

Book Reviews

An Introduction to the Chiroptical Methods of Chemistry. By P. CRABBE (Syntex, S.A., and Universidad Nacional Autonoma de Mexico Universidad Iberoamericana). Impresos Offsali, G.S.A., Mexico. 1971. 121 pp. \$4.00.

This short book serves as a good introduction to the applications of optical rotatory dispersion and circular dichroism. Elementary theory is discussed in Chapter 1 and this can be easily understood with only rudimentary knowledge of the optical properties of molecules. The remainder of the book is devoted to applications. Considerable attention is given to organic functional groups, the empirical rules needed to handle these groups, and to well-referenced examples. Explicit spectra and diagrams are especially helpful in understanding the examples. There are short chapters on biochemicals, polymers, and metallic complexes. In addition, solvent and temperature effects are discussed briefly.

The major fault of this book is the lack of an adequate discussion of the experimental techniques and the required instrumentation. Using this as an introductory book, it would be difficult for the novice to comprehend the technical problems involved in obtaining adequate spectra. Assuming that the reader understands the experimental problems, the book is a good starting point for interpreting ORD and CD spectra.

C. W. Brown, *University of Rhode Island*

Technique of Organic Chemistry. Volume XIV. Energy Transfer and Organic Photochemistry. Edited by A. A. LAMOLA and N. J. TURRO. Wiley-Interscience, New York, N. Y. 1969. xii + 374 pp. \$18.50.

This volume of the series "Technique of Organic Chemistry" consists of a brief introductory chapter by P. A. Leermakers, a lucid discussion by A. A. Lamola of electronic energy transfer in solution with emphasis on practical information of the sort a photochemist needs as he considers a choice of sensitizers or quenchers, a survey by N. J. Turro of some typical photochemical reactions of organic molecules with enough mechanistic discussion to make the mass of facts that are presented intelligible, and finally a presentation of experimental methods by T. R. Evans, where practical questions such as the choice of equipment, solvents, determination of quantum yields, and rates of reaction are discussed. The usefulness of the book is enhanced by numerous energy diagrams for simple organic compounds, and by tables of triplet energies of compounds useful as sensitizers or quenchers, as well as by tables of properties of solvents such as their cut-off wavelengths, or the ease with which they undergo hydrogen abstraction reactions. An author index and a modest subject index are also provided. The book is a welcome addition to the literature of organic photochemistry and should be particularly useful for those chemists making their first venture into the field.

S. N. Ege, *University of Michigan*

Research Techniques in Organic Chemistry. By R. B. BATES and J. P. SCHAEFER (University of Arizona). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1971. xvii + 125 pp. \$7.95 (cloth), \$3.95 (paper).

This latest volume in the Foundations of Modern Organic Chemistry Series is intended to serve students who are "beginning organic research as advanced undergraduates or first-year graduate students." It is divided into three sections on techniques: Reaction (41 pp), Isolation (55 pp), and Structure Determination (27 pp). There is no index but, because of its size, the Table of Contents serves adequately.

It may be reasonably expected that this book would be independently useful "at the bench" and that it would serve as a quick reference source to various comprehensive works. Unfortunately, its use as a practical guide is limited by either shallow or incomplete coverage of many important topics. With this book in hand, the inexperienced student cannot be expected to construct a particular apparatus (*e.g.*, column for gas chromatography (gc), p 76) or to use a specific technique (*e.g.*, gc, p 73) but must turn to the library for more detailed instruction. The treatment is not uniform, however; for example, the construction of a fractional distillation column is described in full (p 60). The student would have been better served with even briefer discussions but more complete reference lists.

It is difficult to accept the inclusion of a section on Structure

Determination. To the beginning student, this section will mean little; to the advanced undergraduate, it is useless since he will have had instruction in most of these techniques earlier and therefore is likely to possess a good book on the subject.

Most of the descriptions of specific techniques or apparatus are extracted from *Organic Syntheses*. Rather than having this type of information served on a silver platter, the student is well advised to search the reference work on his own at greater profit. On the positive side, there are instructive bits of advice (pp 14, 20, 69) and some very useful tables on bath mixtures (p 27), solvents (pp 18, 51), and gc columns (p 77). However, much space is wasted on simple glassware (pp 4-6), rarely used ion-exchange resins (pp 90-93), and pieces of equipment (*e.g.*, pp 9, 88). The increasingly important topic of microtechnique is discussed in a few lines and thick-layer chromatography is not mentioned.

In most departments, students undertaking advanced organic research are presented with a mimeographed set of notes which have been tested and revised over many years. I am afraid that this volume will not replace them. However, it may prove of some use to lower level undergraduate students.

Victor Snieckus, *University of Waterloo, Canada*

Detonics of High Explosives. By C. H. JOHANSSON and P. A. PERSSON (Swedish Detonic Research Foundation). Academic Press, Inc., New York, N. Y. 1970. xiii + 330 pp. \$15.00.

The authors state in their foreword that this book is meant to be a systematic and coherent presentation of current experimental facts and data relating to explosives and detonation phenomena. An idea of how "current" the material is can be gained by noting that roughly 30% of the references are to work published in the mid and early 1960's. Few references date more recently than 1967.

