of 10 electrovolts the scintillation efficiency of a glass 0.5 cm thick was found to be 40%.

It is pointed out that glass used for the detection of slow neutrons must contain a sufficient quantity of either lithium or boron.

59. Review of Work on Borides of Rare-Earth Elements

"Borides of Rare-Earth Metals," by G. V. Samsonov (Kiev);  
Moscow, Uspekhi Khimii, Vol 28, No 2, Feb 59, pp 189-217

The structure and physical properties of borides of rare-earth metals, methods for the production of rare-earth metal borides, sintering of borides of rare-earth metals, and applications of borides of rare-earth metals are reviewed on the basis of USSR and non-USSR publications. A bibliography consisting of 72 references, of which 44 are USSR (22 of them to publications by Samsonov) is appended to the article.

It is pointed out that the principal field of the application of borides of rare-earth metals, particularly their hexaborides, is electronics, where they are used as cathodes for powerful generator installations instead of metallic cathodes. The advantages of using rare-earth metal borides for applications of this type comprise a low work function of thermal emission, stability at low pressures, stability towards bombardment with ions, and a capacity for operation at high intensities of the field. Because cathodes made of rare-earth metal borides are not poisoned in the presence of air, they can be used in dismountable systems of electronic installations. Cathodes of lanthanum boride have been used successfully in a synchrotron at a high intensity of the field, high temperatures, and high current densities. A cathode of lanthanum boride was used on a cyclotron for 150-200 hours as compared with the 20-hour useful life of a tantalum cathode.

With the development of the production of rare-earth metal oxides and the consequent reduction of their cost, and also because investigations have been carried out on boride cathodes, the application of boride cathodes in television sets (electron ray tubes) and other electronic devices which are generally used becomes possible. One of the drawbacks of boride cathodes is a low electric resistance, by reason of which they cannot be heated readily. This drawback can be eliminated by using solid solutions of borides rather than individual borides. These solutions develop maxima of electric resistance while the favorable emission characteristics of the borides remain unchanged.

Extensive possibilities for the application of rare-earth borides are also opened up by reason of the high melting temperatures of compounds of this class, their hardness, and their chemical stability.

60. Method for the Preparation of Europium Hexaboride

"Europium Hexaboride," by G. V. Samsonov, V. P. Dzeganovskiy, and I. A. Semanshko, Institute of Cermets, Powder Metallurgy, and Special Alloys, Academy of Sciences Ukrainian SSR; Moscow, Kristallografiya, Vol 4, No 1, Jan/Feb 59, pp 119-120

The structures of hexaborides of a number of rare-earth metals have been investigated rather thoroughly. It has been established that these borides have advantageous thermal emission characteristics. For this reason, compounds of this class are used extensively in electronics. Among the few rare-earth metals which had not been synthesized or investigated was europium hexaboride. This compound has been prepared in the work described in this instance by reducing a pure europium oxide with boron carbide. The characteristics of europium hexaboride from the standpoint of its application in electronics were determined and compared with those of other rare-earth metal borides.

61. Adhesion Plateaus in Photoconductivity of CdS Single Crystals

"Slow Onset of Photoconductivity of CdS Single Crystals at Weak Excitation Intensities," by K. W. Boer and E. Wartusch, Second Physics Institute of Humboldt University and Laboratory for the Physics of Electrical Breakdown, German Academy of Sciences, Berlin; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 406-412

An observation of the slow build-up of photoconductivity with weak light excitation affords the possibility of obtaining information on the adhesion-term spectrum in the forbidden zone, and of computing the concentration of pronounced adhesion-term groups as well as their adhesion coefficients for the electron capture. Crystals which have a structured

adhesion-term spectrum reveal build-up curves with points of divergence. Plateaus can be recognized, which are caused by the successive filling of adhesion-term groups, and which make possible a calculation of the adhesion-term concentration and of the corresponding adhesion coefficients. To compute these variables, only the concentration of the conductivity electrons on the plateau and the time of the upward swing of the curve at the end of the plateau are required.

IV. ENGINEERING

62. The Ionization and Dissociation of Air in Hypersonic Flight

"Dissociation and Ionization of Air, Problems in Hypersonic Flight," by Engr Capt Yu. Kibardin, Candidate of Technical Sciences; Moscow, Sovetskaya Aviatsiya, 27 Mar 59, p 2

The author presents a basic review of information concerning the dissociation and ionization of air caused by hypersonic flights. After discussing these phenomena, the author states that at the present time, although plasma, which is a mixture of stripped nuclei and electronic gas, has been obtained under laboratory conditions, it has not been obtained under hypersonic flight conditions, although ionization has. In addition, according to the author, electric and magnetic poles can act on this ionized air. The author states that ionized air is chemically more active than normal air. Ions of air energetically enter into chemical reactions with materials found in flying apparatus and can cause the oxidation of the outer covering. The degree of dissociation and ionization of air around the nose portion of a flying apparatus will be less than that found in the rear portion of the apparatus, while the temperature will be higher. Therefore, the nose part of the apparatus should be covered with special insulation.

The discussion is accompanied by three graphs. The first one, Figure I, shows a graph of the dissociation and ionization of air at temperatures up to 25,000° C and at speeds up to 7 kms per sec. Figure 2 shows changes in the chemical composition of air as a result of dissociation and the formation of nitrogen oxides and ionization, depending on temperature for two pressures -- 0.001 atmospheres and 100 atmospheres. Figure 3 presents curves of the air temperatures surrounding the nose-portion of an apparatus at various altitudes and speeds. It is seen from Figure 3 that flight at great speeds close to the ground can be accompanied by air temperatures of up to 10,000° C. At heights of approximately 100 km at these rates of speed, the temperature of the air is decreased at the critical point almost by a factor of 2. On the surface of a flying apparatus, where the pressure is approximately equal to atmospheric pressure, the temperature will be lower, especially at increased speeds. However, such a lowering of temperature does not guarantee the integrity of the structure. Special measures are required for the thermic protection of the structure which will be discussed in a forthcoming article.

In addition, the author states that free atoms of oxygen and nitrogen are obtained as a result of the dissociation of molecules and can enter into reaction with each other, forming opaque nitric oxide. At the same time,

a new type of heat-exchange begins, i.e., radiation, around a flying body. It should be further noted that during the flight of a flying apparatus, the temperature and pressure of the air is different at various points on its surface, complicating the aerodynamic problems.

63. Future Development of Combined Power-Heating Electric Stations

"Power-Heating Plant Development in Large Power Systems With High-Capacity Electric Stations of High and Super-High Pressure," by S. F. Kop'yev; Moscow, Teploenergetika, No 4, Apr 59, pp 3-10

The article analyzes the apparent inefficiency of combined power and heat generation at the same electric power station in the light of greater emphasis recently placed in the USSR on the gaseous and liquid fuels.

"The rayon boiler installations burning gas or liquid fuel for centralized heating cost 30% less than similar installations operating on solid fuel, and their operating efficiency is raised to 80-90%, in contrast to an efficiency of 65-75% for installations operating on solid fuel.

"These advantages of separate generation of electric power and heat, if fortified with superficial and one-sided evaluation of the newly introduced factors affecting the future construction of the power plants in the USSR, might be interpreted as a blow to the practicability of combined power-heating generation, depriving the latter of its leading role in the future power supply to the cities and industry.

"As a possible 'rescue' of the combined power-heating generation, it is suggested to continue to supply heating from large power-heating electric stations located directly at the coal fields or from 'micro-power-heating stations' burning gas. When gas is available, even separate centralized heating boiler units are considered inefficient, and complete decentralization down to individual heating units for each apartment is suggested.

"Detailed analysis of this problem carried out by a number of leading power engineering institutes (Power Engineering Institute, Academy of Sciences USSR, All-Union Heating Engineering Institute, Moscow Power Engineering Institute, All-Union Correspondence Institute of Power Engineering, and Promenergoprojekt), as well as by individual experts, has shown that the existing doubts about the practicability of combined power-heating installations are without foundation and that the economical basis for the combined power-heat generation cannot be undermined by the new factors entering into the further development of power engineering in the USSR, provided these factors are properly interpreted in the future construction of combined power-heating electric stations."

64. New Zeiss Spectrograph

"A New Glass Spectrograph," by H Scheller, VEB Carl Zeiss, Jena; Berlin, Feingeraetetechnik, No 1, Jan 59, pp 19-23

VEB Carl Zeiss, Jena, has developed a new glass spectrograph, the optical principle of which goes back to an earlier type (spectrograph for physicists) with the Foersterling three-prism arrangement. It is a very stable and easy to operate instrument rugged enough for use in an industrial laboratory. It can be converted rapidly and repeatedly to meet the requirements of varying spectrographic problems.

The main feature of the new development was the equipping of the three-prism spectrograph with two cameras of different focal length and large relative aperture for the spectrographic recording of Raman emission of organic substances or of other low-intensity phenomena such as luminescence, flame spectra, and converter spectra. The three-prism arrangement also afforded the possibility of bridging the gap of a glass spectrograph of very high dispersion.

When combined with an autocollimation camera with a focal length of 1,300 millimeters, the three-prism spectrograph can be used for the emission analysis of spectra with an especially large number of lines, such as are encountered in the quantitative analysis of rare earths, highly alloyed steels, and tungsten carbides, as well as ceramic products based on titanium oxide or zirconium oxide.

65. Jet Propellants Commission in Poland

"Formation of Jet Propellants Commission, Polish Academy of Sciences," (unsigned article); Warsaw, Skrzydlatą Polska, 18 Mar 59, p 3

Brief item in source reports the formation of the Jet Propellants Commission (Komisja Napędów Odrzutowych) under Technical Sciences Department IV (Wydział IV Nauk Technicznych) of the Polish Academy of Sciences. The task of this new commission is to prepare a 5-year plan and prospective plans for scientific research in rocket technology in Poland. Chairman of the commission is Prof Dr Michał Lunc, corresponding member of the Polish Academy of Sciences.

66. East Germans Welcome Translation of Tsien's Book on Cybernetics

"Book Reviews. Technische Kybernetik, by H. S. Tsien, translated by H. Kaltenecker, VEB Verlag Technik, Berlin, and Berliner Union, Stuttgart, 1958, 288 pp," by Hornauer; Berlin, Nachrichtentechnik, No 3, Mar 59, pp 142-143

The review of this book (H. S. Tsien, Engineering Cybernetics, McGraw-Hill, New York, 1954) ends with the following statements:

"It can thus be seen that Tsien's observations penetrate up to the very limits of present-day knowledge and give a large view of the problems which cybernetics presents to the engineer. All mathematical entries are given without derivations, and so the book can be used for more profound study only by those who are equipped with the necessary mathematical knowledge, thus essentially that knowledge which today has been compiled under the concept of the mathematics of control.

"In view of the fact that the problems of automation have come to the fore in East German industry, the appearance of this book by Tsien is to be welcomed. It can be recommended emphatically as a valuable aid to anyone who intends to concern himself more deeply with the scientific and mathematical problems connected with automation."

CPYRGHT

67. New Petroleum Research Institute at Kuybyshev

"Creation of a New Petroleum Research Institute at Kuybyshev, USSR," (unsigned article); Bucharest, Petrol si Gaze, Jan 59, p 42

The success of geological exploration in the Kuybyshev area in recent years has led to a considerable increase of gas and oil reserves. New deposits with very favorable exploitation parameters were discovered. As a consequence, crude oil production in the Kuybyshev area will increase to three times that of the present production in the period 1959-1965.

Due to the rapid development of this important industry, which requires the application of ultramodern methods and technological processes, and due to the many problems that need to be solved, the Complex Scientific Research Institute of the Petroleum Industry (Institutul complex de cercetari stiintifice al industriei petrolului) was established at Kuybyshev. The institute's activities began in June 1958.



The institute was created on the basis of many geological research laboratories and some technical services of Giprovostokneft. The structure of the institute provides for the following sections: geology, geochemistry, geophysics, drilling, exploration, automatics and telemechanics, fuel, oils, and plans.

The geology section comprises five laboratories: stratigraphy, tectonic and deposit formation, calculation of reserves, methodology of prospecting and exploration operations, and hydrogeology.

The geochemistry section is represented by the laboratory of the geochemistry of paleozoic deposits; the laboratory of geochemistry of crude oil, and the laboratory of microbiology.

The geophysics section has three laboratories [not named].

The drilling section is provided with laboratories of drilling technology, rational drilling regime, and drilling machines and equipment.

The exploitation section has created laboratories for crude oil extraction techniques and technology, intensification of crude oil extraction, and gas extraction and transportation.

There are three laboratories in the fuel section: preparation of raw material, catalytic processes, and petrochemical synthesis.

In the oils section are the laboratories of the manufacture of oils and paraffin and of grease synthesis.

The planning section has two sectors: drilling and extraction.

The subject plan of the institute for the second half of 1958 provides a broad program of present problems connected with the development of the petroleum industry in the Kuybyshev area.

[For additional information, see Item No 59 and also Metallurgy.]

V. MATHEMATICS

68. Fejer Series Used in the Approximation of Conjugate Functions

"Approximation of Conjugate Functions by Fejer Sums,"  
A. V. Yefimov; Moscow; Uspekhi Matematicheskikh Nauk,  
Vol 14, No 1(85), Jan/Feb 59, pp 183-188

Let  $f(x)$  be a periodic function of period  $2\pi$  and let  $a_m = a_m(f)$  and  $b_m = b_m(f)$  be its Fourier coefficients.

We will denote the corresponding Fourier and Fejer sums by

$$S_n(f, x) = a_0/2 + \sum_{m=1}^n (a_m \cos mx + b_m \sin mx) \quad (n = 0, 1, 2, \dots)$$

$$\sigma_n(f, x) = 1/n+1 \sum_{m=0}^n S_m(f, x), \text{ respectively.}$$

We will say that  $f(x) \in MH_k^1$  if  $f(x)$  has the period  $2\pi$  and for any  $x \in [0, 2\pi]$  and  $h > 0$  satisfies the condition

$$\omega_k(h, f) = \sup_{|\delta| \geq h} \|\Delta_\delta^k f(x)\| = \sup_{|\delta| \leq h} \max_x \sum_{i=0}^k (-1)^{k-i} \binom{k}{i} f(x + k \frac{-2i\delta}{2}) \leq Mh$$

( $k$  is a whole number  $\geq 1$ ). Henceforth, if  $M = 1$ , we will write  $f(x) \in H_k^1$ . We will denote the conjugate function of  $f(x)$  by  $\bar{F}(x)$ .

We have established in [1] the case when  $k \geq 2$  and in [2] the case when  $k = 2$  that if  $f(x) \in H_k^1$  and  $\bar{F}(x)$  is the conjugate function, then

$$(1) \quad \bar{F}(x) - \sigma_{n-1}(f, x) = -1/\pi \int_0^{a_1} [f(x + t/n) - f(x - t/n)] \frac{\sin t}{t^2} dt + \\ + O(1/n), \text{ where } a_1 > 0 \text{ is the smallest root of the equation}$$

$$\int_0^u \frac{\sin t}{t} dt = \pi/2.$$

In the present work the following theorem is proved.

