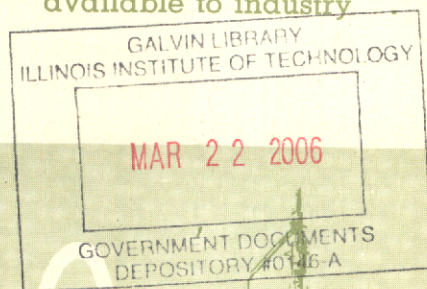


U. S. Government
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August 17, 1956

Vol. 26, No. 2

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In this issue:

Radiation Sterilization of Foods

12 Reports of the Quartermaster Food and Container Institute for the Armed Forces, including—

Chemical Changes in Protein of Sterilized Meat

Changes Produced in Lipids

Radiation Sensitivity of Meat Spoilage Microorganisms

Modification of Flavor, Color, and Texture

Development of a Method of Radiation Sterilization Without Adverse Flavor and Color Changes

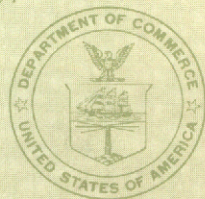
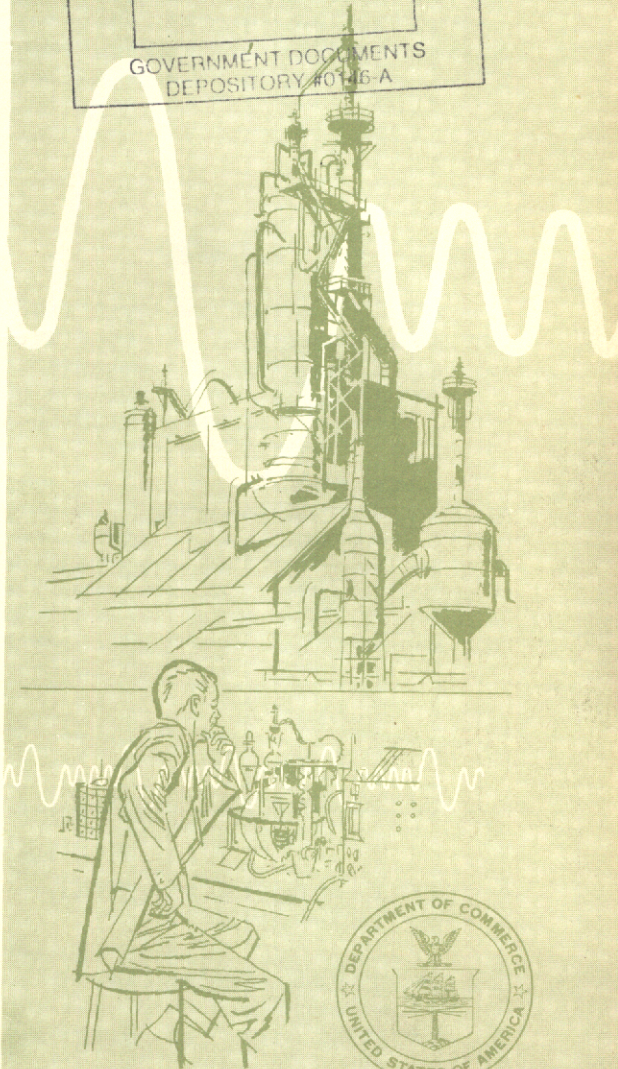
Inhibition of Enzymatic Activity

Relationship of Radiation Induced Fat Oxidation and Flavor, Color, and Vitamin Changes in Meat

Combined Effects of Heat and Radiation

Chemical and Organoleptic Changes in Carbohydrates and Proteins

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The printing of this publication has been approved by the Director of the Bureau of the Budget, August 22, 1955.



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CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Basic studies on the chemistry of fluorine compounds, by W. T. Miller, Cornell University, Ithaca, N. Y. Sep 1954. 148p graphs, tables. Order from OTS. \$3.75. PB 111937

The general purpose of the research at Cornell on the arctic rubber program under subcontract from the M. W. Kellogg Co. was to carry out investigations on fundamental problems directed towards new methods of synthesis of potentially polymerizable fluorine containing monomers and related work aimed at obtaining a better understanding of the basic chemistry of organic fluorine compounds. Work was carried out in three principal areas, (1) Radical addition reactions of perhalo olefins, (2) Condensation reactions of perhalo compounds, (3) Synthesis of fluorinated vinyl ethers. Subcontract from M. W. Kellogg Co. under Contract DA-44-109-qm-222 (Arctic rubber program). Covers work performed from Sep 1950 to Sep 1953.

Combustion calorimetry of organic fluorine compounds by a rotating-bomb method, by W. D. Good, D. W. Scott and Guy Waddington. U. S. Bureau of Mines, Thermodynamics Branch, Bartlesville, Okla. Dec 1955. 42p diags, graph, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 120009

A rotating-bomb method was developed for the combustion calorimetry of organic fluorine compounds. Conventional methods of handling volatile samples could not be used, and a special technique with sealed, fused-quartz ampoules was devised. Some auxiliary data necessary for reduction of the calorimetric results to standard states were lacking; this difficulty was circumvented by use of suitable comparison or "blank" experiments. Project Code no. Chem 30-6. U. S. Bureau of Mines Report no. 56. AF OSR TN 56-10.

Composition change in binary component spray vaporization at atmospheric pressure, by J. F. Culverwell, P. W. Grounds, Jr., G. G. Lamb and W. F. Stevens. Northwestern Technological Institute, Evanston, Ill. Mar 1956. 28p photo, diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 122562

The behavior of the system orthodichlorobenzene - tetrachloroethylene was studied in air ranging from 400° to 1000°F. Initial drop diameters in the sprays were in the 20 to 400 micron range. The experimental data obtained indicated that the rate of change of spray composition during vaporization was affected only by the chamber air temperature, the initial feed composition, and the nozzle characteristics. Equations are presented which mathematically describe the vaporization process, assuming liquid diffusion within the drop controls. The calculations agreed with the experimental data previously obtained during the first five inches of nozzle to tray travel. Project Squid, Technical report NTI-3-P. Paper presented at American Institute of Chemical Engineers meeting, Louisville, Ky., Mar 20-23, 1955. Will be submitted for publication in AICHE Journal in 1956. Contract N6 ori-105, T. O. III, NR 098-038.

Evaluation of inductive and resonance effects on reactivity. I. Rates of hydrolysis of diethylacetals and ketals, by Maurice M. Kreevoy and Robert W. Taft, Jr. Pennsylvania State University, School of Chemistry and Physics, Mar 1955. 22p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119929

The rates of the acid-catalyzed hydrolysis of twenty-three diethyl acetals and ketals of the general formula $R_1R_2C(OC_2H_5)_2$ have been measured spectrophotometrically in 49.6% dioxane - 50.4% water at 25°. Also the rate of hydrolysis of formal has been measured dilatometrically in the same solvent. Contract Nonr-656(05), NR 055-328.

Organic derivatives of germanium ortho esters of 2-alkoxyethanols, by Harold Rosenberg, Elizabeth J. Bartholomew and Donald F. Kippax. U. S. Air

Force, Air Research and Development Command, Wright Air Development Center, Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio, Jun 1955. 17p tables. Order from OTS, 50 cents. PB 121037

An investigation was conducted to determine the applicability of germanium ortho esters, similar to the organosilicates, as base stock materials for high-temperature fluids and lubricants. A series of tetrakis(2-alkoxyethoxy) germanes was synthesized by the reaction of sodium 2-alkoxyethoxides with germanium tetrachloride after it was found that the germanium halide, unlike its silicon analog, failed to react with a 2-alkoxyethanol. Certain of the physical properties of the germanium ortho esters and their resemblance to those of the corresponding silicon derivatives are discussed. In the course of this work a new glycol ether, 2-cyclohexyloxyethanol, was prepared by the action of ethylene chlorohydrin on the sodium salt of cyclohexanol in the presence of xylene. Project no. 7340. AF WADC TR 55-146.

Organometallic chemistry of transition metals. Interim technical report no. 11 for the period 1 Jun 1953 through 31 May 1954 under Contract no. Nonr-582(00), project NR 356-281, by Lawrence Summers and Robert H. Uloth, North Dakota, University, Grand Forks, N. Dak. Mar 1955. 24p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120036

Covers preparation of some organic titanium compounds and reactions with aryllithium compounds. Some organozirconium compounds also covered. Project NR 356-281.

Oxidation of lower paraffin hydrocarbons, by C. C. Schubert and Robert N. Pease, Princeton University, James Forrestal Research Center, Princeton, N. J. Contract N6-ori-105, T. O. III, NR 098-038. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Room temperature reactions of methane, propane, n-butane and isobutane with ozonized oxygen. Jan 1956. 21p graphs, tables. Mi \$2.70, ph \$4.80. PB 122567

Reaction rates of ozonized oxygen (ca. 3 mole % O_3) with methane, propane, n-butane and isobutane were measured, in situ, in a temperature-controlled infra-red absorption cell by observing the decrease of ozone concentration as measured by the absorption at 1055 cm^{-1} . A mechanism based on the postulation of a low lying triplet state of ozone is presented. Project Squid, Technical report PR-62-P. To appear in Journal of the American Chemical Society in 1956.

Part II: Observations on the role of ozone in the slow combustion of isobutane. Apr 1956. 17p graphs, table. Mi \$2.40, ph \$3.30. PB 122561

The reaction of ozonized oxygen (ca. 3 - 6 mole % O_3) with isobutane in the temperature range

100 to 270°C was compared with the slow uncatalyzed reaction with oxygen alone. Preliminary attempts to detect ozone during the normal slow reaction by observing the ultra-violet absorption in a 3-meter tube were unsuccessful due to general absorption in the 2500 A region. Project Squid, Technical report PR-65-P. Taken from thesis submitted by C. C. Schubert.

Relationship between the electronegativities of substituents and the carbonyl stretching frequency, by R. E. Kagarise, U. S. Naval Research Laboratory, Jun 1956. 18p graphs, tables. Order from OTS, 50 cents. PB 121159

An empirical relationship has been shown to exist between the infrared absorption frequency due to the carbonyl stretching vibration and the electronegativity of the substituent atoms or radicals for a variety of compounds of the form X.CO.Y. NRL R 4752.

Thermal decomposition of stibine, by Kenzi Tamaru, Princeton University, Frick Chemical Laboratory, Mar 1955. 19p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 120042

1. Antimony compounds 2. Stibene - Decomposition 3. Contract N5 onr-27018.

Vapor phase catalytic synthesis of heterocycles, by Corwin Hansch, Pomona College, Dept. of Chemistry, Claremont, Calif. Mar 1955. 43p. Order from LC. Mi \$3.30, ph \$7.80. PB 120043

Work was suspended from June 1, 1952 until Nov 1953. Contents: Nitration of o-acetylaminoethylbenzene, by Corwin Hansch. - Synthesis of 6-substituted thianaphthenes, by Corwin Hansch and Beno Schmidhalter. - Catalytic synthesis of heterocycles, VII: Dehydrocyclization of o-ethylbenzenethiols to thianaphthenes, by Corwin Hansch, Beno Schmidhalter, Fred Reiter and William Saltonstall. Technical report III consists of two papers: Catalytic synthesis of heterocycles, VII: Dehydrocyclization of anils to acridine and carbazole (In Journal of the American Chemical Society, vol. 74, p. 4554, 1952) and Dehydrocyclization reaction (In Chemical reviews, vol. 53, p. 353, 1953). Contract N8 onr-67600, NR 356-149, Technical report no. 4.

Plastics and Plasticizers

Development of low-pressure laminates of glass-fabric and silicone resins, by Kenneth R. Hoffman, Dow Corning Corp., Midland, Mich. May 1953. 72p photos, diagr, tables. Order from OTS. \$2. PB 121070

Methods for the production of low pressure laminates of Dow Corning silicone resin 2104 on a commercial scale have been worked out. Data are given on the preparation of laminating stocks, catalysis,

performing, laminating, bag molding, and molding in matched metal dies. The preparation of duct work and tubing are also discussed. An evaluation of the use of the new glass fabric sizings with silicone resins shows that most can be used with resin 2104. An evaluation of new resins, new sizes, catalysts, and additives for resin 2104 are given. Supplement to PB 109025. Contract AF 33(038)-9201. AF TR 6223, Supplement 1.

Effects of molding pressure on the strength properties of several types of glass-fiber reinforced plastics, by Samuel D. Toner, Irvin Wolock and Frank W. Reinhart. U. S. National Bureau of Standards. Dec 1955. 73p diagr, graphs, tables. Order from OTS. \$2. PB 121196

Flexural, tensile and compressive strengths and flexural and tensile moduli of elasticity were determined for dry specimens as well as for specimens that had been immersed in water at 73.5°F (23°C) for thirty days. Specific gravity, resin content, and voids content were also determined. The test results indicate that the properties of laminates fabricated in the closed mold do not vary appreciably with changes in molding pressure. However, the flexural and tensile properties of panels molded in the open mold increase as the pressure increases from 1 to 10 lb/in² but do not change appreciably at higher molding pressure. Compressive strength shows a tendency to decrease with increasing molding pressure. Project no. 7340, Task no. 73400. Covers work conducted from May 1953 to Aug 1955 under Contract AF 33(616)-53-14. AF WADC TR 55-256.

High-temperature creep-rupture properties of glass-fabric-plastic laminates, by John Vanecho, Gale R. Remely and Ward F. Simmons. Battelle Memorial Institute, Columbus, Ohio. Dec 1953. 51p photos, diagrs, graphs, tables. Order from OTS. \$1.50. PB 121082

Creep and creep-rupture tests, in both tension and compression, were conducted at room temperature, 300°, and 500°F on three glass-fabric-base laminates. Resins used in these three materials were a silicone, DC-2104; a phenolic, CTL-91LD; and a polyester resin, PDL-7-669. Deterioration tests and some preliminary short-time tensile tests were also made on these three materials. AF WADC TR 53-491. Contract AF 33(038)-10818.

Investigation of thermal properties of plastic laminates, cores, and sandwich panels, by F. R. O'Brien and S. Oglesby, Jr. Southern Research Institute, Birmingham, Ala. Nov 1955. 79p diagrs, graphs, tables. Order from OTS. \$2. PB 121191

Thermal conductivity, specific heat, and thermal expansion were determined for four glass-fabric laminates with the same reinforcing fabric but with different resins, four foam-plastic cores, one foam sandwich panel, and one honeycomb panel. The thermal properties of the plastic laminates were in

general agreement with those of the laminates tested in the first portion of this program. The foam cores, except the heat resistant core, decomposed at relatively low temperatures. Also, the low densities of these core materials gave less precision in the specific heat determinations. Project no. 7340, Task no. 73400. AF WADC TR 54-306, Part 2. Contract AF 33(616)-2045S2-(54-1233).

Some dynamic hardness tests on plastics, by A. J. Hodges. U. S. Naval Research Laboratory. Sep 1944. 55p photos, diagr, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 120749

Dynamic hardness tests of plastics can be made with the Pendulum-Indenter, a machine designed and developed at NRL. The Pendulum-Indenter consists of a conical indenter clamped in a holder which is suspended on fine music wire. Selected data are presented to show application of the Pendulum-Indenter to measurement of hardness values of a wide range of material types over a large range of hardnesses. Among the material types were homogeneous plastics and cloth laminates. Effects of velocity upon deformation resistance have been investigated in impacts on an ethylcellulose sample. NRL O-2376.

Paints, Varnishes and Lacquers

Development of an organic lacquer resistant to fuming nitric acid, by Francis J. Honn, Robert E. Martin and David R. Wolf. Kellogg, M. W. Co., Jersey City, N. J. Jan 1956. 46p photos, drawings, tables. Order from OTS. \$1.25. PB 121205

The objective of this contract was the development of a protective coating and sealant for the metal surfaces in the acid tank and ATO compartments of the B-47 aircraft. The evaluation of available coatings indicated that polychlorotrifluoroethylene (KEL-F) was the only organic coating material with adequate resistance to fuming nitric acid. However its use was deemed impractical because of the difficulty of application on aluminum aircraft structures. Research on the modification of KEL-F through copolymerization with vinylidene fluoride ultimately led to the development of Kellogg X-200 resin. Laboratory tests indicate that coating systems of X-200 filleting material and X-200 lacquer are adequate for the intended application. Coatings formed from the X-200 lacquer are far superior, in fuming nitric acid resistance, to any other lacquer coating evaluated. Project no. 7312, Task no. 73121. Covers work conducted from Mar 1951 to Mar 1954 under Contract AF 33(038)-21253. AF WADC TR 54-526.

Development of electrical conducting transparent coatings for acrylic plastic sheet, by George A. Dalin and Robert W. Freedman. Balco Research Laboratories, Newark, N. J. Jan 1954. 47p diagrs, graphs, tables. Order from OTS. \$1.25. PB 121104

Methods are discussed for the preparation of transparent, conductive films on both acrylic and glass surfaces. The theory of the structure of such films is presented as well as a description of techniques involved in the preparation. Techniques described are sputtering of metallic cadmium under conditions such as to form the oxide, and the preparation of thin continuous films of silica and titania. Includes bibliography and "survey of literature." AF WADC TR 53-378. Contract AF-33(616)-111.

Development of electrically conductive transparent coatings for acrylic plastic, by Myron A. Coler, Arnold S. Louis and John C. Kalbach. Markite Company, Jan 1956. 92p photos, graph, tables. Order from OTS. \$2.50. PB 121208

The Marklad process, a procedure involving repeated contact between a plastic surface being treated and small particles previously coated with a transferable conductor, has been adapted to the application of transparent static dissipating coatings to acrylic plastic, including curved surfaces such as occur in aircraft canopies. Project no. 7312. Covers period of work from Apr 1953 to Apr 1955 under Contract AF 33(616)-2027. AF WADC TR 55-272.

Inorganic Chemicals

Decomposition of arsine, by Kenzi Tamaru. Princeton University. Frick Chemical Laboratory, Princeton, N. J. Mar 1955. 13p graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 119934

Coherent films of arsenic by decomposition of arsine can be laid down on the surface of a reaction vessel if the glass surface is first covered by a coherent film of antimony. On such antimony and arsenic films the kinetics of the decomposition of arsine have been studied by a static method. Contract N6 onr-27018.

Detailed structure of nepheline, $\text{KNa}_3\text{Al}_4\text{Si}_4\text{O}_{16}$, by Theodor Hahn and M. J. Buerger. Massachusetts Institute of Technology. Crystallographic Laboratory. Mar 1955. 60p photos, drawings, diags, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 119930

Although the ideal formula of nepheline is $\text{KNa}_3\text{Al}_4\text{Si}_4\text{O}_{16}$, there is a small deficiency of potassium and sodium which is probably correlated with a ratio of Si/Al greater than unity. Potassium is surrounded by nine near oxygen atoms at an average distance of about 2.9 Å; sodium is surrounded by 8 nearest oxygen atoms at an average distance of 2.65 Å. Technical report 5 under Contract no. N5 ori-07860, Project NR 032-346. For Technical reports 1-4 and Final report see PB 110721, 112803-112804, 119046 and 119928.

Flocculation studies of ferric oxide and aluminum oxide sols. Technical report, year ending Jan 31, 1955, by Harold Strange. Pennsylvania, University. Dept. of Chemistry, Philadelphia, Pa. Jan 1955. 41p graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 120160

Purpose of this investigation is to study (1) the effect of surface active agents on the stability of aqueous inorganic colloidal systems, (2) the effect of these substances on the streaming potentials of solid surfaces of the colloidal material in powdered form, and to correlate stability with zeta potential, (3) the effect of surface active agents on the mobility of colloidal particles in an electric field and to correlate mobility with stability, (4) the effect of inorganic aqueous colloidal systems on the critical micelle concentrations of the surfactants, (5) the effect of some inorganic electrolytes on colloidal systems and the effect of these same electrolytes on the critical micelle concentrations of the surface active agents. Serial no. 8201. For 1954 report see PB 115929. Contract Nonr-1137(00), NR 356-336.

Quarterly periodic status report under Contract N5 ori-07819, NR 092-008, by R. L. Wentworth. Massachusetts Institute of Technology. Hydrogen Peroxide Laboratories. Mar 1955. 7p. Order from LC. Mi \$1.80, ph \$1.80. PB 120045

Summarizes work on: I. Stability of hydrogen peroxide; II. Cyclical barium peroxide processes; III. Flame velocities in hydrogen peroxide vapor; IV. Decomposition of hydrogen peroxide vapor; V. Partial oxidation of propane. For previous reports see PB 116706-116709, 114080, 115065, 116325, 117376, 118313, 119030.

Thermodynamic functions of CO_2 for 700° - 1000°C and low pressures, by Donna Price. U. S. Naval Ordnance Laboratory. Jun 1953. 43p graph, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 122036

Under contract Nord 10446, Task 5, P-V-T data for CO_2 , 0° - 1000°C and 25 - 1400 bars are now being obtained. These data have a precision of 1/1000 at the higher pressures, but are less precise in the region 0 - 100 bars. To obtain better values of the thermodynamic properties in this region that can be derived from the Harvard data alone, data available in the literature for 0° - 600°C and 0 - 50 bars have been used in conjunction with the low pressure Harvard data to make an extrapolation to 1000°C consistent with the available data and with results predicted by derivation of the second virial coefficient with the use of a Lennard-Jones potential. With the extrapolated values, tables of heat capacities, enthalpy, internal and free energies have been computed as functions of temperature and pressure and as functions of temperature and density. NAVORD 2876.

Thermodynamic properties of carbon dioxide up to 1000°C and 1400 bars: I. Entropy, enthalpy and isobaric heat capacity, by Donna Price. U. S. Naval Ordnance Laboratory, White Oak, Md. Nov 1954. 63p graphs, tables. Order from LC. Mi \$3.90, ph \$10.80. PB 120877

1. Carbon dioxide - Thermodynamic properties
2. NAVORD 3846.

V-centers in evaporated alkali halide films, by Kenneth Teegarden. Rochester. University. Institute of Optics, Nov 1955. 6p graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 119560

V-centers have been produced in thin films of KI and KBr by evaporating the alkali halide and a halogen simultaneously onto a quartz substrate held at low temperature. The concentration of these centers was of the order of $10^{20}/\text{cm}^3$. A study of the films shows that the V-bands depend only on the alkali halide, not on the halogen. For examples, KI + I₂ has the same band structure as KI + Br₂. This fact tends to support the vacancy models of the V-centers suggested by Seitz and others. Project codes: R-355-20-7, R-355-10-1. Contract AF 18(600)-193, Report 5. AF OSR TN 55-402.

Ordnance Chemicals

Determination of average surface diameter and tapped density of powdered pyrotechnic ingredients, by Bernard Dubrow and Mary Nieradka. U. S. Picatinny Arsenal, Dover, N. J. Nov 1954. 24p photos, drawings, diags, graph, tables. Order from OTS. 75 cents. PB 111935

The developed test methods described in this report are applicable to the specification of the average particle size and tapped density of powdered pyrotechnic ingredients. It is recommended, therefore, that these test methods be required for determining the physical characteristics of pyrotechnic ingredients when reference is made thereto on drawings, in detail specifications, or in contracts, Dept. of the Army project 504-01-027. Ordnance project TA2-9201. PA TR 2092.

Detonation trials on a mixture of aluminum and liquid oxygen, by S. J. Jacobs. U. S. Naval Ordnance Laboratory. Mar 1953. 8p photos, diagr. Order from LC. Mi \$1.80, ph \$1.80. PB 122032

Task no. Re2c-1-1-53.

1. Detonation - Tests
2. Aluminum powders - Reactions with liquid oxygen
3. Oxygen, Liquid - Reactions with aluminum powder
4. NAVORD 2792.

