

BOOK REVIEWS

Methods of Biochemical Analysis. Edited by DAVID GLUCK, Professor of Physiological Chemistry, University of Minnesota. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1954. x + 521 pp. 61 × 23.5 cm. Price, \$9.50.

"Methods of Biochemical Analysis" is the first volume in yet another series of "Annual Reviews," devoted, as the title implies, entirely to methodology. The wide variation in the selection of topics, from the highly specialized to those of general interest, is particularly striking, the range extending from "Determination of Raffinose and Ketose in Plant Products" by de Whalley and Gross to the excellent review of "Zone Electrophoresis" by Kunkel. The contributors are selected from laboratories in many different locations, three of the reviews coming from England, one from France and one from Denmark.

The topics cover techniques of microbiological assay, *i.e.*, "Microbiological Assay of Antibiotics" by Kersey and Fink and "Microbiological Assay of Vitamin B₁₂" by Hoff-Jorgensen; various aspects of chromatography, *i.e.*, "Chromatographic Analysis of Radioactive Iodine Compounds from the Thyroid Gland and Body Fluids" by Roche, Lisitzky and Michel, "Chromatographic Separation of the Steroids of the Adrenal Gland" by Haines and Karnemaat and "Analysis of Mixtures of Sugars by Paper and Cellulose Column Chromatography" by Hough. Other reviews are concerned with the estimation of only a single compound, such as the article by Roe on "Chemical Determination of Ascorbic, Dehydroascorbic and Diketogulonic Acids" and "Chemical Estimation of Choline" by Engel, Salmon and Ackerman. Yet another group of articles discusses the problems involved in the analysis of classes of compounds of biological interest, such as "Estimation of Nucleic Acids" by Volkin and Cohn, "Determination of ATP and Related Compounds: Firefly Luminescence and Other Methods" by Strehler and Totter, "The Assay of Urinary Neutral 17-Ketosteroids" by Engel and "Analysis of Phenolic Compounds of Interest in Metabolism" by Bray and Thorpe. There are only two reviews dealing with enzymes, *i.e.* "The Assay of Catalases and Peroxidases" by Maehly and Chance and "The *in vitro* Determination of Hyaluronidase" by Tolksdorf; one chapter is devoted to "Determination of Sulfhydryl Groups in Certain Biological Substances" by Chinard and Hellerman, and de Lalla and Gofman describe the methods used by their group in a review on "Ultracentrifugal Analysis of Serum Lipoproteins."

In reading through these reviews one is struck by a dilemma which is liable to arise in a volume such as this. On the one hand, a worker might discuss one particular type of technique with which he is thoroughly familiar, such as electrophoresis, and the result is correspondingly authoritative. This is perhaps one reason for the excellence of Weissberger's "Physical Methods of Organic Chemistry." On the other hand, several reviews in the present volume attempt to evaluate a variety of methods which have been used for the assay of a group of compounds, with the result that certain techniques, which are less familiar to the author, are either entirely ignored or not treated satisfactorily. The discussion of polarographic methods in some of the reviews in "Methods of Biochemical Analysis" is a good example of this.

The editor states in his preface to the book that "The presentation of the experimental details is to be given in a manner that will furnish the laboratory worker with the complete information required to carry out the analyses." While this is true in some cases, some of the more complex procedures discussed, *e.g.*, ultracentrifugation, will certainly require more preparation than the reading of the corresponding chapter in this volume. Conversely, in some instances the description of experimental minutiae seems extreme, such as the detailed description of the construction and use of a Pasteur pipet, complete with elaborate diagram, or the "calculations," given repeatedly in some of the articles, for the conversion of a photometric or titrimetric reading to a concentration.

There is little doubt that this volume will make a useful

addition to the biochemical literature, since it contains a number of excellent and informative articles. In view of the heterogeneity of the topics covered, however, it is questionable whether many individuals would wish to purchase this book for the sake of one or the other review which is of interest to them. This reviewer would therefore like to suggest that "Methods of Biochemical Analysis" might be more useful to the individual working biochemist if each volume contained reviews of a cognate nature, either on a series of analytical methods used for the solution of problems in one field, *e.g.*, steroids, or alternately, on techniques used widely by nearly all biochemists, such as chromatography or microgasometry. This would be reminiscent of the many excellent "Symposia" volumes which have appeared recently.

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An Advanced Treatise on Physical Chemistry. Volume Four. **Physico-Chemical Optics.** By J. R. PARTINGTON, M.B.E., D.Sc., Emeritus Professor of Chemistry in the University of London. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York 3, New York. 1953. xl + 688 pp. 16 × 26 cm. Price, \$15.00.

