

As a reference book covering the classical era of investigations on these two vitamins, this volume cannot be faulted; experts in the field present authoritatively and clearly the basic information available up to 1964. It is only rarely that a reference for 1965 is encountered, so it appears that there has been a rather greater delay than usual these days between the completion of the manuscript and the publication of the volume. In spite of all the carefully compiled information, one is struck most forcibly by the enormous gaps that, with one outstanding exception—vision—still exist in our knowledge of the mode of action of vitamin A at the biochemical level. The same comment applies to ascorbic acid. There is here a great challenge to young biochemists, and the problems are clearly spelled out in chapters on "Biochemical Systems (Vitamin A)" by O. A. Roels, "Effects of Vitamin A Deficiency in Animals" by T. Moore, and "Effects of Ascorbic Acid Deficiency in Animals" by G. C. Chatterjee. In an edited volume some variation in standard of coverage is inevitable, but in this case the editors have clearly done an excellent job in keeping authors as close to their brief as is humanly possible when dealing with scientists. Overlap is well controlled although the same diagram appears on pages 242 and 250.

If vitamin A-active carotenoids are to be considered together with vitamin A in later editions, they should be given fuller coverage than in the present volume; in this case it is so scant and out of date as to be occasionally misleading. In the ascorbic acid section some of the more modern aspects are not discussed in sufficient detail. For example, one is tantalized by the statement that "thin layer chromatography is also being tried out in ascorbic acid studies". One wonders with what success, especially as three references are added to this statement. These are minor points and this book will take its place as a worthy first volume of the new edition of *The Vitamins*.

Volumes 6 and 7 began life 15 years ago as the well known and well tried *Vitamin Methods*. They now become the final volumes in the second edition of *The Vitamins*. This is a "take-over" which is logically justified. Volume 6 begins with an introductory chapter on "Animal Assays" by C. I. Bliss and P. Gyorgy and an excellent and detailed chapter on "Statistical Methods in Biological Assay of the Vitamins" by C. I. Bliss and C. White, and then continues to deal with each fat-soluble vitamin in detail. All these sections are thorough, critical, well informed and well documented. The chapter on vitamin A is perhaps not quite so up to date as the other chapters, but all the major assay procedures are fully described. Only methods for β -carotene are described in detail and little information is given on the separation and assay of other vitamin A-active carotenoids. It is significant that the chapter on vitamin E by R. H. Bunnell is sufficiently up to date to describe the application of GLC techniques to assays of this vitamin and its congeners.

Volume 7 has been designed on a similar pattern to volume 6. It begins with an excellent, concise introductory chapter on "Principles of Microbiological Assay" by W. N. Pearson, and this is followed by expert discussions of all aspects of assaying water-soluble vitamins. A final chapter is concerned with "Clinical Evaluation of Malnutrition" by W. A. Krehl.

When one considers the three volumes together, one is lost in admiration for the hard work which the editors and contributors have put into compiling these three authoritative volumes and which will be invaluable to investigators dealing with any of the multi-disciplinary aspects of vitaminology. The production of the books is up to the publishers' usual high standards and they will undoubtedly stand up to the continual use they are likely to be subjected to both inside and outside the laboratory.

T. W. GOODWIN

NMR PROTON SHIFTS

NMR Band Handbook

By Herman A. Szymanski and Robert E. Yelin. Pp. xiv + 432. (New York and Washington: IFI/Plenum, 1968.) \$40.

THIS book is an indexed list of the proton shifts in about 1,200 organic compounds, and, as a typical compound appears several times in the list in respect of each of its distinct proton environments, the list contains 4,800 entries. The material in the volume is a compilation of the data contained in the *NMR Spectra Catalog* of Varian Associates and Sadtler Research Laboratories, and from *NMR Spectral Data* of an American Petroleum Institute research project.

