

since 1952. G. K. Fraenkel has arrested paramagnetic resonance for all practical purposes in 1955, a particularly serious matter in a field which has developed so enormously in the last five years. The editor surely deserves some blame here.

After a short chapter on magnetic susceptibilities by P. W. Selwood, the great middle reaches of the book are occupied by various of the modern analytical applications of classical electrochemistry—polarography, potentiometry, transference measurements, and so on. These seem to one not expert in the field to be carefully constructed, and they are without exception easy to read. The large amount of space (415 pages) devoted to this area is, to make the point again, somewhat surprising in a book whose title contains the words "Organic Chemistry" twice.

The volume concludes with long and elaborately referenced chapters on radioactivity (B. M. Tolbert and W. M. Siri) and mass spectrometry (D. W. Stewart). Both are models of intelligibility, coherence and usefulness, and are sure to be referred to repeatedly by those who are approaching one or another technique for the first time.

Just as I was coming to the exciting part of D. H. Moore's article on electrophoresis I was projected unawares into the middle of O. H. Muller's discourse on polarography, by the circumstance that twenty-six pages of the review copy were missing. Since another copy found in a book store had the same flaw, it is perhaps worth issuing an appropriate *caveat* to the few individuals who will consider buying this very expensive volume.

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**Aspects of the Vitreous State.** Edited by J. D. MACKENZIE, Ph.D., D.I.C., F.R.I.C., General Electric Research Laboratory, Schenectady, New York, Butterworth Inc., 7235 Wisconsin Ave., Washington 14, D. C. 1960. viii + 226 pp. 16 × 25.5 cm. Price, \$9.50.

This book consists of eight well written articles or brief reviews, each of which deals in some detail with different aspects of the physics and chemistry of glasses. The articles were prepared by seven different authors each of whom is an authority on a particular modern technique, either experimental or theoretical, which has been used in studies concerning the nature of glasses and vitreous systems generally.

In Chapter 1, Dr. J. D. Mackenzie presents some general aspects of the vitreous state. Chapter 2 by Dr. S. Urnes is a rather searching enquiry into the interpretation of X-ray diffraction patterns of glasses. Chapter 3 by Drs. Turnbull and Cohen, deals with crystallization kinetics and glass formation. In Chapter 4, Dr. A. E. R. Westman of the Ontario Research Foundation discusses the constitution of phosphate glasses. Chapter 5, by Prof. P. J. Bray, Brown University, deals rather completely with nuclear magnetic resonance and glass structure. In Chapter 6, Dr. I. Simon (Arthur D. Little Inc.) presents a study of glass structure as revealed by infrared and Raman spectra. Chapter 7 by Prof. Gibbs is largely a theoretical derivation of the partition function for a "polymer chain quasi-lattice" model "liquid-vitreous" state.

Finally, Chapter 8, by the editor Dr. Mackenzie, is a brief critical review concerning the structure and physical chemistry of inorganic glasses at higher temperatures.

While the reviewer found all of the articles of considerable interest, of the eight articles perhaps those constituting Chapters 2, 3 and 7, being of somewhat more general nature, will appeal to the larger audience. The review by Dr. S. Urnes of the Norwegian Institute of Technology (Chapter 2) dealing with the relation between radial distribution functions and X-ray diffraction patterns is of quite general interest, many of the points brought out being applicable to almost all ultra-finegrained systems. Although perhaps over emphasizing the "Criticism of Warren's Work," Dr. Urnes presents an excellent critical article which brings out the

advantages and disadvantages of the "Fourier transform" the "difference," "additivity," etc., methods of analysis of X-ray diffraction diagrams.

The general behavior of very vitreous materials and the influence of "Kinetics" on apparent "second order" transitions, anomalous thermodynamic properties, etc., are presented very clearly in Chapter 3, by Dr. D. Turnbull and Dr. M. H. Cohen of the General Electric Research Laboratory. Many of the considerations of the chapter are of considerable generality.

Prof. J. H. Gibbs of Brown University (Chapter 7) derives in a very convincing manner a statistical model of a very viscous thermodynamic system. This model obeys the "Third Law" and exhibits a "second order" transition temperature. The behavior of the theoretical model, with suitable parameters (chain length, etc.), is remarkably close to that of real systems.

"Modern Aspects of the Vitreous State" is considered to be a worthwhile and timely addition to the scientific literature. It is not in any sense a school textbook. The book is highly recommended to glass specialists as well as to anyone interested in either the viscous liquid state or in the vitreous state, quite apart from any special interest in ordinary glasses as such.

Literature references seem adequate, except perhaps the spelling of Staveley.

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**Progress in Semiconductors.** Volume 5. ALAN F. GIBSON, B.Sc., Ph.D., General Editor, Prof. R. E. BURGESS, Vancouver, B. C., American Editor, and Dr. F. A. KRÖGER, Salfors, European Editor. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. vii + 316 pp. 16 × 23.5 cm. Price \$11.00.

After a number of years of yeasty growth and ferment, the pattern of research in the field of semiconductors has settled down to a point where one may expect a steady sequence of well-digested review articles on various parts of the field. The present volume is the fifth in a series of books devoted to such reviews. It is a pleasure to state that all of the articles are very well written by experts in particular facets of the subject. Each gives a reader a fairly broad prospective of the portion of the field it covers.

This volume has seven articles in about 315 pages so that the typical article tends to be brief and descriptive. All are quite well written and well documented with many references. As the editor points out, the guiding theme in this member of the series tends to focus on the optical properties of semiconductors, although there are quite important exceptions.

The titles of the component articles, which suffice to give a description of the content, are as follows: The Electrical Properties of Semiconductor Surfaces (T. B. Watkins), The Absorption Edge Spectrum of Semiconductors (T. P. McLean), The Chemical Bond in Semiconductors (E. Mooser and W. B. Pearson), Thermal Conductivity of Semiconductors (J. Appel), Indium Antimonide (T. S. Moss), Magneto-optical Phenomena in Semiconductors (B. Lax and S. Zwerdling), The Band Structure and Electronic Properties of Graphite Crystals (R. R. Haering and S. Mrozowski).

One of the very happy features of this series of survey volumes is that it is quite international in character. Since various workers have a tendency, perhaps natural, to feature the work of their own national groups, the wide geographical distribution of authors makes it possible to obtain a picture of what is going on in the various fields in a substantial part of the world. One can wish the editors continued success in their endeavor.

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