This new treatise on physico-chemical optics, the fourth volume of a well-received series on physical chemistry, should be of considerable value for chemists and physicists—not only advanced students, but also specialists in the various fields treated. The book covers the older literature on optics and brings the subject up to date with recent developments which were previously available only in various journals. In treating both early and also more recent material, the author has achieved a comprehensive coverage of the subject. However, some topics (*e.g.*, the properties of dielectrics as well as molecular spectra) which one might expect to find in such a treatise have been relegated to the next volume in this series. Such topics as the properties of lenses, diffraction gratings and the measurement of spectra have been omitted. The scope of the material may be seen by a consideration of the main topics covered: refraction of light, polarization of light, optical activity, electromagnetic theory of light, magnetic rotation, piezoelectricity, pyroelectricity, and an appendix giving some details and properties of mathematical functions. Each of these topics is considerably elaborated to give a wide coverage of physical optics.

The presentation is clear, logical and easily readable, and accompanied by numerous clear, illustrative figures, examples and tables of data. Further, the author has made an attempt to use the same notation for a given quantity in treating various subjects. Where this has not been possible he has at least taken the trouble to point out where the notation differs. In addition to making liberal use of data to illustrate the theory, the author continually connects theory with experiment, giving details of optical experiments, and principles for refractometers, interferometers, polarimeters and other optical instruments. In cases where a complete theory is still lacking, useful empirical relations are given. He also provides the reader with a phenomenal number of references to the original literature; the latter is at times, however, merely a compilation of references without any attempt to evaluate or even to indicate the significance of the papers cited.

As is commonly done in many books on physical optics, the theoretical principles are developed both from the fundamental experiments and interpretations according to the wave theory of Huygens, Young and Fresnel and also, later in the text, from the point of view of the electromagnetic theory of light of Maxwell and Hertz. These will have their usual usefulness for physical chemists who are making increasingly greater use of optical methods. However, what distinguishes this treatise from the usual texts on physical optics is the continual stress placed on the application to molecular properties in detailed treatments of molar refraction.

tivities, dispersion, induced double refraction (Kerr effect, Cotton-Mouton effect, flow birefringence), light scattering, depolarization, double refraction in crystals, relation of structure to optical activity, the present status of theories of optical activity, Faraday effect, Zeeman effect—to name just a few of the many subjects treated.

An interesting feature of the presentation is the frequent use made by the author of historical introductions to trace the experimental and theoretical development of various phenomena.

This treatise should serve as a valuable reference because it gives an excellent coverage of the classical theory of physical optics and its application to chemistry, and also covers in considerable detail many topics which are involved in current research.

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Magnetic Cooling. By C. G. B. GARRETT, Sometime Senior Scholar of Trinity College, Cambridge. The Harvard University Press, Harvard University, and John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. x + 110 pp. 14.5 × 22 cm. Price, \$4.50.

The author has planned his monograph as an introduction to the study of the properties of matter at temperatures below 1°K. The book covers practically all the phenomena encountered in adiabatic demagnetization and those brought within the range of observation at the temperatures made accessible by magnetic cooling.

The author states that "the book is not primarily aimed at the specialist" and this is borne out, for example, by the fact that the subjects of "Magnets" and "Experimental Arrangements for Magnetic Measurements" are given slightly less than two pages each. However, the book is the best collected source of recent information on its subject and justifies the authors expressed hope that it will be of value to both experimental and theoretical research workers in this field.

Theoretical discussions of thermodynamic-magnetic relationships, measurement of temperature, specific heat and paramagnetism at low temperatures are followed by a chapter on the "Results of Measurements."

There is a 19-page chapter on the important subject of cooperative effects and resultant hysteresis, and a final chapter discusses varied subjects, such as thermal conductivities, experiments on liquid helium and also on metals below 1°K., nuclear alignment, cascade demagnetization and cyclic refrigeration. The author's discussion in this section, of a "formal" case of "negative temperature," based on non-equilibrium nuclear spin states is very unfortunate. It is the sort of thing with which newspaper reporters can, and probably will, do a great deal of damage. Temperature has no meaning when the states used to define it are not in equilibrium. Innumerable cases in ordinary chemical thermodynamics could be cited in which corresponding non-equilibrium systems exist.

There are very numerous references to original papers for those who wish greater detail.

We are glad to recommend the book to those interested in phenomena at very low temperatures.