Let  $f(x) \in H_k^1$  ( $k \geq 2$ ) and  $\bar{f}(x)$  be the conjugate function. Then for deviations of the function  $\bar{f}(x)$  from its Fejer sum, the following equation holds:

$$(2) \quad \bar{f}(x) - \bar{\sigma}_{n-1}(f, x) = f(x - 1/2n) - f(x + 1/2n) + O(1/n).$$

[1] A. V. Yefimov, "On the Approximation of Certain Classes of Continuous Functions by Fourier and Fejer Series," Dissertation, Moscow, 1957.

[2] A. V. Yefimov, "On the Approximation of Certain Classes of Continuous Functions by Fourier and Fejer Series," Izv. AN, Seriya Matem., Vol 22, 1958, pp 81-116.

69. Approximation of Periodic Differentiable Functions by Trigonometric Polynomials

"On the Best Approximation of Periodic Differentiable Functions by Trigonometric Polynomials," by Sun' Yun-Shen; Moscow, Izvestiya Akademii Nauk SSSR Seriya Matematicheskaya, Vol 23, No 1, Jan/Feb 59, pp 67-92

In the work, the exact upper bound of the best approximations by trigonometric polynomials of order  $n-1$  of periodic functions of classes  $W^{(r)}$  and  $\tilde{W}^{(r)}$  for  $r \geq 6$  is established.

70. Information Theory With an Abstract Alphabet

"Information Theory with an Abstract Alphabet-Generalized Forms of McMillan's Limit Theorem for the Case of Discrete and Continuous Time," by Al'bert Perez, Czechoslovak Academy of Sciences, Institute of Radio Engineering and Electronics; Moscow, Teoriya Veroyatnostey i yeye Primeneniya, Vol 4, No 1, 1959, pp 105-109

Various means of generalizing McMillan's limit theorem are discussed.

71. Integral Equations Solved Approximately

"Approximate Method of Solving Nonhomogenous Integral Equations With Any Arbitrary Regular Value of the Parameter,"  
I. D. Belogorskaya; Kiev, Dopovidi Akademii Nauk Ukrain-  
skiy RSR, No 12, 1958, pp 1288-1291

The paper gives a description and a demonstration of a method for solving integral equations which is analogous to Seidel's method for solving a system of linear algebraic equations.

VI. MEDICINE

Antibiotics

72. New Antibiotic -- Mycerin

"Mycerin" (unsigned article); Moscow, Meditinskiy Rabotnik,  
6 Mar 59, p 4

"A method for obtaining and purifying mycerin, a new antibiotic, has been developed at the Division of Infectious Pathology and Experimental Therapy of Infections of the Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, Academy of Medical Sciences USSR. The preparation, prepared from an actinomycete isolated from the soil of Krasnodarskiy Kray, is now being utilized in the therapy of infections caused by microorganisms which are resistant to other antibiotics -- penicillin and streptomycin in particular -- in a number of clinics.

"Conclusive reports on the high effectiveness of mycerin were furnished by the Institute of Neurosurgery imeni N. N. Burdenko, the Moscow City Hospital imeni Bauman, Maternity Home No 16 in the Leningradskiy Rayon of Moscow, and other medical establishments. The drug produces no side effects. When administered parenterally, the drug freely permeates the nervous system, forming a highly effective concentration in the spinal cord fluid. Mycerin is particularly useful when used parenterally in the therapy of large area burns, purulent cerebral processes, and abscesses of the mammary gland in women, and when administered intranasally in drops to newly born infants to prevent infections of the respiratory organs.

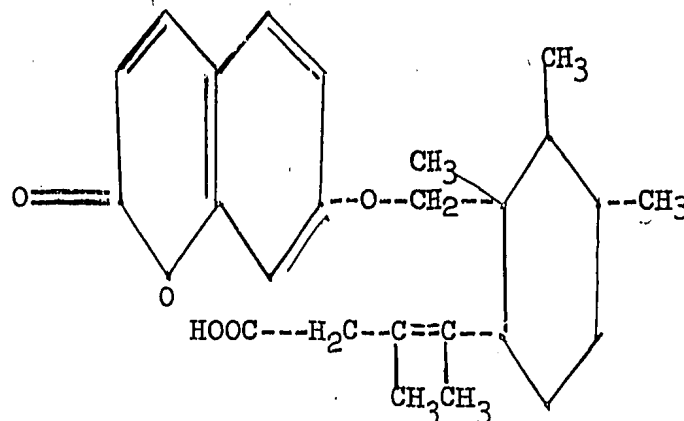
"The new drug is administered intramuscularly in small doses not exceeding a total of 1.5 - 2.0 grams in 24 hours. It was also found to be effective when administered internally in doses of 2-5 grams. The course of treatment is 2 or 3 days. Facilities for large-scale production of this valuable preparation should be provided by the Moscow Sovnarkhoz."

CPYRGHT

73. New Antibiotics Obtained From Plants of Ferula Genus

"Galbanic Acid and its Derivatives as New Antibiotics of Plant Origin," by N. P. Kiryalov, M. A. Litvinov, V. O. Mokhnach, and T. N. Naugolnaya; Moscow-Leningrad, Botanicheskiy Zhurnal, Organ Vsesoyuznogo Botanicheskogo Obshchestva, Vol 44, No 1, Jan 59, pp 101-104

Numerous investigations established that aqueous and aqueous-alcohol solutions of the sodium salt of galbanic acid in meat peptone bouillon have a bacteriostatic effect on staphylococcus aureus strain No 209. Galbanic acid is a crystalline substance obtained from the roots of *Ferula kokanica* Rgl. et Schm. and *Ferula gummosa* Boiss. It has a melting point of 94-96 degrees and its chemical composition is  $C_{25}H_{32}O_5$ . It is an umbelliferone derivative with the following probable structural formula:



Further investigations revealed that the products of the partial decomposition of galbanic acid also possess great antimicrobial activity.

When galbanic acid is reacted with alkalies, an oxidibasic acid is formed. It has a melting point of 225-226 degrees, and its chemical formula is  $C_{23}H_{32}O_6$ . It was further found that the methyl and ethyl esters of the oxidibasic acid are even more antimicrobially active than galbanic acid. The preparations have no effect on the coli bacillus. They are only slightly toxic. Of considerable interest is the fact that they differ structurally from other known antibiotics. Methods of extracting the antibiotics from the plants are described.

74. Phthalazole, an Antibiotic Preparation

"Antibacterial Action of Phthalazole," by Ye. P. Podruchnyak and V. Ya. Pochinok (Kiev); Kiev, Vrachebnoye Delo, No 12, Dec 58, pp 1293-1298

Experiments were conducted to determine the effect of phthalazole [Phthalylsulfathiazole, Lekarstvennyye Sredstva, (Drugs) by Prof. M. D. Mashokovskiy Moscow, Medgiz, pp 490-491] on *Proteus vulgaris*, *Bacillus coli*, and *Bacillus pyocyaneus*. The antibacterial action of phthalazole was tested in vitro by utilizing a physiological salt solution of the chemical. While phthalazole dissolves with difficulty in physiological salt solution, the addition of sodium bicarbonate markedly increases the solubility of the drug. The experiments were carried out in Petri dishes on either a meat-peptone agar medium or on liquid culture media. The results of the experiments were as follows:

- CPYRGHT
1. Phthalazole exhibited an expressed antibacterial action on *Bacillus coli*, *Bacillus pyocyaneus*, and *Proteus vulgaris*.
  2. The antibacterial action of phthalazole depended on its concentration and the culture medium used.
  3. When used in combination with penicillin it enhances the action of both the latter and itself.

75. Plans for Antibiotic Production

"Our Plans and Prospects, Today and Tomorrow in Antibiotics," by Z. Yermol'yeva, Corresponding Member of Academy of Medical Sciences USSR; Moscow, Meditsinskiy Rabotnik, 6 Jan 59, p 3

"During 1958, our industry perfected the production of many antibiotic substances. Among the preparations of the neomycin complex, polymycin and mycerin are very necessary in surgical practice and in treating intestinal infection in children. At the end of the year, as a result of intense work, a group at the Sverdlovsk Factory of Medicinal Preparations produced the first consignment of erythromycin -- an antibiotic effective in diseases caused by penicillin-resistant-type microbes; and the first consignment of an antifungus preparation, nystatin, was produced at the Moscow Factory No I. The production of bicillin III -- a preparation of penicillin of prolonged action -- and a mixture of tetracyclines and vitamins was authorized.

CPYRGHT

"For our group at the Laboratory of Antibiotics of the Central Institute for the Advanced training of Physicians, it was very important to put into mass production the tetracycline preparations for intramuscular administration (these have already received favorable reviews by clinicians in various specialties).

"The second useful work conducted by us: illuminating the action of various antibiotics on tumor growth. We showed that, despite certain ideas on the subject, such antibiotics as penicillin, streptomycin, and tetracycline do not stimulate tumor growth. We have now undertaken an energetic search for antibiotics which will inhibit tumor growth.

"Our young antibiotic science has already made a huge contribution in the fight for the health of humanity. However, there are still many outstanding problems on which many scientific workers throughout the world are working. We hope, as quickly as possible, to find an antibiotic against the oldest killer of man -- cancer -- and against still unconquered diseases -- poliomyelitis, and virus influenza. 'Old' bacterial infections require our constant attention so as to obtain better medicinal forms of antibiotic and to prevent the growth of resistant forms of microbes and superfluous side effects."

CPYRGHT

76. Aerosol Method of Antibiotics Administration

"Therapy of Patients With Pulmonary Inflammatory and Suppurative Processes With Antibiotic Aerosols," by O. V. Korkushko, Chair 1 of Therapy at Kiev Institute for Advanced Training of Physicians; Kiev, Vrachebnoye Delo, No 1, Jan 59, pp 21-26

An aerosol method of administering antibiotics in the therapy of pulmonary inflammatory and suppurative processes is described. The observations and experiments were made on 130 patients at the Kiev Oblast Clinical Hospital. The patients were divided into two groups: the first group comprising 105 patients was given the aerosol treatment; the second group, consisting of 25 patients, received the antibiotics intramuscularly. The course of aerosol therapy consisted of 20-30 inhalations, each inhalation lasting from 25 to 30 minutes. The I. I. Elkin and S. I. Edelshteyn aerosol atomizers were used. The atomizers were connected by rubber tubes with oxygen cylinders equipped with dosimeters and reducers. At each inhalation treatment, the patients received 300,000 units of penicillin and 250,000 units of streptomycin through the respiratory organs. The observations established that the direct aerosol method of therapy of pulmonary inflammatory and suppurative diseases with antibiotics is more effective than the indirect method of therapy by the intramuscular administration of the preparations. In cases which require surgical interference, the aerosol method may be utilized as one of the components of the complex of preoperative preparation.



Bacteriology

77. Membrane Filters to Determine Seedability of Intestinal Bacilli

"The Experimental Use of Membrane Filters for Quantitative Determination of the Extent of Seedability of Surfaces by B. coli," by B. M. Laprun and Ye. I. L'vovskaya, Sb. Nauchn. Rabot. Mold. Otd. Bses. Nauchn. O-va Mikrobiol., Epidemiol., i Infektsionistov (Collected Scientific Works of the Moldavian Branch of the All-Union Society of Microbiologists, Epidemiologists, and Infectionists), No 2, 1957, pp 97-100 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 58, Abstract No 90940, by V. V. Vlodayets)

"Washing from 50 or 100 cm<sup>2</sup> surface was done with a 5 x 5 cm sterile gauze pad moistened with physiological solution. The pad was immersed in a flask containing 50-100 ml of sterile physiological solution and was agitated for 3-5 minutes, after which the liquid was filtered through a membrane filter. This filter was placed on an Endo medium for a day to determine the number of B. coli. The number of B. coli on one cm<sup>2</sup> of surface was determined by simple counting. Washings from small round objects were done from the entire surface. After 726 washings, growth of B. coli was obtained in 428 cases (57.5%), whereas growth was observed in only 302 cases (41.6%) when seeding was done according to the generally accepted directions. The authors recommend a method of washings with seeding on membrane filter for quantitative determination of B. coli."

78. Effect of Sublethal Doses of Chlorine on Enteric Bacteria

"The Relationship of Dysentery Bacteria and Intestinal Bacilli to Sublethal Doses of Chlorine, Taking Into Account Their Drug Resistance and Modifiability," by N. D. Trofimova, Tr. Krymsk. Med. In-t (Collected Works of the Crimean Medical Institute), No 17, 1957, pp 141-147 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 58, Abstract No 90708, by V. G. Petrovskaya)

"The relationship of Sonne and Flexner dysentery bacteria, Boyd-Novgorodskaya and Newcastle subspecies, and intestinal bacilli (citrate-positive and citrate-negative) which were sensitive and resistant to etazol and synthomycin, and to sublethal doses of chloramine and sodium hypochlorite was studied. There was a total of 46 strains in the experiment. A high resistance of Sonne dysentery and very low resistance of the

CPYRGHT

CPYRGHT

Boyd-Novgorodskaya and Newcastle subspecies to etazol and chlorine was noted. The established differences with respect to etazol of the citrate-positive intestinal bacilli and mammalian intestinal bacilli, in the author's opinion, can be an additional criterion for differentiating these species. Parallelism between the resistance of the cultures to synthomycin and etazol and the relationship to chlorine were not established. A change in the biochemical properties of certain cultures after brief action of chlorine was noted."

CPYRGHT

79. Role of B. sporogenes in Experimental Gas Gangrene Infection

"The Significance of Bacillus sporogenes in Experimental Gas Gangrene Infection," by V. P. Ryabchikova, Anaerobnyye Infektsii (Anaerobic Infections), Kiev, Gosmedizdat Ukrainian SSR, 1957, pp 13-19 (from Referativnyy Zhurnal--Biologiya, No 20, 25 Oct 58, Abstract No 90962)

"The effect of anemization, necrotization, and crushing of tissues, and the role of apathogenic strains of Cl. perfringens and Staphylococci on subcutaneous introduction of Cl. sporogenes to mice (15 billion microbial cells of avirulent strains) was studied. In the presence of additional irritants or association of two conditionally pathogenic species (Cl. sporogenes with Cl. perfringens or Staphylococci), the development of gas gangrene infection with a rather high percentage of animal mortality was noted. The simultaneous introduction of all three species of microorganisms caused an increase in the severity of the infection."

CPYRGHT

80. Experimental Tetanus Studied

"A Study of Experimental Tetanus Produced by the Introduction of Tetanus Toxin, Spores of Tetanus Bacilli, and Soil," by L. A. Chernaya, Anaerobnyye Infektsii (Anaerobic Infections), Kiev, Gosmedizdat, Ukrainian SSR, 1957, pp 99-103 (from Referativnyy Zhurnal--Biologiya, No 20, 25 Oct 58, Abstract No 90944, by G. F.)

