

cuss general topics: metal-bearing respiratory pigments of invertebrates (14 pp.), mineral composition of skeletons (10 pp.), the regulating influence of oceanic salt on the composition of marine organisms (10 pp.), and fundamental changes in the elementary composition of marine organisms during geological time (12 pp.). Concluding the monograph, there is a most impressive bibliography of more than 2000 titles that is largely the work of Mrs. Virginia Odum. Regrettably the topical subdivision of chapters, which is listed in the table of contents, provides the only means of entrance to the welter of information that is interwoven through the text as a whole, for there is no index—an omission that greatly impairs the usability of this enormously factual book.

For all who wish information as to the more than 60 elements recorded from living things, this will prove a useful and informative volume. It will help orient the reader, and perhaps enliven his interest in the ways in which organisms accumulate, limit, or reduce constituents in terms of the relative abundance of the elements in their immediate environment. Unfortunately little is known of the ways in which organisms effect this control, and Vinogradov's orientation to the subject permits scant consideration of mechanisms. But the problems are pointed out, and there is great advantage to having the background information available in one source. Although there are many biologists who will place quite different interpretations or emphasis upon the phylogenetic significance that Vinogradov attributes to certain correspondences among organisms in elemental accumulations, few will feel the discussions of these problems unrewarding. Perhaps the chief complaint concerning the text, if any need be made, lies with the general diffuseness of Vinogradov's treatment, and his willingness to discuss or record much that seems trivial. This criticism is dispelled, however, when it is recalled that we are dealing with a reference work that encompasses a literature of more than 2000 titles. To Vinogradov, and to his translators and collaborators, much gratitude is owing for this useful, expensively manufactured, and beautiful book.

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KENNETH W. COOPER

Physical Properties of Solid Materials. By C. ZWIKKER, Director, National Aeronautical Research Institute, Amsterdam. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1954. viii + 300 pp. 16.5 × 25 cm. Price, \$8.75

In the preface of this book the author states it is his purpose to give a summary of the physics of solids, to consider the theoretical concepts involved with a minimum of mathematical detail, and to consider as examples a few practical applications of the theories. He has adhered to this purpose with remarkable consistency. Consequently the book covers a wide range of subject matter and is a useful reference. The broad coverage makes it particularly useful to those whose main interests lie in other branches of science or as an introductory book for those primarily interested in solid state physics. On the other hand, the work is too condensed and the mathematics too abbreviated to satisfy the specialist interested in completeness and scientific unity; such a reader will probably feel that interrelations between the various phenomena have not been sufficiently emphasized.

The author has directed his discussions primarily at the beginner in solid state and has included several unusual explanations to clear up points which are frequently bothersome. For example, on page 102 (Chapter VI) after a good discussion of the concepts of elasticity and elastic waves, he has given an unusual drawing to illustrate the identity of long and short waves in an atomic chain. This is one particular item that is invariably confusing to the beginner and is seldom cleared up by the textbooks.

The text is clearly written and for a technical book is very readable. The author's apology for his language difficulties is entirely unnecessary as few English speaking scientists have written more clearly.

In particular the chapter on thermal properties is better than that found in most comparable books and provides the reader with some feeling for the problems and the various

simplifying assumptions which have been employed in solving the problems. In comparison with earlier books less attention has been given to the electronic properties of solids and the band theory. This may well represent a current trend in emphasis rather than the author's personal viewpoint.

As a minor matter of convenience the publishers could have put the chapter and paragraph numbers on each page.

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M. PARKER GIVENS

Structure Reports for 1950. Volume 13. General Editor: A. J. C. WILSON, University of Wales, Cardiff, Great Britain. Section Editors: N. C. BAENZIGER (Metals), University of Iowa, U. S. A.; J. M. BIJVOET (Inorganic Compounds), University of Utrecht, Holland; J. MONTEATH ROBERTSON (Organic Compounds), University of Glasgow, Great Britain. N. V. A. Oosthoek's Uitgevers MIJ., Domstraat 1-3, Utrecht, Holland. 1954. viii + 643 pp. 17.5 × 25 cm. Price, 80.—Dutch florins.