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The Properties of Glass. By GEORGE W. MOREY, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D. C. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. 1954. vii + 591 pp. 16 × 23.5 cm. \$16.50.

The original appeared as No. 77 in the American Chemical Society Monograph Series in 1938. The revised volume is No. 124 in the same series. The table of contents remains unchanged. This is a comparison review.

Chapter I remains unchanged. The history has not been brought up-to-date, not even Table I, 3, on "Estimated World Production" which still does not go beyond 1937.

Chapter II on Devitrification has been rearranged but ex-

cept for the addition of the system $\text{Na}_2\text{O}-\text{B}_2\text{O}_3-\text{SiO}_2$ remains unchanged.

Chapter III on Composition contains some new analyses in Table III. 2; 4 have been added to Table III. 3. Some recent high-index glasses are mentioned. Table III. 11 on evolved gases on heating glass has been added. Two short paragraphs on permeability to and diffusion of helium through glass close the chapter.

Chapter IV on Durability adds a reference on Hubbard's humidity-powder test, the Hubbard-Hamilton interferometer studies; Figures IV. 7-8-9 on comparative resistance to various reagents are new. Mention of Wickers, Finn and Clabaugh's tests on chemical ware concludes the chapter.

Chapter V, Viscosity, except for the renumbering of some tables and figures is almost unchanged. The recent counter-balanced sphere method (1000-1400°) is introduced and a table of results follows. In the section on Viscosity of Slags there is a brief reference to recent work on iron-free systems. The chapter closes with Deformation and Transformation Temperatures including some recent contributions.

In Chapter VI, Annealing, recent work on temperature and refractive index correlation with annealing is mentioned.

Chapter VII discusses The Surface Tension of Glass. Fiber elongation apparatus and the dipping cylinder method are included. The chapter closes with a discussion of the anomalous behavior of B_2O_3 and includes extensive surface tension tables on Borates and Silicates. Additive relationship concludes the discussion.

In Chapter VIII on Heat Capacity of Glass a table of conversion factors for units of energy has been added.

Chapter IX is on Thermal Conductivity. Except for very brief references to the measuring of combined heat transfer by conduction and radiation, and the thermal conductivity study of rocks, the chapter is unchanged.

Chapter X on The Density of Glass opens with a presentation of recent views on additive factors, and includes extensive tables to indicate their applications. It closes with a discussion of the effect of heat treatment.

In Chapter XI on The Coefficient of Expansion of Glass a short paragraph on $\text{Li}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$ has been inserted. Effects of MgO , BaO , ZnO in dolomitic limestone glasses; of Fe_2O_3 , B_2O_3 , K_2O , Li_2O conclude the three-component section. Under Multicomponent and Commercial Glasses Vycor and silica glasses are mentioned, and the comments on Nonsilicate Glasses include $\text{Na}_2\text{O}-\text{B}_2\text{O}_3$ and $\text{K}_2\text{O}-\text{B}_2\text{O}_3$.

In Chapter XII on Elastic Properties under Dimension and Units, strain discs and large astronomical lens-castings are referred to. A section has been added on Effect of Temperature on Elastic Constants. Strain-time relationships (tables) and effects of low and high temperatures conclude this discussion.

Additions in Chapter XIII on The Strength of Glass are on weak secondary bonds, effect of moisture, strength of fibers, micro-strength, effect of temperature on strength and fatigue.

Chapter XIV on Thermal Endurance is unchanged except that sections on Temperature Distribution during Heating and Cooling, and Optical Path Differences have been deleted.

In Chapter XV on Hardness, abrasion is mentioned; hard glasses for jewel bearings are referred to; diamond indentation of optical glass is compared with grinding hardness.

Chapter XVI on Optical Properties, the first section has been enlarged, rearranged and augmented to great advantage. Tantalum, tellurium have been added. There are new four-component and multi-component systems with accompanying tables, and under miscellaneous glasses, arsenic, lanthanum, and new beryllium and germanium types are given. Fluoride and phosphate glasses are discussed. The new additive factors and methods are important. Effects of temperature and heat treatment on refractive index are stressed. New infrared absorbents are listed, and reflection-prevention is given a place. Finally, there are new sections on solarization, fluorescence and thermoluminescence.

Chapter XVII on The Electrical Conductivity of Glass is practically unchanged, and very little has been added.

Chapter XVIII on The Dielectric Constant, Dielectric Loss and Dielectric Strength, like the preceding chapter, is almost unchanged. High-frequency Effect and Conduction, relaxation, deformation and vibration losses receive consideration. There is an added paragraph in the section on Effect of Temperature on Power Factor.