

stituents which acidify β -hydrogen, and factors which promote the cis configuration of the intermediate base-substrate complex. Thus it is not surprising that $\text{CH}_3\text{-CF}_3$ is an ideal substrate for observing base-induced elimination reactions in the gas phase. In addition, the long range ion-dipole interaction between CH_3O^- and CH_3CF_3 facilitates attack of base at hydrogen.¹⁶

Gas-phase base-induced elimination reactions afford the means to study the selectivity and stereochemistry of E2 processes in the absence of complicating solvation phenomena. Efforts are now in progress to better characterize the thermochemical changes associated with these reactions, to extend the identification of elimination reactions to include substrates other than alkyl fluorides, and to provide better understanding of the factors determining the relative importance of pro-

(16) For a discussion of ion-dipole interactions, see J. V. Dugan and J. L. Magee, *J. Chem. Phys.*, **47**, 3103 (1967).

ton transfer, nucleophilic substitution, and elimination processes. Also of interest is the prevalence of proton transfer in several of the cases indicated in Table I, leading to β -substituted carbanions which recent theoretical calculations have suggested to have strongly preferred conformational stability.¹⁷

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(17) R. Hoffmann, L. Radom, J. A. Pople, P. von R. Schleyer, W. J. Hehre, and L. Salem, *J. Amer. Chem. Soc.*, **94**, 6221 (1972).

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Book Reviews*

Catalysis. Edited by J. W. HIGHTOWER. North Holland/American Elsevier, New York, N. Y. 1973. xxv + 1483 pp (in two volumes). \$79.00.

The Proceedings of the Fifth International Congress on Catalysis (August 1972) are reported here in the form of 107 papers reproduced from the authors' typescripts. Inasmuch as the papers are mostly reports of original research, one cannot help wondering how many of them represent redundant (and expensive) publication. There is an index of authors and commentators, and a minute subject index.

The Chemical Basis of Life. With Introductions by P. C. HANAWALT and R. H. HAYNES. W. H. Freeman and Co., San Francisco, Calif. 1973. 405 pp. \$12.00 (cloth); \$5.95 (paper).

This is a volume of 38 articles reprinted from "Scientific American" and is stated to be an updated version of "The Molecular Basis of Life", published in 1968. The articles originally appeared from 1953 to 1973; they are reproduced with full illustrations and figures, with liberal use of color.

Fundamental Aspects and Recent Developments in Optical Rotatory Dispersion and Circular Dichroism. Edited by F. CIARDELLI and P. SALVADORI (University of Pisa). Heyden and Son, Ltd., London. 1973. xvii + 419 pp. \$30.25.

In September 1971, a NATO Advanced Study Institute was held at Pisa on ORD and CD; the twenty-two main papers make up this volume. The topics range from "Basic Principles, Definitions, and Applications" to such specific subjects as "ORD and CD in Conformational Analysis of Synthetic High Polymers". Although the authors are an international group, all papers are printed in English. They are carefully edited, fully illustrated, and accompanied by extensive bibliographies, and are, in effect, review chapters, with emphasis on the authors' own research. There is a modest subject index.

Rodd's Chemistry of Carbon Compounds. Supplement to Volume I. Parts C and D. Edited by M. F. ANSELL (University of London). Elsevier Publishing Co., New York, N. Y. 1973. xix + 464 pp. \$48.50.

With this volume, the policy is being introduced of issuing supplements rather than completely rewritten volumes, with the goal of keeping the subject up to date without the high cost and large bulk that would otherwise be entailed. This volume thus carries the

subject on from the second edition (1964/5). Unfortunately, it is not stated when the coverage of the literature terminated for the contributions to this volume, so we are left in the dark about how up to date they are. The preface is dated March 1973, but the latest references apparent to casual scanning of the text appear to be from 1970. It is hard to understand this serious oversight in an important work of reference.

This volume covers aldehydes and ketones, dihydric alcohols, hydroxy aldehydes and ketones, carbon monoxide, isocyanides and fulminic acid, carbonic acid and derivatives, and carboxylic acids, simple and substituted (including amino acids). A welcome improvement over the early volumes is the inclusion of a good selection of general references (reviews and monographs). The index is, as heretofore, highly detailed. These supplements should effectively maintain the effectiveness of this valuable reference work.

Organic Reactive Intermediates. Edited by S. P. MCMANUS (University of Alabama in Huntsville). Academic Press, New York, N. Y. 1973. x + 539 pp. \$39.50.