"A 0.5-1.0 ml suspension of soil in physiological solution heated at 80° for 20 minutes, or spores of tetanus bacilli (SSP) in a 0.75% CaCl<sub>2</sub> solution was given to mice subcutaneously. The animals were watched for 10 days. Irregularity in the seedability of the soil with SSP, and also a different disease course in mice following the introduction of soil, SSP, or dry tetanus toxin (controls) was noted. The first symptoms of tetanus appeared 18 hours after the introduction of toxin to the mice; one day

CPYRGHT

after infection with SSP; and 2-3 days after the introduction of soil. An increase in the manifestations of intoxication occurs more quickly after the introduction of SSP and soil, and more slowly after the introduction of toxin. The number of mice which died from tetanus during the first 3 days was 46.9% after the introduction of toxin, 96.6% after the introduction of soil, and 89.5% after the introduction of spores. The author considers that the difference in the genesis, development, dynamics, and outcome of tetanus produced by the introduction of toxin, soil, or SSP is connected with a different disease mechanism: intoxications in the first case and toxicoinfections in the subsequent cases."

Epidemiology

CPYRGHT

81. Source of Human Botulism

"Home Canning as a Source of Human Botulism," by M. S. Segal', P. A. Razumayev, and V. P. Ryabchikova, Anaerobnyye Infektsii (Anaerobic Infections), Kiev, Gosmedizdat Ukrainian SSR, 1957, pp 145-147 (from Referativnyy Zhurnal--Biologiya, No 20, 25 Oct 58 Abstract No 90849, by M. A. Gruzman)

"A case of poisoning of three persons with clinical manifestations of botulism after eating home-canned food prepared from meat of hogs killed under unsanitary conditions is described. The meat was prepared with condiments, cut into small pieces, put into a jar (under tomatoes, and filled to the top with pork fat. Slaughter under unsanitary conditions could have contributed to infection of the carcasses with spores of botulism bacilli, and sealing with fat created the anaerobic conditions necessary for the development of microorganisms and for toxin formation."

Hematology

CPYRGHT

82. Method for Preserving Viable Leukocyte Mass

"Preserving Viable Leukocyte Mass," by R. A. Rutberg and E. I. Terent'yeva, Doctor of Biological Sciences, Central Order of Lenin Institute of Hematology and Blood Transfusion (director, Prof. A. A. Bagdasarov, Active Member of Academy of Medical Sciences USSR), Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 2, Feb 59, pp 50-54

The aim of this research was to discover a method for preserving viable leukocyte mass for several days and in a state ready for transfusion purposes. Various methods are reviewed and solutions described.

The results presented in tables and a diagram prove that the best preserving solution (leukocyte mass with greater percentage of viable cells, with greater phagocytic activity, and for a longer period of time) has the following composition: glucose 0.4 g; gelatin 3.5 g; ascorbic acid 0.3 mg;  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$  16 mg;  $\text{K}_3\text{PO}_4$  3 mg;  $\text{KH}_2\text{PO}_4$  mg; NaCl 500 mg; KCl 50 mg;  $\text{CoCl}_2$  0.5 mg; and twice distilled water to make up to 100 ml. In this solution leukocyte mass viability after 5 and 8 days of preservation is still high, i.e., 81 and 59 % respectively.

The authors conclude that the partial destructive changes that occur in the leukocyte mass thus preserved, even though irreversible, should not be a hindrance to their clinical use, because the nucleic acids and other substances that are released during the preservation and leukocyte disintegration exert a stimulating effect on leukopoiesis.

83. Effect of Synthomycin on Blood

"On the Problem of the Effect of Synthomycin on the Blood,"  
by T. Sh. Sharmanov, Tr. Karagandinsk. med. in-ta (Works of  
the Karaganda Medical Institute), 1957, 1, No 4, 248-250  
(from Referativnyy Zhurnal--Biologiya, No 3, 10 Feb 59,  
Abstract No 14034)

"Observations were made on 20 rabbits. A single administration of synthomycin in doses of 50-250 milligrams per kilogram of body weight was given to the animals; it was repeated within 14 days. Small doses of synthomycin produced no changes in the blood indexes. Large doses of the drug administered to the animals a second time sharply decreased the number of reticulocytes and reduced the number of erythrocytes and Hb in the blood. Large doses of synthomycin produced leukocytosis with neutrophilia at the beginning; it later developed into leukopenia. All blood indexes were normalized soon after the administration of synthomycin was halted."

CPYRGHT

84. Effect of Synthomycin Therapy on Hemopoiesis

"On the Effect of Synthomycin on Hemopoiesis, " by R. K. Kaluzhenko, Tr. Voen-med. akad. (Works of the Military-Medical Academy), 1957, 76, 269-271 (from Referativnyy Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 14036)

"Patients (43) suffering from chronic cholecystitis, cholangitis, hepatitis, and anacid and hyperacid gastritis were given synthomycin in doses of 0.5 gram three or four times a day, the course of treatment comprising a total of 10-20 grams of the drug. An improvement in the general condition of the patients and a reduction in the number of leukocytes was noted in the majority of the patients; these were not only the result of the arrest of the inflammatory process, but were also an indication of the inhibiting effect of synthomycin on hemopoiesis. No modifications of the red blood were noted, although in some cases the number of erythrocytes dropped to 3-4 million per mm<sup>3</sup> of blood. An analysis of the bone marrow established a reduction in the number of erythrocytes. Manifestation of an allergic reaction of the organism to synthomycin in the form of eosinophilia appeared in 19 of the patients. Therapy with synthomycin must be carried out under strict control of the general condition and the blood picture of the patient."

85. Chinese Develop Nonantigenic D-Dextrose Plasma Expander

CPYRGHT

"D-Dextrose Anhydride Plasma Expander Prepared by New Method at Institute of Blood Transfusion and Hematology" (unsigned article); Peiping, Chien-k'ang Pao, 31 Jan 59, p 4

This item reports the development of a plasma expander, d-dextrose anhydride, from a new strain of *Sacchromyces* by the D-Dextrose Anhydride Laboratory of the Institute of Blood Transfusion and Hematology, Chinese Academy of Medical Sciences (中國醫學科學院輸血與血液學研究所右旋糖酐研究室).

In animal assay, the new plasma substitute reportedly proved to be nonpyrogenic, nontoxic, and nonantigenic. It produced no adverse effect on the clotting mechanism. Moreover, it had no stimulating or inhibitory effect on the morphological components of the blood or on the bone marrow. In clinical trials, it kept victims of severe burns out of shock and increased the blood pressure of persons suffering from hemorrhagic shock. None of the patients showed any reaction to the compound. Those who were given bleeding and clotting tests showed no change in bleeding and clotting time.

[SIR Note: The Chien-k'ang Pao reported in 1957 that the Chinese military, in cooperation with government authorities, had founded the Institute of Blood Transfusion and Hemopathy (or Hematology). Although the ideographic combination given for the name of that institute was slightly different (输血与血液研究所), it is probably identical with the institute in the above article since the Chinese Academy of Medical Sciences is directly under the state Ministry of Health.]

Immunology and Therapy

86. Immunogenic Properties of Smallpox Vaccine Determined

"Immunogenic Properties of Smallpox Vaccine and Methods of Determining Them," by Yu. N. Mast'yukova, Tr. Mosk. N.-I. In-ta Vaktsin i Syvorotok (Collected Works of the Moscow Scientific Research Institute of Vaccines and Sera), No 9, 1957, pp 148-155 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 58, Abstract No 90655, by F. I. Leykina)

"Two hundred and seventy-five series of smallpox vaccines prepared by 17 production laboratories were studied. The most suitable method of evaluating their immunizing action was found to be intracerebral introduction of 10 DL<sub>0</sub> of neurovaccine to previously vaccinated rabbits. The survival rate of the rabbits increased proportionately with the increase in infectiousness of the vaccine. A direct relationship between the level of antihemagglutinins in the blood of the vaccinated rabbits and the intensity of inoculation immunity was established. The immunogenic properties of the vaccines prepared by different production laboratories varied."

CPYRGHT

87. Smallpox Vaccine Production

"The Theoretical Bases of Smallpox Vaccine Production," by S. S. Marennikova, Tr. Mosk. N.-I. In-ta Vaktsin i Syvorotok (Collected Works of the Moscow Scientific Research Institute of Vaccines and Sera), No 9, 1957, pp 129-140 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 58, Abstract No 90654, by F. I. Leykina)

"Smallpox vaccine (OV) was obtained from chick embryos (KE) infected with vaccine virus in a high concentration in the chorioallantoic membrane (KhAO) or in the allantoic cavity. OV was not inferior in activity to the dermovaccine. Horse serum was used as a stabilizer in drying OV, and penicillin or streptomycin or a combination of the two (300 and 250 units per ml as required) -- as a preservative. OV maintained its activity for 12 1/2 to 14 1/2 months of preservation at 4-20°; its activity was decreased within 5 1/2 months at 37°. For checking OV, the author recommends a combination of the Grot method with the introduction of virus into the anterior eye chamber in guinea pigs, or titration of KhAO."

CPYRGHT

88. Gamma Globulin Fractions Used Against Many Diseases

"The Problem of Gamma Globulins," by V. Krestovnikova; Moscow, Meditsinskiy Rabotnik, No 15, 20 Feb 59, p 3

After reiterating some of the mechanisms responsible for the effectiveness of prophylaxis and therapy with serum, prepared antibody, and vaccine, the author of this article briefly discusses antibodies and their role in immunity. He states that the use of serum is expanding every year and that the quality of serum preparations is being improved. He mentions in particular that new technology of purifying and concentrating antitoxic sera against tetanus, gas gangrene, and diphtheria ("Diatherm-3") guarantees an increase in their activity. It is pointed out that associates of the Moscow Scientific Research Institute of Vaccines and Sera imeni Mechnikov improved the Cohn method for purifying and concentrating antitoxic, antibacterial, and antiviral sera.

A search for methods of preparing gamma globulins from animal immune sera was motivated by the limited possibilities of obtaining them from human sera. In the protein fractionation laboratory, a constant was developed for low-temperature alcohol precipitation of human immune globulins which could be applied to serum from various animal species. Specific globulins were produced from animal sera against a number of viral and bacterial infections. Workers of this laboratory also established that in antitoxic sera (tetanus, gas gangrene, diphtheria) antibodies were connected with gamma and beta globulins, and in antiviral (rabies, spring-summer tick-borne encephalitis, smallpox), with gamma-, beta-, and alpha-fractions of globulins. A constant for isolating the immune globulin fraction by fraction was developed by taking these peculiarities into account. It is stated that specific globulins prepared at the institute maintain their activity for a long time--dry antitetanus gamma globulin, for example, is active for more than 6 years.

The article reports that a highly active gamma globulin against spring-summer encephalitis was first produced by scientific associates of the Institute imeni Mechnikov in cooperation with workers of the State Control Institute of Medical Biological Preparations imeni Tarasevich. It has been introduced into public health practice. Work on anti-whooping cough gamma globulin, which is prepared from human placental serum and which contains specific antibodies, was begun in 1953. This preparation was found to be very active under experimental conditions and was highly evaluated by clinicians. At present, the preparation of anti-whooping cough gamma globulin from immune measles serum according to a method developed in cooperation with workers of the Omsk Institute of Epidemiology, Microbiology, and Hygiene, is of interest.



Natural immune serum, it is mentioned, has been used in 200 ml doses for therapy and prophylaxis of anthrax; the author regrets that its therapeutic properties are not high. He further states, however, that anti-anthrax gamma globulin prepared at the Institute imeni Mechnikov protected animals from death in 83-100% of the cases following its introduction to animals at the end of incubation.

Specific gamma globulin for treatment of leptospiroses is considered a unique preparation; prepared from ox hyperimmune serum, it contains antibodies to *Leptospira* of the icterohemorrhagica, grippotyphosa, and pomona types in titers up to 1:75,000. When tested experimentally, the preparation protected animals from fatal infection in doses of 0.1-0.05 ml, and doses of 3-5 ml administered to sick animals at the height of infection and in the presence of general jaundice cured 50-60% of them.

In a discussion of antiviral gamma globulins, antismallpox and anti-rabies research is mentioned. Studies have shown that Soviet antismallpox gamma globulin produced from animal serum by means of multiple hyperimmunization is 163 times stronger than that obtained from human serum in Switzerland. The introduction of this preparation to rabbits infected with a lethal dose of virus prevented the development of disease. It is stated that natural smallpox was completely eradicated in the USSR during the first years of Soviet power. Current epidemics in Pakistan, Iran, Afghanistan, etc. are cited. In accordance with a suggestion of the Soviet Union and a resolution of WHO, Soviet antismallpox gamma globulin will be used for therapy and prophylaxis in countries where smallpox is still a problem.

As a result of the discovery that unpurified antirabies serum is not sufficiently effective, new purification and concentration methods were developed at the Moscow Institute of Vaccines and Sera; directions for use in public health services were also issued. The author claims success in the use of this gamma globulin with vaccine when administered to persons bitten about the head and face. Experimental evidence is offered to support this claim. It is supposedly effective in post-vaccinal paralysis of the landry type.

Krestovnikova states in conclusion:

"Sufficiently concentrated antibacterial and antiviral serum preparations have a great future both in the development of our knowledge in the field of theory of immunity and for arming public health practice with new, active agents for controlling infections. The results of scientific investigations make it possible to assert that the method of low-temperature alcohol fractionation of sera is most effective and can be successfully employed for purifying and concentrating antibiotic, antibacterial, and antiviral sera."

CPYRGHT

89. Pentoxyl in the Therapy of Wounds

"Effect of Pentoxyl on the Course of the Wound Process in Experimental Animals," by A. L. Bandman, Tr. Voen.-med. akad. (Works of the Military-Medical Academy), 1957, 77, 83-116 (from Referativnyy Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 13983, by A. M. Ivannitskiy)

"In experiments on rabbits pentoxyl [5-oxy-methyl-4-methyl-uracil, Lekarstvennyye Sredstva, (Drugs), by Prof M. D. Mashkovskiy Moscow, Medgiz, 1957, pp 321-322] had a beneficial effect on the course of the wound process and on the course of the postsurgical period. The duration of the healing period for wounds was reduced by 20 percent following the administration of pentoxyl in a dose of 100 milligrams per kilogram of body weight; the strength of the postsurgical scars increased by 14 percent; blood loss compensation was hastened, and leukopoiesis was stimulated."

