

language has undergone a formal codification in recent years. In this respect the book utilizes a glorious mixture of the old and the new, albeit no more so than most biochemical papers currently appearing in the language of Shakespeare. Some umbrage could be taken at a complete juxtaposition of the old and the new such as the hyphen usage in the same sentence on page 82 or the "Fructan" and "Fructosan" in the headings of page 180. Along with many other writers, the author does not understand that the order of group arrangement on the anomeric carbon is the same for  $\beta$ -D and  $\alpha$ -L or for  $\alpha$ -D and  $\beta$ -L, a circumstance which requires the inclusion of the configurational symbol in the name. The diagrams are of the type one might find in the notes of a student possessing no modicum of talent in lettering; the one on page 217 is especially crude. On the whole this text does not meet current requirements for an introductory text in modern carbohydrate chemistry.

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**Progress in Cryogenics.** Volume 2. Edited by K. MENDELSSOHN, D. Phil. (Berlin), M. A. (Oxon), F. Inst. P., F. R. S. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. vii + 280 pp. 16 × 25 cm. Price, \$11.50.

The year of publication of this second volume of reviews of progress in cryogenics is just one year beyond the fiftieth anniversary of the first liquefaction of helium and one year short of the fiftieth anniversary of the discovery of superconductivity. The contents of the volume testify to the remarkable expansion of cryogenics during this half-century. When Kamerlingh Onnes liquefied helium and discovered superconductivity, low-temperature physics was an esoteric branch of science in which less than a dozen scientists had any competence. The fact that this series of reviews is to a considerable extent devoted to cryogenic engineering makes clear the degree to which cryogenics has become a widely practiced field of technology due to the importance of low-temperatures not only for pure research in many branches of science but in many kinds of industry as well. This rapid expansion and wide application of cryogenic techniques makes this book especially welcome.

Following a brief preface by the editor, there are eight reviews varying in length from eighteen pages on deuterium separation to sixty pages on the *maser*.

The titles and authors are: The Storage and Handling of Cryogenic Liquids, G. H. Zenner, Linde Company, Tonawanda, New York; The Gas Refrigeration Machine and its Position in Cryogenic Technique, Dr. J. W. L. Kohler, Philips Research Laboratories, Eindhoven; The Separation of Deuterium on an Industrial Scale by Low Temperature Distillation, M. P. Malkov, A. G. Zel'Dovich, A. B. Fradkov, I. B. Danilov, Institute for Physical Problems, Moscow; Low-Temperature Bubble Chambers, N. C. Barford, Imperial College of Science and Technology, London; the 1958 Scale of Temperatures for the Liquid Helium-4 Region, Dr. H. Van Dijk, Kamerlingh Onnes Laboratory, Leiden; Resistance Thermometers for Low Temperatures, C. R. Barber, National Physical Laboratory, Teddington; The Three Level Solid State Maser, E. O. Schulz-DuBois, Bell Telephone Laboratories, Murray Hill, New Jersey; Methods of Nuclear Orientation, Dr. E. Ambler, National Bureau of Standards, Washington, D. C.

The first three articles are of interest chiefly to cryogenic engineers; but if a low-temperature chemist or physicist is not lucky enough to have an engineer providing facilities for him, he may find here a number of helpful ideas for solving his own special problems of technique. The fourth article is of special note as it describes the development of the bubble-chamber technique that recently won a Nobel Prize for D. A. Glaser; it is a fascinating chapter in the imaginative marriage of two here-to-fore unrelated fields to produce widely influential progeny. The next two reviews on topics concerned with temperature scale and measurement are especially important for those working in the lowest decades of degrees. The review of research on the three level maser is of wider interest not only because of what it describes in covering past work but for what it implies as possibilities for future development. The theory of maser action raises significant questions concerning the concept

of temperature itself, such as the meaning of negative temperature. The kind of interaction involved has a bearing not only on practical communication problems involving signals with very small energy content, but may open new doors for the study of "communication" in megamolecules, especially in organized channeled systems of a biochemical nature. These networks of signal and response hold the clue to problems of growth and interaction in many chemical systems; and any new means of measuring quanta of energy at the megamolecular level is bound to be ultimately important in future chemistry.

The editor of this volume is to be commended for assembling this series of reviews, well planned and written to summarize and correlate the selected fields, and presented in a pleasing volume that is bound to be both useful and stimulating.