Analytical Chemistry

Comparative methods of fluorine analysis, by Gordon D. Oshesky. U. S. Air Force. Air Research and

Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1956. 62p. Order from OTS. \$1.75. PB 121190

The methods discussed in this report include oxidation, reduction, gravimetric, and titrametric procedures. An attempt has been made in this project to determine which were best suited for compounds containing 10 to 70% fluorine. Several of the methods described here are applicable in the determination of fluorine in fluorinated organics. Of the three suggested methods the procedure in which fluorine is titrated with standard thorium nitrate appears to be the more convenient, more suitable, and the most accurate. Covers period of work from Jan 1954 to Jul 1955. Project no. 7360. AF WADC TR 55-421.

Comparison of three methods for the analysis of gaseous ozone, by Clarence C. Schubert, S. J. Garvin, and David Garvin. Princeton University. James Forrestal Research Center, Princeton, N. J. Mar 1956. 11p diagr, graph. Order from LC. Mi \$2.40, ph \$3.30. PB 122564

Ozone at low concentrations in air or oxygen has been analyzed by three methods, absorption in aqueous potassium iodide followed by titration with sodium thiosulfate, infrared absorption and by measurement of the gas volume increment upon thermal decomposition. Intercomparison of these methods indicates that the titration method as usually applied in a flow system is not precise for gas streams containing more than one mole percent ozone and that at higher concentrations errors occur which tend to reduce the observed ozone concentration below that actually present. The recommended method for the analysis of gases containing 2 to 100 mm. Hg ozone is infrared absorption based on a calibration curve obtained from absolute method analysis. Such a calibration curve is presented. Project Squid, Technical report PR-63-P. To be submitted for publication in Journal of Analytical Chemistry in 1956. Contract N6 ori-105, T. O. III, NR 098-038.

Miscellaneous Chemicals

Chemical intermediates in photosynthesis. Final report for the period Jan 1, 1950-Dec 31, 1954 under Contract no. N7 onr-28505, NR 123-956, T. O. 5, by R. H. Burris. Wisconsin. University. Dept. of Biochemistry. Feb 1955. 6p. Order from LC. Mi \$1.80, ph \$1.80. PB 120147

1. Photosynthesis - Intermediates
2. Biological chemistry - Research
3. Chemosynthesis
4. Bacteria, Autotrophic.

Room-temperature-vulcanizing silicone adhesive, by Aldo J. DeFrancesco. Connecticut Hard Rubber Co., New Haven, Conn. Jan 1956. 69p photos, graph, tables. Order from OTS. \$1.75. PB 121209

All commercially available adhesives recommended for bonding silicone rubber to aluminum and to itself without the use of heat and pressure have been evaluated. A study of other room-temperature-curing systems with various modified siloxanes is reported. A literature survey of silicone adhesives and room-temperature curing systems is also included in this report. Project no. 7340, Task no. 73405. Covers period from Jun 1954 to Mar 1955 under Contract AF 33(616)-2542. AF WADC TR 55-289.

ELECTRICAL MACHINERY

Electronics

Airborne radio: Results of engineering performance tests on model AN/ARC-12 VHF communications equipment, by J. E. McGeogh, D. L. Fye, E. M. Smith and A. Gallant. U. S. Naval Research Laboratory. Jul 1946. 122p photos, drawings, diags, graphs, tables. Order from LC. Mi \$6.30, ph \$19.80. PB 120727

1. AN/ARC-12 (Radio)
2. Radio, Airborne - Tests
3. NRL R 2896.

Antenna pattern measurements, by Warren B. Burgess, R. C. Guthrie, and John P. Hagen. U. S. Naval Research Laboratory. BuShips problem S403. Order separate parts described below from LC, giving PB number of each part ordered.

AGC-7: On USS Mt. McKinley. Jun 1944. 75p graphs, tables. Mi \$4.50, ph \$12.30. PB 120745

Pattern measurements were made on all communication, homing, radar, and IFF antennas of this vessel. These patterns show the relative coverage afforded by each antenna versus relative ship's heading. NRL R 2312.

AGC-8: On USS Mt. Olympus. Jul 1944. 76p graphs, tables. Mi \$4.50, ph \$12.30. PB 120747

On 15 June 1944 the USS Mt. Olympus was made available to a task group of Laboratory engineers for the purpose of determining the directional characteristics of various transmitting and receiving antennas. Field intensity measurements of most of the transmitters were made on 16 June 1944. These tests were similar to those made on somewhat different frequencies for the USS Mt. McKinley on 26/29 May 1944, which have been reported in NRL Report R-2312 (PB 120745) and for the USS Wasatch on 9 June 1944, which have been reported in NRL Report R-2323 (PB 120746). NRL R 2324.

AGC-9: On USS Wasatch. Jul 1944. 70p graphs, tables. Mi \$3.90, ph \$10.80. PB 120746

Pattern measurements were made on all communication antennas, SK-2, BM, forward BN, YG-1, SG's and SQ antennas. These patterns show the relative coverage afforded by each antenna versus relative ship's heading. NRL R 2323.

Application of UHF impedance measuring techniques in biophysics, by Herman P. Schwan. Pennsylvania University. Dept. of Physical Medicine, Philadelphia, Pa. 1955. 24p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120044

This paper attempts to summarize applications of ultrahigh frequency measuring techniques in biophysics, such as: 1) Investigation of the health hazard associated with the exposure of human beings to powerful sources of electromagnetic radiation, i. e. radar equipment; 2) Electromagnetic radiation, for purposes of deep tissue heating; 3) Electromagnetic radiation for cooking purposes; 4) Attempts to derive from UHF-measurements the amount of bound water associated with protein molecules; 5) The internal resistivity of various cellular organisms, as measured with UHF, as indicating salt content and protein properties of the cell interior. Technical report no. 15. Contract NR 119-289.

Design of linear slot antenna arrays with linear phase shift, by S. J. O'Neill. Parke Mathematical Laboratories, Inc., Concord, Mass. Nov 1955. 51p diags, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 120280

This report presents the results of a study of the design of linear slot antenna arrays with linear phase shift in the far field pattern. The general problem, which is discussed in the first section, is the synthesis of linear antenna arrays to give far field radiation patterns with arbitrary magnitude and arbitrary phase. The specific problem, discussed in the second section, is the synthesis of linear antenna arrays to give far field patterns with arbitrary magnitude and linear phase. The third section presents a discussion of the effects which are produced by reversing the direction of energy flow in the feeding wave guide. AF CRC TN 55-960. Contract AF 19(604)-1403.

Effect of a ground discontinuity on a VOR, by Sterling R. Anderson and Arthur E. Frederick. U. S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. May 1956. 20p photos, diags, graphs. Order from OTS. 50 cents. PB 121228

These tests were conducted near Port Washington, Wis., where a reasonably straight length of shoreline presented an almost vertical drop of 125 feet from ground to water level. Tests indicated that satisfactory operation of a VOR could be attained where the antenna was located 4 ft. above the terrain and not less than 63 feet from the ground discontinuity. Tests also showed that the distance

must be increased to 125 ft. if the antenna is raised to a height of 14 ft. Equations were derived which explain some of the phenomena observed during these tests. The theoretical and measured positions of the lowest null were in close agreement. CAA TDR 278.

Electromagnetic waves in a magnetized ferrite sphere, by W. S. Ament and H. J. Passerini. U.S. Naval Research Laboratory. Jun 1956. 41p. Order from OTS. \$1.25. PB 121126

A ferrite sphere (radius a) in a dc magnetic field H is excited by a circularly polarized rf field propagating parallel to H : our problem is to compute the sphere's magnetic dipole scattering coefficient S taking account of the appropriate rf tensor permeability. Superposed cylindrical waves in the sphere are expanded in spherical vector waves to obtain convenient boundary condition equations for determining the scattered spherical waves; this reduces the problem to a scalar, still unsolved, form. Approximating, we assume an internal field of one radial wave and one plane standing wave, scattered magnetic dipole and electric quadrupole waves, all four waves having 'circular' polarization. The previous procedure and neglect of higher multipole fields leads to an approximate S : through terms in a^3 , Sa^{-3} is as if the ferrite had a scalar susceptibility $\chi + \kappa$. Experimental $\chi \pm \kappa$ are inferred essentially from cavity measurements of S ; most of our presentation deals with the effects of $a \gg 0$ on these inferences. NRL R 4747.

General theory of interaction of defects in three dimensional lattices, by E. W. Montroll and R. B. Potts. Maryland. University. Physics Department, College Park, Md. Dec 1955. 47p. Order from LC. M1 \$3.30, ph \$7.80. PB 120010

The self energies and interaction energies of isotopes, holes, and 'source' defects in simple cubic monatomic and diatomic lattices are derived by a general method. Results are also obtained for the interaction of defects with lattice boundaries. For the limiting case of a continuum model, certain analogies between the present theory and field theory are discussed. Technical report no. 24. Contract AF 18(600)-1015. AF OSR TN 55-481.

Industrial preparedness measures for electron tubes in guided missile applications. Interim technical report no. 2 for the period Jan 1-Apr 1, 1955 under Contract no. NObs-8023, by V. P. Grubbe. Sylvania Electric Products Inc. Radio Tube Division, Emporium, Pa. Apr 1955. 44p diagr, graphs (part fold.) Order from LC. M1 \$3.30, ph \$7.80. PB 120304

1. Tubes, Electron - Research 2. Missiles, Guided - Components.

Interim report on type test of AN/APA-5A, by H. W. Herman and S. J. Weller. U. S. Naval Research

Laboratory. Jun 1946. 28p graphs, tables. Order from LC. M1 \$2.70, ph \$4.80. PB 120780

1. Radar - Indicators - Tests 2. AN/APA-5A (Radar indicator) 3. NRL R 2892.

Model DU direction finder equipment, by R. A. Gordon. U. S. Naval Research Laboratory. Dec 1938. 46p photos, drawing, diagrs, graphs, tables. Order from LC. M1 \$3.30, ph \$7.80. PB 120388

1. DU (Radio direction finder) 2. Radio direction finders - Tests 3. NRL R 1502.

Model XTAJ-8 radio transmitting equipment, by C. B. Davis and O. C. Dresser. U. S. Naval Research Laboratory. Jul 1940. 159p photos, graphs, tables. Order from LC. M1 \$7.50, ph \$24.30. PB 120076

1. Radio transmitters - Tests 2. XTAJ-8 (Radio transmitter) 3. NRL R 1634.

Method for determination of the specific charge on an electron, by W. R. Smythe. California Institute of Technology, Pasadena, Calif. Mar 1955. 24p drawing, diagr, graph, table. Order from LC. M1 \$2.70, ph \$4.80. PB 120005

Accurate values of e/m_0 cannot be obtained with the present apparatus although random errors have been reduced to about one part in 10,000. It is very probable that by 1. elimination of oil pumps, 2. construction of optically flat cavity end plates of a single low resistance material without inserts, 3. construction of an efficient, continuous external magnetic shield, an accuracy of one part in 10,000 could be obtained. Contract N6 onr-24419.

Observation of night effect on model CXS radio direction finder below 100 kilocycles, by R. A. Gordon and Matthew H. Schrenk. U. S. Naval Research Laboratory. Nov 1939. 23p graphs (1 fold). Order from LC. M1 \$2.70, ph \$4.80. PB 120394

1. CXS (Radio direction finder) 2. Radio direction finders - Errors 3. NRL R 1575.

Radiation resistance of a small horizontal loop antenna over a conducting plane, by R. M. Powell. U. S. Naval Ordnance Laboratory. May 1951. 45p photos, diagrs, graphs, tables. Order from LC. M1 \$3.30, ph \$7.80. PB 120968

This report describes a new method of measuring the radiation resistance of small loop antennas at ultra high frequencies. The method of measurement involves substituting an inductively coupled rf load resistance and a shield can for the loop antenna resistance due to radiation. NOL R 1155.

Receiver fidelity test of understandability of voice reception and necessary frequency band, by J. F. Lee, Jr. U. S. Naval Research Laboratory. Jul 1939. 16p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 120444

Date of test 21 Mar-26 Jun 1939. Bu Eng. Prob. R-5-33R.

1. Speech - Intelligibility - Tests 2. NRL R 1548.

Report on investigation of antenna systems on USS Seadragon, USS Searaven, USS Tambor, USS Trippe and USS Mayrant, by O. Norgorden. U. S. Naval Research Laboratory. Oct 1940. 44p diagrs, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 120401

Measurements were made on antennas carried by a number of destroyers and submarines docked at the Washington Navy Yard from May to August relating to: (1) Resistance and capacity of the antenna systems; (2) Physical dimensions; (3) Currents; (4) Effective height; (5) Field strengths at a known distance from the transmitting antenna; (6) Background noise; (7) Hull resonance frequencies. Bu Ships Problem B1-R. NRL R 1658.

Research on the mechanism of electric conductivity in semiconductors, metals and superconductors. Report for Sep 1-Dec 1, 1955 under Contract AF 18(600)-1506, by L. Brillouin. Columbia University. Dept. of Physics, Dec 1955. 3p. Order from LC. Mi \$1.80, ph \$1.80. PB 120403

CU-1-55-AF-1506-Physics.

1. Waves, Electromagnetic - Coupling.

Synchro double-receiver, by J. Havrylak. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1950. 23p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120970

Two synchro double-receivers Type 1F Mod 5 were subjected to type approval tests for conformance to OS 671, Revision D, modified by reference (d) as noted below. The units failed to conform in the following tests: 1. Shaft side shake. 2. Synchronizing time. 3. Dielectric test. 4. Insulation resistance. 5. Static accuracy (Serial No. 2 only). 6. Endurance test. Task no. NOL-Re4a-78-1-51. NAVORD 1515.

Generators, Motors, Transmission

Amplifier for use with piezo-electric gages to measure air blast produced by small explosive charges, by Joseph E. Berry. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1953. 16p photos, diagrs, graph. Order from LC. Mi \$2.40, ph \$3.30. PB 120935

This amplifier is a modified version of the Y-axis amplifier in the DuMont Type 304H oscilloscope. The modification consists of incorporating an addi-

tional stage of amplification and a high impedance input circuit with a long time-constant, in addition to a highly regulated electronic power supply. The frequency response curve for sinusoidal voltages shows that this amplifier is flat from one cycle to twenty kilocycles and is down only 3 db at 135 kilocycles. The amplifier is linear over the operating range of input voltages. The sensitivity is sufficient to produce a two inch deflection on a CRO for a 3 millivolt rms input signal. This corresponds to an overall voltage gain of 82 db. NAVORD 2702.

Electrolytic generation of oxygen without the accompanying generation of hydrogen, by G. W. Work. U. S. Naval Research Laboratory. Jun 1956. 11p graphs. Order from OTS. 50 cents. PB 121245

A new type of electrolytic gas generator has been developed from a standard, commercial nickel-cadmium alkaline battery by replacing the nickel-oxide plates with sheet nickel ones. Since the cadmium plates do not gas during most of a charge or discharge and the inert plates gas continuously, a single gas is produced in a cell at any time. Data on several cycles of such a generator are shown and discussed. NRL R 4775.

Magnetic amplifier servo compensation, by Herbert H. Woodson. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1952. 14p diagrs, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 120933

Techniques are described whereby a half-wave bridge-type magnetic amplifier with integral feedback forms a versatile servo building block. Proper adjustment of the polarity and amplitude of the integral feedback makes this circuit a lead network, a lag network, or an integrator. In addition to these characteristics, the circuit can be used to modulate, demodulate, or amplify a-c or d-c, merely by selecting the proper output component. This circuit is useful with vacuum tube amplifier servo controllers as well as with magnetic amplifier servo controllers. NAVORD 2709.

Magnetic arbitrary waveform generator, by C. B. House. U. S. Naval Research Laboratory. May 1956. 10p photos, diagrs, graphs, tables. Order from OTS. 50 cents. PB 121157

The arbitrary waveform generator will produce periodic waveforms in which the magnitude, slope, polarity, slope polarity, and points of inflection may be controlled at will by simple resistance or voltage changes. It is composed of standard magnetic cores, diodes, and resistors, with switching transistors added for special applications. With supplementary circuit additions, power outputs in the watts range may be supplied to low impedance loads. When used with a compatible analogue computer system, it provides output transfer functions which may be tailored to any complexity desired. NRL R 4754.

FOOD AND KINDRED PRODUCTS

Analysis of sensory methods for testing flavor. Report no. 7 for the period 1 May 1952 through 1 Sep 1953 under Contract DA 11-009-qm-18404, project no. 7-84-15-007, by Carl Pfaffmann and Harold Schlosberg. Brown University, Dept. of Psychology, Providence, R. I. Sep 1953. 24p graph, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120417

Several types of selection tests were administered to individuals later serving on discrimination panels. These included paper and pencil tests, analytic tests, and work samples. A total performance score on all discriminations was selected as the best validity criterion. An appendix presents further analysis of previously reported data on fatigue effects in long sessions. QMC FCI Contract DA 11-009-qm-18404.

Changes produced in lipid materials by high energy radiations. Report no. 7 for the period 1 Apr 1954-31 Aug 1955 under Contract no. DA 44-109-qm-1754, by W. O. Lundberg. Minnesota, University, Hormel Institute, Austin, Minn. Aug 1955. 29p tables. Order from OTS. 75 cents. PB 121304

The objectives of this study were to determine the conditions of irradiations that would lead to a minimal development of undesired organoleptic and chemical changes, and to obtain information that would be useful in developing other methods for inhibiting undesired changes when food is sterilized by high energy radiations. Project no. 7-84-01-002.

Chemical and organoleptic changes in carbohydrates and proteins produced by radiation sterilization. Report no. 9 (termination) for the period Apr 20, 1954-Oct 19, 1955 under Contract no. DA 44-109-qm-1772, by M. L. Wolfrom. Ohio State University, Dept. of Chemistry, Columbus, Ohio. Oct 1955. 79p diags, graphs, tables. Order from OTS. \$2. PB 121310

The objectives of this research are threefold: (1) To study the physical and the chemical transformations that occur in carbohydrates and proteins as a result of being exposed to radiation. (2) To study the underlying processes which lead to the ultimate physical and chemical changes. (3) To evaluate the flavor, texture, and other related changes induced by irradiation on carbohydrates. Tables are used extensively throughout the report. Project no. 7-84-01-002.

Chemical changes in protein of sterilized meat. Termination report no. 7 for the period 1 Apr 1954-30 Sep 1955 under Contract no. DA 44-109-qm-1762, by Sidney W. Fox. Iowa, Agricultural Experiment Station, Ames, Iowa. Sep 1955. 22p tables. Order from OTS. 75 cents. PB 121300

Ionizing radiation does not destroy the amino acids in a protein extensively, nor does extensive peptide

bond cleavage appear. Casein undergoes loss of a small proportion of methionine and tyrosine. Hamburger does not break down or lose any of the amino acids studied to a measurable degree. Project no. 7-84-01-002.

Chemistry of color, flavor and odor changes in irradiating meat. Report no. 6 (termination) for the period Apr 1, 1954-Sep 30, 1955 under Contract no. DA 44-109-qm-1757, by B. S. Schweigert. American Meat Institute Foundation, Chicago, Ill. Sep 1955. 16p tables. Order from OTS. 50 cents. PB 121309

These studies have been directed toward ascertaining the nature of the chemical changes that occur in meat during irradiation that may be associated with the production of undesirable color, flavor and odor and toward quantitating the magnitude of these changes. Irradiations were carried out with the use of approximately 2 million to 10 million rep and with the use of Cobalt 60 or the Idaho Falls gamma ray sources. Studies on the changes occurring in the red pigment (myoglobin) in meat during irradiation have revealed that (1) myoglobin is less stable when present in crude or purified extracts than in the meat (2) a green pigment is found (increased amounts in extracts as compared to meat) during irradiation which appears to be attributable to a change in the porphyrin nucleus of myoglobin and (3) the pigments in meat are less susceptible to oxidative changes when the meats are irradiated in an oxygen impermeable casing than when an oxygen permeable casing is used. Fresh ground beef (sirloin butt) and in some instances fresh pork tenderloin were used in these studies. Project no. 7-84-01-002. Some pages will not reproduce well.

Combined effects of heat and radiation in food sterilization. Report no. 9 (termination) for the period 7 Jun 1954-6 Oct 1955 under Contract no. DA 44-109-qm-1826, by Lloyd L. Kempe. Michigan, University. Engineering Research Institute, Ann Arbor, Mich. Oct 1955. 48p graphs, tables. Order from OTS. \$1.25. PB 121308

Studies were conducted to determine the following: 1. Whether the combined killing effect of heat and radiation on food spoilage bacteria present in buffer and in foods is independent, additive, detrimental, or synergistic in nature. 2. Whether bacterial spores react differently to the lethal actions of gamma radiation when irradiated at different temperatures. 3. What effect any process found in (1) above will have on similar spores in meat. 4. Whether preliminary irradiation will endow a food with any antiseptic qualities that will increase the effectiveness of a subsequent thermal process. 5. Whether chemicals or treatments that affect development of flavor in foods by irradiation alter the lethal effects of irradiation. 6. Whether or not a correlation exists between heat and radiation resistance of spores. 7. Whether a biological standard for calibrating the effectiveness of radiation sources can be developed based on a bacterial

spore of known radiation sensitivity. 8. Some extra experiments were conducted to answer specific questions that arose during the project. Project no. 7-84-01-002.

Development of a method of radiation sterilization of foods without adverse flavor and chemical changes. Report no. 8 (termination) for the period 1 Apr 1954-31 Aug 1955 under Contract no. DA 44-109-qm-1746, by B. E. Proctor. Massachusetts Institute of Technology. Dept. of Food Technology. Aug 1955. 109p graphs, tables. Order from OTS. \$2.75. PB 121305

The commercial sterilizing dose with high voltage cathode rays was determined for various meats, vegetables, and fish using the natural microbial flora as the source of contamination. The sterilizing dose was generally found to lie in the range 1.5×10^6 rep to 2×10^6 rep. With inoculated packs containing a concentration of spores of C1, sporogenes that might ordinarily be encountered, sterility was attained with a dose from 1.5×10^6 rep to 2×10^6 rep with a few exceptions. Project no. 7-84-01-002.

Effect of ionizing radiations on carotenoid stability. Report no. 3 for the period 15 Nov 1954-29 Feb 1955 under Contract no. DA 19-129-qm-254, by G. Mackinney. California, University, Berkeley, Calif. Feb 1956. 11p tables. Order from OTS. 50 cents. PB 121313

The destruction of carotenoid pigments on exposure to gamma-radiation is caused by secondary reactions and depends upon the extent to which free radicals or peroxides formed in the surrounding medium are available for reaction. The loss of carotenoids in irradiated whole tomatoes is small even at dosages of several million rep, but the internal structure of the tomato is destroyed, and the problem is therefore one of pectin and carbohydrate instability. Three carotenoid-containing oils were tested, namely that extracted from the carrot root, corn oil and salmon oil. The carotenoid in carrot root oil was very stable, and of the three oils tested, salmon oil was least stable. Crystalline carotene and lycopene, dissolved in petroleum ether solution, in the absence of any antioxidant, are highly unstable. Stability was also markedly decreased, as would be anticipated, when pure beta-carotene was dissolved in methyl stearate, methyl oleate, and methyl linoleate, respectively, in the order mentioned. Films of pure beta-carotene and lycopene in the solid state appear to be remarkably stable, even in the presence of air, and we conclude that where destruction occurs, it is initiated by products of other reactions, normally to be sought in the lipide fraction. Project no. 7-84-01-002.