A single page of the book consists of twelve entries of the list, each entry displaying the structural formula of the compound with the protons labelled, the shifts referred to the labelled protons, and a coded description of the proton environment to which the entry is specifically related. The proton environment code, which determines the ordering of the entries, is that used in the *NMR Spectra Catalog* of Varian Associates. It starts with a number designating one of the twenty-one main chemical groups and subsequent upper and lower case letters refer to nearby subgroups and sub-subgroups, respectively. The actual spectral pattern to which the shifts relate is indicated by a type number. The categories are designed to be rather broad, and the possibility of discrepancies between what is predicted and what is actually obtained is admitted. In the light of this, it is unfortunate that no examples of spectra are given in the book. Two indexes are provided: the first is an index of molecular formulae, subheaded into compounds with a list of appropriate codes; the second is an index of proton shifts in numerical order (p.p.m.), again with the proton codes of the environment which produced them.

The book contains valuable information to aid the determination of structure by providing easy access to data from compounds with features comparable to those of structures which may be proposed. The analyst is also well served for identifying a compound from chemical shifts. A few minor irritations were evident—the usage "comprise" for "compose" in the introduction; C_6H_6 , appearing in the molecular formula index but not in the body of the book, the fold-out sheet showing proton and peak codes being placed before the indexes rather than after them. The major irritation, however, is the price, which, for a book of this size, containing merely a collection of existent data, makes the prospect of purchase by individuals more than somewhat forbidding. But clearly the handbook will prove a valuable tool for groups working in the field it covers.

P. A. ALLINSON

NUCLEAR MAGNETIC RESONANCE

Progress in Nuclear Magnetic Resonance Spectroscopy
Vol. 2. Edited by J. W. Emsley, J. Feeney and L. H. Sutcliffe. Pp. vii + 269. (Oxford, London and New York: Pergamon Press, Ltd, 1967.) 90s. net.

Advances in Magnetic Resonance

Vol. 2. By John S. Waugh. Pp. xii + 269. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd, 1966.) \$12.00.

Guide to the NMR Empirical Method

A Workbook. By Roy H. Bible, jun. Pp. xi + 305. (New York: Plenum Press, 1967.) \$9.50.

In 1953, the first textbook exclusively devoted to nuclear magnetic resonance (Andrew: *Nuclear Magnetic Resonance*).

ance) was published. For many years it remained the only book. In marked contrast to this situation, the past few years have seen the appearance of a large number of texts devoted to this branch of spectroscopy. In my opinion, this has been quite excessive and there has been a great deal of duplication. This has arisen largely from the publicity associated with the technique and from an unnecessary absence of co-operation between publishers. The situation is illustrated by the appearance of two review series (as listed here). Although, in principle, the Academic Press series could incorporate electron spin resonance and therefore cover a wider range than the Pergamon texts, in practice the latter field has (so far) received scant coverage (except in so far as certain basic theory is common to both nuclear and electron resonance). In the light of this, one might imagine that a co-operative production of a single series would adequately cover the subject of nuclear magnetic resonance; compare the situation with the comparatively large field known as "chemical physics" where a single review series has been adequate.

The Pergamon volume comprises five independent "chapters" (of near equal length): "Chemical Shift Calculations", by D. E. O'Reilly; "High Resolution Nuclear Magnetic Resonance in Partially Oriented Molecules", by A. D. Buckingham and K. A. McLauchlan; "Nuclear Magnetic Resonance of Paramagnetic Systems", by E. de Boer and H. van Willigen; "The Calculation of Line Shapes by Density Matrix Methods", by R. M. Lynden-Bell; and "The Cause and Calculation of Proton Chemical Shifts in Non-conjugated Organic Compounds", by R. F. Zürcher. The first four chapters are genuine review articles; the fifth, on the other hand, describes an original and interesting experimental investigation of (a) intramolecular factors influencing chemical shifts in rigid cyclic systems, and (b) solvent effects. In no sense is there overlap with the first chapter, which deals clearly and systematically with quantum mechanical calculations of chemical shifts, chiefly in small molecules. The second chapter describes the theory, method and results of a recent development, which has given a new boost to the non-analytical side of nuclear magnetic resonance. In the third chapter is presented a mixture of a readable description of typical experimental results for paramagnetic species and a more difficult section on the application of density matrix formalism to electron transfer kinetics. Like the fourth chapter, exclusively devoted to the use of density matrices in magnetic resonance, treatment of this subject will probably be too condensed for most readers. The general production of the book is commendable; each chapter is clearly subdivided and a list of contents is given. It is a pity that modern (SI) units have not been used, for example, Hz rather than c/s, J rather than erg or cal.