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**Spot Tests in Organic Analysis.** Sixth, enlarged and revised English Edition by FRITZ FEIGL, Eng., D.Sc., Laboratório da Produção Mineral, Ministério da Agricultura, Rio de Janeiro; Professor at the University of Brazil; Member of the Austrian and Brazilian Academies of Science. Translated by RALPH E. OESPER, Ph.D., Professor Emeritus, University of Cincinnati. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1960. xx + 675 pp. 16.5 × 23.5 cm. Price, \$13.25.

The Fifth English edition of this book appeared in 1956. The rapid growth of spot tests applied to organic substances is indicated by the increase in the number of sections in the 6th ed.—32 preliminary (exploratory) tests in the 6th ed., 25 in the 5th; 70 tests for functional groups in the 6th ed., 49 in the 5th; 133 tests for individual groups in the 6th ed., 78 in the 5th; and 111 practical applications in the 6th ed., 62 in the 5th. Altogether about 600 tests are described and the necessary information for each test is given, including "successful and unique tests in synthetic fibers, plastics and rubbers."

A careful study by the author of "new or hitherto neglected methods in qualitative organic analysis, and the application of the experience gained along these lines, resulted in the discovery and development of so many sensitive and strikingly simple tests that there was every justification for issuing the new edition of "Spots Tests in Organic Analysis." Because of the mass of material available for the new edition, the previous text had to be pruned by deletions, abridgements and typographical simplifications in order to prevent the book from becoming too bulky. In this judicious way the author has held the 6th ed. to an increase of only about sixty pages. The style and arrangement of the material in the new edition closely follows that in the previous ones.

The book contains six chapters: Chapter 1, Development, Present State and Prospects of Organic Spot Test Analysis (33 pp.); Chapter 2 (by P. W. West), Spot Test Techniques (29 pp.); Chapter 3, Preliminary (Exploratory) Tests (96 pp.); Chapter 4, Detection of Characteristic Functional Groups in Organic Compounds (178 pp.); Chapter 5, Identification of Individual Organic Compounds (163 pp.); Chapter 6, Application of Spot Reactions in the Testing of Materials, Examination of Purity, Characterization of Pharmaceutical Products, etc. (98 pp.). The author directs particular attention to Chapter 6, "which illustrates the truly fascinating use of spot tests in the examination of commercial materials" (drugs, dyes, plastics, rubbers, synthetic fibers, etc.).

At the end of each chapter is an extensive list of references to the literature, the total being about nine hundred. Following the last chapter, there are addenda (12 pp.) to Chapters 3, 4 and 5, bringing them up to 1960. Then follows a tabular summary (24 pp.) of the limits of identification attained by spot tests for (a) elements, (b) characterizing orientations, (c) characteristic groups and (d) individual compounds. The limits of identification are given for the lowest and highest values obtained when different compounds are examined or different procedures are used. A macrodrop (*ca.* 0.05 ml.) is implied, unless otherwise stated. Author and subject indexes conclude the book. The index is

comprehensive, and the page numbers are in italics where tests concerning the compounds in question are described.

R. E. Oesper, well-known translator of Feigl's books, is to be congratulated for making "Spot Tests in Organic Analysis" available in clear and concise English. Printing and paper are good and the book has an attractive cloth binding.

This volume, together with its companion volume on "Spot Tests in Inorganic Analysis" (5th ed., 1958), is a useful and up-to-date source of information not only to analytical chemists but also to organic chemists, pharmaceutical chemists and biochemists, as well as to advanced students in chemistry as an aid to the performance of spot tests and to an understanding to the underlying chemistry. Research workers in analytical chemistry will find these two volumes stimulating and helpful.

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**Comparative Effects on Radiation.** Report of a Conference held in San Juan at the University of Puerto Rico, February 15-19, 1960, sponsored by National Academy of Sciences-National Research Council. Edited by MILTON BURTON, Chemistry Department and Radiation Laboratory, University of Notre Dame, J. S. KIRBY-SMITH, Biology Division, Oak Ridge National Laboratory, and JOHN L. MAGEE, Chemistry Department and Radiation Laboratory, University of Notre Dame. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. xx + 426 pp. 16 × 23 cm. Price, \$8.50.

This symposium, held a little less than ten years after the prototype symposium at Oberlin, again brought physicists, chemists and biologists together to consider fundamental problems of the interaction of radiation with matter at various levels of organization and complexity. However, the similarity ceases here, except for some continuity of editorship. The primary theme for this conference was energy transfer. The papers by Fano, Kasha, Magee and Forster develop ways in which the exciton theory of electronic energy levels may be pertinent to the transfer of excitation from absorbed radiant energy in condensed molecular media. Kallmann presents an invited paper commenting on Forster's views and presenting data on energy transfer in rigid media. The paper by Hochanadel provides a useful (and to this reader a more definitive than some) summary of current thoughts on the radiolysis of water. Effects in organic systems are considered by Hamill (benzene and halogen compounds) and by Charlesby (polymers). The import of these phenomena for biological systems is covert except in the discussion sessions when some speculations are made. Correlation between events occurring in microseconds after energy adsorption and structural or functional defects measured from seconds to years after exposure has not yet developed. It is possible that these papers are pointing the way, however.

