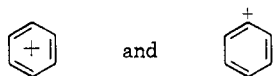


probably justified by the simple lack of available data in a new field, while the stress on the authors' research must result at least in part from the simple fact that their laboratory produces more mass spectral publications than any other.

Probably not enough spectra have been analyzed and the generalizations reached are based on too few. The present book may well serve as a stimulus to fill the gaps in our mass spectral knowledge. It is especially to be hoped that the authors will bring "Interpretation" up to date periodically to take into account new data.

In the symbolism employed for fragmentations and ions, not everyone (not Beynon, Biemann, McLafferty, Ryhage, Reid, and Meyerson, for example) is of the Djerassi fishhook-arrow school, so the chapter, "Note to the Reader" (repeated verbatim, but with an added footnote in "Structure Elucidation") is in the nature of a missionary effort. It is probably a worthwhile book-keeping effort, especially for students, to try to keep track of the electrons, and the fishhooks, arrows, and dots are useful reminders. However, it does require care and even the authors occasionally place fishhooks where arrows are required (*e.g.*, on pp. 175, 244, and 260) or use the $\cdot+$ scheme inconsistently (as on p. 260). Moreover, it does not seem pedagogically advisable in a book to be used by students to write resonance forms of the same compound as individual entities for fragmentation purposes (as on p. 239). Too, the different meanings of the symbols



(both used on p. 192) need to be stressed somewhere.

All of these misgivings, though, do not obscure the generalization that "Interpretation of Mass Spectra of Organic Compounds" is the most successful attempt to date to systematize organic mass spectral fragmentation patterns.

The general appeal of the second book, "Structural Elucidation," Volume 1, is not as great. One does not have to be both an alkaloid chemist and a mass spectrometrist to wax enthusiastic over this volume, but he probably should be one or the other.

Yet here, too, there are two chapters of general interest. One of these evaluates the utility of the mass spectral method in natural products chemistry and delineates the information to be gained from it—molecular weight, functional groups, skeletal structure. This chapter provides much useful information, but has omitted some. For example, Nuclides markets a single focusing mass spectrometer, and both Atlas and Hitachi market double focusing instruments. Here, as in the "Interpretation" volume, deuterium labeling may be over-stressed as a panacea. Very recent results with high resolution mass spectrometry, especially in Biemann's laboratory, suggest it may be at least as useful as deuterium labeling. Readers of Ryhage and Stenhagen since 1956 may also take issue with the statement that "Except for a few isolated instances, the use of mass spectrometry in the field of natural products did not start until around 1960."

The second general chapter is delightful though. This deals with techniques of deuteration, and provides a very useful guide to the methods available for specific deuterium labeling in various positions about carbonyl, hydroxyl, and aromatic groups, and elsewhere in organic molecules. The useful information detailed extends to a list of suppliers of deuterated reagents, and the chapter is over-all the best available on the subject.

The remainder of the book covers the characteristic fragmentation patterns of a number of classes of alkaloids. Many chapters end with a statement summarizing the results of the chapter. Of this material, eight chapters and 131 pages deal with indole alkaloids, six chapters and 54 pages with other classes. Although Biemann's book covers many of the same compounds in the indole series, the present volume is two years more recent. The stress on the indole alkaloids might seem disproportionate until one recognizes that it is precisely the indole alkaloids which have been most studied, especially by the Biemann and Djerassi groups, so that this book, like "Interpretation" can be said to represent the "present state of the art."

A very helpful chapter, which would have been welcome though perhaps impossible to write, would be one summarizing how to assign an unknown alkaloid to one class or another. The impression gained by the treatment here is that mass spectrometry is a highly useful tool in the field, provided one already knows he is dealing with an iboga or an aspidospermine alkaloid, but that this prior knowledge depends on other information like ultraviolet spectra or biogenetic correlations.

As a final comment, the publishers are to be congratulated on taking their place with Reinhold (and the authors with the Fiesers) in demonstrating that it is quite possible to publish a book rapidly. The authors state in the Preface that publication was less than three months after receipt of the manuscript and this is apparent, since a number of the references are to 1934 papers. The reduction in publication time is to be warmly cheered; much of the credit doubtless goes to the authors for their cooperation in meeting deadlines.

Speed, of course, is not without its disadvantages: the book has a somewhat hurried look about it and errors have inevitably crept in, though some (but not all) of these are corrected in an errata sheet sent to purchasers of the book. The over-all advantages of speed of publication in an area as active as this are enormous, however. One can only await with interest the arrival of "Structure Elucidation," Volume 2, and this reviewer closes with the repeated hope that the authors will keep their works current with new editions.

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International Series of Monographs on Analytical Chemistry.
Volume 12. Organic Polarographic Analysis. By PETER ZUMAN, Polarographic Institute, Czechoslovak Academy of Science. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. x + 313 pp. 15 × 22.5 cm. Price, \$6.50.

This book represents a concise and all-inclusive review of the applications of polarography to organic chemistry. The author is eminently qualified for this presentation since he has worked with all phases of this technique.

