

use of complex equipment. It is not enough to have general ideas of principles of operation. One must know about machine capabilities, machine-introduced artifacts and machine limitations if one is to make proper use of these devices.

This book and its accompanying laboratory course comes as close to meeting these objectives as could be hoped for in a single volume. The topics selected have been suggested with judgment and are presented in a succinct fashion without loss of clarity. This book is the result of a lot of hard work and will require a lot of hard work upon the part of the uninitiated to read. However, the non-electronics scientist can sit down with paper, pencil and book in hand and get a good course in practical electronics.

This first chapter presents an excellent discussion of basic electrical measurements and instruments of common type. As is true in general, no attempt is made to be encyclopedic, but the examples are well chosen and the problems and limitations of making measurements clearly discussed. Other chapters in the first section of the book deal with such traditional material as power supplies, amplifiers and circuits, oscillators, etc. It is rather surprising how much material is presented in a logical, clear, and condensed fashion, with important practical considerations outlined. Certainly in cases such as the discussion of the transistors no person not already well informed is going to appreciate the physics of their operation. However, he should understand much about their design and operation given the characteristics supplied.

The last half of the book covers servo systems, operational amplifiers for measurement and control and switching timing and digital computing systems. This material covers a wide range of possible applications not ordinarily found in an electronics text. Again the context is very well presented and well illustrated. Circuit diagrams are used profusely and are exceptionally well drawn with a minimum of confusion. Undoubtedly they will present an initial source of difficulty, but their consistent use will certainly help the non-electronically experienced reader with his practical problems.

The book closes with certain supplements on basic d.c. and a.c. theory etc. that will serve to widen its applicability.

An additional supplement concerns the experiments and equipment needed to perform them. As the authors suggest, the desired state of competence undoubtedly can only be achieved by undertaking the experimental course outlined. This laboratory is made practically possible for all by means of a laboratory kit marketed by the Heath Company and specially designed to accompany the text.

In conclusion this is a well written book with a great deal of valuable information presented concisely in one volume at a level appropriate for a scientist working in areas other than electronics but with electronics needs.

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**Comprehensive Biochemistry. Volume 3. Methods for the Study of Molecules.** Edited by MARCEL FLORKIN, Professor of Biochemistry, University of Liege (Belgium), and ELMER H. STOTZ, Professor of Biochemistry, University of Rochester, School of Medicine and Dentistry, Rochester, N. Y. American Elsevier Publishing Company, Inc., 62 Vanderbilt Avenue, New York 17, N. Y. 1962. xiii + 324 pp. 16 × 23 cm. Price, \$14.50.

This volume forms part of a comprehensive treatise of very broad scope, and can be fairly judged only in relation to the rest of this large enterprise. I have therefore examined not only this volume but also (more superficially) the other three volumes already published and the announced plans for the treatise as a whole. Volume 2 on "Organic and Physical Chemistry" has already been reviewed in this journal (85, 838 (1963)) by W. P. Jencks.

Volume 3 begins with two chapters by C. J. Bullen on crystallography and X-ray diffraction. The fundamentals are well presented, although it is somewhat surprising to find Patterson syntheses and isomorphous replacements discussed in Chapter I, while the Laue conditions and the Bragg equation are not reached until the beginning of Chapter II. The great recent achievements in the study of heme protein crystals are not discussed here—they are probably reserved for a later volume dealing with

proteins—but much of the background for understanding them is laid. Chapter III on "Analysis by Emission Spectroscopy" (N.H. Nachtrieb) is brief but useful. R. A. Morton discusses "Spectrophotometry in the Ultraviolet and Visible Regions," covering much material of fundamental importance. One misses discussion of the important distinctions between  $\pi \rightarrow \pi^*$  and  $n \rightarrow \pi^*$  transitions, and there is no mention of exciton theory. There is virtually no discussion of the spectra of proteins or nucleic acids; presumably these are to be taken up in later volumes dealing with these classes of substances. The discussion of purines and pyrimidines assumes the enolic form to be predominant. However there is strong evidence from infrared spectra, not mentioned in this book, in favor of the keto structures (H. T. Miles, *Biochem. Biophys. Acta*, 22, 247 (1956); 27, 46 (1958); *Proc. Natl. Acad. Sci.*, 47, 791 (1961)). Morton's chapter is, however, a valuable contribution and covers much fundamental material very well.

Chapter V on infrared spectra (L. J. Bellamy) gives an excellent presentation of the fundamental significance of vibrational spectra for compounds of biochemical interest; and Chapter VI on "Fluorescence" (A. Ehrenberg and H. Theorell) manages to present, in only twenty pages, an inevitably brief, but useful, sketch of fundamental theory and a clear picture of the use and power of fluorescence methods in biochemistry.

Chapter VII on "Electronic Paramagnetic Resonance" (S. I. Weissman) will prove hard going at the start for those who do not have some basic background in quantum theory; in any case, however, a knowledge of quantum theory must indeed become part of the essential equipment of the biochemists of the coming generation. Those who are prepared to grapple with this brief and compact chapter should learn much from it.

The following chapter on "Nuclear Magnetic Resonance" (C.D. and O. Jardetzky) has to compete with a number of other recent expositions of the subject. Having read this chapter in manuscript, at the invitation of the authors, I may be prejudiced in its favor; but I do believe it does an excellent job of introducing this vital topic to the non-specialist like myself. The same authors have given a more detailed treatment of the subject in Volume 9 of "Methods of Biochemical Analysis" (D. Glick, editor).

The final chapter on "Determination of Mass, Form and Dimensions of Large Particles in Solution" (C. Sadron and M. Daune) covers a great deal of important material in highly condensed fashion. The discussion is admirable, and Sadron is one of the great masters in this field, but this chapter can be fully appreciated only by those who have much more background in the study of macromolecules than can be obtained from this volume.

All the topics covered are of fundamental importance for biochemists today, and all of course have been presented in other recent books and reviews. It is noticeable that optical rotatory dispersion is not discussed here or elsewhere in the first four volumes, although it is now comparable in importance to the subjects treated in Volume 3. However, it could quite logically be taken up later, in the volumes devoted to proteins and nucleic acids.

Internal evidence indicates a long delay between the submission of the manuscripts and the publication of the book. Few references later than 1959 are cited, and scarcely any later than 1960. In the subject matter of almost every chapter there have been recent advances of major importance, some of which reveal quite new perspectives, and it is regrettable that a book published late in 1962 should not have included more of these developments. This is presumably not the fault of the authors, and probably not of the editors; the chief responsibility must fall upon the publishers. The present rate of scientific advance indeed creates formidable publishing problems, which scarcely existed in a more leisurely age. Articles in a book like this must be prepared thoughtfully, with mature consideration, as these chapters are. Once the manuscript is ready and has received critical editorial review, however, it should appear in print with all possible speed.

The useful working life of most scientific books today is relatively short; if the process of publication can be speeded up by six months or even a year, which is certainly within the realm of possibility, a substantial percentage will be added to that period of useful life. Publishers must break with past habits, and explore new approaches, if they are to achieve this; in a time when science is moving with such phenomenal speed, publishers must improve their own techniques to meet the situation.

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