Enzymatic conversion of carotene to vitamin A. Final report for the period 1 Jan 1952-31 Dec 1954 under Contract Nonr-700(00), NR 123-118, by John G. Bieri. Texas. University. Medical

Branch, Galveston, Texas, Mar 1955. 5p. Order from LC. Mi \$1.80, ph \$1.80. PB 120046

1. Carotene - Conversion 2. Vitamin A - Synthesis.

Flavor of foods sterilized by combining conventional processing with ionizing radiations. Report no. 10 for the period 23 Apr 1954-22 Oct 1955 under Contract no. DA 44-109-qm-1782, by H. W. Schultz. Oregon. Agricultural Experiment Station, Corvallis, Ore. Oct 1955. 52p tables. Order from OTS. \$1.50. PB 121302

The general objective of the research was to assess the effect of various methods of processing when combined with sterilization by ionizing radiations on the flavor of meat and meat products. During the course of the work several new and important areas of investigation were investigated and the results are included. Project no. 7-84-01-002.

Fundamental physical and biochemical changes which occur as a result of radiation treatment resulting in modifications of flavor, color, and texture. Report no. 7 for the period 1 Apr 1954-31 Aug 1955 under Contract no. DA 44-109-qm-1744, by B. E. Proctor. Massachusetts Institute of Technology, Cambridge, Mass. Aug 1955. 77p photos, diags, graphs, tables. Order from OTS. \$2. PB 121303

Deals with effects of cathode rays on: 1. Ascorbic acid aqueous solution, (2) oxalic acid, (3) saturated and unsaturated carbonyl compounds in frozen orange juice concentrate, (4) amino acids, and (5) paper electrophoresis of casein. Project no. 7-84-01-002.

Inhibition of enzymatic activity in irradiated food-stuffs. Report no. 6 (final report) for the period 1 Jan-15 Dec 1955 under Contract no. DA 19-129-qm-257, by David E. Green. Wisconsin. University. Institute for Enzyme Research, Madison, Wis. Dec 1955. 26p graph, tables. Order from OTS. 75 cents. PB 121306

The effect of ionizing radiations on the enzymatic activities of a number of widely different foodstuffs has been investigated. Particular emphasis has been placed on the enzymes concerned with energy production, intermediate metabolism, and degradation of food products. The above enzymes have been found to be highly resistant to ionizing radiations. The production of a disagreeable taste, offensive odors, and undesirable color changes accompanied the irradiation of food products. Project no. 7-84-01-002.

Investigation of changes that take place in foods during storage in the frozen condition. Final report for the period Feb 1, 1947-Jan 31, 1955 un-

der Contract no. N6 onr-246, Task Order 2, NR 133-194, by Arnold J. Lund, Minnesota, University. Hormel Institute, Mar 1955. 76p graphs, tables. Order from LC. Mi \$4.50, ph \$12.30.

PB 120039

This report includes the following phases: (I) the effect of freezing and thawing on physiology of yeasts; (II) freezing injury to yeast as measured by loss of phosphates from the yeast cell; (III) the activity of a bacterial protease and lipase at low temperatures; (IV) changes occurring in meats during frozen storage; and (V) bacterial lipoxidase studies.

Radiation sensitivity of meat spoilage micro-organisms. Report no. 9 (termination) for the period 15 Jun 1954-14 Jan 1956 under Contract no. DA 44-109-qm-1769, by C. F. Niven, Jr. American Meat Institute Foundation, Division of Bacteriology, Chicago, Ill. Jan 1956. 19p tables. Order from OTS. 50 cents. PB 121301

The present study was directed toward a study of the bacteria that primarily limit the shelf life of cured meat products, their identity, their radiation resistance, and factors that affect their radiation resistance. Project no. 7-84-01-002.

Relationship of radiation induced fat oxidation and flavor, color, and vitamin changes in meat. Report no. 8 (final report) for the period Dec 31, 1954-Jan 15, 1956 under Contract no. DA 19-129-qm-256, by A. L. Tappel, California, University. Dept. of Food Technology, Davis, Calif. Jan 1956. 7p table. Order from OTS. 50 cents. PB 121307

This a review of the major results and implications. Fat oxidation is measured chemically in terms of peroxide concentration and carbonyl compounds. Flavor is evaluated organoleptically during taste panels. The effect of radiation on the hematin compounds responsible for the color of meal is determined by chemical and spectrophotometric techniques. Carotenoid destruction is measured by spectrophotometric techniques. Project no. 7-84-01-002.

FUELS AND LUBRICANTS

Burning velocities by the Bunsen burner method. I: Hydrocarbon-oxygen mixtures at one atmosphere. II: Hydrocarbon-air mixtures at subatmosphere pressures, by J. M. Singer, Joseph Grumer and E. B. Cook, U. S. Bureau of Mines, Division of Explosives Technology, Pittsburgh, Pa. Jul 1955. 38p photos, graphs, tables. Order from LC. M1 \$3, ph \$6.30. PB 122558

The Bunsen-burner technique of measuring burning velocity, established in a previous paper, was applied to fast-burning mixtures: methane-oxygen, ethane-oxygen, and propane-oxygen at atmospheric

pressure. Hydrocarbon-air mixtures of methane-air, propane-air and ethylene-air were investigated by the same technique at subatmospheric pressure. In addition to presentation of new data, the potentialities of the Bunsen-burner method have been re-examined. The following disadvantages have been found to be inherent in all burner methods: (1) non-predictable deformation of flow profile; (2) possible diffusion of ambient atmosphere into the unburned gas; (3) quenching by the port; (4) contributions of flame curvature to the burning velocity; (5) uncertainty as to the correct reference outline to be identified with the combustion wave surface; (6) difficulty in accurately tracking the streamtubes; (7) possible cooling of the combustion wave by the surrounding atmosphere. Project Squid, Technical report BUM-13-P. Presented at the Gasdynamic Symposium at Northwestern University, Aug 22-24, 1955. Contract N6 ori-105, T. O. III, NR 098-038.

Burning velocities of hydrogen-air flames, by Herman Burwasser and Robert N. Pease, Princeton University, Frick Chemical Laboratory, Princeton, N. J. Jul 1955. 13p graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 122556

Burning velocities of hydrogen-air mixtures were measured by the Bunsen burner method. A modified angle technique applied to the dark outer edge of the shadow cone was used in calculating the burning velocities. An attempt was made to correlate the experimental result with approximate diffusion and thermal theories of flame propagation. It was found that diffusion theory predicts a maximum in burning velocity at a much leaner hydrogen composition than is observed experimentally, whereas thermal theory produces the opposite situation by predicting a maximum at a richer composition (29 vs. 42 vs. 55% H₂). Possible explanations of these discrepancies are discussed briefly. Project Squid, Technical report PR-57-P. Submitted for publication in the Journal of the American Chemical Society. Contract N6 ori-105, T. O. III, NR 098-038.

Cellular slot burner flames, by G. H. Markstein and D. Schwartz, Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Jun 1955. 41p photos, drawing, diags, graphs. Order from LC. M1 \$3.30, ph \$7.80. PB 122572

Rich n-butane-air mixtures were used in the present study. Measurements of cell widths carried out with steady flames showed that individual as well as average values varied somewhat erratically with flow conditions. The technique was therefore modified so that minimum rather than average cell widths could be measured. Streak camera records of these flames thus permitted measurement of minimum widths immediately preceding cell collapse, which were found to be independent of flow conditions. The photographs were also evaluated regarding peak-to-peak amplitudes of the flame corrugations and widths of the ridges between cells. Rapid propagation or oscillations of flame cells that occurred under certain conditions were briefly in-

vestigated. The slot burner method is believed to offer advantages over previous techniques not only for the above measurements, but also for mapping of flow fields, sampling of local burned gas composition and radiation studies in cellular flames. Project Squid, Technical report CAL-64-P. To be presented at Gasdynamics Symposium, Northwestern University, Evanston, Ill., Aug 22-24, 1955. Contract N6 ori-105, T. O. III, NR 098-038.

Combustion of droplets of heavy liquid fuels, by H. C. Hottel, G. C. Williams and H. C. Simpson. Massachusetts Institute of Technology, Cambridge, Mass. Mar 1955. 17p photos, diagr, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30.

PB 122555

The rate of combustion of the fuel spray is a complicated function of the size and velocity distribution of the droplets, the physical and chemical properties of the fuel, its environment, and the character of the mixing process of the spray with air and with combustion products. One aspect of the problem is reported here, viz. the combustion of individual droplets of pure hydrocarbons similar to those occurring in the heavy oils. Project Squid, Technical report MIT-6-P. Presented at the 5th Symposium on Combustion, Pittsburgh, Sep 1954. Will appear in the 5th symposium combustion volume. Contract N6 ori-105, T. O. III, NR 098-038.

Derivation of the flame equations, their transformation and a suggested method of their solution, by G. Klein. Wisconsin University. Naval Research Laboratory, Madison, Wis. Nov 1955. 100p graphs, tables. Order from LC. Mi \$5.40, ph \$15.30.

PB 122571

The equations of a one-dimensional flame under stationary conditions are deduced from the general equations of a gas mixture, and their boundary conditions are discussed. These flame equations are transformed so as to make them amenable to solution by a perturbation method of successive approximations. Project Squid, Technical report WE-2-R. Appendix: Numerical details concerning the HBr flame. Contract N6 ori-105, T. O. III, NR 098-038.

Effect of particle size on the combustion of uniform suspensions, by J. A. Browning, T. L. Tyler and W. G. Krall. Dartmouth College. Thayer School of Engineering, Hanover, N. H. Sep 1955. 30p photos, drawings, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80.

PB 122570

The lean limit of inflammability and the maximum pressure rise of nearly monodisperse clouds of Armowax particles in air have been determined. The maximum pressure reached during the constant volume combustion of suspensions composed of particles ranging from 10 μ to 90 μ is inversely proportional to particle size. A maximum air-fuel ratio of 58:1 for the lean limit of inflammability is obtained for suspensions of 60 μ particles. Larger and smaller particles have lean limits of lower air-

fuel ratio with values of 25:1 for both 10 μ and 90 μ sizes. No rich limit is evident within the range of mixture strengths tested. Project Squid, Technical report DART-6-P. To be published in Industrial and Engineering Chemistry in 1956. Contract N6 ori-105, T. O. III, NR 098-038.

Equations of a simple flame solved by successive approximations to the solution of an integral equation, by G. Klein. Wisconsin University. Naval Research Laboratory, Madison, Wis. Jul 1955. 169p graphs, tables. Order from LC. Mi \$7.80, ph \$25.80.

PB 122557

The problem of an idealized flame whose underlying chemical reaction is unimolecular, reversible, and of the first order, which has already been treated and solved is reconsidered here (kinetic energy of the gas stream being neglected). Its solution is made to depend on the solution of an integral equation which contains an unknown parameter whose eigenvalue has to be determined. This equation is solved by a method of successive approximations. Project Squid, Technical report WIS-1-R. Contract N6 ori-105, T. O. III, NR 098-038.

Examination of experimental alcohol-gasoline blends, by Dan Fore, Jr. U. S. Naval Research Laboratory. Oct 1939. 25p graph, tables. Order from LC. Mi \$2.70, ph \$4.80.

PB 120448

Appendix A. Letter of Jun 17, 1939 to U. S. Navy from B. Woulbroun concerning test of a carburant. - Appendix B. Information of general interest concerning the properties and usability of alcohol-gasoline blends. - Appendix C. A detailed description and discussion of the methods and results of the qualitative analysis of the blends.
1. Fuels, Engine - Tests 2. Fuels, Alcohol-gasoline blends - Tests 3. NRL P 1563.

Investigation of lubrication oil for naval use, by Charles M. Murphy. U. S. Naval Research Laboratory. Jun 1939. 12p tables. Order from LC. Mi \$2.40, ph \$3.30.

PB 120440

The purpose of this investigation is to study the factor or factors which influence the carbon-forming tendencies of fuel and lubricating oils, and if possible to correlate this information with chemical properties. NRL P 1541.

Literature survey on some physical aspects of the combustion of falling fuel drops, by Phillip M. Blair. Purdue University. Rocket Laboratory, Lafayette, Ind. Nov 1955. 86p graphs, tables. Order from LC. Mi \$4.80, ph \$13.80.

PB 122565

This report is not considered to be a comprehensive literature survey. However, it is hoped that the general information presented will be useful to those persons interested in the combustion of fuel droplets. This survey is subdivided into three main

parts as follows: I. Dynamics of falling drops. II. Heat transfer to drops and spheres. III. Mass transfer from drops and spheres. Project Squid, Technical report PUR-27-R. Contract N6 ori-105, T. O. III, NR 098-038.

Molybdenum disilicide coating for graphite, by J. F. Lynch, J. A. Slyh and W. H. Duckworth. Battelle Memorial Institute, Columbus, Ohio. Sep 1954. 33p photos, drawings, graph, tables. Order from OTS. \$1. PB 121084

Basic features of the process consist of applying molybdenum disilicide powder suspended in a phenolic-resin vehicle on the graphite surface, curing, and then heating in a neutral or reducing atmosphere at 3900 to 4000 F. The result is a dense, adherent, glaze-like surface. It significantly protected graphite when tested as nozzles in a hot, high-velocity stream of oxidizing gases. AF WADC TR 53-457. Contract AF 33(038)-841.

Preparation and properties of solidified gasoline, by Dan Fore, Jr. U. S. Naval Research Laboratory. Order separate parts described below from LC, giving PB number of each part ordered.

Part II, Aug 1937. 15p drawings, tables. Mi \$2.40, ph \$3.30. PB 120383

The present study is a continuation of the investigation of the preparation and properties of "solidified" gasoline. It was thought desirable to extend the work along lines of perfecting the method of preparation and of cheapening the product. Various possibilities for recovering the liquid gasoline from the solidified state were also considered. NRL P-1390.

Part III, Dec 1939. 20p tables. Mi \$2.40, ph \$3.30. PB 120395

Emulsified petroleum oil preparations known as "solid gasoline" have been made in quantity at this Laboratory and subjected to storage tests for a period of 18 months. The materials were dispersions of hydrocarbons in aqueous casein solutions. The stability of these solidified products to storage under pressure in contact with sea water and the effect of storage in the solidified state on the recoverable liquid gasoline was determined. The gasoline itself was not affected adversely by storage in the emulsified condition. The significant properties of the fuel were unaltered and the gum content somewhat improved. This last effect is probably due to the method of recovering the liquid gasoline which leaves the major portion of preformed gum in the residue of solidifying material. NRL P-1578.

Study of pressure dependence of burning velocity by the spherical vessel method, by John Manton and B. B. Milliken. U. S. Bureau of Mines. Division of Explosives Technology, Pittsburgh, Pa. Jul

1955. 24p photo, graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 122559

Burning velocity measurements over a range of pressures from 1.5 to 1/25-atmosphere show that pressure dependence is variable and apparently a function of burning velocity. At burning velocities below 50 cm./sec., burning velocity varies inversely with pressure; in the range from 50-100 cm./sec., burning velocity is almost constant with pressure; and from 100 cm./sec. upward, it increases with pressure. This observation indicates that all burning velocities must approach a constant value at very low pressure. Some of these experiments indicate that detonability of a mixture can be correlated with its pressure dependence of burning velocity. Project Squid, Technical report BUM-12-P. Presented at the Gasdynamics Symposium at Northwestern University, Aug 22-24, 1955. Contract N6 ori-105, T. O. III, NR 098-038.

Thin films of polytetrafluoroethylene resin (Teflon) as lubricants and preservative coatings for metals, by V. G. Fitzsimmons and W. A. Zisman. U. S. Naval Research Laboratory. Jun 1956. 32p photos, table. Order from OTS. \$1. PB 121161

The Naval Research Laboratory has pioneered in the use of Teflon films for lubricating and preserving a wide variety of military equipments. Teflon, it has been found, when applied as thin films to hard substrates, produces a dry, chemically resistant, all-weather lubricant which has remarkable preservative qualities. Its coefficient of friction, when sliding against another film of Teflon on a hard substrate is 0.04 to 0.05 through a temperature range of -50° to 230°C. In nearly every instance the applications have been carried from the laboratory through service tests in the military equipments. As a result of much experience in applying Teflon films to metal substrates, the Laboratory has developed a number of essential techniques which insure minimum friction, maximum durability to prevent wear, good adhesion, and good corrosion-prevention properties. This procedure is contained in an appendix to this report. In nearly historical order a summary is given of the experimental work and field tests on a number of applications of Teflon to guns and ammunition, submarines, aircraft, and miscellaneous applications. Appendix A. Some properties of thin films cast from teflon dispersion. - Appendix B. Process of applying polytetrafluoroethylene coatings on steel surfaces (NAVORD 10362). NRL R 4753.

HIGHWAYS AND BRIDGES

Load-transmission test for flexible paving and base courses. Part V: Summary of tire tests on various pavements overlying a weak subgrade, by Raymond C. Hermer. U. S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. May 1956. 13p graphs, tables. Order from OTS. 50 cents. PB 121146

This report presents additional test data from the load-transmission project and summarizes all tests with single airplane tires as the loading medium and with the test pavement supported by a weak subgrade. Charts are developed by which the maximum subgrade reaction can be predicted accurately for a wide variety of design conditions for which specific load-test data are not available. By correlation between triaxial tests and load-transmission tests it is possible to extend use of these charts to paving materials and combinations of materials which differ greatly in physical characteristics and performance. The accuracy of the procedure, as shown by comparison of computed values to observed values, is very good. For Part IV see PB 111828. Parts 1-3 issued as TDR no. 108, 144, 203. CAA TDR 282.

INSTRUMENTS

Automatic data processing system (ADAPS) for the supersonic wind tunnels, by B. D. Gilbert. U. S. Naval Ordnance Laboratory. Mar 1953. 31p photos, diagrs. Order from LC. Mi \$3, ph \$6.30. PB 122033

The system translates aerodynamic forces and moments acting on a wind-tunnel model into tabulated and plotted aerodynamic coefficients. The system is automatic except for manual transport of cards between the IBM card punch located at the wind tunnel and the IBM calculating equipment located in another building. Operating procedures are included. Aeroballistic Research Report 164. NAVORD 2813. NOL ARR 164.

Centrifugal compressor system for the continuous supersonic wind tunnel, by G. E. Baum, W. E. Brewbaker and A. E. Platnick. U. S. Naval Ordnance Laboratory. Feb 1953. 57p photos, diagrs. Order from LC. Mi \$3.60, ph \$9.30. PB 122029

Included in this report is a description of the centrifugal compressors, the driving motors, the main air valves, and the integrated systems for providing lubrication, cooling, and dry air. The pneumatic control instrumentation is also described. NAVORD 2773. NOL ARR 154.

Continuous recording of pressures for supersonic wind tunnel calibration, by L. P. Gieseler. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1953. 27p photos, diagrs, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 122026

This report is a description of equipment designed to record on the chart of an electronic potentiometer recorder the pitot and static pressure distribution in the test section of supersonic wind tunnels. The apparatus and technique give continuous calibration curves automatically. The pressure gage and associated electrical equipment are described. Two typical calibration curves of the flow in a nozzle de-

signed for Mach 2.48 are shown. The observed difference between static and pitot pressure records is discussed and a method that permits accurate determination of stagnation pressure from pitot pressure records alone is described. NAVORD 2744.

Design and development of a heavy weight high impact shock machine, by Edward N. Sabbagh and Arthur S. Quint. Lowell Technological Institute Research Foundation, Lowell, Mass. Nov 1955. 39p photos, diagrs, graphs. Order from OTS. \$1. PB 121198

The construction and operation of a pneumatically driven impact tester designed to evaluate the dynamic performance characteristics of cushioning materials is described. The 577-pound flat impacting element is capable of being projected downward with a velocity of from 20 ft/second to over 50 ft/second. An analog computer is used in a new application to record and analyze the impact. Project no. 6077, Task no. 73295. Covers period of work from Jan 1952 to Dec 1954 under Contract AF 18-(600)-127. AF WADC TR 54-573.

Development of an inductance type accelerometer for use in a frequency modulated recording system, by Benjamin Sussholz. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1953. 33p photos, diagrs, graphs. Order from LC. Mi \$3, ph \$6.30. PB 120932

The development characteristics and calibration of a new inductance type accelerometer are described. The mechanical features of this accelerometer are characterized by a mass unit suspended by a double cantilever beam spring system. An excursion of this mass unit changes the gap spacing of a mu metal pad relative to an E coil. The resulting change in reluctance of the magnetic circuit produces an inductance change in an inductance coil which comprises the inductance element in the tank circuit of an FM oscillator. NAVORD 2712.

Dielectric fault indicator, by E. B. Abrahamson. U. S. Naval Ordnance Laboratory, White Oak, Md. Nov 1952. 8p photos, diagr. Order from LC. Mi \$1.80, ph \$1.80. PB 120934

A dielectric fault indicator has been developed which greatly simplifies the dielectric test procedure specified for synchros. This compact test unit may replace previous cumbersome apparatus. It is usable with 60-cycle as well as 400-cycle synchros. The ease of application of the test unit recommends it for production as well as laboratory testing. Task no. NOL-Re4a-78-1-53. Fire control transmitting and computing components. NAVORD 2703.

Effect of element-wall thickness on operation of continuous fire-detector systems, by Charles A. Hughes. U. S. Civil Aeronautics Administration, Technical Development Center, Indianapolis, Ind.

May 1956. 17p photo, diagr, graphs, tables. Order from OTS. 50 cents. PB 121125

The elements tested included the standard, thin-wall, and the heavy-wall types and a double-wall element with the same diameter as the thin-wall element. The elements first were placed in an electric furnace and subjected to a slow rate of temperature increase to check the similarity of the temperature-resistance characteristics of the core materials between the heavy- and thin-wall elements. The elements then were tested by placing them over a standard burner at 1500° and 2000° F., to obtain response and clearing times. CAA TDR 280.

Electronic instrumentation for 100,000 psi adiabatic compressor, by P. L. Edwards. U. S. Naval Ordnance Laboratory. Apr 1953. 48p photos, diagrs. Order from LC. Mi \$3.30, ph \$7.80. PB 122038

This report describes the present status of the electronic instrumentation for the 100,000 psi adiabatic compressor. This instrumentation provides amplification and voltage calibration for the pressure signal, timing markers for correlation of the pressure, volume and temperature records, and automatic control of a cathode-ray tube beam for recording the pressure signal. Further electronic instrumentation is required. NAVORD 2880.

Experiment in universal coding, by Saul Gorn. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1955. 83p diagrs, tables. Order from OTS. \$2.25. PB 121055

This report presents the results of an experiment with this coding system run on both EDVAC and ORDVAC at Aberdeen. This experiment involved, beside the test problems, two executive routines (namely a 'universal word input-output' routine and a 'translating' routine) for each machine and one executive (namely an 'assembly' routine) in universal code which each machine translated into its own code. The input-output form used was punched cards. Actual time and storage figures are given. Dept. of the Army project no. 5B03-06-002. Ordnance Research and Development project no. TB3-0007. APG BRL R 953.

Filtered X-ray spectra, by L. C. Thompson. U. S. Naval Research Laboratory. May 1956. 21p diagrs, graphs, table. Order from OTS. 75 cents. PB 121102

Energy spectra of filtered X-rays have been measured with a NaI scintillation spectrometer. Various thicknesses and combinations of copper, tin, and lead were used as filters at nine tube potentials between 34 and 300 kv. The attenuation of the roentgen field by each filter was also measured. Curves are given showing various properties of the spectra. In addition, a method is given to correct for the energy resolution of the scintillation spectrometer. NRL R 4743.

High-speed reader for perforated tape, by Richard J. Bianco. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Sep 1955. 17p photo, diagrs, graphs. Order from OTS. 50 cents. PB 121057

A perforated-tape reader which is simple in concept, is trouble-free and easy to operate, and is very fast (1000 character per second) is described. The reading head consists of six photo-electric cells to read standard five-channel tape. The sprocket hole is used for timing purposes. The design could easily be expanded for six-, seven-, or eight-channel tapes and for higher speeds. Schematic diagrams and typical observed wave shapes are included. Dept. of the Army project no. 5B0306002. Ordnance Research and Development project no. TB3-0007. APG BRL M 938.

