

namics, statistical mechanics and advanced calculus can follow the arguments, and use the book as an introduction to research in polyelectrolytes, which was the authors' stated purpose for the book. Considering the intended reader, the book begins with a review of the statistical mechanical treatment of general solutions and of the equilibrium properties of simple electrolytes before proceeding to polyelectrolytes. Then rigid polyelectrolytes (exemplified by many inorganic colloids) are treated. In Chapter 5 (by Morawetz), the goal is finally reached: the flexible charged polymer is brought on stage, and becomes the center of interest from there on. Chapters 6 and 7 present the current theory of polyelectrolytes, much of the material based on work of one of the authors. The last four chapters then apply the theoretical treatment to reversible and dissipative processes in solutions of polyelectrolytes; these are the chapters which will be especially useful both to the graduate student and also to the experienced researcher in biochemistry who realizes the necessity of considering most of the substances with which he works as both natural products of biochemical importance and as members of a special category of compounds for which the theoretical chemist and the physical chemist have established a general pattern of properties and behavior. Finally, the book is recommended to the research worker in polyelectrolytes as a convenient and well organized reference source for much of the material which previously was only available in a multitude of articles scattered through many journals in the library, or many reprints in his files.

STERLING CHEMISTRY LABORATORY
YALE UNIVERSITY
NEW HAVEN, CONN. RAYMOND M. FUOSS

Die Elektronenspektren in der Theoretischen Chemie. By CAMILLE SANDORFY. Übersetzt und Bearbeitet von H. v. HIRSCHHAUSEN. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1961. x + 207 pp. 14.5 × 21.5 cm. Price, DM. 28.--

This book is a translation into German of a book in French by the same author, entitled "Les Spectres Électroniques en Chimie Théorique" (Paris, Éditions de la Revue d'optique théorique et instrumentale, 1959). Added in this edition have been a number of examples, a few new references, and a useful listing of quantum-theoretical calculations by molecule and method.

The main topic discussed is the quantum theory of the visible and ultraviolet spectra of organic molecules. The author wanted not so much to cover the literature in this field as to introduce his readers to it by working through illustrations of the various methods. He well presents in this way the valence bond method, the simple molecular orbital method, the method of antisymmetrized products of molecular orbitals (erroneously called the method of antisymmetric molecular orbitals), and the method of free electrons, as these methods were practiced in about 1950. According to the reviewer's count, the more than 300 references cited fall as follows, year by year, beginning with 1930: 4, 6, 4, 13, 9, 9, 9, 8, 14, 6, 5, 11, 6, 4, 5, 8, 19, 18, 30, 22, 17, 14, 12, 4, 13, 6, 1, 4, 4, 4, 1. The recent book by Daudel, Lefebvre and Moser, "Quantum Chemistry" (Interscience Publishers Inc., New York, N. Y., 1959) provides a better introduction to the current literature in, and the current understanding of, this branch of theoretical chemistry.

DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING
AND CENTER FOR ADVANCED STUDY
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS ROBERT G. PARR

Protein Structure. By HAROLD A. SCHERAGA, Department of Chemistry, Cornell University, Ithaca, New York. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. xiv + 305 pp. 16 × 23.5 cm. Price, \$8.00.

This book is based on a series of lectures given by Professor Scheraga in Melbourne, Australia, in December, 1959. The author has extended the notes of his original lectures in such a way as to make the treatment of most of the subjects that are included quite complete and informative. Dr. Scheraga states in his preface that he planned the presentation so that

the material could be managed by students not previously exposed to formal physical chemistry beyond the elementary level. There is some question in this reviewer's mind whether this aim has indeed been achieved. A number of his theoretical treatments, particularly those dealing with denaturation, and with the hydrodynamic and elastic properties of proteins and protein fibers do require, if not formal background in physical biochemistry, at least some of the sophistication that only a particular variety of protein chemist is likely to have. On the other hand, bright students with a natural talent for physical chemistry and mathematics should find the subject matter straight forward and provocative.

The title of the volume, "Protein Structure," is, in my opinion, slightly misleading since what is presented is a discussion of proteins as visualized and studied by the author and his colleagues. Scheraga has been intimately involved, experimentally and theoretically, with all of the subjects he discusses in his book. His competency in the physical aspects of protein chemistry makes it possible for him to write with authority. The theoretical approach taken, however, occasionally involves assumptions that would not be universally accepted by all experts in the field. For example, although it is clear from the work of Kendrew and his colleagues that a variety of non-covalent interactions can and do exist in a globular protein (myoglobin), it is perhaps premature to develop sets of thermodynamic equations governing some of these interactions before their presence in the proteins under consideration has been demonstrated in an unequivocal fashion. However, even these sections of the book serve as a useful didactic treatment for students who hope to achieve facility in the construction and analysis of physicochemical models for the behavior and properties of proteins in solution.