CPYRGHT

90. Antibiotics in the Therapy of Psychic Disturbances

"The Reaction of Myeloid Tissue to the Administration of Antibiotics in Some Psychic Disturbances," by P. I. Lyubovskaya and S. Z. Rokhlenko, Chair of Psychiatry and Chair of Pathological Physiology of the Chernovtsy Medical Institute and Chernovtsy Psychiatric Hospital; Kiev, Vrachebnoye Delo, No 12, Dec 58, pp 1261-1264

This is a report on the results of observations conducted to determine the modifications in the functions of bone marrow cells caused by antibiotics used in the therapy of a number of psychoses. A total of 97 patients were observed. They were divided into three groups; group one included 37 patients suffering from infectious psychoses of various etiologies -- rheumatic, syphilitic, and psychoses of a banal nature; the second group -- 51 persons -- consisted of schizophrenic patients ill for periods of from less than one year to longer than 3 years; the third, the control group, comprised schizophrenic patients who had been ill for periods of over 3 years. Myelograms taken before the beginning of the antibiotic therapy and 10 days after the termination of the antibiotic therapy were studied. The studies established that affections of the hemopoietic functions of bone marrow, apparently of toxic origin, take place as a result of the infectious psychoses and schizophrenia in particular, and that antibiotics have a positive effect on the bone marrow functions of patients suffering from infectious psychoses and schizophrenia. In patients with infectious psychoses the regeneration of the bone marrow functions, as a result of antibiotic therapy, occurs in parallel with the general improvement in the condition of the patient. In schizophrenic patients, bone marrow functions were normalized even when no essential improvement in the clinical picture of the patients could be noted.

91. Therapy of Hypertonic Psychoses

"Modifications of Vascular Tonus and Reactivity by Reserpine, Dicumerine, and Carbon Dioxide Therapy of Patients Suffering From Hypertonic Psychoses," by A. D. Doilnitsyna, Tr. Gos. n-i. psikhonevrol. in-ta (Works of the State Scientific Research Psychoneurological Institute), 1957, 14, 47-54 (from Referativnyy Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 13901, by Ya. I. Zaydler)

"Ninety patients, between the ages of 46 to 70, suffering from hypertonic psychoses, were treated with reserpine, dicumerine, and carbon dioxide. Before therapy the pressure in the brachial artery was high, but there were some variations. At the same time the pressure in the temporal artery (determined by palpitation) and the average pressure in the brachial artery remained stable. Venous pressure (registered according to Waldman) fluctuated considerably; these fluctuations, however, had no relation to the fluctuations of arterial pressure. The vascular tonus in these patients was low according to the oscillometric index, and dropped still further after therapy with dicumarine, and (to a great degree) after therapy with reserpine. Blood pressure also dropped. At the same time, the general condition of the patients improved, and headaches, alarm, and fear diminished. Reactivity of the peripheral vessels to mechanical and chemical stimuli were not affected by the therapeutic measures. No improvement was noted when the patients were treated with carbon dioxide."

92. Reserpine in the Therapy of Extrapyramidal Disturbances

CPYRGHT

"Reserpine Therapy of Huntington's Chorea and Other Syndromes of Extrapyramidal Disturbances," by Vlastimil Vorisek, Czechosl. neurol. (Czechoslovakia), 1958, 21, No 2, 99-105 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 58, Abstract No 85088)

"The beneficial results obtained in the therapy of Huntington's chorea with small doses of reserpine in four patients are described. Reserpine was effective in hyperkinesia as well as in psychic changes. No side reactions were noted. Larger doses of reserpine administered to two patients with athetosis were found to be less effective. No improvement was noted in cases with an organic conditioned tic."

CPYRGHT

93. Largactil in the Therapy of Psychoses

"Largactil Therapy in Patients Suffering From Endocrine and  
Psychic Disturbances," by Er. Tomorug and Gh. Tanasescu, Studia  
si cercetari endocrinol. Acad. RPR (Rumania), 1957, 8, No 4,  
449-457 (from Referativnyy -- Zhurnal-Biologiya, No 18, 25 Sep  
58, Abstract No 85075)

"Largactil was administered, predominantly in conjunction with  
endocrine preparations, to 166 patients suffering from psychoses and  
neuroses associated with hyperfunction of the thyroid gland, hypofunction  
of the parathyroid gland, or climacteric disturbances. There was an  
improvement in the psychic condition and in the endocrine functions of  
most of the patients."

CPYRGHT

94. Chinese Academy Prepares Human Amnion Vaccine for Poliomyelitis

"Human Amnion Replaces the Monkey in Successful Preparation of  
New Poliomyelitis Vaccine" (unsigned article); Peiping, Chien-  
k'ang Pao, 31 Jan 59, p 4

This item reports a recent achievement of the Department of Virology,  
Chinese Academy of Medical Sciences -- the development of a poliomyelitis  
vaccine by a new process which utilizes the human amnion instead of monkeys.  
The article states that the new method is much cheaper than the old one  
which yielded only a liter of vaccine per monkey.

95. Chinese Army Medical Academy Types Shanghai Polio Viruses

"Isolation and Typing of Poliomyelitis Viruses Found in Shanghai,"  
by Ku Fang-chou (顧方舟), Hsiao Chi-ho (肖繼何), Chu  
Te-chung (朱德鍾), Wu Ping (吳冰), and Kuo Ch'eng-  
chou (郭成周), People's Liberation Army Academy of Medical  
Sciences; Peiping, Chung-hua Chi-sheng-ch'ung-ping Ch'uan-jan-ping  
Tsa-chih (Chinese Journal of Parasitic and Infectious Diseases),  
Vol. 1, No 4, 1958, pp 228-231

In connection with a study of the distribution of poliomyelitis in  
China, the authors reportedly undertook the typing of viruses which they  
recovered from the stools of 344 clinically manifest or suspected cases  
of poliomyelities. This paper describes the preparation of materials  
and the techniques used to isolate and type the various strains. An  
analysis of the results is also presented. The work was performed at  
the Chinese Liberation Army Academy of Medical Sciences in Shanghai.

During July-October 1957, the authors received from Shanghai hospitals a total of 726 stool samples. From a random selection of 344 of them, 140 strains of virus pathogenic to monkey kidney cells were isolated and grown in tissue cultures. Typing experiments positively identified 116 strains of poliomyelitis virus with the Mahoney Strain (83.6%), the MEF 1 Strain (12.9%), and the Saukett Strain (3.5%).

The monkey kidney epithelial cells used for the tissue cultures were prepared by the authors. Three standard [virulent] strains of poliomyelitis virus -- the Mahoney, MEF 1, and Saukett Strains -- were obtained from the Shanghai Biologicals Research Institute and the Peking Biologicals Research Institute. Corresponding avirulent strains were obtained from the USSR.

Type-specific immune serum prepared by the authors according to Salk's method reportedly had neutralizing antibody titer of 1:40-1:160. That prepared from the avirulent strains according to the authors' own method had neutralizing antibody titer of 1:80-1:320.

The article gives the following information on poliomyelitis outbreaks in China:

During June-September 1955, the morbidity rate in Nan-t'ung, Kiangsu Province was 27.5 per 100,000; case fatality, 28.1 percent. In Tsingtao that year, the morbidity rate was 50 per 100,000. During May-August 1956, the morbidity rate in Wen-chou, Fukien Province, was 64 per 100,000. In addition, outbreaks have been reported in Hankow, Canton, Shanghai, Hang-chou, Kaifeng, Ch'ang-sha, Chungking, Tientsin, Peiping, Tsinan, Mukden, and Ch'ang-ch'un.

#### 96. Czechoslovak Efforts in Combating Polio

"The Struggle Against Infantile Paralysis Has Not Yet Ended," by Docent Vilem Skovranek, MD; Prague, Veda a Zivot, No 2, Feb 59, pp 73-76

According to Skovranek, inoculations against polio started in spring 1957 in Czechoslovakia. In the first half of 1958, Czechoslovak scientists made a detailed evaluation of the results of the first inoculation program, coming to these conclusions:

1. Inoculation clearly influenced the disease curve, which usually hits its peak between the 30th and 40th weeks of the year, i.e., in August and September. Although a typical epidemic started to appear at the beginning of 1957, particularly in Slovakia, the further course of the epidemic curve was atypically flattened, as shown in a graph on page 74.

2. On a nationwide average, the number of cases among those who received two inoculations "was reduced threefold in comparison with those who were not inoculated." The inoculations were 66 percent effective in the Czech krajs and 72 percent in Slovakia, according to precise mathematical-statistical evaluation.

CPYRGHT

3. Differences between the number of cases among those inoculated and not inoculated also show up in the comparison of so-called specific numbers of cases in age groups where inoculation was carried out to the greatest extent, i.e., from one to 7, and in the comparison of the number of cases in individual peak months. "If the favorable results of 1958 are added

to the 1957 results, then the conclusion can be reached that this favorable situation in the number of polio cases cannot be explained other than as a result of the Salk vaccine inoculations, and this happened in defiance of all prognoses concerning the epidemic which was supposed to occur in Czechoslovakia in 1958, since polio epidemics in Czechoslovakia recur every 5 years, and the last one was in 1953."

CPYRGHT

Skovranek discusses some criticisms offered concerning the Salk and Sabine vaccines in other countries; "We are trying to travel both roads, i.e., to inoculate with Salk and Sabine vaccines."

CPYRGHT

CPYRGHT

Several graphs show the 1948, 1953, and 1957 weekly curves for the absolute number of polio cases in the Czech krajs; the 1953 and 1957 weekly curves for the absolute number of polio cases in Slovakia; the influence of inoculation on the number of cases in children's age groups in the Czech krajs and Slovakia; and differences in the number of cases among inoculated and noninoculated children in individual months during 1957. It is stated that in the 1-7 age group the difference between the inoculated and noninoculated is very clear. While a typical seasonal maximum can be observed for those not inoculated (solid line), the number of cases among the inoculated (dotted line) is decreasing.

#### Instruments and Apparatus

##### 97. Radio Electronics in Biology and Medicine

"Radio Electronics in Medicine" (unsigned article); Moscow, Meditsinskiy Rabotnik, 16 Jan 59, p 3

"During the past several days in Moscow, a conference has been held on the problems of utilizing radio electronics in medicine and biology. Approximately 50 reports were heard.

CPYRGHT

"Academician Secretary of the Academy of Medical Sciences USSR V. V. Parin, Doctor-Inventor I. T. Akulinichev and Engr V. G. Mavrodiadi reported on the tasks which medicine and biology have presented to radio electronics, as well as tasks concerning the contemporary possibilities of radio electronics.

"The introduction of electronics into experimental and clinical medicine has been of great importance in the development of medical science. Radio electronic apparatus presently play a great role in the diagnosis and therapy of internal, neural, and other diseases, in surgery, etc. The technical rearming of medicine has permitted an increase in the exactness and precision with which earlier known phenomenon and laws could be studied. The possibility has been created for the electrical measurement and recording of a number of nonelectrical quantities which guarantee synchronous recording and simultaneous comparison of a number of indexes of physiological functions. A number of new methods of investigation and therapy, such as vectorography, plethysmography, oximetry and oxigraphy, ballistocardiography, ultrasound, etc., are based on radio electronics principles.

"Interesting work is presently being conducted in the field of automation for the diagnosis of heart diseases which require surgical therapy. The building of an electronic analyzing logic machine which has made it possible to diagnose heart diseases with great accuracy will aid our surgeons in attaining new successes. A preliminary logical scheme for diagnosis has been developed at the Kiev Clinic of Thoracic Surgery. It was developed mathematically by workers of the Computer Center of the Academy of Sciences Ukrainian SSR and was programmed for an electronics machine. The logic of the diagnosis was promulgated on the basis of general experience in the preoperative diagnosis of heart diseases according to objective research data.

"Radio electronics has made possible the construction of new apparatuses to compensate for the loss of hearing and sight, as well as the development of methods for bioelectric control of prosthetics. It is opening great possibilities in surgery. This was discussed in the report of P. A. Kupryanov, Active Member of the Academy of Medical Sciences USSR. One area in which it can be used is television. The results of transmitting images with the aid of color television are providing broad prospects for surgeons.

"The report of M. D. Gurevich concerned medical apparatus utilizing ultrasound. He reported on the possibility of using ultrasound oscillations in pharmacology, stomatology, microbiology, and the treatment of varicous diseases. Much interest was shown in the report of L. I. Gutenmakher concerning the electrical modeling of certain functions of memory. With the aid of electronic recall device, it has become possible to store and retrieve information in a volume approaching that of the human memory. The electronic memory models can be used for checking various hypotheses

CPYRGHT

concerning the mechanisms of human memory and for analyzing certain neural and psychiatric diseases which are accompanied by the disruption of this mechanism.

"As was noted in the reports, although successes have been accomplished with electronic medical instruments, there is a huge gap between the requirements of medicine and the potential of electronics. The reason for this is the lack of the necessary contact between these two branches of science.

"The participants in the conference praised the initiative of the Scientific-Technical Society of Radio Technology and Electronic Communication imeni A. S. Popov in forming a section of Medical Electronics.

CPYRGHT

98. Radio Electronics To Be Used in Medicine and Biology in USSR

"Use of Radio Electronics in Medicine and Biology," by V. Mavrodiadi; Moscow, Radio, No 3, Mar 59, p 18

During the course of the First All-Union Conference on the Use of Radio Electronics in Medicine and Biology, held by the Scientific-Technical Society of Radio Engineering and Electrical Communications imeni A. S. Popov, a recommendation was made for the establishment of an All-Union Scientific Research Institute of Radio Electronic Medical Technics (Vsesoyuznyy Nauchno-Issledovatel'skiy Institut Radioelektronnoy Meditsinskoy Tekhniki) under the Ministry of Health USSR.

99. Experimental Model of Ultrasound Biolocator Undergoing Tests

"Ultrasound in Diagnosis" (unsigned article); Moscow, Izvestiya, 21 Mar 59

An announcement is made that an apparatus, which can discover very small tumors, record small pathological changes in tissue, and indicate stones in the kidneys and liver, will be called an ultrasound biolocator. A laboratory model of this apparatus has been constructed in the Laboratory of Ultrasound Waves, Institute of Biophysics, Academy of Sciences USSR, where it is undergoing testing.



100. Surgical Equipment

"New Surgical Equipment"; Moscow, Meditsinskiy Rabotnik, No 19, (1767), 6 Mar 59, p 4

M. G. Ananyev and S. I. Babkin, the director and deputy director of the Scientific Research Institute of Experimental Surgical Apparatus and Instruments report the development of new surgical instruments and equipment. These include new suturing instruments for use in operations on the heart and lungs; new and original obstetrical and gynecological instruments; instruments for use in urology and proctology; modernized electric knives; an electrothermograph; an apparatus for heart sounding; suturing materials; suturing instruments for suturing large blood vessels, the dura mater, the cornea of the eye, gastrointestinal organs, and other equipment.

Pharmacology and Toxicology

101. Chlorpromazine Intoxication

"Acute Intoxication by Chlorpromazine (Largactil, etc.)," by Imre Lazar, Orv. Hetilap (Hungary), 1958, 99, No 21, 704-707 (from Referativnyy Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 13775)

"Seventeen cases of intoxication by largactil are reported. The prognosis for intoxication cases is usually favorable. The symptoms disappear in 2-4 days without any therapy, except in very serious cases."