High-speed shift register, by Sylvian R. Ray. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Sep 1955. 14p diagrs. Order from OTS. 50 cents. PB 121060

This report is a technical description of a shift register designed for application to computing machines which operate in the parallel, asynchronous mode, specifically, the ORDVAC. Dept. of the Army project no. 5B0306002. Ordnance Research and Development project no. TB3-0007. APG BRL M 925.

Manual for VODARO, vertical ozone distributions from the absorption and radiation by ozone, by Edward S. Epstein, Charles Osterberg and Arthur Adel. Arizona State College, Flagstaff, Ariz. Dec 1955. 181p graphs, tables. Order from LC. Mi \$8.40, ph \$28.80. PB 120282

A new method for determining the vertical distribution of ozone, utilizing only surface observations, has been developed. Infra-red observations of the absorption and radiation by ozone, and ultra-violet determinations of total ozone amount are used to complement one another. The theoretical background of the method is discussed in detail. Complete instructions for determining the distributions, including the techniques which have been developed at ARO, and the necessary tables, are presented, also the results of applying the method to data collected in the seven months beginning February 1955 (124 days' observations). The principal result is that ozone distributions are not related in any simple way to the total amount of ozone. Scientific report HA-7 under Contract no. AF 19(122)-198. AF CRC TN 55-885.

Medium-speed digital plotter, by P. M. Kintner and Emery A. White. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1955. 35p photos, diagrs, graph. Order from OTS. \$1. PB 121056

This report describes a rather inexpensive solution to the problem of digital plotting at medium

speeds. The system is built around a commercially available stencil cutting machine and will plot six points per second on a stencil suitable for reproduction by mimeograph or offset processes. The report covers theory of system operation and details of electrical and mechanical modifications to the stencil cutting machine, as well as the description of the logical circuitry attached externally to the machine. Dept. of the Army project no. 5B0306011. Ordnance Research and Development project no. TB3-0538. APG BRL M 940.

Naval Research Laboratory research reactor. Part

II: Reactivity measurements on a graphite and water reflected core, by E. H. Bebb, R. H. Vogt and K. W. Downes. U. S. Naval Research Laboratory. May 1956. 32p photos, drawings, diags, graphs, tables. Order from OTS. \$1. PB 121050

A series of experiments was performed jointly by NRL and BNL on a mock-up of the NRL Research Reactor at the critical facility of Brookhaven National Laboratory. Reactivity effects of fuel, temperature, a hole in the graphite reflector, control rods, and movement of the core were investigated as well as critical masses and relative neutron fluxes. For Part I see PB 111859. NRL R 4729.

NOL vector airborne magnetometer, types 2A and 2B, by H. R. Irons and E. O. Schonstedt. U. S. Naval Ordnance Laboratory. Nov 1954. 188p photos, drawings, diags, graphs, tables. Order from LC. Mi \$8.40, ph \$28.80. PB 120969

1. Magnetometers - Design 2. Magnetometers - Calibration 3. 2A (Magnetometer) 4. 2B (Magnetometer) 5. NOL R 1187.

Ordnance locator Mark 1 (torpedo) and associated equipment, by E. R. Haberland. U. S. Naval Ordnance Laboratory. Dec 1950. 40p photos (1 fold.), diags, tables. Order from LC. Mi \$3, ph \$6.30. PB 120967

Equipment used to locate torpedoes lost during testing operations is described. The equipment consists of a transmitter that is installed in the torpedo and that emits ultrasonic pulses. These pulses are received by a hydrophone installed on a search craft or carried by a diver, and are amplified and demodulated by a receiver to give audible signals. NOL R 1129.

Piney Point hyperbolic torpedo tracking system, by C. E. Goodell. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1953. 54p photos, diags, graphs, table. Order from LC. Mi \$3.60, ph \$9.30. PB 122024

This report describes, in detail, a Hyperbolic Type torpedo tracking system which has been developed to assist in the performance evaluation of moving torpedoes. An acoustic pinger in the torpedo serves as the source of intelligence for tracking purposes.

The output of the tracker furnishes a record which can be readily converted into a three-dimensional trajectory of the torpedo relative to a stationary submerged target. NAVORD 2728.

Quartz fibre ultra microbalance for use inside an evacuated container, by W. P. Hutchinson. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Oct 1955. 17p photo, drawings, graphs. Available for loan from AEC Depository Libraries. Photocopies at a fee.

PB 119974

1. Atomic power - Research - Gt. Brit. 2. Microbalances - Design - Gt. Brit. 3. AERE C/R 1757.

Report of test on wind intensity indicator system for USS WASP (CV7), by W. B. Roberts. Julien P. Friez and Sons, Inc., Baltimore, Md. Nov 1938. 18p photos, drawing (1 part fold), graph. Order from LC. Mi \$2.40, ph \$3.30. PB 120381

1. Indicators, Wind - Tests 2. WASP (Steamship) (CV7) 3. Indicators, Repeat 4. NRL B-1488.

Research on a non-return-to-zero system of magnetic digital storage. Reed Research, Inc., Washington, D. C. Aug 1952. 23f photos, diags. Order from LC. Mi \$2.70, enl pr \$6.30.

PB 122102

The circuitry described in this report is intended to supplement the design of the Logistics Computer now under development by Engineering Research Associates for the Office of Naval Research. Accordingly, the design data have been taken from the ERA report on The Logistics Computer, Phase I, and other ERA publications. The non-return-to-zero recording system is intended to double the storage capacity of magnetic drums which have previously used return-to-zero techniques. Final report under Contract no. NONr-691(00). Project RR-672.

RF wattmeter AN/URM-73(XA-1). Final report under Contract no. AF 33(600)-18727. Radiation, Inc., Melbourne, Fla. Jul 1955. 81p photos, drawings, diags, graphs, tables. Order from OTS. \$2.25. PB 121096

This report covers the investigation, development, and design of an RF wattmeter to be used in field and depot testing. It measures powers in the high and medium power ranges over the frequency band of 20 to 1000 mc. Drawings listed are not included.

Sonar digital recorder, "Digiter", by A. G. Pieper and R. Q. Tillman. U. S. Naval Research Laboratory. Jun 1956. 10p diags. Order from OTS. 50 cents. PB 121220

Instrumentation has been designed to print automatically the acoustic level of a sonar signal in

decibels, accurate to +0.2 db and having a dynamic range of 50 db. The associated range may also be printed. By suitable programming, range information is gated into a portion of the counter and printed simultaneously with the signal level. This system, constituting in fact a logarithmic voltmeter and printer, may be found useful in applications other than sonar studies. NRL R 4762.

Third partial report on gas pulsator, by T. O. Meyer and F. K. Elder, Jr. U. S. Naval Research Laboratory. Oct 1946. 80p photos, drawing, diags, graphs. Order from LC. Mi \$4.50, ph \$12.30.
PB 120774

1. Pulsators, Gas - Tests 2. NRL O 2859.

Zylindermühle zur ladungsmessung an bewegten objekten, z. b. textiltäden, während des arbeitsprozesses (Field mill for measuring the charge of moving objects (e.g. textile threads) during the production process), by H. Israël and H. Meinhold. Translated by Valda Dreimanis. Aug 1955. 10p photo, diag.s. Order from LC. Mi \$1.80, ph \$1.80.
PB 119609

This paper describes an instrument for measuring the static charges occurring in the production and processing of raw materials (textile threads) with a high degree of insulation, in such a manner that: (1) the thread is not touched; (2) the production process is not disrupted; (3) the unavoidable oscillations of the thread do not disturb the measurement. From Textil-Praxis, Vol. 1, no. 8, pp. 1-3, 1955 translated under Contract AF 19(604)-1364.

MEDICAL RESEARCH AND PRACTICE

"Essential" and "nonessential" amino acids in the urine of severely burned patients. Harvard University. Medical School. Dept. of Surgery. Order separate parts described below from LC, giving PB number of each part ordered.

II. Quantitative studies, by G. L. Nardi. n.d. 5p graphs. Mi \$1.80, ph \$1.80. PB 119403

Abstract of manuscript in preparation. Appendix B.
1. Amino acid excretions - Research 2. Urine - Amino acids.

III. Study of the polypeptides present, by G. L. Nardi. n.d. 6p graphs. Mi \$1.80, ph \$1.80.
PB 119404

Abstract of manuscript in preparation. Appendix C.
1. Polypeptides - Research 2. Urine - Amino acids.

IV. Role of the adrenals, by G. L. Nardi, G. S. Bascom and O. Cope. n.d. 5p graph. Mi \$1.80, ph \$1.80. PB 119405

Abstract of manuscript in preparation. Appendix D.

1. Adrenals - Research 2. Urine - Amino acids.

Final report under Contract Nonr-1231(00), project NR 123-282, by Louis Laufer, Marcia Gutcho and Sidney Gutcho. Schwarz Laboratories, Inc., Mount Vernon, N. Y. Mar 1955. 39p diagr, tables. Order from LC. Mi \$3, ph \$6.30. PB 119920

This report presents: I. Details for the synthesis of C¹⁴ NEM with a specific activity approximately 3.2 microcuries per milligram in yield of about 30% from C¹⁴ labeled maleic anhydride and ethylamine. II. Experiments demonstrating that this C¹⁴ NEM reagent can be used to detect and assay as little as 0.016 micromoles of sulfhydryl compounds on chromatograms with an accuracy of +5%, and an accuracy of +15% down to about 0.004 micromoles of sulfhydryl. III. The results of preliminary experiments on the use of C¹⁴ NEM reagent for sulfhydryl studies in mammalian tissue and suggestions for further development of the technique. The difficulties encountered in applying C¹⁴ NEM as a quantitative reagent in tissue appear to be primarily mechanical. It is believed that the reagent holds considerable promise as a potentially valuable tool in biological research.

Healing of burn wounds, by Oliver Cope, Bradford Cannon and Benjamin A. Barnes. Harvard University. Medical School. Dept. of Surgery. 1955. 9p. Order from LC. Mi \$1.80, ph \$1.80.
PB 119407

Proposal for renewal of contract between Armed Forces Special Weapons Project and President and Fellows of Harvard College for period 1 Feb 1955-31 Jan 1956; Appendix K.
1. Burns - Therapy 2. Homografting - Research.

Papers presented at the American Chemical Society Symposium on respiratory protective devices and civil defense at Cincinnati, Ohio, 4 Apr 1955. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Apr 1955. 200p photos, diags, graphs, tables. Order from OTS. \$5. PB 121162

Mr. Saul Hormats, Chairman. Contents: 1. Introductory remarks, by S. Hormats. - 2. Mechanical filtration of aerosols, by W. L. Anderson and E. A. Ramskill. - 3. Formation of filter materials from glass fibers, by Van A. Wentz and R. T. Lucas. - 4. Design considerations in the development of protective masks, by Bernard Siegel and Frank Shanty. - 5. Laboratory evaluation of protective masks, by Bernard Siegel, Frank Shanty, and Charles J. Shoemaker. - 6. Efficiency of individual and collective protective equipment against radioactive

METALS AND METAL PRODUCTS

materials, by E. H. Engquist, J. R. Hendrickson, and J. W. Thomas. - 7. Methods used in the evaluation of gas masks and aerosol filters for particulate aerosol penetration, by Frederick Lense and H. Gerald Guyton. - 8. Diffusional concept of toxic agent protection, by L. A. Jonas, B. L. Karpel. - 9. Investigation of wet scrubbing methods for chemical agent removal, by J. R. Conlisk and John C. Boardway. - 10. Role of the chemist in civil defense, by Charles W. Steele, A. B. Andrews, John L. Parsons, and Walter A. Lawrance. - 11. Public Health Service civil defense research program, by Bernard Berger and H. F. Ludwig.

Psychosomatic study of childrens' burns, by Robert T. Long. Harvard University, Medical School, Dept. of Surgery. n.d. 9p. Order from LC. Mi \$1.80, ph \$1.80. PB 119406

Abstract of manuscript in preparation. Appendix J. 1. Burns - Psychological effects.

Relationship between reactive groupings of proteins and the physical, chemical, and immunochemical properties of the proteins. Annual progress report under Contract no. Nonr 1077(00), NR 442-249, for period Jan 1, 1954 to Dec 31, 1954, by Paul H. Maurer and Seymour Ehrenpreis. Pittsburgh, University, School of Medicine, Pittsburgh, Pa. Dec 1954. 14p tables. Order from OTS. 50 cents. PB 111840

The objectives of the project are to modify the reactive groupings in proteins (amino, carboxyl, sulfhydryl) with organic reagents and see what physical, chemical, and immunochemical changes are produced in the protein molecule. For report for 1953 see PB 116491.

Study of the nitrogen-containing compounds found in the urine of severely burned patients, by G. L. Nardi, C. L. Minor and O. Cope. Harvard University, Medical School, Dept. of Surgery. n.d. 4p graph. Order from LC. Mi \$1.80, ph \$1.80. PB 119402

Abstract of manuscript in preparation. Appendix A. 1. Nitrogen compounds - Toxicity 2. Urine - Analysis.

Studies on anti-tissue serum. Final report for the period 1947-8 to 1954-5 under Contract N6 onr-266, T. O. 5, NR 131-163, by C. M. Pomerat. Texas. University, Medical Branch, Galveston, Texas. Feb 1955. 7p. Order from LC. Mi \$1.80, ph \$1.80. PB 119825

The work falls under four headings: I. Reticulo-endothelial immune serum, II. A macrophage promoting factor, III. Ancillary projects dealing with body defense, and IV. Studies on the human nasal mucosa. Bibliography of manuscripts, 1947-1954.

Cold extrusion of titanium, by Alvin M. Sabroff and Paul D. Frost. Battelle Memorial Institute, Columbus, Ohio. Feb 1956. 50p photos, drawings, diagr, graphs, tables. Order from OTS. \$1.25. PB 121267

Cold-extrusion studies were conducted on two grades of unalloyed titanium to evaluate the effects of die design and extrusion reduction. By utilizing a fluoride coating and a conventional oil-graphite-molybdenum disulfide lubricant, forward extrusions with reductions of 40, 50, and 60 per cent were successfully accomplished on 1-1/2-inch-diameter by 3-inch billets. Project no. 7351, Task no. 73510. Covers period of work from June 1954 to July 1955 under Contract AF 33(616)-2446. AF WADC TR 55-362.

Conference on materials and design for low-temperature service, sponsored by the Scientific Council, Engineer Research and Development Laboratories, with the cooperation of other government agencies and industrial organizations. U. S. Army, Corps of Engineers, Engineer Research and Development Laboratories, Fort Belvoir, Va. May 1952. 400p photos, drawings, diagrs, graphs, tables. Order from OTS. \$10. PB 121009

Contents: History of low-temperature property evaluation tests, by G. Manning. - Fundamentals of fracture in metallic materials, by M. Gensamer. - Some metallurgical aspects of low-temperature behavior of metals, by Robert H. Frazier and F. W. Boulger. - Low-temperature properties of ferritic alloys, by J. C. Fisher. - Effect of chemical composition on transition temperature, by O. T. Marzke. - Military experience in low-temperature failure of metals, by R. Faylor. - Subzero applications of steel at high hardness levels, by S. Tour. - The evaluation of ship-plate steel by the Navy tear test, by N. Kahn. - Performance evaluation of structural steels and weldments, by W. S. Pellini. - Brittle fractures in ship plates, by M. L. Williams. - Low-temperature structural failures versus design, by E. M. MacCutcheon. - Reproducibility of Charpy impact test, by David E. Driscoll. - Use of impact tests in steel specifications, by Abraham Hurlich. - Design criteria for low-temperature applications, by D. C. Rollins. - Discussion of "Design criteria for low-temperature applications", by Albert Muller. - Supplementary discussion of "Design criteria for low-temperature applications", by M. S. Northup. - Low-temperature properties and applications of aluminum alloys, by F. M. Howell. - Low-temperature properties and applications of magnesium, by E. H. Schuette. - Preliminary survey of the low-temperature properties of titanium, by W. L. Finlay, D. R. Luster and W. W. Wentz. - Low-temperature properties and applications of austenitic-cast alloys, by J. Juppenlatz. - Wrought austenitic steels for low-

temperature service, by P. Payson. - Low-temperature properties and applications of heavy non-ferrous metals and alloys, by G. W. Geil. - Limitations of present knowledge of low-temperature properties, by H. Schwartzbart. - Low-temperature metallic materials of the future, by N. E. Promisel. - Low-temperature welded design of the future, by Finn Jonassen. - Low-temperature studies which should be sponsored by the government or private industry, by E. L. Hollady. - Current sources of information on low-temperature properties, by J. B. Johnson.

Corrosion resistance of phosphated steel after heating under oil, by Jodie Doss. U. S. Arsenal, Rock Island, Ill. Aug 1955. 14p photos. Order from OTS. 50 cents. PB 111915

Zinc and manganese phosphate coatings were heated under oil at 25° intervals in the range of 175°F. through 450°F. Accelerated corrosion tests were performed on these coatings, and the temperature at which they begin to lose their corrosion resistance was determined. Dept. of the Army project no. 593-14-006. Ordnance project no. TB4-302D, report no. 16. Photos will not reproduce well. RIAL R 55-3256.

Design properties of high-strength steels in the presence of stress-concentrations. Effects of a number of variables on the mechanical properties of aircraft high-strength steels, by B. B. Muvdi, E. P. Klier and G. Sachs. Syracuse University, Syracuse, N. Y. Jan 1956. 116p tables. Order from OTS. \$3. PB 121155s

Supplement 2 of this report summarizes in table form all data obtained in this investigation with the exception of the program covering hydrogen embrittlement which were submitted as separate reports. The data are presented for each steel in the following order: tension, notch-tension, impact, fatigue and notch-fatigue. Supplement 2 to PB 121155. AF WADC TR 55-103, Supplement 2. Contract AF 33(616)-2362.

Effect of geometry on the properties of 195-T6 and 356-T6 aluminum alloy castings, by W. H. Johnson and H. F. Bishop. U. S. Naval Research Laboratory. Jun 1956. 16p diags, graphs, tables. Order from OTS. 50 cents. PB 121227

Tensile properties were determined at various locations in cast aluminum alloy (195-T6 and 356-T6) castings of different thicknesses and geometries and compared with properties obtained from separately cast test bars. The properties of the 195 alloy castings were shown to be more sensitive to cooling rates than those of the 356 alloy. The properties of the 195 alloy castings are also affected to a greater extent by section thickness variations than for the case of 356 alloy castings. It is shown that special molding and melting processes may be used to develop properties in castings which approach (alloy 356) or exceed (alloy 195) test bar properties. NRL R 4761.

* Electrical conductance test method for measuring corrosion, by David Roller. U. S. Air Force. Air Research and Development Command, Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1955. 34p photos, diags, graphs, tables. Order from OTS. \$1. PB 121089

Measuring the rate of uniform corrosion of a metal specimen by measuring the change in conductance of the specimen will give results of practical significance. The primary advantages of this method over older, more conventional, methods of measuring corrosion are numerous. When measurements are made specimen cleaning is unnecessary; it can be used in any corrosive environment; and measurements are simple, rapid, and precise when corrosion is generally uniform. The method is particularly adaptable to classifying similar media or metals according to their relative corrosivities or corrosion resistance. AF WADC TN 55-178.

Electrical resistance and hydraulic friction in small copper tubes, by R. M. Edelstein and W. F. Goodell, Jr. Columbia University, New York, N. Y. Jan 1955. 4p graph, table. Order from LC. M1 \$1.80, ph \$1.80. PB 119606

Several small magnets have been constructed for deflecting and focussing beams of electrically charged particles, and for determining the magnetic design of larger magnets. R-97. CU-77.

Electrolytic grinding of hard metals and carbides, by I. Weber. U. S. Frankford Arsenal. Pitman-Dunn Laboratories, Philadelphia, Pa. May 1953. 42p photos, graphs, tables. Order from OTS. \$1.25. PB 111834

Electrolytic grinding of hard metals and carbides was investigated as a substitute for diamond grinding to conserve supplies of diamond bort. Suitable electrolytes and the various parameters affecting grinding rate were investigated. It was determined that sodium silicate was necessary to produce sharp edges. For rapid stock removal, high conductivity electrolytes, exemplified by sodium nitrate, were far superior to sodium silicate. However, sodium nitrate grinding was characterized by severe edge erosion. FAL R 1137.

Fundamentals of brazing. Second year final report, Jun 23, 1953 to June 23, 1954, under Contract no. DA-11-022-ORD-957, by N. Bredz and O. T. Barnett. Armour Research Foundation, Chicago, Ill. Dec 1954. 162p photos, drawings, diags, graphs, tables. Order from OTS. \$4.25. PB 111697

Two fundamental problems have been investigated: (1) Causes of imperfections in brazed joints; (2) Factors determining the strength of the brazed joints. Investigation of the wettability phenomenon and the determination of the mechanism involved were problems treated in the first part of this work.

The second part deals with the tensile-strength-joint-thickness curves for pure silver and pure copper brazed joints in SAE 1020 steel and drill rod. The investigation of extremely thin copper brazed joints led to the development of a new brazing method, characterized by complete diffusion of the filler metal into the adjacent layers of the base metal. Ordnance project no. TB-4-31. For 1952-53 report see PB 111509. ARF Proj B039.

Hydrogen embrittlement and static fatigue in high strength steel, by R. D. Johnson, H. H. Johnson, W. J. Barnett and A. R. Troiano. Case Institute of Technology, Cleveland, Ohio, Aug 1955. 41p drawings, graphs, table. Order from OTS. \$1.25. PB 121064

The strength level dependence and the temperature dependence of the static fatigue phenomenon were determined. The initial embrittlement introduced by cadmium plating, either commercial or laboratory, was comparable in magnitude to that introduced by standard hydrogen charging conditions. Cadmium plating had a powerful influence in delaying recovery. Upon aging, the hydrogen distribution in cadmium plated specimens changed from a localized surface concentration to a uniform distribution at a concentration sufficient to produce substantial embrittlement. Project no. 7351, Task no. 70645. AF WADC TN 55-404.

Investigation of compressive-creep properties of aluminum columns at elevated temperatures, by R. L. Carlson and A. D. Schwoppe. Battelle Memorial Institute, Columbus, Ohio, Sep 1952. 76f photos, drawing, graphs. Order from LC. Mi \$4.50, enl pr \$13.80. PB 122099

An experimental investigation of the behavior of 24S-T4 (stabilized) aluminum columns at three elevated temperatures has been conducted. Tests were performed on long- and short-hinged-end columns of five slenderness ratios. By using an adjustable end eccentricity, it was possible to fix the eccentricity for a column of a given slenderness ratio and thereby obtain comparable results for different loads. Deflection measurements were taken at the mid-point throughout the duration of each test, and curves of deflection versus time with load as the parameter were obtained for each slenderness ratio. Test results indicate that, for a column of a given slenderness ratio and eccentricity, there is a limiting load below which collapse due to creep will not occur. It is concluded that this lower limit should be considered the limiting or allowable load. It is suggested that an approximate method of the type introduced in the report should be employed to determine this load. Covers work performed from 1 Feb 1950 to 30 Sep 1952 under Contract AF 33(038)-9542. For Parts 2-3 see PB 120298 and PB 111896. AF WADC TR 52-251, Part 1.

Notch sensitivity of heat-resistant alloys at elevated temperatures. Part 2: Analysis of notched-bar rupture life in terms of smooth-bar properties, by

Howard R. Voorhees and James W. Freeman. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Jan 1956. 86p photos, diags, graphs, tables. Order from OTS. \$2.25. PB 121184

Rupture lives of smooth and notched bars have been compared in tests on three heat-resistant alloys with conventional heat treatments. Additional rupture tests were run for two of the alloys using notched and smooth specimens from material cold rolled between solution and aging treatments. The method of notch preparation was demonstrated to have a large effect on notched-bar life for some conditions. Variable results were attributed to residual stresses remaining from the machining operation. Other experimental data obtained on smooth bars for the same alloys and conditions included short-time tensile properties, creep curves, relaxation characteristics, and rupture life when the stress was changed from one level to another during the test. A definite qualitative agreement was noted between notch strengthening or weakening and the rate of experimental stress relaxation under creep conditions. Project no. 7360. Covers period of work from Jan 1954 to Dec 1954 under Contract AF 18-(600)-62. AF WADC TR 54-175, Part 2.