This newest volume of "Structure Reports" maintains the general excellence of its predecessors in the series. The reporting of essential structural results is critical and adequately detailed, with many excellent diagrams contributing to clarity. As "Structure Reports" is sponsored by the International Union of Crystallography, diffraction studies of crystalline structure naturally preponderate, and the coverage of such matters apparently is complete. Many data related to and even somewhat peripheral to this main theme are included, however. For example, there are reported numerous electron diffraction studies of gaseous molecules, several microwave studies of simple organic molecules, phase diagrams for many systems (metals particularly), studies of texture and epitaxy, etc. The convenience and utility to the student of crystalline structure of having "Structure Reports" at hand scarcely can be overestimated. As a reliable and easy to use guide to what has been done in the field, "Structure Reports" is warmly commended to the attention of the non-specialist.

It may be useful to note that with the appearance (also during 1954) of "Structure Reports" for 1945-46, volume 10, the gap in coverage between the last volume of "Strukturbericht," volume 7 (1939) and the "Structure Reports" has been narrowed to the period, 1940-44. "Structure Reports" for 1942-44, volume 9, now is being prepared for publication.

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J. L. HOARD

Monomeric Acrylic Esters. By E. H. RIDDLE, Rohm and Haas Company, Philadelphia, Pennsylvania. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1954. vii + 221 pp. 16 × 23.5 cm. Price, \$5.00.

This book is a practical guide to those who wish to use monomeric acrylic esters in polymerization on almost any scale, or in synthesis. Emphasis is on the four acrylic and seven methacrylic esters which are commercially available. By concentrating on operations and observations, and by reducing theoretical considerations to simple generalizations, much practical information has been included in moderate space. In general, journals and patents have been covered adequately through 1952, but there are many references to more recent or unpublished work.

The first three chapters tell how the monomers are made commercially, handled, stored and freed from inhibitor, and list their physical properties. The last chapter describes in detail analytical methods for the monomers and inhibitors. More than three-quarters of the book is devoted to the remaining three chapters on polymerization, copolymerization and other reactions. The reviewer's impressions are that the author writes well, that he knows his subject, that he has summarized the many patents briefly and rather optimistically, but that he has made little effort to evaluate the relative importance or usefulness of the numerous patents. Perhaps one should not expect the author to state the ad-

vances in some patents are trivial, while those in others are important, but it would nevertheless be interesting and useful to have his opinion. The copolymerization chapter is distinguished by 371 references, mostly to patents, on the preparation and properties of copolymers. The chapter on other reactions is notable for a sixteen-page table summarizing additions of amines to acrylic esters and for a six-page table on additions of nitroparaffins. A detailed table of "Contents" is a reasonable substitute for an index.

In comparison with the "Styrene" monograph by Boudry and Boyer, the acrylic ester book gives much less attention to the preparation of the monomer, to the properties of the pure polymers and to theory and interpretation in general, but the more concise presentation by a single author is an advantage. In comparison with "Monomers" by Blout and Mark, the present monograph has much less review of ester preparations, covers a smaller number of esters, gives a much better idea of what to expect from copolymers and is about six years more up-to-date. Chemists who want to use acrylic esters without great concern for theoretical details will find the "Monomeric Acrylic Esters" useful convenient and authoritative.

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F. R. MAYO

Dielectrics and Waves. By ARTHUR R. VON HIPPEL, Professor of Electrophysics and Director, Laboratory for Insulation Research, Massachusetts Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. xii + 284 pp. 22.5 × 28.5 cm. Price, \$16.00.

As the title indicates, this is an account of electromagnetic waves and their interaction with dielectric materials with emphasis upon those aspects of the subject which have come to be associated with the investigation of dielectrics. The title is a comprehensive one, but its breadth is justified by the content of the book. Sixty sections constitute the two principal divisions, Macroscopic Approach and Molecular Approach, and a considerable appendix contains problems and illustrative examples. The Macroscopic Approach, which forms the first third of the book, consists of sections such as Polarization and Magnetization, Maxwell's Field Equations, Description of Dielectrics by Various Sets of Parameters, Field Energy and Radiation, Skin Effect, Reflection and Refraction by Media with Loss, Short-Circuited Guides and Cavity Resonators. The somewhat longer division, Molecular Approach, includes Various Aspects of Electromagnetic Radiation, Wave Mechanics, The Structure of Atoms, including a two page chart of the periodic system, The Formation of Molecules, Vibration and Rotation, Electronic, Atomic, and Orientation Polarization of Gas Molecules, Microwave Spectroscopy, Piezoelectricity, Ferroelectricity, Ferromagnetic Metals and Semiconductors, Conduction and Breakdown.