CPYRGHT

102. Toxicology of Rare Metals Investigated

"The Effect of Rare Metals on an Organism" (unsigned article); Moscow, Meditsinskiy Rabotnik, 6 Feb 59, p 4

"During the past several years, the Chair of Labor Hygiene of the First Moscow Medical Institute imeni I. M. Sechenov investigated the effect of rare and new metals and their compounds and alloys on the human body. The work was conducted in many ways: experiments were conducted on animals; workers who work with these types of substances were examined and sanitary hygiene investigations were conducted in enterprises which manufacture and use these metals.

CPYRGHT

"It was determined that metals such as vanadium, beryllium, molybdenum, cobalt, cadmium, and others can, under certain conditions, cause harmful effects on various organs.

"On the basis of their investigations, the workers of the Chair of Labor Hygiene presented a number of recommendations for improving labor conditions at enterprises, such as those making electric lamps or engaged in the production of alloys of rare metals. In accordance with these recommendations, instructions were prepared for conducting preventative examinations at enterprises producing molybdenum, wolfram, selenium, and other rare elements.

"As a result of the work of scientists during recent years, maximum permissible norms have been worked out for the content of a number of rare elements --- selenium, vanadium, molybdenum, titanium and others in aerosols in industrial facilities. These data on the maximum permissible concentration of toxic substances and dust in the air in industrial enterprises have been introduced in a draft proposal which is now being discussed.

"At present, the chair, while continuing to study the effect of metals (niobium, rare-earth elements, and others) on the body, is also investigating the toxic properties of new types of plastics and other polymer materials."

CPYRGHT

103. Occupational Intoxications in Agriculture

"Problems of Prophylaxis of Occupational Intoxications by Poisonous Chemicals Used in Agriculture," by O. V. Chebanova, Sanitation-Epidemiological Administration of the Ministry of Health USSR; Kiev, Vrachebnoye Delo, No 12, Dec 58, pp 1307-1308

This article warns the personnel working with poisonous chemicals used in agriculture to exercise greater caution in handling the poisons to prevent intoxications. Recently, a number of intoxications by Davidov's preparation--a 30-percent solution of sodium arsenide-- AB preparation [ $\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$ , Spravochnik po Yadokhemikatom (Handbook on Toxic Chemicals) by P. V. Popov, Moscow, 1956, pp 457-461], nicotine sulfate, and metafos were reported. Investigations established that these were due to carelessness in handling the chemicals, delays in reporting the intoxications to medical centers, and failure by medical personnel to warn the workers of the dangers of intoxication. Steps should be taken to acquaint all workers handling poisonous chemicals with the rules in regard to the storage, transportation and use of the poisons.

Physiology

104. Effects of Oxygen Under High Pressure

"Oxygen Supply to an Organism Under Conditions fo Extremely Rarefied Atmosphere," by D. I. Ivanov and G. G. Sturus, Scientific Research Institute of Aviation Medicine, Moscow, Biofizika, No 2, 1959, pp 243-249

The authors of this article state that results of experiments showed that respiration of oxygen under very great pressure, under normal atmospheric conditions, causes a slow down in blood flow in anesthetized dogs and an increase in the time required for injected radioactive blood samples to become thoroughly mixed with the entire mass of the circulating blood. They suggest that the extent of these changes depends on the magnitude of pressure.

Respiration of oxygen, under a pressure of 20 millimeters of mercury (20 Hg mm) for a period of up to 30 minutes, gives rise to symptoms of increasing cardiac insufficiency. The rate of blood flow and of its mixing with radioactive blood show considerable departure from the normal.

A compensating vest produces a definitely favorable effect. This type of a vest produces a counterpressure on the chest and abdominal areas which corresponds in magnitude to the pressure produced by the mask in the lungs.

The authors of this article further state that the nature of changes in blood circulation, during inspiration of oxygen under very great pressure, is essentially the same in nonanesthetized as in anesthetized dogs, irrespective of whether a compensating vest is used or not. The degree of manifestation of these changes was considerably weaker in nonanesthetized dogs than in anesthetized dogs.

105. Pulmonary Changes Due to Sudden Drop in Atmospheric Pressure

"Morphological Changes Produced by Sudden Change in the Atmospheric Pressure Under Experimental Conditions," by V. I. Nikolayeva (Moscow), Arkhiv Patologii, No 2, Feb 59 pp 28-31

The author of this article describes experiments conducted on ten dogs to determine what damage an abrupt drop in atmospheric pressure, from 424 mm of mercury to 56 mm of mercury, causes in their vital organs. On the basis of the data collected, she concluded that even repeated (5-6 times) exposure to a sudden drop in atmospheric pressure produced no changes dangerous to life if oxygen under pressure was provided for respiration and a high altitude survival suit was used to protect the

body. However, an acute vesicular, principally peripheral, emphysema was noted in the lungs, accompanied by areas of atelectasis and spasms of the bronchial muscles, which reduce the lumen of the bronchi. Only mild circulatory disturbances were observed in other internal organs. These disturbances consisted of venous congestion in the brain matter, liver, kidneys, and gastrointestinal tract and a lack of blood in the arteries, spleen, and myocardium. It can be assumed that gradual development of the above-mentioned changes represents a compensatory adjustive reaction of the body to the altered conditions of the external environment.

106. Depth Perception Investigated

"Individual Differences in Perception of Depth," by Candidate of Medical Sciences A. V. Skripchenko, Scientific Research Institute of Psychology, Ukrainian SSR, Oftal'mologicheskii Zhurnal, No 1, Jan 59, pp 24-28

The author of this article describes experiments with humans conducted to determine what effect direction of movement of objects has on accuracy of depth perception. Attempts were made to clarify some individual peculiarities of perception of depth when one object is moving toward the individual experimented with and then away from him, and another object remains stationary. Analysis of material collected showed that considerable individual differences exist in accuracy and consistency of estimation of equidistance of moving and stationary objects.

The subjects of the experiment were divided into three groups. The first group consisted of people who estimated equidistance between objects with comparatively greater accuracy when the object moved away from them. The second group of people consisted of those who estimated equidistance more accurately between objects when the object was moving toward them. Direction of movement of the object did not have any substantial effect on the third group of people as far as accuracy of depth perception is concerned: they estimated equidistance between objects with almost equal accuracy irrespective of what direction the objects were moving.

The author further states that experimental data collected indicated that no direct relationship exists between accuracy and stability of estimation of equidistance between objects. Considerable deviation in stability of estimation always leads to a decrease in ability to evaluate equidistance between objects accurately. Ability to estimate the distance from objects is not easy to study in people in whom the error in stability of estimation of equidistance between objects remains almost the same; but when, after a period of training, these people reach high levels of accuracy in estimating distances of objects, they become better specialists in their work.

Inquiry into effect of direction of movement of objects on accuracy of depth perception is both of theoretical and practical significance. It may be of help in the development of procedures for improving methods of training people for various professions and may help to increase efficiency of workers in many industries where success depends on uniform and accurate estimation of distances between moving objects.

Public Health, Hygiene, and Sanitation

107. Malaria Control

"Results of the Antimalaria Campaign," by B. B. Rubinshteyn;  
Minsk, Zdravookhraneniye Belorussii, Vol V, No 1, Jan 59,  
pp 16

A brief history is given of the campaign to eliminate malaria in Belorussia. Malaria was one of most widespread diseases in the republic in pre- and postrevolutionary years. As late as 1946 an incidence of the disease of 317.6 persons per 10,000 of the population was reported. An all-out campaign for the control of malaria was launched in 1947. Personnel were trained, and a network of 101 antimalaria stations was established. Early diagnosis of the disease, control of carriers, prophylactic measures, outpatient treatment, and pre-epidemic control of foci endemic to malaria were some of the measures undertaken. As a result, the disease was completely eliminated in many areas. In 1957 only 24 cases of malaria were reported. In the first 6 months of 1958, only three cases of the disease were registered.

108. Evaluation of Efficiency of Rechmenskiy-Type Bacterial Air Samplers

"Practical Evaluation of Rechmenskiy-Type Apparatuses for Bacterial Investigation of the Air," by A. S. Labinskaya, Chair of Microbiology, Central Institute for the Advanced Training of Physicians; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 30, No 2, Feb 59, pp 74-78

In a brief introduction to this article, the author makes the following statements concerning the limitations of currently used bacterial air sampling methods:

"The absence of a generally accepted method of bacteriological investigation of the air is explained chiefly by the difficulties which arise in collecting air samples. Many apparatuses recommended for this purpose have not found extensive use. Some of them, like D'yakanov's apparatus, are only slightly effective since their ability to trap microorganisms suspended in the air is inadequate. Such apparatuses as the very expensive Shafir centrifuge were found to be relatively unsuitable for daily practical use: large and heavy, they are not portable, require an absolutely flat surface for installation, and finally, their essential shortcoming is the fact that colonies growing on a culture medium which covers the inner walls of a cylinder are difficult to isolate and cannot be studied easily. The membrane filters proposed by Milyavskaya exclude the possibility of examining large volumes of air, a process which is necessary in detecting pathogenic microorganisms which it contains.

"According to the literature, the Krotov apparatus is the most efficacious of all the approved apparatuses designed for taking air samples. However, its high cost is a serious deterrent to the extensive use of this apparatus in practical work.

"In 1950-1951, Rechmenskiy's first report on the apparatus he designed a siphon bacterial sampler and aerocentrifuge for taking air samples was published. According to the characteristics given by the author, the aerocentrifuge can be recommended for qualitative bacteriological analysis of air, and the siphon bacterial sampler traps all phases of bacterial aerosols (small droplet, large droplet, and dust); it is, however, particularly sensitive with respect to the small-droplet phase."

The purpose of the research described in this article was to test the Rechmenskiy apparatus under different conditions of use. Attempts were made first to determine the effectiveness of its trapping action under conditions of insignificant bacterial contamination of the atmosphere to detect microorganisms contained in negligible concentrations; and also to establish its trapping effectiveness when the atmosphere was inundated with bacterial aerosols in dust or droplet phases. Second, the necessity of resolving problems connected with the use of these apparatuses in daily practical laboratory work along sanitary-epidemiological lines was apparent. The Petri dish method was tested along with the Rechmenskiy so that a comparison of the different principles on which these methods are based could be made.

Details of the testing procedure are given. Results are shown in four tables. Conclusions drawn from examination of these results are as follows:

"1. The siphon bacterial sampler is an aspiration apparatus which makes it possible to observe microorganisms contained in the air even in insignificant amounts. At the same time, it is possible to calculate quantitatively the microorganisms contained in the air by using this apparatus, although the values obtained in this manner are only approximate.

"2. The bacterial sampler is simple in design, does not require special experience, is portable, and is easily sterilized; under known conditions, the use of an electric vacuum cleaner, with an attachment which makes aspiration of air possible, is impossible; however, this does not at all diminish the value of the siphon bacterial sampler, since the vacuum can be replaced by a hand or water-powered pump.

"3. One of the drawbacks of this apparatus is the fact that its capacity is limited to 30-400 liters of air since the droplets formed when the bouillon is crushed evaporate frequently and often penetrate the tube which connects the siphon bacterial sampler to the aspirator.

"4. The aerocentrifuge has a weak bacteria-trapping capacity with respect to both droplet and dust phases of bacterial aerosols and is totally unsuitable for isolating pathogenic microorganisms from the air.

"5. The aerocentrifuge is not at all superior to the Petri dish method. The author's assertion that the aerocentrifuge is an aspiration device is erroneous. During rotation of the disk the particles suspended in the air are not drawn into the cylinders as a result of the development of centrifugal force, but, conversely, are deflected, and the microorganisms fall into them in very small amounts.

CPYRGHT

109. New Method for Aniline Vapor Determination

"A Method for Determining the Vapors of Aniline in Air,"  
by S. A. Kushnir, Vestn. tekhn. i ekon. inform. Mezhotrasl. labor. tekhn.-ekon. issled. i nauchno-tekhn. inform. N.-i. fiz.-khim. in-ta im. L. Ya. Karpova (Herald of Technical and Economic Information of the Interbranch Laboratory for Technical-Economic Research and Scientific-Technical Information of the Scientific Research Physicochemical Institute imeni L. Ya. Karpov) 1958, No 3, (8), 22-23  
(from Referativnyy Zhurnal -- Khimiya, No 4, 25 Feb 59, Abstract No 12264, by I. Lekaye)

"The known methods of determining the concentration of aniline vapors in air possess substantial disadvantages since they are dependent on complex apparatus requiring highly qualified operators and require a prolonged period of time for conducting the analysis. A simple and rapid method of determining aniline vapor concentration has been proposed (its maximum permissible concentration amounts to 0.005 mg/l). This method is based on the condensation reaction of aniline with furfural in acetic acid with the formation of a red colored dye. For this determination, an extremely simple apparatus is used which is described in the article. The method has been tested by sanitary-epidemiological stations and has been recommended for use in industrial enterprises to determine aniline vapors in air."

CPYRGHT



110. Disinfection of Materials With Hot Air

"A Plan for Disinsection and Disinfection With Moist, Hot Air (Steam-Air Mixture) Using the Increased Norm for Loading a Chamber and Curtailed Exposure," by Ye. S. Ben'yaminson and M. G. Graboys, Moscow State Disinfection Station; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 30, No 2, Feb 59, pp 133-134

"In accordance with 1952 instructions of the Ministry of Health USSR, materials in chambers with moist hot air should be decontaminated under the following conditions: norm for loading -- eight units (with a total weight of 48 kg) per square meter of useful area of the chamber; duration of exposure during disinsection -- 10 minutes, during disinfection of materials infected with vegetative forms of microorganisms -- 30 minutes, and on infection with spore forms -- 45 minutes.

"Further investigation of the heat-generating properties of moist, hot air showed that internal reserves which permit an increase in the norm for loading the chamber and simultaneous shortening of exposure are latent in this thermal agent.

"Disinsection experiments in which the norm for loading was increased from 8 to 10 units (with a total weight of 60 kg) per square meter and exposure was shortened from 10 to 5 minutes showed that completely satisfactory temperature conditions which guarantee an insecticidal effect were established inside the materials. In this manner the necessity of keeping the period of heating of the materials in the chamber at 80° C according to an external thermometer (the beginning of exposure) depending on the steam pressure in the boiler was established: heating should last at least 20 minutes at a steam pressure lower than one atmosphere, and at least 15 minutes at pressures exceeding one atmosphere. In experimental disinfection of materials infected with vegetative forms of microorganisms, even with a mixed load (wearing apparel and bedclothes), the effect under the indicated conditions was guaranteed when the exposure time was reduced from 30 to 10 minutes. These experiments also verified the fact that 'deep' disinfection is achieved when exposure is shortened to 10 minutes: maximum thermometers and tests (cultures of Staphylococcus aureus) inserted deep into mattresses showed a temperature regimen which provided for a disinfecting effect.