Onset of fast crack propagation in high strength steel and aluminum alloys, by G. R. Irwin. U. S. Naval Research Laboratory. May 1956. 16p photos, tables. Order from OTS. 50 cents. PB 121224

The concept of driving force per unit crack front or the "force tendency" is discussed. It is shown that the force tendency " C_0 " exists for any stress condition and that it can be determined from strain measurements near the crack head. Various formulae for C_0 are given and the case of hydrogen embrittlement is discussed. NRL R 4763.

Plasticity of magnesium alloy single crystals and origin of secondary maxima (002) pole figures for rolled magnesium alloys. Final report under Contract no. N9 onr-85900, T. O. 85902, Dow Chemical Co. Metallurgical Laboratories, Midland, Mich. 1953. 48f photos, graphs, tables. Order from LC. Mi \$3.30, enl pr \$9.30. PB 122105

The mechanisms of plastic deformation during the rolling of single crystals are (002) slip, (102) twinning, slip on the reoriented (002) plane, bend plane formation and (101) slip (?) in highly constrained areas. Report no. 15960.

Progress report on investigation of aluminum-silver alloy systems (mechanical properties, age hardening and corrosion resistance of some aluminum alloys containing two or three per cent silver), by William H. Baer. U. S. Naval Research Laboratory. Sep 1944. 21p photo, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120758

1. Aluminum-silver alloys - Corrosion resistance
2. Aluminum-silver alloys - Aging 3. Aluminum-silver alloys - Mechanical properties 4. NRL M 2375.

Rapid determination of oxygen in steel, by H. F. Taylor and L. Singer. U. S. Naval Research Laboratory. Jun 1939. 16p photo, diags, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 120441

1. Steel castings - Oxygen content 2. Oxygen - Determination 3. NRL M 1543.

Research of the weldability of iron alloys, by Clarence E. Jackson. U. S. Naval Research Laboratory. Jun 1939. 31p photos, graphs, table. Order from LC. Mi \$3, ph \$6.30. PB 120442

1. Iron alloys - Welding 2. NRL M 1544.

Solubility of oxygen in potassium metal and sodium-potassium alloys, by D. D. Williams. U. S. Naval Research Laboratory. Dec 1951. 17p diags, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 120353

The oxides resulting from the incomplete reaction of potassium metal and sodium-potassium alloys with dry oxygen have been isolated and identified as the monoxides of potassium and sodium, respectively. The equilibrium oxide in a sodium-potassium-oxygen system is sodium monoxide exclusively. The solubility of potassium monoxide in potassium and in sodium-potassium alloys has been determined. NRL R 3894.

Some magnetic properties of fermalite, by John F. Haben. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1953. 23p photo, diags, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 120883

An evaluation has been made of some magnetic and electrical properties of Fermalite, a magnetic core material furnished by Dr. Charles Guillaud, National Center for Scientific Research, Bellevue, France. The normal magnetization curves, static hysteresis loops, resistivity, dynamic loops, permeability and core losses (15 KC - 1 MC), and Curie temperatures were measured. The results indicate that these materials are worthy of further consideration. NAVORD 2834.

Study of factors affecting the uniform elongation of titanium and titanium alloys, by Frank C. Holden, Horace R. Ogden and Robert I. Jaffee. Battelle Memorial Institute, Columbus, Ohio. Feb 1956. 40p photos, diags, graphs, tables. Order from OTS. \$1. PB 121213

The limits of uniform elongation were measured for typical alpha, alpha-beta, and beta titanium alloys. Each alloy was studied in three microstructural

conditions over a temperature range from -75 to 300 C. Highest uniform elongation was obtained for commercial titanium (alpha), whereas that for the beta-quenched Ti-7.5Cr-7.5Mo alloy was low. The presence of massive alpha in the alpha-beta alloys increases their uniform elongation. Project no. 7351. Covers period of work from Dec 1954 to Jun 1955 under Contract AF 33(616)-2783. Appendix A. Tables of mechanical properties. - Appendix B. Flow curves. AF WADC TR 55-454, Part 1.

Study of purification and substructure formation of metals and the properties of high purity metals, by M. Herman, J. L. Rutherford, R. L. Smith. Franklin Institute. Laboratories for Research and Development, Philadelphia, Pa. Sep 1955. 30p photos, diags, graphs, table. Order from OTS. 75 cents. PB 111933

Induction equipment has been constructed for the floating zone technique of zone melting. Iron and titanium have been zone melted by this method and are in the process of being evaluated. Studies of substructure show that lead segregation accounts for the observed substructure and pits formed in etched zinc. Final report, no. F-2337-3, Oct 1, 1954 to Sep 30, 1955. AF OSR TN 55-404.

Welding characteristics of selected titanium alloys. Battelle Memorial Institute, Columbus, Ohio. Contract DA-33-019-ORD-231. O. O. project no. TB4-15. Order separate parts described below from LC, giving PB number of each part ordered.

Interim technical report for the period Feb 1 - Jul 31, 1953, by G. E. Faulkner, G. B. Grable and C. B. Voldrich. Jul 1953. 68p photos, graphs, tables. Mi \$3.90, ph \$10.80.

PB 122302

Several series of binary titanium alloys containing vanadium or aluminum, and ternary titanium alloys containing manganese and aluminum were arc cast and fabricated to plate for welding tests. The tensile properties of the base metals were determined. Welds were made in 1/8- and 1/4-inch-thick plates of these alloys, and were tested for bend ductility and notch toughness. Hardness surveys and metallographic examinations of the welded joints also were made. Previous report is WAL R 401/97-18. WAL R 401/97-27.

Interim technical report for the period Jul 31 - Dec 15, 1953, by F. E. Faulkner, G. E. Martin and C. B. Voldrich. Dec 1953. 32p graphs, tables. Mi \$3, ph \$6.30. PB 122258

During this period, most of the work consisted of the preparation, welding, and testing of alpha-beta alloys containing combinations of one beta-stabilizing element and aluminum and combinations of two or more beta-stabilizing elements. A few metastable-beta alloys which contained relatively large amounts of beta-stabilizing elements also were prepared and welded. The welds were made in 1/8- and 1/4-inch plates of

these alloys. Tests conducted on the base metals and welded joints consisted of base-metal tension tests and base-metal and weld-joint bend tests, notch-toughness tests, hardness studies, and microstructure examinations. WAL R 401/97-28.

Summary report for the period Feb 1, 1953 to Mar 31, 1954, by G. E. Faulkner, G. E. Martin and C. B. Voldrich. Mar 1954. 54p photos, diags, graphs, tables. Mi \$3.60, ph \$9.30.

PB 122319

Series of titanium-aluminum alloys and titanium-vanadium alloys were prepared and tested. On the basis of the information obtained from these alloys and the binary chromium, iron, manganese, and molybdenum alloys studied last year, alloys were selected and studied which had promise of good strength and weld-joint properties. These selected alloys contained combinations of one beta-stabilizing element and aluminum, and combinations of two or more beta-stabilizing elements. The tests conducted on the base metals and welded joints consisted of base-metal tension tests and base-metal and weld-joint bend tests, notch-toughness tests, hardness studies, and microstructural examinations. WAL R 401/97-29.

Zone purification of reactive metals, by R. L. Smith and J. L. Rutherford. Franklin Institute, Laboratories for Research and Development, Philadelphia, Pa. Feb 1956. 37p photos, drawings, graphs. Order from LC. Mi \$3, ph \$6.30. PB 122106

A description is given for an apparatus and technique used to zone melt reactive, high-melting-point metals by the floating zone method. The use of radioactive tracers to determine the redistribution of solute during zone melting is discussed and results are shown for P^{32} in iron, Au^{198} in titanium and zirconium, and Zn^{65} in titanium. Some tensile results on iron at liquid nitrogen and liquid helium temperatures are given which illustrate that the removal of trace impurities may increase markedly the low temperature ductility of iron. Interim report no. I-A1878-1 under Contract AF 18(600)-1581. AF CSR TN 56-70.

METEOROLOGY AND CLIMATOLOGY

Free-atmosphere turbulence, by A. D. Anderson. U. S. Naval Research Laboratory. Jun 1956. 92p diags, graphs, tables. Order from OTS. \$2.50. PB 121090

Free-atmosphere turbulence data, measured between 10,000 and 60,000 feet by means of a parachuted telemetering instrument, the gustsonde, has been reduced to punched card form with the corresponding meteorological data. This is believed to be the largest amount of such data in existence. An analysis of the approximately 1800 layers of free-

atmosphere turbulence has shown correlations between this turbulence and ranges of the following parameters: Richardson's number, vertical wind shear, lapse rate, wind speed, wind direction, temperature, and relative humidity. Correlations were also found between this turbulence and the bases and tops of tropospheric inversions, and the base of the tropopause. NRL R 4735.

Generation of available potential energy and the intensity of the general circulation, by Edward N. Lorenz. California, University, Dept. of Meteorology, Los Angeles, Calif. Jul 1955. 40p graphs. Order from LC. Mi \$3, ph \$6.30. PB 120145

The intensity of the general circulation, or the kinetic energy of the atmosphere is explained on the basis of the solar radiation reaching the atmosphere. Scientific report no. 1 under Contract no. AF 19-(604)-1286.

Geomagnetic secular variation at the core-mantle boundary, by Keith Leon McDonald. Utah, University, Dept. of Physics, Salt Lake City, Utah. Mar 1955. 29p maps, diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119923

From maps of the geomagnetic secular variation, the time derivative of the radial component of the magnetic intensity is extrapolated to the core-mantle boundary. On the assumption of a homogeneous insulating mantle, a quantitative description is given of the topography of the magnetic field variation at that boundary. Technical report no. 15 under Contract Nonr-1288(00): Earth's magnetism and magnetohydrodynamics.

Grozovoe elektrichestvo i sokhranenie otritsatel'nogo zariada zemli (Thunderstorm electricity and maintenance of the earth's negative charge), by P. N. Tverskol. Translated by Michael M. Dane and David Kraus. Jul 1955. 43p photo, drawings, diags, graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 119624

Translated from Vestnik Leningradskogo Universiteta, Vol. 6, pp. 3-23, 1947, under Contract AF 19(604)-1364.

1. Atmosphere - Electricity - Russia.

Grundlagen der objektiven wolkenhohenmessung (Basic principles underlying the objective measurement of cloud heights), by W. von Olbers. Translated by James Gough, Jr. May 1955. 29p diag, graph, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119823

The measuring accuracy and range are treated in so far as they are dependent upon geometrical and meteorological factors (cloud type and thickness, number and size of drops) which influence the reflectivity of the drops. The optic-lighting considerations relate to the light intensity of the projector (which depends upon the brightness of the light

source and the geometrical dimensions), the quality of the focus of the light beam, the brightness on the cloud, the luminous flux on the receiving surfaces, the influence of the Tyndall effect, the delimitation of the angle of vision, and the favorable spectral regions. The problems of the electric measuring technique include modulation and impulse method, photoelectric cells, amplifier technique, and reduction of the background noise. Bibliography, pp. 25-27. Translated from Technische Mitteilungen des Instrumentenwesens des deutschen Wetterdienstes, Neue Folge Nr. 1; 3-18, Hamburg, 1955, under Contract AF 19(604)-1364.

Juneau ice field research project, Alaska. Progress report for 1954. American Geographical Society, Dept. of Exploration and Field Research, New York, N. Y. Feb 1955. 60p graphs, table, maps. Order from LC. Mi \$3.60, ph \$9.30. PB 120142

The purpose of this report is to make available, prior to the issuance of final publications, some of the preliminary findings of the 1954 research program. As the more comprehensive papers are completed and published, reprints will be distributed by the project. This precedent has been established in preference to bringing together the ultimate findings in mimeographed form which has often been the practice in the past. For 1950-1951, 1953 reports see PB 115700, 115752-115753, Contract N9 onr-83001.

Luftelektrische erfahrungen in den polargebieten (Atmospheric-electric observations in the polar regions), by Hans Israël. Translated by Valda Dreimanis. Aug 1955. 14p graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 120158

Translated from Polarforschung, 3(1/2): 210-215, 1953 under Contract AF 19(604)-1364.
1. Atmosphere - Electricity - Polar regions.

Measurement of the size of stellar images, by Roger Hosfeld. Ohio State University. Dept. of Physics and Astronomy. Jun 1955. 51p photos, diags, graphs. Order from LC. Mi \$3.60, ph \$9.30. PB 120329

The sizes, profiles and motions of stellar images in the daytime and the nighttime have been studied with the 12.5-inch refractor of the McMillin Observatory. The motions and sizes of images were determined both photographically and photoelectrically, while the image profiles were obtained photoelectrically. Joint scientific report no. 2 under Contracts AF 19(604)-41 and AF 19(604)-964. AF CRC TN 55-873. OSURF Proj 480, Report no. 2. OSURF Proj 583, Report no. 2.

Meteorological radar studies. Harvard University. Blue Hill Meteorological Observatory, Milton, Mass. Contract AF 19(604)-950. Order separate parts described below from LC, giving PB number of each part ordered.

Part 2: Spiral precipitation patterns in extra-tropical cyclones, by John H. Conover. Nov 1955. 20p photos, maps. Mi \$2.40, ph \$3.30. PB 120368

1. Radar, Meteorological - Sensitivity 2. Cyclones, Tropical - Structure 3. AF CRC TN 55-875.

Part 3: Melting layer, by Raymond Wexler. Nov 1955. 21p graphs. Mi \$2.70, ph \$4.80. PB 120370

The increase in the fall velocity of a spherical melting snowflake is derived from the assumption that the melting occurs from the outside leaving the inner low density ice portion intact. The depth of the melting layer may then be determined as a function of the lapse rate, the raindrop size, and the initial and final fall velocity. AF CRC TN 55-876.

Radioactivity of the air, by I. H. Blifford, Jr., H. Friedman, L. B. Lockhart, Jr., and R. A. Baus. U. S. Naval Research Laboratory. Jun 1956. 37p photo, graphs, tables. Order from OTS. \$1. PB 121222

Since 1949 the Naval Research Laboratory has operated stations for the detection and collection of atmospheric radioactivity. This report presents an analysis of some of the results obtained. It is apparent that the distribution of activity throughout the earth's atmosphere is not uniform. Perhaps the most striking aspect of the data is the long period of time over which radioactivity has been detected. Supersedes R 4509. NRL R 4760.

Radio-frequency observations of the solar eclipse of Jun 30, 1954, by G. Eriksen, Ø. Hague and E. Tandberg-Hanssen. Oslo. University. Institute of Theoretical Astrophysics. 1955. 24p photos, diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120217

Radio-frequency power received from the sun at wavelengths of 60 cms and 1.5 m was measured during the solar eclipse of June 30, 1954. The sun was essentially free from active areas, and the eclipse curves obtained have been used to derive models of the radio sun at the two wavelengths. These models give predicted eclipse curves in good agreement with the observed ones. Comparison has been made with models derived by other investigators on the same wavelengths. Scientific report no. 1 under Contract no. AF 61(514)-651-c. AF CRC TN 55-894.

Relation between point discharge current, potential gradient and wind speed for an isolated point. Preliminary report, by J. A. Chalmers and J. R. Kirkman. Durham. University. Physics Dept., Durham, Eng. Jun 1955. 11p photo, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 120416

Technical note 1 for the period Oct 1-Jun 30, 1955 under Contract AF 61(514)-743-C.
1. Atmosphere - Electricity - Gt. Brit. 2. Winds - Velocities - Gt. Brit. 3. Contract AF 61(514)-743-C 4. AF CRC TN 55-861.

ORDNANCE AND ACCESSORIES

Condensation shocks, weak detonations, and related phenomena, by W. H. Heybey and S. G. Reed, Jr. U. S. Naval Ordnance Laboratory. Jun 1953. 27p diags, graph. Order from LC. Mi \$2.70, ph \$4.80. PB 122031

Condensation shock phenomena are discussed from the standpoint of the theory of detonations. It is shown that such phenomena may be regarded as examples of weak detonations, and are, accordingly, appropriate to fill the gap left by the absence of weak detonations in available experience. The discussion is extended to certain endothermic processes induced by shockwaves. Aeroballistic Research Report 156. NAVORD 2779. NOL ARR 156.

Interior ballistics, VII: Numerical methods of solution of the ordinary problems of interior ballistics, by R. E. Johnson, N. L. Johnson and J. W. Wrench, Jr. U. S. National Defense Research Committee. Oct 1945. 100f tables. Order from LC. Mi \$5.40, enl pr \$16.80. PB 122100

The procedures and tables presented herein permit the solution of interior-ballistic problems involving both seven-perforated and constant-burning-surface granulations of the powder. Examples are given to show the recommended way of solving most of the problems encountered in interior ballistics. Final report in the series, prepared under Contract OEMsr-51. NDRC A-348. OSRD 6231.

NOL fragment velocity range, by A. D. Solem and B. N. Singleton, Jr. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1953. 24p photos, diags, graph, table. Order from LC. Mi \$2.70, ph \$4.80. PB 122028

This range uses a rotating drum camera to record the passage of fragments past three lighted slits. The motion of the camera drum is such that the film moves parallel to the trajectory of the fragments. The sharp images of each fragment permit easy calculation of its velocity. This velocity depends upon a known fragment path defined by the geometry of the range and time of transit between slits which is determined by speed of film and spacing of successive fragment images on the film. The accuracy of the range is on the order of 1 to 2 per cent. The limitations of the range are discussed and further developments are suggested. Task NOL-Re2C-35-1-53. NAVORD 2766.

Theory of lead computing gunsights, by A. S. Householder. U. S. Naval Research Laboratory. Dec 1946. 191p drawings, diags, graphs. Order from LC. Mi \$8.70, ph \$30.30. PB 120779

This report is an exposition of the basic theory of the computers used in the light Navy AA directors. The theory of rectilinear prediction and its mechanization by the gyroscope is considered first. Problems incident to the composition of two lead angles, and the necessity for smoothing the solution are outlined. These topics constitute the main body of the report contained in the first two chapters. The third chapter discusses the principles underlying the methods of correcting for ballistic disturbances and the fourth presents some considerations relevant to the evaluation of fire control systems. NRL R 2888.

PACKING AND PACKAGING

Packaging requirements for bearings. U. S. Forest Products Laboratory, Madison, Wis. Contract AF 18(600)-103. Order separate parts described below from LC, giving PB number of each part ordered.

Part 1: Study of greaseproof barrier requirements for AN-G-25 grease, by R. S. Kurtenacker. Jan 1954. 37f photo, tables. Mi \$3, enl pr \$7.80. PB 122320

Various greaseproof barrier materials were used in this investigation. Twenty-three materials were tested for compliance with Specification JAN-B-121, Barrier-Materials, Greaseproof. Of the twenty-three materials tested, three met all requirements of Specification JAN-B-121, and five met all requirements except for high acidity. None of the barrier materials prevented dispersion of the oil base from the grease. AD 27598. AF WADC TR 53-38, Part 1.

Part 2: Investigation of aluminum-foil barriers for packaging, by V. W. Meloche and D. R. Johnson. Mar 1954. 31p photos, tables. Mi \$3, ph \$6.30. PB 122321

Results of an investigation of the use of aluminum foil as an intimate wrap for bearings coated with either petrolatum-base preservatives or synthetic greases and packaged in water-vaporproof pouches indicate that the aluminum foil is subject to pinholding and breaking at the folds, does not retain the grease or preservative with the type of wrap employed, and does not prevent changes in the composition of the synthetic grease. The results also indicate that it is more desirable to employ oil-free foil than the foil with rolling oil present. AD 37704. AF WADC TR 53-38, Part 2.

Part 3: Compatibility of MIL-G-3278 synthetic grease with various intimate wraps and AN-B-20 pouches (Series A), by M. A. Taras. Mar 1954. 28p photos, tables. Mi \$2.70, ph \$4.80. PB 122322

126 pouch packages containing the outer ring of standard ball bearings assemblies were subjected to a cyclic exposure to evaluate the compatibility of pouch materials, synthetic greases, and intimate wraps. None of the combinations of pouches or wraps prevented hardening of the greases. The polyester film produced consistently good results with both greases and pouch materials. AD 48437. AF WADC TR 53-38, Part 3.

Part 4: Performance of five methods of packaging bearings in metal containers (series 1), by L. O. Anderson. Jun 1954. 19p photos. Mi \$2.40, ph \$3.30. PB 122323

This investigation was conducted to determine the relative performance of five methods of packaging bearings as prepared by a roller bearing manufacturer. The best results were produced by a preservative of petrolatum and an intimate wrap of neutral kraft waxed paper. The use of silica gel with this combination of preservative and wrap was also satisfactory. These results are not fully conclusive, since all of the test specimens were prepared at the adverse condition of 90 percent relative humidity. AD 43065. AF WADC TR 53-38, Part 4.

Part 5: Performance of various types of water-vaporproof barriers containing grease-coated parts, by M. A. Taras. Feb 1954. 18f tables. Mi \$2.40, enl pr \$4.80. PB 122324

Five different pouch materials, a synthetic grease, and a petroleum-base preservative were investigated. Each preservative-or grease-coated ring was wrapped in a greaseproof barrier of polyethylene-kraft. Although two of the barrier materials used for pouches did not deteriorate upon exposure, none of the barrier materials gave good protection to the rings when used with preservative. The exposure condition of 160°F. is too severe for this preservative, since it flows readily from the ferrous parts at this temperature. AD 27685. AF WADC TR 53-38, Part 5.

Part 6: Performance of three types of seals for various intimate wraps with MIL-G-3278 greases (series E), by M. A. Taras. Mar 1954. 30p photos, tables. Mi \$2.70, ph \$4.80. PB 122325

A study of the performance of three methods of closing various intimate wraps (containing ferrous bearing parts coated with grease complying with Specification MIL-G-3278) included the drugstore fold, heat sealing, and the use of an aluminum band. In general, the greases used hardened upon exposure. Nylon, however, was the only intimate wrap that prevented any of the greases from hardening. No reason for this re-

action was apparent. The data also indicate that one of the greases was less deleterious to the vinyl coating of the pouch material used in this test than the other. AD 37705. AF WADC TR 53-38, Part 6.

Part 7: Plastic-coated, aluminum-foil barriers as intimate wraps for packaging bearings, by M. A. Taras. Feb 1954. 22p tables. Mi \$2.70, ph \$4.80. PB 122326

Eight different intimate wrap materials, 2 greases, and 2 methods of sealing the intimate wraps were investigated. Results of this study indicated that the heat-seal method of closing laminated plastic-coated aluminum-foil barrier intimate wraps was more effective in regard to corrosion prevention than the drugstore method of closure. The only barrier that offered complete protection to the synthetic polyethylene-foil-polyethylene-scrim intimate wrap. AD 27931. AF WADC TR 53-38, Part 7.

Part 8: Performance of tin cans containing anti-friction bearings and various types of oils (series P and Q), by L. O. Anderson, M. A. Taras and R. K. Stern. Jan 1954. 16f photos, tables. Mi \$2.40, enl pr \$4.80. PB 122327

Three types of oils together with three bearing types were investigated. No corrosion was evident on any of the bearings in packages subjected to the 30-day exposure period. Bearings packaged in tin cans with the inhibited oils were in excellent condition after storage for 120 days. Corrosion of a minor extent was present on 50 percent of the bearings packaged in tin cans with the uninhibited oil that were exposed to a 3-week cycle plus 120 days of storage. AD 27595. AF WADC TR 53-38, Part 8.