The volume is supplied with an excellent collection of references. It can be quite sincerely recommended to students of protein chemistry who wish to become thoroughly familiar with one of the active approaches to the subject.

NATIONAL HEART INSTITUTE CHRISTIAN B. ANFINSEN
LABORATORY OF CELLULAR PHYSIOLOGY
BETHESDA 14, MARYLAND

Gas Chromatography. By D. AMBROSE, Ph.D., F.R.I.C., and BARBARA A. AMBROSE, B.Sc. George Newnes Limited, Tower House, Southampton Street, London, W.C. 2, England. 1961. vii + 220 pp. 14 × 22 cm. Price, 40s.

Several years ago, anyone could learn all there was to know about gas chromatography by reading a handful of papers. Now, with over one thousand papers appearing annually, it is impossible even to read the titles of them all. It is clear that a chemist wishing to use this technique intelligently needs a compact source of information on the theory, practice and present state of the art. Ambrose fills the need for a wide survey which will enable the technologist to construct an apparatus and use it wisely. The book provides a basic introduction but does not attempt to carry through to the fine points of theory which are in the current literature. To this extent the authors have succeeded in producing the best introduction now available.

The apparatus is described in detail with emphasis on home-made equipment. There is a comprehensive treatment of retention parameters and their value to the analyst. The theoretical plate concept is treated adequately, but very little on the rate theory of van Deemter and others is given. Qualitative and quantitative analysis are clearly described. Numerous key references to the literature are given, some as late as 1961. For the most part, however, the book represents the state of the art as it existed in 1959, and much of the material is from the 1956 London Symposium.

This reviewer would have suggested more emphasis on recent developments at the expense of detailed instructions on how to build and understand a thermal conductivity detector (20 pp.). For example, the rate theory approach is discussed in only six pages; only the abbreviated version of the van Deemter equation is given, and no discussion of recent modifications leading to optimizing speed. Capillary columns are discussed in two pages and programmed heating in one page, which is far less than these two important topics occupied in two similar books appearing in 1959. In other

words, the fraction of the book devoted to ideas developed since 1959 is very small.

The style of writing is clear, concise and very readable. It would make an excellent text-book. The printing and paper are of high quality, and it is essentially free from errors. There is a definite, but justifiable, lean to the British work and apparatus, which does not make it any less useful to the American reader. It is highly recommended to the beginning chromatographer or the technician who needs more background.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF CALIFORNIA
LOS ANGELES 24, CALIFORNIA

ROBERT L. PECSOK

Separation of Heavy Metals. By ANIL K. DE, D. Phil., Reader in Chemistry, Jadavpur University, Calcutta, India. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. 308 pp. 16 × 23.5 cm. Price \$9.00.

The opening sentence on the inside of the dust jacket is: "This book, the first of its kind, is devoted to liquid-liquid extraction and deals with the theory and practice of this valuable tool for separation of heavy metals." However, it is by no means devoted exclusively to this separations technique, the 91-page section on liquid-liquid extraction being followed by 78-page, 37-page and 27-page sections, respectively, on ion-exchange, analytical procedures (classical) and radiochemical separations procedures.

Of course this diversity of treatment is not, in itself, bad; but the lack of a unifying philosophy of presentation renders the book difficult to read. The resultant disjointed effect is heightened by the presence of an irritatingly large number of "typographical" errors: O_x for Ox (p. 30), making the theoretical treatment difficult indeed; HQEHP for HDEHP (p. 66); Szilard-Chalmer's for Szilard-Chalmers (consistently); misspelling of the names of prominent workers in the field such as Hindman (pp. 106, 189), Maddock (p. 95, 96), Dyrssen (pp. 105, 176), etc.

The theoretical sections on liquid-liquid extraction and ion-exchange are so sketchy as to be of doubtful value; and the "applied" discussions are, in many instances, deficient in detail. For example, pp. 243-249, if the TBP, (*n*-C₄H₉O)₂PO, has not been freed from acidic phosphates (almost certain to be present in the sample as received), the stripping procedure will be totally ineffectual.

Nevertheless, the major criticisms may be summarized by saying that too much has been attempted in too few pages. With the exception that exceedingly sparse attention has been given to amine "liquid ion exchange" systems, the book constitutes a good survey of both liquid-liquid extraction and ion-exchange in the field of metals separations. Whereas it will be of limited value to the separations specialist, it should prove of very real worth to the research worker wishing to use these techniques as tools and to the analytical chemist faced with unusual separations problems.