"Along with this, it was shown that moist hot air causes less deterioration of substances being decontaminated than steam: if triple processing of materials in a steam chamber deteriorated cotton and wool fabrics by 20% or more, ten-time decontamination with a steam-air mixture depreciated these fabrics by 3.7-10%.

CPYRGHT

"In conclusion, experiments were performed on disinfection of materials infected with spore forms of microorganisms in which the norm for loading was increased to 10 units and exposure was shortened from 45 to 30 minutes. The experiments showed that a sporocidal effect was also guaranteed under these conditions.

"In this manner, it is possible to treat materials in a chamber with a steam-air mixture when the norm for loading is increased from 8 to 10 units per square meter, and the time of exposure is shortened at the same time: during disinfection--from 10 to 5 minutes, during disinfection of materials infected with vegetative forms of microorganisms -- from 30 to 10 minutes, and during disinfection of materials infected with spore forms of microorganisms -- from 45 to 30 minutes.

CPYRGHT

[For additional information on public health, hygiene, and sanitation, see Items No 26 and 27.]

Radiology

111. Cancerogenic Effect of Radiations From Artificial Radioactive Substances

"Concerning the Question of the Significance of Radiations From Artificial Radioactive Substances in the Process of Cancerogenesis," by E. Ya. Smoylovskaya, Laboratory of Experimental Oncology (scientific head, Prof N. N. Petrov, Active Member of Academy of Medical Sciences USSR) of the Institute of Experimental Pathology and Therapy, Academy of Medical Sciences USSR (director, I. A. Utkin) and Laboratory of Radiology (head, N. D. Perumova, Doctor of Medical Sciences) of the Institute of Oncology, Academy of Medical Sciences USSR (director, Prof A. I. Serebrov, Active Member of Academy of Medical Sciences USSR); Moscow, Voprosy Onkologii, Vol 5, No 1, Jan/Feb 59, pp 38-43

The purpose of this research was to determine the size of doses of absorbed energy necessary to exert a cancerogenic effect. Small doses of insoluble preparations of six isotopes (Ag<sup>110</sup>, Zn<sup>65</sup>, Co<sup>60</sup>, Ca<sup>45</sup>, TI<sup>204</sup>, and Wl<sup>85</sup>) differing in type of radiation and period of half-life were used. Photographs, photomicrographs, and tables accompanying the article illustrate and summarize the results obtained.

The author presents the following conclusions:

"1. Using insoluble preparations of  $\text{Co}^{60}$ ,  $\text{Ag}^{110}$ , and  $\text{W}^{185}$  in the dose range of 100 microcuries, we produced tumors in the mammary glands in 10 out of 32 of the female rats that lived for 6 months after the commencement of the experiments. This included eight adenocarcinomas, and two sarcomas.

"2. Gamma radiations from  $\text{Co}^{60}$  proved to be the most effective with respect to causing adenocarcinoma of mammary gland. Adenocarcinomas of the mammary gland were observed in five out of ten experimental rats in one series. Doses amounting to several tens of thousands of  $\text{rad}/\text{cm}^3$ , which may be considered "threshold," were sufficient [to provoke adenocarcinoma of the mammary gland].

"3. We observed a much smaller number of tumors due to the effects of mixed beta and gamma radiations from  $\text{Ag}^{110}$  which was used without filters; in a series [of tests] on 16 rats tumors were observed in only 4. The doses due primarily to beta rays amounted to several tens of millions of  $\text{rad}/\text{cm}^3$ , and exceeded the "threshold" values by several hundred times.

"4. It was not possible to induce tumors by using too small quantities of isotopes, and consequently small doses of absorbed energy. No tumors appeared in control animals."

The author also states that, "The use of the same quantities of isotopes with softer radiations i.e.,  $\text{Ca}^{45}$ ,  $\text{Tl}^{204}$ , and  $\text{Zn}^{65}$ , did not result in tumor formation during these experiments."

CPYRGHT

CPYRGHT

112. Ginseng in the Prophylaxis and Therapy of Radiation Sickness

"The Course and Outcome of Radiation Sickness in White Mice Following the Prophylactic and Therapeutic Application of a Fluid Extract of Ginseng," by I. I. Brekhman, A. I. Khakham, and L. I. Oskotskiy, Materialy k izuch, zhenshenya i limonika (Data on the Investigation of Ginseng and Citrus), No 3. L., 1958, 71-77 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 58, Abstract No 85119, by V. V. Berezhinskaya)

"The effect of a fluid extract of ginseng root on the course of radiation sickness was studied in experiments on mice. The mice were subjected to irradiation by Roentgen rays and  $\text{Co}^{60}$  gamma rays. The fluid extract of ginseng root was administered to the animals in doses of 0.1 milliliter every other day [total administered is not indicated]. The animals were divided into three groups: prophylactic, therapeutic, and control. Thirty days of observations clearly established the prophylactic effect

of the fluid extract of ginseng when used in mice that were subjected to irradiation by doses of rays close to 50% lethal. Longevity increased and a large number of the animals survived. The number of control mice that perished within 30 days was equal to 58.3 percent and the average longevity of the animals was 20.7 days. The indexes were 41 percent and 24 days in the mice that received the prophylactic administration of the fluid extract of ginseng. The fluid extract of the root administered after irradiation aggravated the course of radiation sickness causing a high percentage of lethality (83.3 percent) and reduced longevity (to 16.3 days)."

CPYRGHT

113. Toxic Granulation of Neutrophils in Radiation Therapy

"Toxic Granulation of Neutrophil Leukocytes of the Blood in Patients Suffering from Cancer of the Uterine Cervix in Radiation Therapy," by M. A. Bazarnova, Vopr. luchevooy terapii (Problems of Radiation Therapy), Kiev, Gosmedizdat Ukrainian SSR, 1956, 100-106 (from Referativnyy Zhurnal -- Biologiya, No 18, 25 Sep 58, Abstract No 84980, by N. M. Otsep)

"The determination of toxic granulation of neutrophils in patients suffering from cancer of the uterine cervix in the second, third, and fourth stages indicated that the number of neutrophils with toxic granulation before therapy did not exceed 10 percent in most of the patients. In the course of radiation therapy the number of neutrophils with toxic granulation increased. The number of neutrophils with toxic granulation gradually decreased as the condition of the patients improved, reaching a minimal number and finally completely disappearing. In cases with complications of the basic disease by toxic processes, the neutrophils with toxic granulation changed not only quantitatively reaching a high of 100 percent, but also qualitatively (the appearance of large and coarse clumpy granulations). No parallelism between the toxic granulation of neutrophils, erythrocyte sedimentation reaction, and the nuclear shift of the neutrophils to the left in radiation therapy was noted."

CPYRGHT

114. Protective Action of Chlorpromazine and Prometazine Against Radiation

"Experimental Investigation of the Protective Action of Chlorpromazine and Prometazine Against Affection by Roentgen Rays. Preliminary Report," by T. Roxin, P. Vulcan, Em. Manolescu, Probl. terap (Rumania), 1957, 8, 85-91 (from Referativnyy-Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 13795, by the author)

"It was shown that largactil or phenergan administered to rats intraperitoneally in doses of 20 milligrams per kilogram body weight 10 minutes before irradiation with lethal doses of Roentgen rays (1000 r) reduced animal lethality (evaluation made 35 days after irradiation) from 89 to 50 percent."

CPYRGHT

Miscellaneous

115. Scientific Session on Problems of Internal Medicine Held in Moscow

"Problems of Internal Medicine," by N. Malkova, Scientific Secretary, Institute of Therapy, Academy of Medical Sciences USSR; Moscow, Meditsinskiy Rabotnik, 20 Mar 59

The Tenth Scientific Session of the Institute of Therapy, Academy of Medical Sciences USSR, on problems of internal medicine was held recently. A number of reports were concerned with the clinical manifestations of hypertonic diseases (heredity, differential diagnosis, symptomatic hypertonia, etc.), the treatment of hypertonic diseases by new preparations (reserpine, hexonium, etc.), the early diagnosis and treatment of arteriosclerosis, and experimental arteriosclerosis. The session was attended by scientists from Moscow and other Soviet cities, as well as from Czechoslovakia.

116. Conference on Heredity and Human Pathology Held in Moscow

"Problems of Pathology and Heredity" (unsigned article); Moscow, Meditsinskiy Rabotnik, 27 Mar 59

A scientific conference on problems of human pathology and heredity was recently held by the Institute of Experimental Biology, Academy of Medical Sciences USSR. Scholars attending the conference heard over 30 reports on the above problems.

N. N. Zhukov-Verezhnikov, S. N. Davidenkov, V. S. Gostev, and others spoke on the problems of pathology and heredity, the prospects for the development of these problems in connection with medical aims, and the study of hereditary diseases of the nervous system.

A number of reports concerned the problems of the genetics of somatic cells and radiation genetics. V. D. Timakov, I. N. Mayskiy, and others acquainted the delegates with new data on the research in the field of controlled mutation of microorganisms, genetic changes of cancer cells during heterotransplantation, the immunochemistry of malignant degeneration of tissues, the interrelation of the biosynthesis of nucleic acid and protein, and the radio-sensitivity of desoxyribonucleoproteids and desoxyribonucleic acids.

117. All-Union Conference of Neurosurgeons in Moscow

"All-Union Conference of Neurosurgeons" (unsigned article);  
Moscow, Meditsinskiy Rabotnik, 24 Mar 59

An All-Union Conference of Neurosurgeons, attended by 500 delegates from 115 cities of the USSR, Czechoslovakia, Bulgaria, Poland, and the German Democratic Republic was held in Moscow. Nearly 70 reports were given.

The basis of the conference's program was the problem of the diagnosis and treatment of neuroectodermal tumors of the brain, which is considered one of the most complicated and serious problems of present-day neurosurgery. To demonstrate current research on this problem, 53 reports were given.

The second important problem concerned surgical treatment following inflammatory diseases of the brain. The significance of this problem is that this ailment is frequently mistaken for a tumor of the brain since differential diagnosis is very difficult.

Following the conference, a symposium was held on the complicated and still not fully clarified problem of the pathogenesis and treatment of closed cranial traumas.

118. Conference in Kiev on Problems of the Physiology and Pathology of Blood Circulation

"Conference on Problems of the Physiology and Pathology of Blood Circulation" (unsigned article); Moscow, Meditsinskiy Rabotnik, 3 Apr 59

A conference on problems of the physiology and pathology of blood circulation was recently convoked in Kiev by the Institute of Physiology imeni A. A. Bogomolets, Academy of Sciences Ukrainian SSR; the Institute of Normal and Pathological Physiology, Academy of Medical Sciences USSR; and the Kiev Medical Institute. The conference concerned problems of the physiology and pathology of vascular tonus, experimental therapy of cardiovascular diseases, and the physiology and pathology of venous circulation. Some 250 scholars from all major cities of the USSR and other countries participated in the conference.

119. New Periodical on Diseases of Ear Nose and Throat to be Published in the Ukraine

"New Medical Periodical," by P. Koshovets', physician; Moscow, Meditsinskiy Rabotnik, 3 Apr 59

The first issue of the newly re-established Zhurnal Ushnykh Nosovykh i Gorlovykh Bolezney (Journal of Ear, Nose, and Throat Diseases) has just been published. The periodical was discontinued a number of years ago. It is published in the Ukraine; its editor is Prof A. I. Kolomyichenko, Honored Worker of Science of the Ukraine.

The first issue includes original articles on scleroma respiratorium. The articles are written by Ukrainian, Belorussian, and Soviet Bloc scholars who discuss the problems of the diagnosis and current treatment of scleroma.

120. P. S. Kupalov, Soviet Physiologist, Receives Gold Medal imeni I. P. Pavlov

"The Gold Medal imeni I. P. Pavlov" (unsigned article); Moscow, Meditsinskiy Rabotnik, 3 Apr 59

For his work on the study of the normal and pathological action of the hemispheres of the cerebrum, Petr Stepanovich Kupalov, Active Member of Academy of Medical Sciences USSR, was awarded the Gold Medal imeni I. P. Pavlov for 1958. The medal is awarded every 3 years to the most outstanding researcher in Pavlovian physiology by the Presidium of the Academy of Sciences USSR by decree of the Council of Ministers USSR.

Kupalov is considered one of the closest students of I. P. Pavlov and is one of the most outstanding specialists in the field of the physiology and pathology of higher nervous activity.

121. Hungarian Medical Research

"1957 Scientific Work of the Budapest Medical Sciences University," by Dr. Gyula Goracz and Dr. Harry Jelinek; Budapest, Felsooktatasi Szemle, Vol VIII, No 2, Feb 59

The various institutes of the Budapest Medical Sciences University conduct significant scientific research in addition to their instructional work. The scientific research of the institutes is done under the guidance of the Hungarian Academy of Sciences and the Health Affairs Scientific Council (Egeszsegugyi Tudomanyos Tanacs).

The Scientific Committee of the university consists of a chairman and eight members; in addition deans of the three schools of the university serve on the committee. The members of the committee are selected by the rector, and the committee serves as his advisory board. Every year, it surveys the scientific research of the several institutes. Scientific meetings for the university's researchers are held once per month. An average of two or three themes are discussed at each meeting.

There are 41 chairs in the 3 faculties of the university; there are 19 theoretical institutes and 22 clinics which are concerned with theoretical problems, as well as with treatments. The severe shortage of modern equipment seriously hinders work throughout the university.

The following is a research progress report as presented to the Scientific Committee:

The Anatomy Institute (Anatomiai Intezet) is concerned with the origin and function of granules, microsomes, and macrocytes. These examinations led to the discovery of the D. III condensor. The polyvinyl chloride and "piacril" corrosion preparations are also promising.

The Histology and Embryology Institute (Szövet- és Fejlődéstan Intezet) achieved significant results in the area of cell proliferation and the histophysiology of the thymus (including changes in the thymus due to the effect of X-ray radiation). Histochemical examination of sperm, the submicroscopic structure of peripheral nerves, the development of monsters, and further development of cancer diagnosis procedures were other areas of successful research.

The Surgical Anatomy and Surgery Institute (Sebészeti Anatomiai és Mutettani Intezet) does not have adequate space, but in collaboration with Surgical Clinic No II, it is experimenting on essential problems concerning the bile duct and gastric surgery.



The Pathology Institute No I (I. sz. Korbonctani Intezet) is doing scientific work on the development and structure of collagen fibers and tumor research. It is also doing research on arteriosclerosis and the problem of "elastas".

The Pathology Institute No II had nearly all of its equipment destroyed during the counterrevolutionary events. The reconstruction promised for September 1958 has not yet been completed. Despite this, its research on gerontology won an international prize. The institute is continuing its research on tuberculosis of the aged.