Part 9: Performance of four MIL-G-3278 greases with various greaseproof barriers in anti-friction bearing-pouch packages (series S), by Michael A. Taras. Mar 1954. 19p tables. Mi \$2.40, ph \$3.30. PB 122328

Four greases and six intimate wraps were investigated. The specimens were enclosed in water-vaporproof pouches and exposed to a 3-week cycle of temperatures ranging from -65° to 160°F. Results of this study showed that various synthetic greases that comply with Specification MIL-G-3278 perform differently at the same storage conditions. It was likely that variation in grease composition was responsible for this reaction. Nylon (3 mils) was the only barrier that performed satisfactorily with each of the greases. AF WADC TR 53-38, Part 9.

Part 10: Performance of plastic-coated (extruded) aluminum-foil barriers as intimate wraps for packaging bearing parts coated with synthetic grease, by M. A. Taras and J. O. Bixby. Feb 1954. 29p photos, tables. Mi \$2.70, ph \$4.80. PB 122329

Three hundred pouch-type packages containing the outer rings of ball bearings were prepared with various combinations of grease, coated and uncoated intimate wraps, and methods of closure of the wrap. Severe delamination occurred with polyethylene-foil wraps regardless of the kind of grease or method of closure used. Comparable packages using nylon extruded to foil were not delaminated. Delamination, varying in degree from none to moderate, was evident in polyethylene-tissue-foil wraps with all greases. There was no significant difference, in the amount and degree of corrosion in comparable packs that could be attributed to method of closure. Although all four synthetic greases used in this experiment compiled with Specification MIL-G-3278, a wide range of effectiveness in corrosion prevention existed among them. AD 27889. AF WADC TR 53-38, Part 10.

Part 11: Performance of procoated black iron can packages containing volatile corrosion inhibitor and antifriction bearings (series T), by V. C. Setterholm. Feb 1954. 18p photos, tables. Mi \$2.40, ph \$3.30. PB 122330

Interior protection was provided by dicyclohexylammonium nitrite-impregnated paper or crystals. Procoated black iron cans were used to contain antifriction bearings with steel or brass retainers. Although the dicyclohexylammonium nitrite was successful in minimizing corrosion on ferrous parts, the tendency of crystals to undergo sublimation resulted in a dense formation of crystals on all surfaces of the bearing. The presence of these crystals on functional surfaces acted to freeze the rolling parts. AD 32538. AF WADC TR 53-38, Part 11.

Part 12: Effect of five cleaning procedures on antifriction bearings packaged with MIL-G-3278 greases, by R. A. Aubey. Feb 1954. 27p photos, tables. Mi \$2.70, ph \$4.80. PB 122331

The results indicated that cleaning method C-5 of Specification MIL-P-116A, consisting of the use of a specification fingerprint remover followed by a solvent wash, is the most satisfactory. Other cleaning methods were accompanied by staining and discoloration of the specimens. None of the methods prevented recontamination. A thin film of oil did not prevent recontamination. AF WADC TR 53-38, Part 12.

Part 13: Performance of tin cans containing antifriction bearings subjected to cyclic exposure and rough handling (series F-F), by R. K. Stern. Jan 1954. 16p photos, tables. Mi \$2.40, ph \$3.30. PB 122332

No significant mechanical damage to the cans was caused by rough handling. All bearings were unaffected by the cyclic exposure and rough handling. Immediately after testing, however, the procoating on all cans contained a large number of water-filled blisters, most of which disappeared after a few days of exposure to 30 percent relative humidity. This blistered condition

could be a principal factor in causing severe corrosion to the cans in the case of a longer period of exposure. AD 27642. AF WADC TR 53-38, Part 13.

Part 14: Performance of tin cans containing antifriction bearings and commercial motor oils (series E-E), by A. A. Mohaupt. Jan 1954. 17f tables. Mi \$2.40, enl pr \$4.80. PB 122333

The cans were procoated with an olive-drab paint, and the packages were subjected to a 3-week cyclic exposure plus 60 days storage at 160°F, and 92 percent relative humidity. Bearings packaged in an inhibited oil were in better condition after exposure than those packaged in motor oils. The different viscosities of the motor oils, filling or partially filling the tin cans, and the temperature at which the oil was applied to the bearings at the time of packaging had little or no effect on the condition of the bearings after exposure. AD 27592. AF WADC TR 53-38, Part 14.

Part 15 is PB 111650. Order from OTS, 75 cents.

Part 16: Effect of exposure on glass packs containing steel rollers in various preservatives or greases and in atmospheres of air or nitrogen (series V), by V. W. Meloche and A. Frisque. Feb 1955. 19p tables. Mi \$2.40, ph \$3.30. PB 122335

Test specimens consisted of sealed glass tubes each containing a steel roller, a synthetic grease or petroleum-base preservative with various amounts of moisture, and an atmosphere of air or nitrogen. In general, the degree of stain and corrosion on rollers in the oxygen containing atmosphere was less than the stain and corrosion on rollers in a nitrogen atmosphere. There was a definite variation in the performance of the various preservatives and greases. AF WADC TR 53-38, Part 16.

Part 17: Performance of tin cans containing two antifriction bearings per can with various inner packaging, by R. K. Stern. Oct 1953. 19p tables. Mi \$2.40, ph \$3.30. PB 122336

Tin cans, each containing two antifriction bearings, were subjected to a three week cyclic exposure plus 120 days storage at 160°F and 92 percent relative humidity. Ball bearings with steel, fiber, or brass retainers were coated either with a synthetic grease, Specification MIL-G-3278 (Grease; Aircraft and Instruments, for High and Low Temperatures) or petroleum preservative, Specification AN-C-124 (Compound; Soft Film, Corrosion-Preventive). The bearings were then sealed in cans; or, after being coated, wrapped with each of 10 different intimate wrapping materials and sealed in cans; or, after being coated, sealed in cans which were filled with petroleum preservative or synthetic grease. The synthetic grease performed more effectively as a preservative than the

petroleum preservative. Very good results were obtained from the cans filled with the preservative or grease. AD 25389, AF WADC TR 53-38, Part 17.

Part 18: Effect of relative humidity at time of packaging on the condition of bearings after a cyclic exposure (series G-G), by R. A. Aubey. Jan 1954. 27p photos, tables. Mi \$2.70, ph \$4.80. PB 122337

Bearings were cleaned and packaged in metal cans at each of 6 humidity conditions ranging from 30 to 97 percent relative humidity. The packages were exposed to a 3-week cycle plus 60-days exposure at 160°F. and 92 percent relative humidity. One of the petroleum-base preservative materials, when packaged with a polyester film as an intimate wrap, gave complete protection through all of the humidity conditions. AD 27584, AF WADC TR 53-38, Part 18.

Part 19: Performance of tin cans containing antifriction bearings and various greases and preservatives, by R. K. Stern. Jul 1953. 18p tables. Mi \$2.40, ph \$3.30. PB 122338

Immersion of the bearings in greases or preservatives was more effective than dip-coating for preventing corrosion and staining. However, where preservative, Specification AN-C-124 was used, better results were obtained with the 225°F temperature of application. All bearings preserved with the proprietary compound by any method were free of stain and corrosion. AD 21968, AF WADC TR 53-38, Part 19.

Part 20: Antifriction bearing can packages subjected to cyclic exposure and 120 days of storage, by R. K. Stern. Jul 1953. 19p tables. Mi \$2.40, ph \$3.30. PB 122339

All bearings packaged without intimate wraps and sealed in cans filled with grease or preservative were free from corrosion and stain after testing. The best over-all results were obtained with the procoating, when paint that conformed to Specification MIL-C-10506 was sprayed on the cans to an average dry film thickness of 1.3 mils. AD 22063, AF WADC TR 53-38, Part 20.

Proceedings of the first Joint Military-Industry Packaging and Materials Handling Symposium, Dept. of Commerce Auditorium, Washington, D. C., Oct 10-12, 1955. Sponsored by the Dept. of the Navy, with the cooperation of the Dept. of the Army, Dept. of the Air Force, and Dept. of Commerce. 1956. 695p photos, drawings, diags, graphs. Order from OTS. \$6. PB 121350

Contents: Welcome address, by Sinclair Weeks. - Military key-note address, by Thomas P. Pike. - Industry key-note address, by V. deP. Goubeau. - Planning military transportation today, by Bertram F. Hayford. - Underway replenishment at sea, by R. P. Briscoe. - An essential element of air power, by John P. Doyle. - Research and development, by

F. R. Furth. - Recent industry packaging developments, by Charles A. Southwick, Jr. - Teflon films as operating lubricants and preservative coatings, by V. G. FitzSimmons. - Air drop technique, by Cecil W. Hospelhorn. - Gaseous system for corrosion control, by T. J. Nussdorfer. - Temperature controlled packages, by Donald S. Martin. - Materials handling, transportation and warehousing operations, by William L. Pearce. - Materials handling in production, by H. O. Horning. - Industrial counterparts of military packaging, by John K. Mount. - Dynamic cushion tester - its application to cushion design, by M. T. Hatae. - New developments in materials handling, by V. H. Laughner. - Automatic packaging of military supplies, by Roger Putnam. - Joint military packaging course, by James R. Glisson. - An approach to the selection of packaging methods, by Paul F. Curtis. - Reducing transportation and handling costs, by T. S. Stern. - How can industry control packaging costs, by R. H. Thomas. - Revision of packaging requirements, by G. L. Griffin. - Specialized materials handling equipment requirements, by R. E. Fullam. - Automation of packaging lines for military items, by William Bronander. - Consolidation of cargo for shipment, by Charles A. Nebel. - Aircraft industry packaging, by E. P. Troeger. - Dehumidified storage, by George W. Higgs. - Research and development, by Hayward R. Baker. - Unitization, by James H. Johnston. - Factors to be considered in container weight reduction and handling simplification efforts, by Paul F. Curtis. - Introducing new materials and processes to government agencies, by L. C. Heller. - Automation in handling, by S. S. Nicholson. - Administration of packaging and materials handling programs, by John C. Immer.

PAPER AND ALLIED PRODUCTS

Performance characteristics of paper honeycomb cushioning materials impacted under a heavy weight high impact shock machine, by Edward N. Sabbagh. Lowell Technological Institute Research Foundation, Lowell, Mass. Jan 1956. 62p graphs, tables. Order from OTS. \$1.75. PB 121183

Dynamic tests with respect to the energy absorption characteristics of certain paperboard honeycomb materials impacted under a heavy weight high impact shock machine show that these materials are more efficient energy absorbers at the lower limit of the imposed test conditions than other materials previously tested. They are much less effective in the higher portions of the test range. A correlation between energy absorption and density is exhibited. For reports on the shock machine used and earlier tests see PB 121145 and PB 121198. Project no. 6077, Task no. 73295. Covers period of work from Jun 1955 to Sep 1955 under Contract AF 18(600)-127.

PHOTOGRAPHIC AND OPTICAL GOODS

Attenuation of light by smoke screens, by John A. Sanderson and R. L. Tuve. U. S. Naval Research Laboratory. Mar 1940. 24p photos, diagr, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 120396

1. Light - Attenuation 2. Screens, Smoke - Light attenuation 3. NRL H 1602.

Fogging of photographic materials by radiographic radium, by Herman F. Kaiser, Jr. U. S. Naval Research Laboratory. Jul 1939. 17p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 120443

A variety of commercial photographic and X-ray films were exposed under conditions simulating actual shipping conditions at several distances from a standard 250 milligram radium capsule enclosed in its lead carrying case. The exposure required in each case to produce a density gain of 0.07 were determined and a table was constructed giving the permissible transit times for each kind of film when 15 feet from the radium unit. These values are at the least several times those permitted for the same conditions by present railway express regulations. NRL M 1547.

Selective spectrum lighting for CIC areas. U. S. Navy Electronics Laboratory, San Diego, Calif. Nov 1952. 8f graphs. Order from LC. Mi \$1.80, enl pr \$3.30. PB 122104

Investigation was made into methods of increasing ambient illumination in CIC and other areas without lowering signal contrast on the CRT displays in such areas. Two selective spectrum lighting methods were found to accomplish this, thus making possible improved conditions for maintenance and inspection of gear, reading and writing of messages, free and safe movement of personnel, and operation of equipment controls. One of the methods - the sodium-yellow system - may be installed immediately in CIC's with only superficial changes in equipment. Installation of the other method - the mercury-minus-red system - requires some modification to present radar circuitry and a change in the phosphors used in CRT's. Covers work from Apr 1951 to Jun 1952. NELS R 337.

PHYSICS

General

Asymptotic theory for principal component analysis, by T. W. Anderson. Stanford University. Dept. of Statistics, Stanford, Calif. Jan 1955. 33p. Order from LC. Mi \$3, ph \$6.30. PB 119612

Technical report no. 27 under Contract N6 onr-251, Task Order III (NR 042-993).

1. Factor analysis 2. Mathematical equations and solutions.

Base pressure of spheres at supersonic speeds, by Richard Lehnert. U. S. Naval Ordnance Laboratory. Feb 1953. 29p photos, diagr, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 122030

Base-pressure measurements on spheres with various diameters were carried out at Mach numbers between 1.57 and 5.0 in the NOL 40 x 40 cm aeroballistics wind tunnels no. 1 and no. 2 to study Mach number and Reynolds number effects in a Reynolds number region between approximately 10^5 and 10^6 . The base-drag coefficient was determined from measured base-pressure data and coordinated flow separation locations taken from schlieren photographs. The behavior of the base-drag coefficient is discussed in comparison with the calculated wave-drag coefficient and existing data of the total-drag coefficient. Flow-separation phenomena found to be departing from those at subsonic speeds are briefly analyzed. NAVORD 2774.

Comparison of experiments in the infinite case and the use of invariance in establishing sufficiency, by Charles H. Boll. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Feb 1955. 33p. Order from LC. Mi \$3, ph \$6.30. PB 119843

Discusses the equivalence of more information and sufficiency, the principle of invariance and the comparison of experiments, an example of an auxiliary experiment which is invariant under the location and scale parameter group, and an example of an auxiliary experiment which is invariant under the translation parameter group. SU AMSL TR 25. Contract N6 onr-251, T. O. III, NR 042-993.

Improved wave diagram procedure for shock reflection from an open end of a duct, by George Rudinger. Cornell Aeronautical Laboratory, Buffalo, N. Y. Aug 1955. 13p graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 122552

It could be shown that the recently derived improved boundary conditions for the reflection of weak shock waves from an open end of a duct can be well approximated by a centered expansion wave if the center of the latter is located on the leading characteristics of the reflected wave and some distance e outside the duct. This result makes it possible to apply the improved boundary conditions without losing the convenience of the customarily used wave diagram procedure. Project Squid, Technical report CAL-65-P. Part 2 of Technical report CAL-61-P. To appear in Journal of Applied Physics. Contract N6 ori-105, T. O. III, NR 098-038.

Influence of finite observation interval on the measurement of turbulent diffusion parameters, by

Y. Ogura, Johns Hopkins University, Baltimore, Md, Mar 1956. 21p. Order from LC. Mi \$2.70, ph \$4.80. PB 122563

The correlation functions obtained from truncated samples are expressed in terms of the sampling length and correlation functions of the basic stationary random variables. The application of the results to diffusion phenomena in a turbulent flow is discussed. The investigation brings out the influence of being confined to finite observation intervals on the average rate of dispersion of particles from a point source. It is also shown that the turbulent level is of importance in determining the relationship between the Eulerian and Lagrangian time intervals of observation. Project Squid, Technical report JHU-11-P. Contract N6 ori-105, T. O. III, NR 098-038.

Interaction of a shock-wave and turbulence, by Leslie S. G. Kovaszny, Johns Hopkins University, Baltimore, Md, Jun 1955. 74p diagr, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 122554

An axisymmetric wake is passed through an oblique shock produced by a wedge. Hot-wire anemometer surveys of the turbulent fluctuations were made to explore the different modes. Comparison with available theory indicated an order of magnitude agreement. Project Squid, Technical report JHU-8-P. To be presented at the meeting of the Heat Transfer and Fluid Mechanics Institute at Los Angeles in June 1955. Contract N6 ori-105, T. O. III, NR 098-038.

Iterative solution of linear systems having sparse matrices, by M. Douglas McIlroy. Massachusetts Institute of Technology, Digital Computer Laboratory, Sep 1955. 6p. Order from LC. Mi \$1.80, ph \$1.80. PB 120274

A preliminary routine for solving large-order linear systems having sparse matrices is described. An iterative approach is used in order to take advantage of the absence of most matrix elements. Such a routine could handle a 100 x 100 matrix of this character in core storage. MIT DCL 101.

Laminar pipe flow with injection and suction through a porous wall, by S. W. Yuan. Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Mar 1955. 26p graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 122551

The effect of injection and suction at the wall on the two-dimensional steady-state laminar flow of a fluid in a porous-wall pipe has been investigated in detail by the solution of the Navier-Stokes equations in cylindrical coordinates. An exact solution of the dynamic equations, reduced to a third-order nonlinear differential equation with appropriate boundary conditions, is obtained. A perturbation method was used to solve the latter equation for both small and large flows through the porous wall. Project Squid, Technical report PIB-25-P. To be presented at meeting

of the Heat Transfer and Fluid Mechanics Institute in June 1955. Contract N6 ori-105, T. O. III, NR 098-038.

Minimum variance unbiased estimation for a truncated Poisson parameter, by R. F. Tate and R. L. Goen. Washington University. Dept. of Mathematics, Laboratory of Statistical Research, Mar 1955. 10p table. Order from LC. Mi \$1.80, ph \$1.80. PB 119927

An unbiased estimator with minimum variance is provided for the Poisson parameter in the case of truncation of the values $0, 1, 2, \dots, m$. Special consideration is given to the case $m = \infty$, where the estimator has a very simple form. Technical report no. 20 under Contract no. N8 onr-520, Task Order II, project no. NR 042-038.

Maximum production of vorticity in isotropic turbulence, by R. Betchow, Johns Hopkins University, Baltimore, Md, Mar 1956. 17p. Order from LC. Mi \$2.40, ph \$3.30. PB 122568

This paper is concerned with the largest production of vorticity compatible with the requirements of isotropy, homogeneity and incompressibility. It is shown that kinematics alone imposes a limit, and comparison with experiments, old and new, indicates that a turbulent flow produces vorticity at about 50% of the kinematical maximum rate. It is quite possible that dynamical considerations are responsible for this factor and that we are confronted with an external state of affairs, characteristic for turbulent flows. Project Squid, Technical report JHU-10-P. Submitted for publication in Journal of Fluid Mechanics in 1956. Contract N6 ori-105, T. O. III, NR 098-038.

Numerical evaluation of multiple integrals. Final report by Alfred T. Hind, Jr. under research Contract Nonr-1359(00), NR 044-142, Clemson Agricultural College of South Carolina, Engineering Experiment Station, Clemson, S. C. Mar 1955. 12p. Order from LC. Mi \$2.40, ph \$3.30. PB 120004

1. Errors - Statistical methods 2. Mathematics - Statistical theory 3. Approximate computations.

New shock tube technique for the study of high temperature gas phase reactions, by H. S. Glick, W. Squire and A. Hertzberg. Cornell Aeronautical Laboratory, Buffalo, N. Y. Mar 1955. 37p photos, diagrs, graphs. Order from LC. Mi \$3, ph \$6.30. PB 122553

A modified shock tube has been developed for the study of high temperature chemical kinetics. A sample of reactant gas in this shock tube is subjected to a precisely controlled high temperature pulse with real gas temperatures up to several thousand degrees Kelvin and cooling rates in excess of 10^3 °K per millisecond. Quantitative data

on the equilibrium state of the reacted gas and the kinetics of the approach to equilibrium can be obtained. Project Squid, Technical report CAL-63-P. Paper presented at the 5th Symposium on Combustion, Pittsburgh, Pa. in Sep 1954. Contract N6 ori-105, T. O. III, NR 098-038.

On an initial value problem of an unbounded incompressible viscous flow, by Tse-Sun Chow. Johns Hopkins University, Baltimore, Md. Nov 1955. 29p diags. Order from LC. Mi \$2.70, ph \$4.80. PB 122569

The motion of an incompressible, viscous fluid is governed by the Navier-Stokes equation and the continuity equation. The analysis of such fluid motion is greatly complicated by the fact that the Navier-Stokes equation is nonlinear. It has been recognized that when a solution to the flow equations is sought in terms of a Fourier representation for the velocity field, the various Fourier components will interact with each other as a consequence of the non-linearity of the equation of motion. It is the purpose of this article to study this interaction, and to apply the results of the investigation to an initial value problem. Project Squid, Technical report JHU-9-T-P. Submitted for publication in the Journal of Rational Mechanics and Analysis in 1956. Contract N6 ori-105, T. O. III, NR 098-038.

Polynomial factorization, by Martin Jacobs. Massachusetts Institute of Technology, Digital Computer Laboratory, Cambridge, Mass. Aug 1955. 4p. Order from LC. Mi \$1.80, ph \$1.80. PB 120273

Several new routines for factoring higher order polynomials are described in this memorandum. Using CS II code, the routines employ a method first described by Frank L. Hitchcock (Jour. Math. and Phys. 1944, p. 69) and theoretically can handle polynomials with real coefficients up to 100th degree or higher, subject to certain restrictions. MIT DCL M 94-1.

Supplementary information on Prandtl number determination by means of recovery factor measurements, by R. A. Seban and A. Levy. California University, Berkeley, Calif. Nov 1955. 7p graph, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 118341s

Supplementary information to previously reported Prandtl numbers for air is given for temperatures between 500°F and 700°F and indicates a constant value in this region. Results with a bakelite probe give the same magnitudes as with a platinum probe in the low temperature range. Project Squid, Technical report UCB-2-R. Supplement to UCB-1-R (PB 118341) covering the results of work under extension of contract. Contract N6 ori-105, T. O. III, NR 098-038.

Attempt to discover nuclei of H^4 among the products of spallation of carbon by protons of energy 300 MeV, by A. A. Reut, S. M. Korenchenko, V. V. Yur'ev and B. M. Pontekorvo. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 4p diagr, table. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119287

Translated from Dokladii Akademii Nauk S.S.S.R., Vol. 102, no. 4, pp. 723-5, 1955.
1. Atomic power - Research - Russia 2. Hydrogen - Isotopes - Detection - Russia 3. AERE Lib/Trans. 600.

Fission of heavy nuclei by high energy neutrons, by V. I. Gol'danskiĭ, E. Z. Tarumov and V. S. Pen'kina. Translated by V. Beak. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 7p graphs, tables. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119284

Translated from Doklady Akademii Nauk S.S.S.R., Vol. 101, no. 6, pp. 1027-1030, 1955.
1. Atomic power - Research - Russia 2. Neutrons - Fission - Russia 3. AERE Lib/Trans 581.

Fission of heavy nuclei by slow π^- -mesons, by N. A. Perfilov and N. S. Ivahova. Translated by J. B. Sykes. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 5p graphs. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119990

Translated from Zhurnal eksperimental'noi i teoreticheskoi Fiziki, Vol. 28, no. 6, pp. 732-734, 1955.
1. Atomic power - Research - Russia 2. Fission fragments - Photography - Russia 3. AERE Lib/Trans 613.

Method for the graphical calculation of the number of theoretical plates in an electrolytic plant with exchange towers for the production of heavy water, by D. Dinelli. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 11p diagr, graphs. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119965

Translated from Energia Nucleare, Vol. 2, no. 16, pp. 426-433, 1955.
1. Atomic power - Research - Italy 2. Water, Heavy - Production - Italy 3. AERE Lib/Trans 606.

On the possibility of dispensing with a critical energy in accelerator with strong focussing, by V. V. Vladimirovskii and E. K. Tarasov. Gt. Brit. Ministry of Supply. Atomic Energy Research

Establishment. 1955. 9p. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119968

Translated from Some Problems in the Theory of Cyclical Accelerators, U.S.S.R., Academy of Sciences, Moscow, 1955, pp. 13-22.
1. Atomic power - Research - Russia 2. Accelerators - Focussing - Russia 3. AERE Lib/Trans 624.