The Academic Press publication has four sections: "Sensitivity Enhancement in Magnetic Resonance", by R. R. Ernst; "The Chemical Shift and Other Second-order Magnetic and Electric Properties of Small Molecules", by W. N. Lipscomb; "Theory of the Chemical Shift", by J. I. Musher; and "Nuclear Relaxation in Hydrogen Gas and Liquid", by J. M. Deutch and I. Oppenheim". The first section is considerably longer than the others, occupying about half of the book. This, however, has permitted the author to present a delightfully clear account of his subject. Taking the Pergamon and Academic Press publications together, this article must take first prize for clarity. The second section is principally a description of the calculation of magnetic susceptibilities, shielding coefficients and spin-rotational constants for diatomic molecules using SCF LCAO wavefunctions. The third section develops the theory of chemical shift in an authoritative fashion and indicates in an interesting and critical way how this has been applied. The well known ring-current theory for aromatic systems is strongly criticized and the whole philosophy of cal-

culating chemical shifts is questioned. As with the second section (with which there is no significant overlap), there is a good balance of material between appendices and remaining text. The fourth section is a quantitative treatment of the Oppenheim-Bloom theory of nuclear spin relaxation, particularly as applied to assemblies of hydrogen molecules, with and without inert gas contaminants.

The text by R. H. Bible is aimed at a completely different audience from the other two volumes. Whereas the latter are directed at the magnetic resonance spectroscopist interested in the fundamentals of his subject, the former is intended for the organic chemist wishing to use high resolution nuclear magnetic resonance to analyse his products. The book presents some hundred ^1H spectrograms on left pages. On corresponding right pages are then given (a) other known information (including integrated band intensities), and (b) a small number of questions to be answered by the reader. The spectra are subdivided into nine sections, at the beginning of each of which is a list of references taken from standard texts. Answers to the problems are presented in some detail towards the end of the book. Cross-referencing and indexing are very good. There are several other texts which adopt this kind of approach to the teaching of applied nuclear magnetic resonance (either in this field alone or together with other branches of spectroscopy).

This book can be recommended to organic chemists wishing to use nuclear magnetic resonance in chemical analysis, but not wishing to delve deeply into theoretical fundamentals.

J. LEE

ORGANOHALOSILANES

Organohalosilanes

Precursors to Silicones. By R. J. H. Voorhoeve. Translated from the Dutch. Pp. xiv + 423. (Amsterdam, London and New York: Elsevier Publishing Company, 1967.) 145s.

THERE is a trend to produce larger and larger monographs on smaller and smaller subdivisions of chemistry. Here is a classical example. In 423 pages the author covers, with little deviation, the subject of halogenosilanes. That such a specialist topic justifies a whole book to itself is, however, amply illustrated by the quotation of nearly two and a half thousand literature references in the text.

The bulk of this volume is taken up by a very full discussion of the direct synthesis of the organohalogenosilanes, which are of such immense importance to the silicone and related industries. In addition, adequate accounts are given of what is known of the kinetics and mechanisms of these processes.

A chapter on the physical and chemical properties of organohalogenosilanes forms a commendable résumé of interesting organosilicon compounds obtained by way of these intermediates; and the closing chapters on industrial and analytical aspects of the field are particularly readable and interesting.

While the book is a "must" for organosilicon chemists, it deserves note from a wider body of readers. Thus, for example, organometallic chemists exploring the now rapidly expanding field of metal-to-silicon bonds will find a wealth of useful material here.

The book is virtually devoid of typographical errors; the references are made easy to find by a note at the base of each page; and a very good subject index makes for easy information retrieval.

The author (and translators) are to be complimented on producing such a readable account of such an involved topic.

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