The Forensic Medical Institute (Igazsagugyi Orvostani Intezet) is in a similar situation [its facilities were destroyed]. It is doing work on comparison of finger prints of children and parents and on the connection between sudden death of infants and the weather.

The Medical Physics Institute (Orvosi Fizikai Intezet) also suffered during the counterrevolutionary period and is struggling with a lack of space. Nevertheless, it is doing significant work in artificial crystal physics, in biophysics, with radioactive isotopes, and in the use of ultrasonics on biological problems. The institute helps other institutes in solving physics problems.

The Medical Chemistry Institute (Orvosi Vegytani Intezet) is studying in vitro fermentation and the effective mechanism of acridine type chemicals. It is also doing work in K-ion permeability of red blood cells, use of isotopes, and protein synthesis.

The Biochemistry Institute (Biokemiai Intezet) is examining the dystrophic changes arising in the striated muscles of rabbits suffering from vitamin E starvation -- the myosin and nucleic acid content and changes therein. A new research area involves methods for examining lipid metabolism.

The Biology Institute (Elettani Intezet) is working on the role of the nervous system in the regulation of the homeostasis of body fluids. It is also doing experiments on kidney circulation and on blood circulation in hypothermic animals.

The Disease Biology Institute (Korelettani Intezet) is working on the role of the amino acids in nutrition, on development of histamine resistance, on the tumor growth inhibiting effect of methionine deficiency, and on the growth inhibiting effects of the antimetabolites.

The Microbiology Institute (Mikrobiologiai Intezet) is studying adeno- and hepatitis viruses and leptospirosis.

The Pharmacology Institute (Gyogyszertani Intezet) is working with stereoisomers of atropin alkaloids and the chemical structure of amino-ketones and muscarine. Members of the institute are investigating the tranquilizing effects of chemicals similar to reserpine. They have worked out a new method for recording the quantity of circulating blood. They have examined the problem of tachyphylaxis in central nervous system shock and the changes in creatinine content. They have done research on the toxicity of the diethylperoxides arising in ether.

The Public Health Institute (Kozegeszsegtani Intezet) reported on chemical, microbiological, and endemiological research pertaining to area hygiene.

The Health Organizations Faculty (Egeszsegugyi Szervesi Tanszek) is investigating the connections between alcohol consumption and accidents and between day nurseries and child development and the effect of social adaptation on health.

Internal Medicine Clinic No I (I. sz. Belgyogyaszati Klinika) is studying lymph circulation, the endocrine system, peroral antidiabetic preparations, liver pathology, and the central nervous system effects of [vitamin] B-12 and Strophantine.

Internal Medicine Clinic No II is studying the pathology of polyglobulism and hyperthyreosis and the effect of antibiotics, coagulation, leukemia, and hormonal influences on carcinoma growth.

Internal Medicine Clinic No III has clarified the role of the kidney veins in hypoxia. It is also studying the mechanism of nerve regulation of kidney tubules, regulation of aldosterone secretion, the pathology of scleroderma, shock, and the allergic nature of arteriosclerosis.

Surgery Clinic No I (I. sz. Sebészeti Klinika) has examined the collateral circulation between the spleen and the kidney, rectal carcinoma, and synthetic problems. Members of the clinic organized a gerontology department. They achieved success in the use of hypothermic and hibernation surgery and in abdominal cavity adhesions. Their work in lung X-ray anatomy deserves mention.

Surgery Clinic No II has done research on the bronchial system and on X-ray "layer" examinations.

Surgery Clinic No III is doing work on comparative respiration and circulation, thoracic intervention, modern anesthesia, hypothermia, hibernation, modern treatment of diseases of the esophagus, and prevention of thrombo-embolisms.

Surgery Clinic No IV is working on some aspects of extracorporeal circulation.

Gynecology Clinic No I (I. sz. Noi Klinika) is working with uterine cancer, genital tuberculosis, sterility, and the use of ultrasonic therapy.

Gynecology Clinic No II is studying clinical and biological problems of pregnant women with heart disease, toxemia, and uterine cancer and will soon be using radioactive isotopes.

Children's Clinic No I (I. sz. Gyermekek Klinika) is studying the infantile diabetes, the development of personality, heart and blood circulation, hibernation, infantile atrophy, and hormone therapy of nephrosis.

Children's Clinic No II is studying pathology and therapy of tuberculosis.

Ophthalmic Clinic No I (I. sz. Szemeszeti Klinika) is studying the effect of light (changes in wave length and intensity of light) on interrelationships in the neuro-endocrine system (in the adrenal gland). It is also studying trachoma but does not have adequate equipment for this.

Ophthalmic Clinic No II is studying the use of plastics for contact lenses.

The Dermatology Clinic (Borgyógyászati Klinika) was partially destroyed during the counterrevolution but is doing scientific work on pemphigus, lermal tuberculosis, and syphilis.

The Dental Clinic (Fogyászati Klinika) is doing research in gerontologic stomatology, the origin of caries, paradontosis, precancerosis of the oral cavity, new local anesthetics, stomatological biochemistry, enzymology, and modern dental materials.

The Ear, Nose, and Throat Clinic (Fül-orr-gege Klinika) is studying the organs of hearing and balance, prevention of hearing loss, surgical correction, lymph circulation of the organs of hearing, and radiation treatment of the throat and sinuses.

The Urology Clinic (Urológiai Klinika) is studying the pathology of hydronephrosis and pyelonephritis, the physiology of the kidney, and the pathological significance of lymph circulation in the lymph systems of the gall bladder, bladder, intestinal tract, and spleen. It is also examining the spread of tumor cells through the lymph.

The Neurology Clinic (Neurologiai Klinika) was formed on 1 January 1957, but has already done work on gerontological changes of the nervous system, the interdependence between changes in the nervous system and muscles and vascular changes in the brain.

The Psychiatric Clinic (Psychiatriai Klinika) is dealing with the pathology and therapy of schizophrenia, the psychology of senility, and the problem of responsibility. Material difficulties in carrying out histological investigations have held back the work of the clinic.

The X-Ray Clinic (Rontgen Klinika) is doing work in pharmacoradiology, X-ray diagnosis, and casuistics.

The Orthopedic Clinic (Orthopadiai Klinika) is concerned primarily with problems of bone regeneration, but it is also doing X-ray examinations of spinal (sacroiliac) articulation, paying special attention to spinal cord nerve roots.

The Pulmonary Clinic (Tudogyogyaszati Klinika) is doing work on non-specific lung diseases. It has studied the effect of 33 chemicals on the treatment of pulmonary tuberculosis.

The Pharmaceutical Organic Chemistry Institute (Gyogyszereszi Szerves Kemiai Intezet) has been reorganized but its research is still underdeveloped.

The Pharmaceutical Chemistry Institute (Gyogyszereszi Kemiai Intezet) is hampered in research activities by lack of space and equipment.

The Medicinal Plants and Drugs Institute (Gyogynoveny- es Drogismereti Intezet) is studying the history of pharmacy and is working with humic acids and "fulvo" acids.

The Pharmaceutical Institute (Gyogyszereszeti Intezet), working under difficult circumstances, has shown results in the area of ointment preparation technology and medical use of phenyl-mercurial-borate. All the pharmacy institutes worked on the compilation of the addendum to the Gyogyszerkonyv (Pharmacopia).

The above institutes put out 855 reports and 54 books or monographs.

VII. METALLURGY

122. Chromium-Cerium Alloys

"The Constitutional Diagram of the System Chromium-Cerium" by Ye. M. Savitskiy, V. F. Terekhova, and A. V. Kholopov, Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 435-438

Recently a number of investigations have been carried out on the alloying of chromium with different elements which would improve the ductility of this metal. Among the elements which improve the properties of chromium are rare-earth metals.

To investigate the physico-chemical interactions of chromium with rare-earth metals, the constitutional diagrams of the systems chromium-cerium and chromium-lanthanum were determined by the authors of this article. Furthermore, the effects of lanthanum, cerium, and a mixture of all rare-earth metals on the mechanical properties of chromium was investigated. In the present article, the results of an investigation of the constitutional diagrams of chromium-cerium up to 30% by weight of cerium are reported.

123. Academy of Mining and Metallurgical Sciences USSR Proposed

"Immediate Problems of the Development of Nonferrous Metallurgy," by S. Bayanov, Engineer-Metallurgist; Alma-Ata, Kazakhstanskaya Pravda, 23 Dec 58

To solve the serious scientific-technical problems of nonferrous metallurgy, the establishment of a scientific-technical center of the mining and metallurgical industry in the USSR has been proposed. An Academy of Mining and Metallurgical Sciences USSR could be such an organization. The new academy could be based on the Institute of Mining, Metallurgy, and Ore Dressing; the Altay Mining-Metallurgical Scientific Research Institute, Academy of Sciences Kazakh SSR; the All-Union Scientific Research Institute of Nonferrous Metallurgy; and other scientific research institutes of ferrous and nonferrous metallurgy in the USSR.

The new academy would be in a position to help solve all problems in the mining, metallurgical and ore dressing industries and coordinate research in ferrous and nonferrous metallurgy.

VIII. PHYSICS

Acoustics

124. Matrix Calculus for Computing Transmission of Sound Through Partitions

"Calculating the Transmission of Sound Through Walls by Means of Matrix Calculus," by T. Y. Wei, Institute of Physics, University of Nanking; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 116-120

A method proposed by A. London (JASA, No 22, 1950, p 270) for determining the acoustic transmission of partitions leads to extremely laborious calculations when multiple partitions are involved. This article draws upon matrix calculus to reduce considerably the amount of mathematical treatment required, without sacrificing the physical viewpoint of London.

In addition to a general treatment of the transmission of sound through homogeneous and isotropically stratified media, this article also discusses the use of certain types of multiple-shell structural units.

125. Vibration of Plates

"On the Vibration of Plates," by I. Malecki and S. Kaliski, Institute of Basic Problems of Technology, Polish Academy of Sciences, Warsaw; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 120-124

The behavior with respect to time of waveforms produced by an impact against a plate is investigated theoretically. The waveforms produced in such a case are determined by the mechanical properties of the hammer and of the plate. An indication is also given of how the waveform changes, when the impact is an elastic or elastic-plastic one through intermediate layers.

The results of the calculations are in good agreement with the results of the experiments and are applied in soundproofing.

126. Design of Sound Absorbers

"The Configuration of Resonant Sound Absorbers and their Use for Echo Control and Sound Absorption," by S. N. Rshvkin, Physics Faculty, Moscow State University; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 128-135

Resonant sound absorbers of modern design are given, the data of which (in the simplest case) depend on the given frequency characteristic. The opposite case is also given.

In all resonant sound absorbers, low material expenditure, long life, and stability to heat and moisture are important.

The article also investigates the manner in which the frequency characteristic of the sound absorption can be changed by the co-oscillation of the front plates of the resonance systems; these changes are found to be practically negligible.

127. Damping of Resonators

"The Damping of Resonators," by M. Vlcek, Research Institute of Telecommunications, Jeneralka, Nebusice, Prague; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 135-139

An analysis is given of the properties of Helmholtz resonators damped by means of a thin porous covering in the air cushion. The dependence of the acoustical level values of such resonators on the value and location of the added acoustical impedance is investigated theoretically and experimentally, and a comparison is made of the results of two methods of solution and of measurement.

In both principle and practice, it is possible to tune a resonator by varying the position of an added impedance in the resonant cavity. If this added impedance is located at a distance from the opening somewhat greater than twice the end correction, the changes can be studied with the aid of electro-acoustic analogies. When the impedance is positioned closer, however, the modes are higher, with the result that a one-dimensional observation is no longer sufficient.

128. Individual Resonators and Sound Absorption

"The Absorption of Sound by Individual Resonators in the Partition of Infinite Size," by W. Woehle, Institute of Electrical and Architectural Acoustics, Dresden Technische Hochschule; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 140-146

The size and frequency dependence of absorption surfaces are computed for individual resonators incorporated within an infinitely large wall. It is shown that the behavior of the resonator can be represented quite easily with the aid of a simple equivalent circuit diagram, in which the sound field and resonator itself are portrayed as an active and a passive two-terminal network, respectively. The correctness of the equivalent circuit diagram is confirmed by measurement.

For incident sound coming from all directions, the calculation gives a value equal to twice the value of an absorption surface with perpendicular incident sound. Comparisons of individual resonators with a really distributed resonators show practically the same absorption surface value for perpendicularly incident sound; for omnidirectional incident sound, on the other hand, individual resonators have greater effectiveness.

129. Computing High-Efficiency Sound Absorption

"The Determination of a High-Efficiency Sound Absorbing Structure," by K. A. Velishanina, Physics Faculty, Moscow State University; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 147-149

The investigations are limited to spheres of porous material, behind which there is an air cushion. The lowest reflection factors were found for spheres of glass wool ( $120-140 \text{ kg/m}^3$ ) about 75-85 centimeters high, and with an air cushion about  $1/3$  the height of the sphere. The measured amplitude reflection factor amounted to 10 percent at 80 cycles per second, and less than 5 percent at higher frequencies. The computed values are in relatively good agreement with the measured values.



128. Individual Resonators and Sound Absorption

"The Absorption of Sound by Individual Resonators in the Partition of Infinite Size," by W. Woehle, Institute of Electrical and Architectural Acoustics, Dresden Technische Hochschule; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 140-146

The size and frequency dependence of absorption surfaces are computed for individual resonators incorporated within an infinitely large wall. It is shown that the behavior of the resonator can be represented quite easily with the aid of a simple equivalent circuit diagram, in which the sound field and resonator itself are portrayed as an active and a passive two-terminal network, respectively. The correctness of the equivalent circuit diagram is confirmed by measurement.

For incident sound coming from all directions, the calculation gives a value equal to twice the value of an absorption surface with perpendicular incident sound. Comparisons of individual resonators with a really distributed resonators show practically the same absorption surface value for perpendicularly incident sound; for omnidirectional incident sound, on the other hand, individual resonators have greater effectiveness.

129. Computing High-Efficiency Sound Absorption

"The Determination of a High-Efficiency Sound Absorbing Structure," by K. A. Velishanina, Physics Faculty, Moscow State University; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 147-149

The investigations are limited to spheres of porous material, behind which there is an air cushion. The lowest reflection factors were found for spheres of glass wool ( $120-140 \text{ kg/m}^3$ ) about 75-85 centimeters high, and with an air cushion about  $1/3$  the height of the sphere. The measured amplitude reflection factor amounted to 10 percent at 80 cycles per second, and less than 5 percent at higher frequencies. The computed values are in relatively good agreement with the measured values.