In general, the material is well organized and clearly presented. Bearing in mind that this book is a survey, the reader will find most of the topics adequately and accurately discussed. However, where gaps in current knowledge and understanding exist, the authors rarely suggest the nature of the work which needs to be done, and frequently fail to point out the reasons for a particular weak spot. For example, the experimental and theoretical difficulties associated with the determination of detonation temperatures are poorly treated, and the motivation for all the experimental work upon light emission during detonation is not indicated. Similarly, the problems associated with the determination of high pressure equations of state are not adequately treated.

Beyond these few reservations, however, the book is a valuable contribution to the explosives literature. Workers in the field of high explosives will find it interesting and a useful review. The numerous references to work done in Sweden and abroad are an asset. Because it is essentially a collection of experimental knowledge, most students would find it inadequate as a text from which to learn basic principles of the physics of high explosives. As background material, and as a supplement to more theoretically oriented works, it is very good.

Philip M. Howe, *Aberdeen Research & Development Center*

Absolute Configuration of Metal Complexes. By CLIFFORD J. HAWKINS (University of Queensland). John Wiley & Sons, Inc., New York, N. Y. 1971. x + 349 pp. \$19.50.

Hawkins has written a book which is very much needed in an important area of chemical research in which up to now there have been only a few reviews to summarize the literature (approximately 400 papers) that has appeared since the middle fifties. From the outset it should be made clear that "absolute configuration" is used by the author in its broadest sense to include geometrical isomerism, optical isomerism, and diastereoisomerism; thus the book could have been entitled "Stereoisomerism of Metal Complexes." Indeed, it would have been difficult to discuss the techniques applied in determining absolute configuration in its more restricted sense without becoming involved in the literature dealing with stereoisomerism in general. For example, the chapter on the application of nuclear magnetic resonance deals extensively with the study of the geometric isomerism of cobalt(III) chelates, which facilitates an understanding of the intricacies involved in determining absolute configurations through the study of diastereoisomers. As might be anticipated, a good portion of the book deals with cobalt(III) chelates.

The author discusses in detail the various nomenclatures which have been used for absolute configurations. The reader should be aware of the differences between the nomenclature used by Hawkins and that recommended by IUPAC (*Inorg. Chem.*, **9**, 1 (1970)) as noted by the author on page 27. A periodic check throughout the book suggests that the author has been consistent. Following the discussion of nomenclature, Hawkins presents chapters on conformational analysis, absolute configuration by X-ray analysis, circular dichroism, and nuclear magnetic resonance, followed by two short chapters on miscellaneous techniques and geometric isomerism. The last chapter deals briefly with techniques (ir, electronic absorption spectroscopy, etc.) not covered in previous chapters.

As might be anticipated from the author's interests, an extensive and thorough treatment of conformational analysis has been included. The comparison of the various methods which have been used to calculate repulsive forces for the nonbonding interactions in chelates is particularly informative. Entropy factors, ignored in earlier conformational studies, are also discussed. It is quite clear, as recognized by the author, that the current status of conformational analysis is controversial. With this in mind, the reader should be aware of the recent work published in this journal and elsewhere by Buckingham, Sargeson, Snow, and others as well as of the fact that some of the material on conformational analysis discussed originating from Hawkins group is yet unpublished (as noted) and, therefore, untested by formal review. The material on the conformational analysis of Co(en)_3^{3+} and related trisdiamines is discussed extensively in this chapter and the chapter on nmr. Again, new and important information has appeared on this subject which deals with nmr studies of conformational distribution in solution and the great importance of recognizing coupling with the ^{59}Co nucleus (J. L. Sudmeier and G. L. Blackmer, *J. Amer. Chem. Soc.*, **92**, 5238 (1970); J. K. Beattie, *Accounts Chem. Res.*, **4**, 253

(1971), and other recent reports by Sudmeier and Beattie). An interesting and vital question not confronted by the author is the assumption by most workers in this field that charcoal promotes equilibrium conditions in aqueous solutions of cobalt(III) complexes.

The various approaches and models that have been developed which use circular dichroism to relate absolute configurations are discussed critically. The recently popularized "excitation" model for conjugated chelates is discussed at some length. It should be pointed out that recent evidence (R. M. Wing and R. Eiss, *J. Amer. Chem. Soc.*, **92**, 1929 (1970); K. R. Butler and R. M. Snow, *Chem. Commun.*, 550 (1971)) gives support to Piper's "twisted crystal field model" contrary to the conclusions drawn by Hawkins.

The statement in the preface that the reader should be familiar with the principles of symmetry and group theory is misleading in part. A familiarity with symmetry is essential but with the exception of a few places an understanding of group theory is not needed.

The literature is quite thoroughly covered through early 1969, and the author is to be commended for his liberal use of "Note added in proof" which in some cases updates important and controversial subjects to early 1970. Care is also taken to point out errors in the literature along with the appropriate corrections. The figures, in particular those showing the stereochemistry of various molecules, are well done and helpful. Extensive compilations of crystallographic and circular dichroism data are presented by the author in his discussions of various trends.

"Absolute Configuration of Metal Complexes" is well written and is worth reading from cover to cover as a refresher for the researcher in the field as well as for the novice who wants to acquaint himself with the substance of some very intriguing research. The book will fill an important gap in graduate level courses in inorganic chemistry and will serve as an excellent reference book for researchers in this area.

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