Scattering of electrons from clustered vacancies in copper, by D. L. Dexter, Rochester, University, Rochester, N. Y. Jan 1956. 20p table. Order from LC. Mi \$2.40, ph \$3.30. PB 120008

The excess resistivity, p , and resistivity per unit stored energy, q , associated with dislocations, vacancies, and interstitials are briefly reviewed, and the same quantities are calculated for clustered vacancies. For clusters of more than one hundred vacancies, which seem to exist at room temperature in cold-worked or bombarded copper, q is larger by factors of about 3, 8, and several hundred than the corresponding ratios for vacancies, interstitials, and dislocations. Project Code no. R-355-20-7. AF CSR TN 56-12, Contract AF 18(600)-688, Report no. 12.

Stabilization of the energy of ions accelerated by a high-voltage electrostatic generator, by V. G. Brovchenko, B. M. Gokhberg and V. M. Morozov. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 4p diagr. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119285

Translated from Doklady Akademii Nauk S.S.S.R., Vol. 101, no. 6, pp. 1023-1025, 1955.
1. Atomic power - Research - Russia 2. Generators, High-voltage - Electrostatic - Russia 3. Ions - Polarization - Russia 4. AERE Lib/Trans 582.

Total interaction cross-sections of negative mesons with hydrogen in the energy range from 140 to 400 MeV, by A. E. Ignatenko, A. I. Mikhin, E. B. Ozerov and B. M. Pontekorvo. Translated by J. B. Sykes. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1955. 4p diagrs. Available for loan from AEC Depository Libraries. Photocopies at a fee. PB 119964

Translated from Doklady Akademii Nauk S.S.S.R., Vol. 103, no. 1, pp. 45-47, 1955.
1. Atomic power - Research - Russia 2. Mesotrons - Cross sections - Russia 3. AERE Lib/Trans 620.

PSYCHOLOGY

Acquiring of membership in established groups, by Quin F. Curtis and Harold A. Gibbard. West Virginia University, Morgantown, W. Va. Feb

1955. 23p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120157

Annual technical report.
1. Psychological tests 2. Group behavior 3. Contract Nonr-1365(01).

Basic studies on individual and group behavior. Annual technical report for the period 16 Feb 1954 through 15 Feb 1955 under Contract N8 onr-66216, Minnesota, University, Minneapolis, Minn. Feb 1955. 15p graph. Order from LC. Mi \$2.40, ph \$3.30. PB 120144

The report includes three specific projects each of which is reported separately: A. Research on group structure and function as related to the personality characteristics and interests of group members, B. Research studies on the role of language in behavior, and C. Research studies on the relations between cognition and behavior.

Further study of the effects of power reduction on arousal of hostility, by Murray Horwitz, Morton Goldman and Francis J. Lee. Illinois University, College of Education, Bureau of Educational Research. 1954. 8p tables. Order from LC. Mi \$1.80, ph \$1.80. PB 119521

Date is 1954 or later.
1. Group behaviour - Tests 2. Contract N6 ori-07144.

Opinion change as a function of some intra-personal attributes of the communicatees, by Walter Weiss and Bernard J. Fine. Boston University, Boston, Mass. n.d. 25p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119608

This study was designed to test three research hypotheses. (1) Individuals who are high in extrapunitive are more likely to be influenced by a communication designed to effect an aggressive opinion or action toward a particular group than are those low in extrapunitive. (2) Such a communication is more likely to be effective with those high in aggressive needs than those low in such needs. (3) Those high in both aggressive needs and extrapunitive are more likely to be influenced by the communication than those low in both. Contract Nonr-492(04), Technical report no. 1.

Power over decision making and the response to frustration in group members, by Francis J. Lee, Murray Horwitz and Morton Goldman. Illinois University, College of Education, Bureau of Educational Research. 1954. 10p diagrs, graph. Order from LC. Mi \$1.80, ph \$1.80. PB 119592

Preliminary report of a study performed under Contract N6 ori-07144. This study is part of a program entitled "Factors Underlying Motivational Persistence and Hostility in Group Members."
1. Group behaviour - Tests.

Quantitative aspect of combat, by B. O. Koopman.
Columbia University. Applied Mathematics
Group, Aug 1943. 17f graphs. Order from LC.
Mi \$2.40, enl pr \$4.80. PB 122101

Applied Mathematics Group publication AMG-C-
no. 12.

1. Combat - Theory 2. Contract OEMsr-1007
3. OSRD 1874 4. NDRC APP Note no. 6.

RUBBER AND RUBBER PRODUCTS

Development of high-temperature oil-resistant rubber, by William J. Mueller, Louis E. Novy,
Richard A. Clark and Randall G. Heiligmann.
Battelle Memorial Institute, Columbus, Ohio.
Dec 1955. 96p graphs, tables. Order from OTS.
\$2.50. PB 121195

The work described in the present report emphasizes the development of a rubber for use in synthetic hydraulic fluids, whereas previous reports emphasized the development of a rubber for use in diester-type lubricants, such as Turbo Oil-15. A limited amount of research with the latter fluid was carried over into the present studies. A description of the scope of the program, rubber properties desired, and suggested approaches to the problem appears in Exhibit "C", shown in Appendix A. Project no. 7340, Task no. 73405. Covers work completed between Jan 1, 1955 and Aug 31, 1955 under Contract AF 33(616)-476. For Part 1 see PB 111693, AF WADC TR 54-190, Part 3.

Plasticizers for oil-resistant rubber. Phillips
Petroleum Co., Bartlesville, Okla. Contract AF
33(616)-59. Project 7340, Task no. 73405. Order
separate parts described below from OTS, giving
PB number of each part ordered.

Part 1. Mar 1954. 28p tables. 75 cents.
PB 121075

A number of experimental plasticizers were prepared and evaluated as non-extractable plasticizers in oil-resistant rubber for service at low temperatures. These includes n-formyl morpholine; diethylene glycol bis(morpholinylformate); diethylene glycol dicarbonate esters of methyl, ethyl, and butyl carbitol; dibutyl and diisobutyl sebacate; bis(methoxy polyethylene glycol 350) adipate; bis(3-methoxy-2-bromoethyl) phosphonate; formals prepared from ethyl carbitol, ethoxy triglycol, the monoethyl ether of polyethylene glycol 200 and the mixed formal from methoxy polyethylene glycol 350 and n-hexyl carbitol; and the product from the reaction of butadiene monoxide with phosphorus pentoxide. Thiokol Corporation's liquid polysulfide ZL-109 was evaluated in combination with TP-90B. A number of 1,3-butadiene-1-cyano-1,3-butadiene copolymers were prepared and compared to Paracril B both with and without TP-90B and

liquid polybutadiene as plasticizers. AF WADC
TR 53-281. Contract AF 33(616)-59.

Part 2, by Charles S. Imig. Nov 1954. 49p
tables. \$1.25. PB 121076

Various compounds either purchased or synthesized were evaluated as low temperature, non-extractable plasticizers for oil-resistant polymers such as Paracril B. These compounds including various carbamates, dithiocarbamates, amides, imides, esters, and several liquid polymers were generally unsatisfactory as low temperature plasticizers for Paracril B. Attempts to improve the low temperature properties of 70/30 butadiene-acrylonitrile copolymer by the addition of ethyl, butyl, or hexyl mercaptans was unsuccessful. It was found that a mixture of Thiokol Corporation's liquid polysulfide ZL-109 and TP-90B is an effective plasticizer for Paracril B and imparts fair low temperature properties combined with reduced extractability. AF WADC TR 53-281, Part II.

Quantitative analysis of elastomers through the infrared spectra of their pyrolyzates, by Freeman
F. Bentley. U. S. Air Force. Air Research and
Development Command. Wright Air Development
Center. Materials Laboratory, Wright-Patterson
Air Force Base, Dayton, Ohio. Feb 1956. 25p
photos, graphs, tables. Order from OTS. 75
cents. PB 121115

A semi-quantitative method is described for determining polymer blends and copolymer ratios from the infrared spectra of their pyrolyzates (distillates). The method was established through the analysis of phenolic resin blends in Buna N rubber, and by determining the percentage acrylonitrile in butadiene acrylonitrile co-polymers. The method described here permits the semi-quantitative analysis of Buna N phenolic resin blends, which because of their physical state, cannot be analyzed by conventional methods. It also makes it possible to estimate the amount of non-combustible materials in these polymers. The method is based on the pyrolyzate technique combined with standard infrared quantitative procedures. Project no. 7360, Task no. 73602. Covers period of work from Oct 1953 to Mar 1954. AF WADC TR 54-268.

Testing of silicone rubber at elevated temperatures,
by Aldo J. deFrancesco. Connecticut Hard Rubber
Co., New Haven, Conn. Jan 1956. 41p photos,
diagr, graphs, tables. Order from OTS. \$1.25.
PB 121192

An apparatus to measure tensile strength, elongation, and tear strength of silicone rubber at elevated temperatures was designed and constructed. Fifteen different silicone compounds were tested at room temperature, 212°F and 400°F. Project no. 7340, Task no. 73405. Covers period of work from 1 Jul to 15 Aug 1955 under Contract AF 33(616)-2542. AF WADC TR 55-351.

TEXTILES AND TEXTILE PRODUCTS

Evaluation of fabric finishes for high temperature operation of parachute ribbons, by Louis C. Block, Lowell Technological Institute Research Foundation, Lowell, Mass. Nov 1955. 52p photos, diagrs, graphs, tables. Order from OTS. \$1.50.
PB 121197

The fabrics were exposed to temperatures above the melting point of nylon (480°F) produced by three modes of heat propagation: conduction, convection, and radiation. Instrumentation and testing programs were developed to appraise the results. The result showed that no single finish satisfactorily retarded the fusion of the nylon ribbon when it was tested by all three methods. The conclusions drawn were that if a technique to change the heat transfer characteristics of nylon at these high temperatures is to be realized, methods other than applying surface finishes should be investigated. Project no. 7320, Task no. 73201. Covers work conducted from Mar 1952 to Dec 1954 under Contract AF 18(600)-136. AF WADC TR 54-571.

Study of the effect of twist in yarns on parachute fabrics, by Chauncey C. Chu, Charles A. Lermond, and Milton M. Platt. Fabric Research Laboratories, Inc., Boston, Mass. Feb 1956. 365p photos, diagrs, graphs, tables. Order from OTS. \$5.50.
PB 121193

Analytical developments on the mechanics of air flow through textile structures were made by adopting classical flow equations with due consideration to the visco-elastic behavior of textile materials. Experimental results on a large number of fabric samples (MIL-C-7020, Types I and II) with yarn twists varying from 0.5 to 35 turns per inch are given to demonstrate the various changes in the performance characteristics affected by changes in yarn geometry. Project no. 7320, Task no. 73201. Covers work conducted from Jan 1952 to Jan 1955 under Contract AF 33(616)-387. AF WADC TR 55-104.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Review of the Air Force materials research and development program, by Mary M. Sokas. U. S. Air Force. Air Research and Development Command, Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1956. 137p. Order from OTS. \$3.50.
PB 111648s

Two hundred and five (205) technical reports written during the period 1 July 1954 - 30 June 1955 are abstracted. These reports cover the following areas of research: adhesives, metallurgy, analysis and measurement, biochemistry, textiles, petroleum products, plastics, packaging, protective treatments and rubber. In Section II are listed ten (10) reports issued during July 1952 - June 1954 which were not mentioned previously. As a final summary, a corrected numerical index of all the technical reports issued during the period Mar 1923 - June 1955 is provided. Supplement 2 to PB 111648. AF WADC TR 53-373, Supplement 2.

Rotary wing aircraft handbooks and history, vol. 5: Weights and balance, by Eugene K. Liberatore. Prewitt Aircraft Co., Clifton Heights, Pa. 1954. 89p graphs. Order from OTS. \$2.25.
PB 121097

This volume contains weight and balance data pertaining to U. S. and foreign helicopters. Some graphs of weight data are also presented. For vols. 6-8, 10-11, 13-14 see PB 111390, 111289, 111632-111633, 111521, 111288, 111391. For preview of the set see PB 110454.

Instruments

Application of specification MIL-E-5272 to ground support equipment, by Wallace S. Newton and Constantine G. Makrides. Corvey Engineering Co., Washington, D. C. Jun 1954. 18p. Order from LC. Mi \$2.40, ph \$3.30. PB 119518

This report has been written in conjunction with WADC TR 54-132, "Effect of climate and environment on ground support equipment" (PB 119369) and WADC TR 54-133, "Environmental criteria for ground support equipment" (PB 119537). This review of specification MIL-E-5272 applies to sheltered equipment and to unsheltered equipment intended for Arctic and Subarctic use. AD 39437. Evaluates specifications in PB 119369 and 119537. AF WADC TR 54-134. Contract AF 33(616)-2278.

Hycospan, a high expansion steel aircraft control cable, by Edward Dugger. U. S. Air Materiel Command, Engineering Division, Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1950. 11p graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 119625

The coefficient of expansion of Hycospan cable is greater than that of standard carbon steel cable per Specification AN-C-43 and of corrosion-resisting cable per Specification AN-C-44, and is approximately 70 percent of that for 24S-T aluminum alloy material. Copy will not reproduce well. AF TSEAM MR 45324-307.

Maintenance and repair

Dictionary of aircraft maintenance terms, Section M: Welding, forging and casting section, Revised. U. S. Army Air Forces, Sep 1945, 229p drawings, diags, tables. Order from LC, Mi \$9.90, ph \$34.80, PB 122166

Basic issue of 15 Apr 1945 including revisions through 20 Sep 1945. Prepared by Civilian Personnel Section, Personnel and Base Services Division, HQ, ATSC.

1. Aircraft - Dictionaries 2. AF TO 30-1-2-M.

Training and Training Devices

Critical requirements of basic training tactical instructors, by Robert G. Smith, Jr. and Frank T. Staudohar, U. S. Air Force. Air Research and Development Command, Air Force Personnel and Training Research Center, Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas, Jun 1955, 18p tables. Order from LC, Mi \$2.40, ph \$3.30, PB 120245

The purpose of this study was to determine the critical requirements of basic training tactical instructors (TIs) by means of analysis of critical incidents of TI behavior, as reported by basic airmen and training supervisors. These critical requirements have important implications for evaluation, selection, and training of TIs. AF PTRC TN 55-5.

Aerodynamics

Investigation of boundary-layer transition on 10° cone in Langley 4- by 4-foot supersonic pressure tunnel at Mach numbers of 1.41, 1.61, and 2.01, by Archibald R. Sinclair and K. R. Czarnecki, U. S. National Advisory Committee for Aeronautics, May 1956, 17p photos, diagr, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122508

1. Boundary layer - Transition point 2. Cones - Boundary layer 3. Mach number - Effect 4. NACA TN 3648.

Measurements of pressure distribution and boundary-layer transition on a hollow-cylinder model, by Roland E. Lee, U. S. Naval Ordnance Laboratory, Apr 1953, 20p photos, graphs, table. Order from LC, Mi \$2.40, ph \$3.30, FB 122034

Static pressure distributions and location of boundary-layer transition were determined on a 4'' outer diameter hollow-cylinder model. Its centerline was adjusted parallel to the flow in the NOL 40 x 40 cm Aeroballistics Intermittent Wind Tunnel No. 2 at six Mach numbers between 2.2 and 5.0. Pressure distributions on the hollow cylinder were found

to be nearly the same as the free-stream static pressure distribution. The location of boundary-layer transition was determined from schlieren photographs. The results of the boundary-layer transition were compared with those obtained previously on a 5° cone and a 20° cone-cylinder in the same tunnel. Aeroballistics Research Report 176. NAVORD 2823, NOL ARR 176.

Rockets and Jet Propulsion

Aero-resonator power plant of the V-1 flying bomb, by Guenther Diedrich, Translated by A. Kahane, Princeton University, Princeton, N. J. Jun 1948, 76f drawings, diags. Order from LC, Mi \$4.50, enl pr \$13.80, PB 122103

This report of the development of the aero-resonator of the V-1 flying bomb was written in Germany by Dr. Ing. Guenther Diedrich shortly before the end of the recent war. The text mentions dates as late as April 1945. Dr. Diedrich was personally responsible for much of the work that was done, and this report may be regarded as authoritative. The illustrations were taken directly from the original report. Contract N6 ori-105, T. O. III, NR 098-038.

Performance of single-flow jet engines, by J. V. Foa, Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. May 1950, 106p diags, graphs (1 fold.), tables. Order from LC, Mi \$5.70, enl pr \$18.30, PB 122134

The purpose of this paper is to present a generalized method of performance analysis of existing or conceivable powerplants of single-flow machines, in which all the working medium undergoes the same thermodynamic process. The method is based on the description of the modes of compression, heating and expansion of the working fluid in terms of parameters that can be varied continuously over their respective ranges of practical significance. The thrust and specific impulse of single-flow jet engines are then derived, in the most general form, as functions of such parameters. Project Squid, Technical report no. 20, Contract N6 ori-119, T. O. 1, NR 220-041.

Project Squid, semi-annual progress report under Contract N6-ori-105, T. O. III, NR-098-038, Princeton University, James Forrestal Research Center, Princeton, N. J. Order parts described below from LC, giving PB number of each part ordered.

Report for the period 1 Apr 1955-30 Sep 1955, Oct 1955, 147p diags, graphs, tables, Mi \$7.20, ph \$22.80, PB 122560

Cooperative program of fundamental research as related to jet propulsion for the Office of Naval Research, Dept. of the Navy, Office of Scientific Research, Dept. of the Air Force,

and the Office of Ordnance Research, Dept. of the Army. For other progress reports see PB 107680, 114392, 116870. Contents: I: Fluid mechanics: Mixing of supersonic and subsonic gas streams (Princeton). - Fundamental investigation of nonstationary flow phenomena (Cornell). - Investigation of turbulence (Johns Hopkins). - The interaction of discontinuities (Michigan). - II: Fluid properties: Transport properties of liquids (Princeton). - Heat conductivity of gases (M.I.T.). - Prandtl number determination (California). - Physical properties of the oxides of nitrogen (Cal. Tech.). - III: Heat transfer: Studies of heat transfer from hot gases and the mechanism of liquid film cooling (Purdue). - Porous wall cooling studies (Brooklyn). - IV: Combustion phenomena: Vaporization and combustion of multi-component fuel droplets (Northwestern). - Combustion studies of homogeneous droplet-air mixtures (Dartmouth). - Investigation of the basic problems associated with gaseous combustion (Delaware). - Flame and flow interaction (Cornell). - Flame and ignition phenomena (Bureau of Mines). - Spark ignition, ionization in flames, and high-flow combustion (Experiment, Inc.). - High output combustion (M.I.T.). - Turbulent flames, flame stability, and rough burning (Atlantic Research). - Study of chemical kinetics and basic combustion processes (Princeton). - Theory of detonations and flame propagation in gases (Wisconsin). - Research on ionization in combustion zones (NRL). - V: Index: Index to reports by contracting organizations. - VI: Appendix A: Reports and publications.

Report for the period 1 Oct 1955- 1 Apr 1956, Apr 1956. 138p graphs, tables. Mi \$6.90, ph \$21.30. PB 122573

Cooperative program of fundamental research as related to jet propulsion for the Office of Naval Research, Dept. of the Navy, Office of Scientific Research, Dept. of the Air Force, and the Office of Ordnance Research, Dept. of the Army. Contents: I: Fluid mechanics: Mixing of supersonic and subsonic gas streams (Princeton). - Fundamental investigation of non-steady-flow phenomena (Cornell). - Investigation of turbulence (Johns Hopkins). - The interaction of discontinuities (Michigan). - II: Fluid properties: Transport properties of liquids (Princeton). - Heat conductivity of gases (M.I.T.). - Physical properties of the oxides of nitrogen (Cal. Tech.). - III: Heat transfer: Studies of heat transfer from hot gases and the mechanism of liquid film cooling (Purdue). - Porous wall cooling studies (Brooklyn). - IV: Combustion phenomena: Atomization, vaporization, and combustion of multi-component fuel droplets (Northwestern). - Investigation of the basic problems associated with gaseous combustion (Delaware). - Flame and flow interaction (Cornell). - Flame and ignition phenomena (Bureau of Mines). - Spark ignition, ionization in flames, and high-flow combustion (Experiment, Inc.). - High output combustion (M.I.T.). - Rotating

flame stabilizer (Atlantic Research). - Study of chemical kinetics and basic combustion processes (Princeton). - Theory of detonations and flame propagation in gases (Wisconsin). - Research on ionization in combustion zones (NRL). - Kinetics of the elementary reactions in combustion (Catholic). - V: Index: Index to reports by contracting organizations. - VI: Appendix A: Reports and publications.

Theoretical and experimental investigation of the feasibility of the intermittent ram-jet engine. Princeton University. Aeronautical Engineering Laboratory, Princeton, N. J. Aug 1951. 183p photos, drawing, diagrs, graphs, tables. Order from LC. Mi \$8.40, enl pr \$30.30. PB 122133

A theoretical and experimental investigation of the possibilities of an intermittent ram jet engine has been carried out. Theoretical studies have been made of the several possible modes of intermittent combustion, the gas dynamic cycle of the engine, and the problem of diffuser and nozzle design. A performance theory of intermittent jet engines has been developed, and specific impulse calculations of the intermittent ram jet have been made for two possible modes of combustion. An experimental investigation of the intermittent combustion process in a flowing gas in a constant area tube has been made. Synchronized high-speed motion picture and transient pressure studies were carried out to determine the mode of the combustion process occurring. Transient pressure rise measurements were made over a range of combustion chamber Mach numbers and fuel flows. Performance tests of a subsonic configuration at 0.5 Mach number were also made. Project Squid, Technical report no. 35. ATI 197742. Contract N6 ori-105, T. O. III, NR 098-038.

Land Transportation

Mobility test of jet transport trailer, Hammond model 3000, by James C. Stelyn. U. S. Air Force. Air Research and Development Command, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, Jul 1955. 31p photos, diagr, graphs. Order from LC. Mi \$3, ph \$6.30. PB 119762

Dynamic loads were determined which may be imposed on the jet transport trailer and its cargo when towed over various types of test surfaces. Technical grouping T54P. AD 70020. AF WADC TN 55-304.

Marine Transportation

Absorption coefficients of sound in sea water, by E. B. Stephenson. U. S. Naval Research Laboratory. Aug 1938. 46p graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 120385

1. Sound - Absorption 2. Sea water - Sound transmission 3. NRL S 1466.

Applications of biological and chemical oceanography to delimitation of environments on continental shelf. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Texas. Mar 1955. 25p table. Order from LC. Mi \$2.70, ph \$4.80. PB 119917

Under biological oceanography the following are considered: A. Bottom-dwelling organisms; B. Biological factors in development of shore and coast. Under chemical oceanography: A. Salinity and B. Isotopes. Conclusions and bibliography attached. Interim report. Contract N7 onr-487, T. O. 6, NR 388-099.

Effect of shallow water on the hydrodynamic characteristics of a flat-bottom planing surface, by Kenneth W. Christopher. U. S. National Advisory Committee for Aeronautics. Apr 1956. 36p photos, drawings, diags, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120406

The effects on the planing characteristics of the clearance between a flat-bottom planing surface and the tank bottom are presented. The range of trims investigated was from 4° to 20° for wetted-length-beam ratios of 0.4 to 6.4. Each condition was investigated over a range of clearances of from 0.2 to 1.6 beams. All the measured values increased with decreasing clearance. A description of the monorail and its associated apparatus is included. NACA TN 3642.