In the preface, the book is described as "a treatise intended for physicists, chemists, and electrical engineers, . . . a survey book which cannot go into many important details and has to leave unmentioned many significant contributions." It describes "a field of knowledge that belongs not only to physics and chemistry, but is also of vital importance for modern electrical engineering" and, in so doing, lays a foundation which should be useful to those approaching the subject from any one of these three fields. Since the intent of the book is a broad survey rather than a detailed coverage of each subject, there are relatively few literature references and no author index. but, instead, a two page reference list of books and summarizing articles. For example, the chemist interested in the problems of dipole moment and molecular structure will find a brief, but rigorous account of the equations relating dipole moment and dielectric constant, but no account of the solution method commonly used in dipole moment determination. However, the solution moment values of the three dichlorobenzenes are used to illustrate the vector addition of dipole moments in a molecule, no references to the original literature being given, as they are unimportant to the general reader.

The book is much larger than the number of pages would seem to indicate, as its two-column page is slightly larger than that upon which this review is printed. The glazed paper used throughout gives unusual clarity to the reproduction of the many equations and excellently drawn diagrams. The writing shows the author's long familiarity with the field, and a breadth of scientific culture which enables him to relate parts to the whole in such a way as to present a broad and useful panorama of the subject.

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CHARLES P. SMYTH

Dielectric Materials and Applications. By ARTHUR R. VON HIPPEL, Editor, Professor of Electrophysics and Director, Laboratory for Insulation Research, Massachusetts Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. xii + 438 pp. 22.5 × 28.5 cm. Price, \$17.50.

This is similar in make-up and physical appearance to the companion volume, "Dielectrics and Waves," which has been reviewed above. The first two-thirds of this second book, based upon a course of lectures given at the Massachusetts Institute of Technology in September, 1952, consists of articles by twenty-two experts from science, industry and Government. The mutual independence of the two volumes is emphasized by the fact that this practical volume begins with a long theoretical section by the editor, which is largely a summary of the basic portions of the first volume, using many of the same diagrams. Presented rigorously by an authority, this section is a useful introduction or review of fundamentals.

The second section, Dielectric Measuring Techniques, is a long one, but the sixteen pages devoted to lumped circuits may, at first glance, seem disproportionately brief in comparison with the sixty-four on distributed circuits, including extensive tables and charts for use in calculating the results of very high frequency measurements. It must be remembered, however, that the relatively new microwave techniques have been less frequently described and are, in some cases, described here for the first time in book form. The presence of the article on the measurement of magnetic permeability is consistent with the editor's treatment of electric and magnetic phenomena as a whole. The same may be said of the short articles on microwave spectroscopy and magnetic resonance, although they may seem slightly foreign to the practical nature of the rest of the volume. The section, Dielectric Materials and their Applications, written largely by industrial experts, contains articles such as Insulation Strength of High-Pressure Gases and of Vacuum, Plastics as Dielectrics, Ceramics, Dielectrics in Power and Distribution Equipment, Rubber and Plastics in Cables, Problems of the Cable Engineer, Rectifiers, Piezoelectric Transducers and Resonators, and Memory Devices. A brief section on the dielectric requirements of each of the three Armed Services is followed in the last third of the book by Tables of Dielectric Materials. These tables, originally issued in January, 1953, as Volume IV of the Tables compiled in the editor's laboratory, consist principally of dielectric constants and loss tangents measured over a wide range of frequencies, together with a few magnetic permeabilities and loss tangents. The materials include crystals, liquids, ceramics, glasses, plastics, elastomers, natural resins, and waxes. In addition to the tables, the temperature dependence of many dielectric constants and loss tangents is shown by graphs, from which the values may be read off.

In spite of cutting and rewriting by an editor who is an authority, a book of this kind may strike the reader as something of a miscellany. However, to workers in the field of industrial dielectrics and to others desiring an insight into the problems of this field, it has much of interest and value to offer.

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