CHEMISTRY DIVISION
ARGONNE NATIONAL LABORATORY DONALD F. PEPPARD
ARGONNE, ILLINOIS

Progress in Organic Chemistry. 5. Joint Editors, J. W. COOK, D. Sc., F.R.S. Vice-Chancellor, University of Exeter, Fellow of University College, London, and W. CARRUTHERS, Ph.D., M.R.C. Carcinogenic Substance Research Unit, Washington Singer Laboratories, Exeter. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D.C. 1961. viii + 172 pp. 15 × 24.5 cm. Price, \$9.00.

Most books which gather together an extensive literature on one or more topics in the field of organic chemistry are useful and valuable even if they leave something to be desired. However, at a time when chemists depend so heavily on the review as an indispensable instrument for broadening their grasp of the ever-changing and proliferating fields of chemical science, one hopes for an emphasis on quality, for a logical selection of topics to be reviewed and for expert and well-reasoned presentation. The latest in the series of volumes on "Progress in Organic Chemistry," in my opinion, is at best of average quality relative to the various reviews which are currently available in organic

chemistry. Its coverage includes chapters on homolytic oxidation processes, hydroxylation of phenols, dextran, diterpenoids and finally tropylium and related compounds. The last of these chapters, written by Professor Nozoe, appeared to me to be of outstanding merit. However, some of the others hardly seemed suitable for inclusion in a series dedicated to "the policy of presenting critical reviews of some of the major topics of organic chemistry which are of present interest." If the chapters do not blend to one man's punch, it is as much due to the unevenness and lack of care in the treatment as to the variety of topics. The book is not inexpensive.

DEPARTMENT OF CHEMISTRY
HARVARD UNIVERSITY
CAMBRIDGE 38, MASSACHUSETTS

E. J. COREY

Molecular Sieves. By CHARLES K. HERSH, Senior Engineering, Armour Research Foundation of Illinois Institute of Technology, Chicago, Illinois. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. vii + 129 pp. 16 × 23 cm. Price, \$6.50.

This well-printed but brief volume on the so-called "molecular sieves" will serve a useful purpose, because of the growing importance of the synthetic zeolites in industrial and technical processes such as the drying of gases at both low and high temperatures, gas separations, ion-exchange and gas chromatography. It is the only book on the subject wherein a coherent picture of the applications of molecular sieves can be found in a single source. The principal difficulty with this book is its brevity. However, the reviewer strongly recommends this volume to libraries and to individuals interested in the subject, especially those desiring an introductory approach.

The brief historical introduction is well-presented and accurate. However, the second and fourth chapters on the physical chemistry of adsorption will be of little interest to those familiar with the theory of adsorption or informative to others. Chapters five to seven represent the heart of the book, and justify its publication.

The lack of specific references to the original literature will limit its usefulness to the initiated, but may be justified on the grounds that the book is primarily directed to the novice. The price is high, considering the number of pages.

Despite some of the obvious short-comings of this book, the reviewer believes that it will serve a useful purpose in stimulating interest in the application of molecular sieves to technical problems, and it is recommended on that basis.

DEPARTMENT OF CHEMISTRY
WILLIAM MARSH RICE UNIVERSITY W. O. MILLIGAN
HOUSTON, TEXAS

The Chemical and Biological Action of Radiations. Volume 5. Edited by M. HAISSINSKY. I. Mechanism of the Radiolysis of Water by Gamma Rays or Electrons. By A. O. ALLEN. II. Action des Rayons Alpha sur les Solutions Aqueuses. By J. PUCHEAULT. III. Diffusion Kinetics in Radiation Chemistry. By A. KUPPERMANN. IV. Mass Spectrometry and Radiation Chemistry. By D. P. STEVENSON and D. O. SCHISSLER. Academic Press, Inc., (London) Ltd., 17 Old Queen Street, London, S. W. 1, England. 1961. xi + 278 pp. 16.5 × 24.5 cm. Price, \$8.00.

The book is prefaced by a seven page introduction by the editor which itself provides an excellent review of the book. He discusses unresolved problems and differences of opinion in a manner not feasible for the individual authors.

No one is better qualified than A. O. Allen to discuss the development of the theories used to explain the action of gamma rays or electrons on aqueous systems and to point out the areas where research work remains to be done. This he does in an interesting and concise manner in the 20 pages of Part I.

In Part II, 53 pages, Puccheault reviews experimental information on the effects in aqueous systems of heavy particles ranging in L.E.T. from high energy protons to low energy alpha particles. He also introduces some new ideas to explain and correlate the yields observed in various