Structural changes in nucleic acids and their components as described by B. and A. Pullman provide a possible bridge *via* large molecules. In Hutchinson's chapter on radiation effects in monolayers the presentation is aimed at cellular function and produced a lively disputation on the interpretation of membrane and permeability effects in irradiated cells. An unexpected bonus appears in the discussion for this chapter in Platt's presentation of Szilard's theoretical ideas on potential "flip-flop" systems in the cell.

Experience with living systems is represented by Swanson's discussion contrasting the initial effects of different types of radiation, the mechanism of photorecovery as presented by Rupert (substantial progress has occurred), and photoresponsiveness mediated by the plant pigment phytochrome as discussed by Hendricks.

Whereas the Oberlin symposium volume provided quite general coverage of many areas, this volume is quite specialized, and is less appropriate for the general reader. This is consistent with the purposes of these NAS-NRC sponsored symposia (note also the Highland Park conferences). However, a direct concern with and knowledge of energy transfer processes will be prerequisite to a detailed understanding of many of the papers. Some of the data seem to be almost irrelevant to the theme, but adroit comments by the editors reveal their pertinence. The recorded

discussions are carefully presented and edited and do much to give the chapters a feeling of purpose. Without these, the volume would be largely a collection of specialized, sometimes only vaguely related papers. With them, the progress of the last ten years and portents for the future in understanding the early events in irradiated systems are highlighted.

The format is pleasing and readable.

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**Infrared Methods. Principles and Applications.** By G. K. T. CONN, Department of Physics, University of Exeter, Exeter, England, and D. G. AVERY, Development and Engineering Group, United Kingdom Atomic Energy Authority, Capenhurst, England. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. viii + 203 pp. 16 × 23 cm. Price, \$6.80.

This volume gives the operating characteristics and the physical properties of the components, materials and systems used in studying or measuring absorption spectra in the portion of the infrared region between 1 and 25 microns. A brief introduction to infrared studies prefaces the volume, which is divided into two sections.

The first section deals with the individual components, materials employed and the design of units of an infrared spectrometer. There are chapters on sources of radiation, optical materials, detectors, amplifiers, and dispersive systems. The second section of the book covers practical infrared spectroscopy and there are chapters on calibration of detectors, monochromator design, non-dispersive absorption instruments, and radiation pyrometry.

The book is well written, clear, and concise, with extensive references for each chapter; however, it is not clear for whom this book is intended. The title would be misleading to the analytical spectroscopist, as the scope of the book covers infrared instrumentation and deals primarily with the spectrometer. The book does not instruct in or review methods of analysis or interpretation of spectra; however, the material presented will give the analytical spectroscopist a comprehensive survey of the components of his spectrometer and a finer appreciation of the design of commercial instruments.

The design spectroscopist may find some sections oversimplified and others of academic interest only, but the collection of references and bibliographies for review may be of sufficient value to warrant adding to his library.

The student of science will find the book most instructive because of the detailed treatment of each subject. The book will serve well as an introduction to infrared studies because the subject matter presented has not been similarly covered in any prior publication.

The Practical Applications Section appeared to have been added to broaden the scope of the book; however, it is not extensive enough to be helpful or educational. The material covered in this section has been better presented elsewhere.

In summary, the student or beginning spectroscopist will find the book most valuable; the analytical spectroscopist will find the book interesting and instructive in parts, while the design spectroscopist will probably value the book as a collection of references.

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CORPORATION OF AMERICA  
RESEARCH AND DEVELOPMENT DEPARTMENT  
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R. C. WILKERSON

**Block and Graft Polymers.** By WILLIAM J. BURLANT, Chemistry Department, Scientific Laboratory, Ford Motor Co., and ALLAN S. HOFFMAN, Assistant Professor of Chemical Engineering, Massachusetts Institute of Technology. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. vi + 166 pp. 16 × 23.5 cm. Price, \$7.95.

The interesting book on "Block and Graft Polymers" by Burlant and Hoffman appears to be addressed to non-specialists interested in applications. The solution properties and mechanical behavior of various polymers belonging