The book consists of twelve chapters which discuss basic principles, instrumentation, experimental techniques, classes of polarographically active compounds, direct and indirect methods of analysis, separation techniques, practical applications, and applications to organic syntheses, isolation of natural products, studies of reaction rates and equilibria, and structures of organic substances. Numerous procedures are presented in detail in a number of the chapters to illustrate the efficacy and simplicity of the method.

Ample cross references and a comprehensive index facilitate its usefulness both as an introductory and reference text for organic polarography.

Errors are infrequent and are mainly involved in setting up the formulas on pages 123 and 134. Linguistic errors are rare.

The principal omission in applications is the use of the polarographic behavior in aprotic solvents as a rapid method of determining which organic compounds are capable of forming monovalent anion radicals.

This text should prove invaluable not only as a starting point for the neophyte who is interested in possible uses of polarography in organic systems but also as a reference text for the specialist working in this field.

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Chemical Applications of Infrared Spectroscopy. By C. N. R. RAO, Department of Chemistry, Indian Institute of Technology, Kanpur, India. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 1964. xiii + 683 pp. 16 × 23.5 cm. Price, \$19.50.

This rather impressive volume is a full-scale attempt to cover the whole field of the chemical applications of infrared spectroscopy which the author considers as the most powerful tool at the disposal of the organic chemist. It can be divided roughly into two equal parts: the first part concerns the general applications of infrared spectra in organic chemistry; the second one, specific applications.

A comparison of the first part with the monographs of Jones, *et al.*, and of Bellamy makes it abundantly clear that Dr. Rao has leaned extensively on these earlier publications both for source material and format, completing their material and covering the new developments up to 1962. The approach is essentially em-

pirical; no information resulting from normal coordinate treatments or wave mechanical work on the related molecules is used.

The first chapter discusses "Basic Concepts, Instrumentation, and Techniques" on about 110 pages. It is rather complete and highly useful in the sense that perhaps every problem of interest is at least briefly mentioned with good starting references for the more interested reader. In one or two instances, more extensive treatment would be welcome like in the case of "Factors Affecting Vibrational Modes in Complex Molecules" although, naturally, many other remarks are found in later sections.

The following five chapters are devoted to hydrocarbons, oxygenated organic compounds, organic nitrogen compounds, organo derivatives of other elements, and heterocyclic compounds (the latter in collaboration with R. Venkataraghavan). We should like to commend the author's intention to make all the chapters as "self-consistent" as possible. Scientific books are seldom read from the first to the last page, and a few pages of repetition can make a book twice as useful. Unlike in some of the previous treatises, Raman spectra are not systematically included. On the other hand, both far-infrared and near-infrared data are covered and this will certainly be appreciated by the readers. There is a good description of some easy-to-forget topics such as the vibrations of CH₂ groups linked to O, N, and other heteroatoms, the CH vibration of the aldehyde group, the combination tones in the 2000-1600 cm.⁻¹ area in the spectra of aromatic molecules, the spectra of nonbenzenoid aromatic compounds, and others. The general part of the book is completed by a brief chapter on inorganic compounds including transition metal complexes.

Among the specific applications we find a chapter on more complex organic compounds from steroids to antibiotics by T. R. Kasturi, one on biochemical applications from amino acids to viruses by L. K. Ramachandran, and one on high polymers. This is followed by a chapter on quantitative analysis and on "miscellaneous topics" including charge-transfer complexes, matrix isolation studies, adsorbed molecules, and other problems. There is even an appendix on the teaching of infrared spectroscopy.

It is believed that because of the careful inclusion of most of the available information, its coverage of widely different topics in one book, and its easy readability, Rao's book is likely to become very popular with the users of infrared spectroscopy.

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An Introduction to Electron Spin Resonance. By TERENCE L. SQUIRES, A. M. British I.R.E., Assistant Editor R. and D. (Research and Development), Fellow of the Physical Society, late Research Assistant at the Research Unit in Radiobiology, Mount Vernon Hospital, Northwood. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 1964. 140 pp. 13 × 19.5 cm. Price, \$5.50.

The few things in this book which are correct are better treated in other places. Important ideas are presented incorrectly. The magnetic moment of free radicals is described as coming from "the electron rotating around the rest of the molecule" (page 15). Relaxation and saturation, essential features of the magnetic resonance phenomenon, are not discussed. I do not recommend the book to anyone.

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S. I. WEISSMAN

BOOKS RECEIVED

October, 1964

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Allied Chemical Corporation, National Aniline Division. "Aniline." Allied Chemical Corp., 40 Rector St., New York, N. Y. 1964. 110 pp. N/C.

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NORMAN S. BHACCA and DUDLEY H. WILLIAMS. "Applications of NMR Spectroscopy in Organic Chemistry. Illustrations from the Steroid Field." Holden-Day, Inc., 728 Montgomery St., San Francisco, Calif. 1964. 198 pp. \$7.95.

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FRIEDRICH DESSAUER and KURT SOMMERMEYER. "Quantenbiologie. Einführung in einen neuen Wissenszweig." Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf (West), Germany. 1964. 286 pp. DM 39.60.

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