CIA/PB 131891-T21

Approved For Release 1991/12/01 : CIA-RDP80-01048A000700300010

~~UNCLASSIFIED~~ SCIENTIFIC INFORMATION  
REPORT

8 MAY 1959

2 OF 2

132. Secondary Paths of Room Sound

"The Determination of the Secondary Paths of Sound Transmitted by Air According to the Method of Measuring and Generating Sound Transmitted by Solids," by W. Erler, Institute for Electro and Room Acoustics, Dresden Technische Hochschule; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 105-111

For a case where sound is transmitted between adjacent spaces by air along four paths (one direct path and three secondary paths), a method is described which permits the separation of the individual transmission paths from four measurements, without architectural considerations. The method is based on the law of reciprocity, the determination of the wall reflection through measurements of the passage of sound through solids and the determination of a secondary path a sound transported by solids in the separating partition. Measurement results and comparisons with results of other methods are given. The measurement accuracy averaged plus or minus one decibel. Special attention is given to measurements of sound transmitted by solids and to edge effect.

133. Flow Level Value in Soundproofing

"The Influence of the Flow-Level Value in the Determination of the Dynamic Stiffness of Porous Soundproofing Material," by W. Kraak, Institute of Electrical and Architectural Acoustics, Dresden Technische Hochschule; Leipzig, Hochfrequenztechnik und Elektroakustik, Vol 67, No 4/5, Jan 59, pp 111-113

The measureable dynamic stiffness of a porous material is made up of the stiffness of the framing material and the stiffness of the air enclosed in the pores. The effective stiffness of the air is computed as a function of the coarse dimensions, of the porosity, and of the flow level value of the material for both round and square specimens. Experiments conducted on foam material were in good agreement with the theoretically computed values.

Atomic and Molecular Physics

134. Scattering Cross Sections of Hartree Potentials

"The Total Effective Cross Section and the Diffusion Scattering Cross Section of Hartree Potentials," by T. Tietz, Institute of Theoretical Physics, University of Lodz (Poland); Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 387-392

Since, for a treatment of the problem of electron collisions with atoms, the method of the "self-consistent field" developed by Hartree and further developed by Fock involves considerable calculation, requiring the use of computers, and provides only numerical tables, rather than analytical expressions, for the total and diffusion-scattering cross sections, this article presents, in the first Born approximation, expressions for the total and diffusion-scattering cross sections of electrons scattered by neutral atoms. Analytical approximations given earlier by Holtzmark (Z. Physik, 55, 1929, p 437; Ibid, 66, 1930, p 49), Raurk (Physic. Rev., 57, 1940, p 62), and Byatt (Physic. Rev., 104, 1956, p 1298) for the Hartree potentials are used here. Numerical results are tabulated for the elastic differential scattering cross section and for the total and diffusion-scattering cross sections in the first Born approximation for the above Hartree potentials.

135. Depolarization of Sodium Resonance Fluorescence

"The Depolarization of Sodium Resonance Fluorescence," by W. Ermisch and R. Seiwert, Second Physics Institute of Humboldt University and Institute for Optics and Spectroscopy of the German Academy of Sciences in Berlin; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 393-402

Measurements of the degree of polarization of sodium resonance fluorescence in the case of linearly polarized light showed that the effect of depolarization begins at particle densities of approximately  $10^{10}$  sodium atoms per cubic centimeter. The occurrence of collisions with transitions between the Zeeman levels must be discarded as an explanation, both for theoretical reasons and on the basis of experimental findings. Apparently, the depolarization in the case of very low particle densities is caused by the radiation diffusion; depolarizing collisions could not have an appreciable influence on the degree of polarization until higher particle densities are reached.

Atomic Energy Development

136. Nuclear Energy in Poland

"The Prospects for the Development of Nuclear Energy in Poland." by Minister Wilhelm Billig; Warsaw, Przegląd Techniczny, 7 Jan 59, pp 7-9

The year 1958, according to the author, is the beginning of the development of the atomic age in Poland. During the year, two newly built nuclear research centers were opened in Warsaw and in Krakow. The Nuclear Research Institute has approximately 1,400 workers, and of this number approximately 700 are scientists and engineer technicians. In 1958, nearly 200 scientific technical works were published, many of which appeared in foreign scientific and technical publications. In addition, the plans, which were confirmed by the Council of Ministers in 1957, call for the following developments:

1. Building a second reactor (mainly using domestic ability with technical aid from the USSR) as a prototype for the first atomic power station -- by 1962.
2. Building the first electric power station of approximately 200 megawatts utilizing natural uranium, a graphite moderator and a gas coolant -- about 1965.
3. Planning for a truly atomic industry, i.e., the concentration of Polish uranium ore and the production of the uranium metal during the next 5 years, while in the meantime, Russian fuel elements will be used in the electric power plants.

Between 1965 and 1970, the building of another atomic power station with a capacity of 600 megawatts is foreseen. And by 1970, the first atomic propelled ship should be under construction.

In addition, according to the author, although Poland cannot think of thermonuclear research on a grand scale, within the purview of its capabilities it will meet the challenge of the new era.

Nuclear Physics

137. Gamma Ray Spectroscopy

"Thermal Neutron Capture Gamma-Rays," by L. V. Groshev, B. I. Gavrilov and A. M. Demidov; Moscow, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 281-289

A magnetic Compton spectrometer was used for the study of a number of gamma ray spectra at the VVR reactor Academy of Sciences USSR, obtained from the reaction  $(n, \gamma)$  at irradiation by thermal neutrons. The testing conditions and the results of measurements of gamma ray spectra from lead and antimony are described.

138. Fission Asymmetry

"Asymmetry of Nuclear Fission," by B. T. Geylikman; Moscow, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 290-297

An essential characteristic of nuclear fission and processes occurring in a nuclear reactor is the distribution of fission fragments according to masses. The liquid drop model calls for a symmetrical fission of fragment masses which, however, contradicts experimental data. To find the fragment distribution according to masses the energy of the splitting nucleus is computed before the disruption of the neck, taking into account shell effects for several nuclei. It is shown that the minimum of energy corresponds to asymmetric fission.

139. Excitation Energy at Nuclear Fission

"Excitation Energies of Fission Fragments," by B. T. Geylikman; Moscow, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 298-305

The reactivity coefficient for chain reaction in a nuclear reactor essentially depends on the number of secondary electrons emitted during fission which is fully determined by the energy value of the excited fragments. Therefore, the energy computation of excited fragments as a function of the order number  $Z$  and of the atomic weight  $A$  of the splitting atom is of important interest for nuclear energetics. It is shown that the excitation energy of fragments may be found from the solution of a system of equations for the parameters of fragment deformation and of distance between them. The initial conditions for this system of equations have been derived. The excitation energy of fragments has been found for certain nuclei. The relation of excitation energy to  $Z$  and  $A$  of the splitting nucleus has been analyzed.

140. Acceleration of Polarized Protons

"The Possibility of Acceleration of Polarized Protons in a Cyclotron," by G. M. Budyanskiy, Yu. A. Zavenyagin, N. D. Fedorov, and V. A. Khrabov, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 306-310

The evaluation of the reorientation probability of spin at acceleration of polarized protons in a cyclotron is carried out. The cyclotron magnetic field decreases radically and has an azimuthal nonuniformity. The extraction of the beam from the chamber is analyzed. It is demonstrated that the probability of depolarization at acceleration and extraction of the particles is low.

141. Theory of Neutron Diffusion

"Experimental Confirmation of the Theory of Neutron Diffusion in a Medium With Cavities," by I. F. Zhezherun, Atomnaya Energiya, Vol 6, No 3, Mar 59, pp 311-314

Tests for confirming the diffusion theory of thermal neutrons in a graphite medium are described. The measuring of neutron flux in a continuous graphite medium and in a graphite medium with channels confirmed the correctness of theoretical formulas connecting the effective diffusion coefficients (and diffusion lengths) of thermal neutrons in a medium with empty channels with the parameters of channel lattice and the corresponding diffusion coefficients (and diffusion length) in a continuous medium.

Optics

142. Isotropic Conducting Media

"Optics of Isotropic Conducting Media," by F. I. Fedorov, Tr. In-ta fiz. i matem AN BSSR, 1956, No 1, 32-45 (from Referativnyy Zhurnal -- Fizika, No 3, Mar 59, Abstract No 6696)

A general theory of propagation of plane monochromatic waves in an isotropic conducting medium is analyzed. In contrast to usual methods, using a complex angle of refraction, the analysis is carried out by means of a complex vector of refraction. General expressions for vectors of a field of nonuniform waves in a conducting medium expressed in a complex refraction vector as well as correlations for the density of the energy flux are derived. The problem of light reflection from conducting media is discussed and it is shown that in a general case a sideward light pressure and a sideward ray shift should occur.

Plasma Physics

143. Moving Layers in Neon Glow Discharge

"Some Results on Moving Layers in Neon Glow Discharges," by H. Achterberg and J. Michel, Physics Institute, University of Greifswald; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 365-379

An investigation is made of the manner in which external conditions effect the properties of moving layers in neon. Suitable methods of avoiding this influence are given. It is shown that the production of artificial moving layers with sinusoidal voltages can be employed as a means of measuring the properties of the moving layers, without external influences.

The concepts developed here regarding the feedback relationships in the case of moving layers in neon seem to apply to other gases also, which would have to be confirmed by investigations in other gases and under other conditions. When feedback is avoided, it is possible to measure the properties of the moving layers which depend solely on the plasma. It is just such variables, however, which are independent of the boundary conditions, which are required for a reappraisal of the validity of the theory of moving layers.

Solid State

144. High-Pressure Effect on Solid State

"The Effect of High Pressure on Certain Physical Properties of the Solid State," by K. P. Rodionov, Tr. In-ta fiz. metallov, Ural Branch of Academy of Sciences 1958, No 20, 273-282 (from Referativny Zhurnal--Fizika, No 3, Mar 59, Abstract No 5584)

Reviews work carried out in the Laboratory of High Pressures of the Institute of Physics of Metals in 1955-1956, consisting in theoretical and experimental research of the effect of the external high pressure on elastic, electric and magnetic and other properties of metals and some alloys and on phase transitions of steel.



145. Refractory Considerations

"Some Theoretical Prerequisites to the Preparation of Refractory Materials Based on Metal-Like Compounds," by G. V. Samsonov and V. S. Neshpor, Institute of Metalloceramics and Special Alloys of the Academy of Sciences Ukrainian SSR, Kiev; Inzh. fiz.zh. 1958, 1, No 8, 30-38 (from Referativnyy Zhurnal--Fizika, No 3, Mar 59, No 5801)

Discusses the basic possibilities of preparation of refractory alloys. Points out in particular that for an efficient use of metal-like compounds as refractory materials it is necessary to obtain compounds with not too high bonds of interatomic interaction and at the same time a not very high mass of structural complex. It will increase their ability to relaxation of elastic tensions, decrease their brittleness and improve their resistance to heat shock.

Theoretical and Experimental Physics

146. Gravitational Radiation and Energy Transport

"The Gravitational Radiation of an Intermittently Nonstationary System," by D. Geissler, A. Papapetrou, and H. Treder, Research Institute for Mathematics, [East] German Academy of Sciences, Berlin; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 344-350

On the assumption that a gravitational field which is always strictly periodically dependent on time cannot exist, an explicit and covariant calculation is presented for the gravitational radiation of a system which, during an infinite period of time, is intermittently (periodically) dependent on time. With the aid of the integral form of the general relativistic energy-momentum theorem given by Weyl (Raum, Zeit, Materie, Berlin, 1923), it is shown that the gravitational radiation emitted from an intermittently nonstationary system possesses a total energy which is not vanishing and which cannot be further transformed.

On the basis of this computation it is concluded that the gravitational radiation of an intermittently nonstationary system, inferred by Einstein, is a real physical process which is connected with the transportation of energy.

147. Spectrochemical Analysis of Impurities in Aluminum

"Manufacture and Testing of Test Electrodes for the Spectrochemical Determination of Impurities in Pure Aluminum," by G. Mueller-Uri, Central Institute for Foundry Practice, Leipzig; Berlin, Experimentelle Technik der Physik, No 1, 1959, pp 26-33

Describes the manufacture and testing of test electrodes, which contain, along with Fe and Si, small admixtures of Cu, Zn, Ti, Mg, and Mn; procedures are given, with which an analysis of the impurities of pure aluminum with an average error of 4 percent, and a reliable classification in accordance with DIN 1712, is possible.

The calibrating electrodes were produced at VEB Leichtmetallwerk, Rackwitz.

148. Testing of Sound Penetration Through High Polymers

"Measurements of the Sonic Velocity of Plastics According to the Penetration and Echo Methods," by J. Nittel, Physics Institute of Karl Marx University, Leipzig; Berlin, Experimentelle Technik der Physik, No 1, 1959, pp 14-19

The article describes the conversion of an ultrasonic pulse generator, type 806, built by Funkwerk Erfurt, for the purpose of measuring the sonic velocities of strongly absorbing substances, primarily high polymers, according to the ultrasonic pulse method. Several measurement results obtained with this apparatus on Buna rubber are also given. The conversion of the apparatus and the measurements were done in the Department of Technical Physics of the Physics Institute of Karl Marx University.

149. Thermal Conductivity and Elongation in Rubber

"Determination of the Thermal Conductivity of Caoutchouc Vulcanisates in Relation to Elongation," by H. Tautz, Physics Institute of Karl Marx University, Leipzig; Berlin, Experimentelle Technik der Physik, No 1, 1959, pp 1-14

To study the connection between the improvement of molecular orientation, which occurs during the elongation of vulcanized caoutchouc, and thermal conductivity, an apparatus was developed which afforded the possibility of determining the thermal conductivity of filament-shaped material specimens by means of a comparison method. The results of tests on eight different caoutchouc specimens showed a considerable increase of thermal conductivity with increased elongation.

150. Behavior of the Curie Point of a Ferrite Under High Pressure

"The Influence of Hydrostatic Pressure on the Curie Point of a Ni-Zn Ferrite," by K. Werner, Department of Technical Physics, Physics Institute of Karl Marx University, Leipzig; Leipzig, Annalen der Physik, Vol 2, No 7/8, Jan 59, pp 403-405

A Ni-Zn ferrite with the molar composition 15% NiO, 35% ZnO, and 50% Fe<sub>2</sub>O<sub>3</sub>, and a Curie point of 45 degrees centigrade was subjected to pressure from all sides. The transformer method employed could not give an exact determination of the transformation point, but Curie point changes were reproduced well. The measurements in a pressure range up to 6,000 atmospheres indicate a shifting of the Curie point in the direction of higher temperatures.

IX. MISCELLANEOUS

151. Second Scientific Center To Be Established in Siberia

"Second Scientific Center in Siberia;" (unsigned article);  
Moscow, Izvestiya, 14 Mar '59

Measures have been taken to establish a second scientific center in Siberia, according to V. I. Belyayev, deputy chairman of the Presidium, East Siberian Affiliate of the Siberian Department, Academy of Sciences USSR. The new center will have nine scientific research institutes and a number of special divisions and laboratories. The center will presumably be in Irkutsk where the East Siberian Affiliate is located.

\* \* \*