Experiments with tanker models IV, by Hans Lindgren. Sweden. Statens Skeppsprovninganstalt, Göteborg, Sweden. 1956. 38p graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119905

Continues experiments with tanker models at the Swedish Shipbuilding Experimental Tank from 1952. Propulsive characteristics and problems are the principle points of interest. Study of the effects of systematic variation of: (A) the form of the after-body sections, which was varied from extreme U-form to extreme V-form; and (B) the propeller dimensions, which were varied systematically to give four inter-related propellers of equal coarseness. The four model hulls were tested with each of the four propellers in turn. For experiment II see PB 116760. I and III are issued as Meddelanden no. 23 and no. 29. Sweden. Statens Skeppsprovninganstalt, Göteborg, Sweden. Meddelanden no. 36.

Marine wood-boring organisms. Annual progress report for the period 1 Jan-31 Dec 1954 under

Contract no. Nonr-233(13), NR 163-084, by Robert J. Menzies and Martin W. Johnson. California. University. Scripps Institution of Oceanography. Jan 1955. 27p graphs, tables. Order from OTS. 75 cents. PB 111908

Objectives are to gather data on the life history of the wood-borers, principally *Limnoria*, in order to elucidate their reproductive, migratory, and wood-boring habits, and to relate these to environmental conditions that may have a bearing on effective control or avoidance of the ravages of these borers. For 1953 annual report see PB 116182. UC SIO Ref 55-1.

Physiology of deep-sea animals. Section I: Techniques of live capture and maintenance. Annual progress report for the period Jul 1, 1954-Dec 31, 1954 under Contract no. Nonr-1135(02), NR 163-281, by Talbot H. Waterman and Theodore A. Napor. Bermuda Biological Station, St. George's West, Bermuda. Jan 1955. 10p graphs, table. Order from LC. Mi \$1.80, ph \$1.80. PB 119605

1. Animals, Aquatic - Physiology - Bermuda
2. Biological research - Bermuda 3. Contract Nonr-1135(02), NR 163-281.

Pleistocene chronology of the Great Lakes region, by Jack L. Hough. Illinois. University, Urbana, Ill. Jan 1953. 124f maps, diags, table. Order from LC. Mi \$6.30, enl pr \$21.30. PB 122095

The principal objective, in this final report, is to present a revision of the geologic history of the Great Lakes. This revised history is based on the facts and in part on the conclusions reported in earlier monographs and other publications on the subject. It takes into account the recent papers dealing with parts of the lake history, and it utilizes the new information gained in the field and in the laboratory by the project. Final report under Contract no. N6 ori-07133, Project NR 018-122. Includes "Fathogram indications of bottom materials in Lake Michigan", by J. L. Hough (Reprinted from *Sedimentary Petrology*, vol. 22, no. 3, p. 162-172, Sep 1952).

Reduction of sound in diving helmets, by F. W. Struthers. U. S. Naval Research Laboratory. Jun 1939. 9p diagr, graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 120439

1. Helmets, Diving - Noise reduction 2. NRL S 1538.

MISCELLANEOUS

Report of NRL progress. U. S. Naval Research
Laboratory. Jul 1958. 58p. Order from OTS.
\$1.25. PB 121349

Contents: Articles: New tool for materials strength research, by M. W. Brossman. - Broad-band X-band ferrite duplexer, by J. W. Bryan. - Portable air-operated aerosol generator, by J. K. Thompson. - Scientific program: Problems accepted. - Problem notes: Applications research: Experimental study of naval systems organization. - Chemistry: Colloidal properties of the phenylstearates of the alkali and alkaline earth metals in benzene. . . . Mechanisms of linseed oil film degradation under ultraviolet irradiation. . . . Reactions of esters of phosphorus acids with metallic compounds. - Mathematics: Effect of boundary conditions on the pattern of longitudinal waves propagated in a circular cylinder. . . . Effect of the stress-strain-time relationship on the patterns of longitudinal oscillations. - Mechanics: On attempts to follow the stress-strain history of metal specimens loaded to a value close to the yield point and simultaneously subjected to neutron irradiation. . . . Static and dynamic calibration of a photoelastic model material. . . . Effect of solvent-type cements on the shatter resistance of stretch-oriented acrylics. . . . A remote control wideband multichannel telemeter used for long-distance measurement and recording of shock and

vibration in naval structures. . . . High-velocity caliber .30 gun (helium type) designed for studying the penetration of small particles. - Metallurgy and ceramics: Polarographic solution screening test aids search for non-embrittling cadmium-plating bath. . . . The Hall effect in the silver-palladium alloy system. . . . Effect of vacuum degassing on properties of various aluminum alloys. . . . Progress of service failure correlations with the NRL drop weight test. . . . Hydrogen effusion technique extended successfully to corrosion rate measurements in thermal convection loops constructed of commercial piping. - Nuclear and atomic physics: The disordering of polyatomic solids by neutrons. - Optics: Atmospheric refraction over water under a variety of meteorological conditions. - Radio: Overload behavior of low-power traveling-wave tube amplifiers. . . . High-level microwave detector. . . . Multiple mode excitation of the trimode turnstile waveguide junction. . . . A synchrodata quantizer and serve. . . . Starting currents in single-cavity klystrons. . . . Thin dielectric film of bentonite clay for cathode-ray storage tubes. . . . Analysis of the dc pulsed thermionic emission from BaO. - Solid state physics: Paramagnetic resonance absorption of Mn^{II} in single crystals of zinc-blende. . . . Effect of magnetocrystalline anisotropy on the magnetic spectra of Mg-Fe ferrites. . . . Dielectric properties and molecular structure of certain partially fluorinated esters. . . . Emission band shape of KCl:TI at temperatures in the range from 4°K to 300°K. - Published reports. - Papers by NRL staff members. - Patents.

ATOMIC ENERGY REPORTS OF INTEREST TO INDUSTRY

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Biology and Medicine

10p. Order from LC. Mi \$1.80, ph \$1.80.

A-1788

Effect of X-irradiation on rat spleen adenylate

kinase, by Edwin M. Uyeki. Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project. Jan 1956. Contract W-31-109-eng-78. 13p. Order from LC. Mi \$2.40, ph \$3.30.

NYO-4926

Thermodynamics of the reduction of certain halides,

by Clyde A. Hutchison and James S. Smith. Columbia Univ., New York. Div. of War Research. Aug 1944. Decl. Dec 1955. Contract W-7405-eng-50. 10p. Order from LC. Mi \$1.80, ph \$1.80.

A-2108

The use of the hepatoscan for the visualization of

liver abnormalities, by Abbas M. Rejali, W. J. MacIntyre, and H. L. Friedell. Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project. Mar 1956. Contract W-31-109-eng-78. 38p. Order from LC. Mi \$3, ph \$6.30.

NYO-4927

Preliminary investigation employing a rotating kiln

for the preparation of $RF_4(UF_4)$ by reaction of $RO_3(UO_3)$ and "Freon-114" ($C_2F_4Cl_2$) at elevated temperatures, by Charles A. Kraus. Brown Univ., Providence. Mar 1945. Decl. Jan 1956. Contract W-7405-eng-73. 6p. Order from LC. Mi \$1.80, ph \$1.80.

A-2309

Health Physics Division semiannual progress report

for period ending January 31, 1956. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-eng-26. 68p. Order from LC. Mi \$3.90, ph \$10.80.

ORNL-2048

Preparation of $RCl_4(UCl_4)$ by vapor phase chlori-

nation of $RO_2(UO_2)$ formed by reducing $RO_3(UO_3)$ with ethanol, by Charles A. Kraus. Brown Univ., Providence. Jul 1945. Decl. Jan 1956. Contract W-7405-eng-73. 11p. Order from LC. Mi \$2.40, ph \$3.30.

A-2313

Chemistry and Chemical Engineering

Determination of the chlorine-oxygen ratio in the

counter-current electrolysis of uranyl chloride solutions, by Walter J. Hamer. National Bureau of Standards, Washington, D. C. Mar 1943. Decl. Jan 1956. 23p. Order from LC. Mi \$2.70, ph \$4.80.

A-494

Influence of salt impurities on the calcination of

$RO_4(UO_4)$ to $RO_3(UO_3)$, by Charles A. Kraus. Brown Univ., Providence. Aug 1945. Decl. Jan 1956. Contract W-7405-eng-73. 8p. Order from LC. Mi \$1.80, ph \$1.80.

A-2319

Directions for the preparation of $X(OC_2H_5)_5$ and

$X(OC_2H_5)_6$, by Henry Gilman. Ames Lab., Ames, Iowa. Feb 1943. Decl. Dec 1955. 15p. Order from LC. Mi \$2.40, ph \$3.30.

A-523

Influence of temperature on the extraction of

$RO_2(NO_3)_2[UO_2(NO_3)_2]$ by polyethers. Report no. 1, $Ca(NO_3)_2$ and $Al(NO_3)_3$ as salting out agents and dibutyl "carbitol" as extraction agent, by Charles A. Kraus. Brown Univ., Providence. Sep 1945. Decl. Jan 1956. Contract W-7405-eng-73. 14p. Order from LC. Mi \$2.40, ph \$3.30.

A-2322

The electromotive force of the reaction between

chlorine and uranous chloride in hydrochloric acid solution, by John Keenan Taylor and Edgar Reynolds Smith. National Bureau of Standards, Washington, D. C. Apr 1944. Decl. Jan 1956.

Influence of temperature on the extraction of

$RO_2(NO_3)_2[UO_2(NO_3)_2]$ by polyethers. Report no.

2. $\text{Cu}(\text{NO}_3)_2$ and $\text{Fe}(\text{NO}_3)_3$ as salting out agents and dibutyl "carbitol" as extraction agent, by Charles A. Kraus, Brown Univ., Providence, Nov 1945. Decl. Jan 1956. Contract W-7405-eng-73. 13p. Order from LC. Mi \$2.40, ph \$3.30. A-2323
- Extraction of $\text{RO}_2(\text{NO}_3)_2 [\text{UO}_2(\text{NO}_3)_2]$ employing methylisobutyl ketone as extraction agent, by Charles A. Kraus, Brown Univ., Providence, Nov 1945. Contract W-7405-eng-73. 8p. Order from LC. Mi \$1.80, ph \$1.80. A-2324
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- Influence and control of acid in extraction processes, by Charles A. Kraus, Brown Univ., Providence, Feb 1946. Decl. Jan 1956. Contract W-7405-eng-73. 54p. Order from LC. Mi \$3.60, ph \$9.30. A-2327
- Development of shipping cylinders for C-216 (F_2). Problem report JWD-43, by J. F. Froning and M. K. Richards, Du Pont de Nemours (E.I.) and Co., Jackson Lab., Wilmington, Del. Jan 1945. Decl. Jan 1956. Contract W-7412-eng-151. 13p. Order from LC. Mi \$2.40, ph \$3.30. A-2555
- Plant for packaging fifteen pounds C-216 (F_2) per day by the liquefaction method. Problem report JWD-45, by J. F. Froning and M. K. Richards, Du Pont de Nemours (E.I.) and Co. Jackson Lab., Wilmington, Del. Jan 1945. Decl. Jan 1956. Contract W-7412-eng-151. 16p. Order from LC. Mi \$2.70, ph \$4.80. A-2557
- The spectrographic determination of the rare earths, by David Kaufman, Massachusetts Inst. of Tech., Cambridge, Spectroscopy Lab. Mar 1946. Decl. Dec 1955. 16p. Order from LC. Mi \$2.40, ph \$3.30. A-2910
- Preparation of pure C_7F_{14} by fractional distillation of C_7F_{14} foreshot, by F. H. Max Nestler, J. R. Hendrickson, T. E. Zava, and A. Alfano, Carbide and Carbon Chemicals Corp., Oak Ridge, Tenn. Jul 1946. Decl. Jan 1956. 18p. Order from LC. Mi \$2.40, ph \$3.30. A-3608
- Construction, installation and operation of Harshaw fluorine cell, by H. D. Williams, G. C. Whitaker, and K. E. Long, Harshaw Chemical Co., Cleveland, Nov 1944. Decl. Dec 1955. Contract W-7405-eng-43. 18p. Order from LC. Mi \$3.30, ph \$7.80. A-4013
- Attempts to prepare trifluoroacetic acid by the reaction of cobaltic fluorides with acetic anhydride and acetonitrile, by H. S. Halbedel, Harshaw Chemical Co., Cleveland. May 1945. Decl. Jan 1956. Contract W-7405-eng-43. 3p. Order from LC. Mi \$1.80, ph \$1.80. A-4014
- Report for general research for September 18 to December 11, 1950. (Radium volume). Mound Lab., Miamisburg, Ohio. Jan 1951. Decl. with deletions Aug 1955. Contract AT-33-1-gen-53. 65p. Order from LC. Mi \$3.90, ph \$10.80. AECD-3694
- Measurements of the viscosity of flinak (11.5 Mol % NaF, 42 Mol % KF, and 46.5 Mol % LiF), by M. Tobias, Oak Ridge National Lab., Y-12 Area, Tenn. Feb 1952. Decl. with deletions Nov 1955. Contract W-7405-eng-26. 9p. Order from LC. Mi \$1.80, ph \$1.80. AECD-3775
- The recovery of uranium by the high temperature chlorination of the ammonia precipitate obtained from oxidized alpha gunk, by J. Newcomer, Purdue Univ., Lafayette, Ind. Mar 1946. Decl. with deletions Dec 1955. Contract W-7405-eng-74. 22p. Order from LC. Mi \$2.70, ph \$4.80. AECD-3784
- Hydrogen peroxide analysis and decomposition in chromate solutions, by J. Rynasiewicz and J. W. Ryan, Knolls Atomic Power Lab., Schenectady, N. Y. Mar 1952. Decl. with deletions Dec 1955. Contract W-31-109-eng-52. 24p. Order from LC. Mi \$2.70, ph \$4.80. AECD-3790
- Application of conductivity measurements to a study of (a) complex formation between $\text{TO}^{2++} (\text{UO}_2^{2+})$ and F^- and Al^{+++} and F^- (b) titration of F^- ion with H^+ ion, by F. W. Tober, Tennessee Eastman Corp., Oak Ridge, Tenn. Sep 1945. Decl. Jan 1956. Contract W-7401-eng-23. 17p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3858
- The absorption of fluorine and uranium hexafluoride by sodium carbonate solutions, by George G. Joris and Charles D. Compton, Princeton Univ., N. J. 1946. Decl. Jan 1956. 30p. Order from LC. Mi \$3, ph \$6.30. AECD-3892
- A rapid method for determination of water in $\text{TO}_3 (\text{UO}_3)$, by B. B. Barash, F. B. Lee, and E. O. Curtiss, Tennessee Eastman Corp., Oak Ridge,

- Tenn. Feb 1945. Decl. Dec 1955. Contract W-7401-eng-23. 13p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3898
- A pilot plant for the preparation of uranium tetrachloride by fluidization, by H. A. Perlmutter, J. H. Coobs, R. S. Lowrie, and A. J. Miller. Tennessee Eastman Corp., Oak Ridge, Tenn. Mar 1946. Decl. Dec 1955. Contract W-7401-eng-23. 16p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3918
- Chemistry Division, Section C-I summary report for April, May and June 1951, by D. W. Osborne, ed. Argonne National Lab., Lemont, Ill. Aug 1951. Decl. with deletions Dec 1955. Contract W-31-109-eng-38. 23p. Order from LC. Mi \$2.70, ph \$4.80. AECD-3927
- Tuballoy oxides in the reduction of TO_3 , by Charles Tanford, R. L. Tichenor, and C. E. Larson. Tennessee Eastman Corp., Oak Ridge, Tenn. Jul 1945. Decl. Dec 1955. Contract W-7401-eng-23. 20p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3961
- Interfacial tension measurements on $Al(NO_3)_3-H_2O-HNO_3$ -dibutyl cellosolve system, by E. H. Turk. Clinton Labs., Oak Ridge, Tenn. Jan 1947. Decl. Dec 1955. 9p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3964
- The Hanford polarograph, by William N. Carson, Jr. Hanford Works, Richland, Wash. Apr 1949. Decl. Dec 1955. Contract W-31-109-eng-52. 13p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3865
- The catalytic recombination of hydrogen and oxygen, by T. W. Costikyan, C. B. Hanford, and D. L. Johnson. Engineering Practice School, Mass. Inst. of Tech., Oak Ridge, Tenn. Jun 1952. Decl. Dec 1955. 26p. Order from OTS. 25 cents. AECD-3969
- The preservation of fluorescence standards, by Henry M. Grotta. Tennessee Eastman Corp., Oak Ridge, Tenn. Feb 1946. Decl. Dec 1955. 6p. Order from LC. Mi \$1.80, ph \$1.80. AECD-3970
- Uranium hydride: A survey, by A. S. Kitzes. Oak Ridge National Lab., Tenn. Apr 1950. Decl. with deletions Dec 1955. Contract W-7405-eng-26. 13p. Order from LC. Mi \$2.40, ph \$3.30. AECD-3981
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- Reclamation of contaminated kinney and diffusion pump oils and removal of uranium therefrom, by J. E. Lee, Jr., L. M. Aikin, and C. D. Susano. Tennessee Eastman Corp., Oak Ridge, Tenn. Mar 1947. Decl. Jan 1956. Contract W-7401-eng-23. 24p. Order from LC. Mi \$2.70, ph \$4.80. AECD-4089
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- Progress report for August 1948. Standard Oil Development Co., Elizabeth, N. J. Sep 1948. Decl. Jan 1956. Contract AT-30-3-gen-3. 13p. Order from LC. Mi \$2.40, ph \$3.30. AECD-4091
- Recovery of uranium from oil distillation residue, by J. E. Lee, Jr., L. M. Aikin, and C. D. Susano. Tennessee Eastman Corp., Oak Ridge, Tenn. Feb 1947. Decl. Jan 1956. Contract W-7401-eng-23. 11p. Order from LC. Mi \$2.40, ph \$3.30. AECD-4092
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- Separation of iron and tuballoy with phthalic acid, by R. E. Hoffman, G. M. Armstrong, A. J. Miller, and J. W. Gates, Jr. Tennessee Eastman Corp., Oak Ridge, Tenn. Jan 1945. Decl. Jan 1956. Contract W-7401-eng-23. 6p. Order from LC. Mi \$1.80, ph \$1.80. AECD-4114
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- Spectrophotometric evidence for the existence of UCl₅ as a double compound of UCl₆ and UCl₄, by C. C. Sterett and V. P. Calkins. Tennessee Eastman Corp., Oak Ridge, Tenn. Dec 1946. Decl. Jan 1956. Contract W-7401-eng-23. 22p. Order from LC. Mi \$2.70, ph \$4.80. AECD-4123
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- Dissolution and recovery of uranium from phosphate rock and shale by chemical methods, by John D. Sullivan. Battelle Memorial Inst., Columbus, Ohio. Apr 1947. Decl. Feb 1956. Contract W-38-094-eng-27. 11p. Order from LC. Mi \$2.40, ph \$3.30. AECD-4128
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- Engineering study of evaporation for concentrating radioactive liquid wastes. Engineering research final report, by R. L. Bates and M. McEwen, Mound Lab., Miamisburg, Ohio. Nov 1950. Decl. with deletions Jan 1956. Contract AT-33-1-gen-53. 15p. Order from LC. Mi \$2.40, ph \$3.30. AECD-4150
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- Determination of chromium in plutonium, by Maynard E. Smith, Los Alamos Scientific Lab., Los Alamos, N. Mex. Apr 1955. Decl. Dec 1955. Contract W-7405-eng-36. 27p. Order from OTS. 25 cents. AECD-4171
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- Calculated thermal conductivities of pure gases and gaseous mixtures at elevated temperatures, by J. M. Wright, Hanford Works, Richland, Wash. Jul 1951. Decl. with deletions Dec 1955. Contract W-31-109-eng-52. 15p. Order from LC. Mi \$2.40, ph \$3.30. AECD-4197
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- A volumetric method for the determination of lithium, by R. H. Moore, Hanford Works, Richland, Wash. Jan 1951. Decl. with deletions Dec 1955. Contract W-31-109-eng-52. 11p. Order from LC. Mi \$1.80, ph \$1.80. AECD-4200
- Study of the feasibility of aqueous recovery of spent fuels. Part I. Dissolution experiments on alloy samples, by Philip J. Elving, John L. Griffin, and John O. Larson, Engineering Research Institute, University of Michigan, Ann Arbor, Mich. Jun 1954. 20p. Order from OTS. 25 cents. AECU-3160
- A "mock-up" method for studying the possible modes of radioactive contamination, by R. F. Plott, Argonne National Lab., Lemont, Ill. Aug 1949. Decl. Jan 1956. Contract W-31-109-eng-38. 5p. Order from LC. Mi \$1.80, ph \$1.80. ANL-4332
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CE-2532

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KAPL-332

Thermal stability of ferrous hydroxide precipitates, by F. J. Shipko and D. L. Douglas. Knolls Atomic Power Lab., Schenectady, N. Y. Nov 1955. Contract W-31-109-eng-52. 43p. Order from LC. Mi \$2.70, ph \$4.80.
KAPL-1377

Decontamination of crib wastes (24-A3). Progress report for second quarter, 1950 covering period April 1-June 30, 1950 on Job 24-A. Kellex Corp., New York, Jul 1950. Decl. Jan 1956. Contract AT(30-1)-850. 28p. Order from LC. Mi \$2.70, ph \$4.80.
KLX-1305

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M-256

A single column under continuous operation, by Nathan Rosen. North Carolina Univ., Chapel Hill. (194?). Decl. Jan 1956. Contract W-7401-eng-37. 36p. Order from LC. Mi \$3, ph \$6.30.
M-1349

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M-1378

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M-2104

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M-2113

Investigations on gunk solution. Monthly report no. 13, by Charles A. Kraus. Brown Univ., Providence. Jul 1944. Decl. Jan 1956. Contract W-7405-eng-73. 9p. Order from LC. Mi \$2.40, ph \$3.30.
M-2178

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M-2179

Tentative dye works process for the manufacture of $(UO_4 \cdot 2H_2O)$ C-112 paste from C-100. (Na_2UO_4) , by Louis Spiegler. Du Pont de Nemours (E.I.) and Co. Jackson Lab., Wilmington, Del. Mar 1943. Decl. Jan 1956. 7p. Order from LC. Mi \$1.80, ph \$1.80.
M-3001

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M-3030

The direction spectrophotometric determination of iron in uranium and its compounds, by V. A. Fassel. Chicago. Univ. Metallurgical Lab. Apr 1945. Decl. Feb 1956. 14p. Order from LC. Mi \$2.40, ph \$3.30.
M-3049

Analysis of certain uranium alloys, by Charles V. Banks. Chicago. Univ. Metallurgical Lab. (194?). Decl. Jan 1956. Contract W-7401-eng-37. 36p. Order from LC. Mi \$3, ph \$6.30.
M-3056

Extraction of molybdenum by cupferron and chloroform, by D. R. Norton. Princeton Univ., N. J. Frick Chemical Lab. Nov 1945. Decl. Jan 1956. 5p. Order from LC. Mi \$1.80, ph \$1.80.
M-3082

Stability of plastic gasketing materials in crud removal solutions, by W. B. Howerton. Clinton Labs., Oak Ridge, Tenn. Aug 1947. Decl. Jan 1956. 6p. Order from LC. Mi \$1.80, ph \$1.80.
M-4164

The polarographic determination of uranium--application to low-grade complex materials, by N. H. Furman and G. P. Haight, Jr. Princeton Univ., N. J. Frick Chemical Lab. 1946. Revised Oct 1947. Decl. Nov 1955. 32p. Order from LC. Mi \$3, ph \$6.30.
M-4245

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M-4497

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UR-431

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Columbia Univ., N. Y. Pupin Physics Labs; Mar
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- Production of finned aluminum tubing for Brookhaven National Laboratory, by F. R. Kemmer and P. Miller. Ferguson (H. K.) Co., Inc., New York. May 1949. Decl. Dec 1955. Contract AT-30-2-gen-16. 52p. Order from LC. Mi \$3.60, ph \$9.30. HKF-5
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