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 Boundy 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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**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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**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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