The editor has classified reactive intermediates according to type, each being the subject of a contributed chapter: Free Radicals (E. S. Huyser); Carbenes (D. Bethall); Nitrenes (R. A. Abramovitch); Carbonium Ions (S. P. McManus and C. U. Pittman, Jr.); Carbanions (E. M. Kaiser and D. W. Slocum); Radical Ions (G. A. Russell and R. K. Norris); and Arynes (E. K. Fields). The authors have been appropriately chosen. The book is a selective review, designed, it is said, for readers who have had a basic course in organic chemistry, and particularly for advanced undergraduates and graduate students. The editor recommends it as a textbook for a graduate course, but the publishers evidently did not take this point seriously when setting the price.

This book is, in fact, a useful orienting reference work, with extensive bibliographies (eleven pages of references in the chapter on Carbonium Ions, for example). The coverage of the literature extends through 1971, with a few later references. There is an author index of 24 pages; it is a pity that the subject index is relatively skimpy.

Among the many pleasant features of this book is the way the generally untidy matter of nomenclature of carbenes has been neatly handled. Bethell cleanly states his principle that "carbene" will be used only in the generic sense, and "methylene" will be used in naming specific compounds; the structure $\text{R}_2\text{C:}$ will be used non-committally for singlet or triplet carbenes, and $\text{R}_2\text{C}\uparrow$ and $\text{R}_2\text{C}\uparrow\uparrow$ will be used to specify singlet or triplet species, respectively. Much confusion would be avoided if these principles would be followed in all the literature.

* Unsigned book reviews are by the Book Review Editor.

The coverage of the various chapters is generally complete, although there are some choices that one might take exception to. Carbenes, for example, are defined in Chapter 2 as "species which contain at least in one of their valence-bond representations, a divalent carbon atom associated with only six valence electrons," yet isocyanides, which clearly qualify, are not even mentioned in the section on Related Species. All chapters, however, present a concise historical background, methods of investigation and generation, and reactions and reactivity, with a moderate amount of material in tables. The result is good.

Organoboranes in Organic Synthesis. By GORDON L. CRAGG (University of Cape Town). Marcel Dekker, Inc., New York, N. Y. 1973. xii + 422 pp. \$24.50.

This is Volume 1 in the series "Studies in Organic Chemistry" edited by Paul G. Gassman. It is a review of the material published up to mid-1972, arranged in ten chapters that cover hydroboration, reduction, and synthesis of organoboranes, carbon chains, and various functional groups. It is certainly useful to have this material brought together and classified. The most noticeable shortcoming is a general avoidance of a critical treatment, especially with respect to comparisons with other methods of accomplishing the same changes. The text is essentially reportorial and does not convey the feel for the subject that one expects from an experienced practitioner. There are no examples of experimental methods or procedures, and the chapters are not the equivalent of those to be found in "Organic Reactions."

The book is reproduced from typescript. Although it is commendably free from typographical errors, there are some infelicities, such as the consistent use in citations to Russian journals of a period after "Nauk", treating it as an abbreviation, which it is not. A glossary of chemical abbreviations is included; it is of special importance in this field, in which the workers are prone to coin neologisms at the drop of an acorn (*e.g.*, Th = "thexyl" = 1,12,2-tetramethylpropyl). Some of these abbreviations, which may be all right as "lab lingo", are undesirable for formal use, and it is a pity to see them dignified in print. A horrible example is "LiBPH" which contains lithium, boron, and hydrogen but not phosphorus; its undeducible structure is "lithium perhydro-9b-boraphenaly hydride". An author index and a fine, 32-page subject index are valuable complements to the text.

Rate Control of Biological Processes. Edited by D. D. DAVIES. Cambridge University Press, New York, N. Y. 1973. vii + 583 pp. \$23.50.

This volume contains the collected papers of the twenty-seventh symposium of the Society for Experimental Biology, held in September 1972. There are twenty-four papers, an author index, and a subject index. The papers are largely concerned with enzyme kinetics. They do not appear to be primary reports of original research, but are critical, summarizing reports.

International Symposium on Mass Spectrometry in Biochemistry and Medicine. Organized by A. FRIGERIO and A. LEONARDI. Istituto Ricerche Farmacologiche Mario Negri, Milan. 1973. 56 pp. Price not stated.

This booklet contains the summaries, all in English, of the papers presented at the Symposium. There is an index of authors but no table of contents or other index.

Proceedings of the International Symposium on Gas Chromatography—Mass Spectrometry, 1972. Edited by A. FRIGERIO. Tamburini Editore, Milan. 1972. x + 505 pp. Price not stated.

All the invited and contributed papers, reproduced from the authors' typescripts in English, are included in his volume. They appear to be mostly accounts of original research and include such

timely titles as "The Search for Drugs of Abuse by G. C. with MS Detection Systems," and "GC-MS Analysis of Yoghurt Aroma."

Symposium on Electron Paramagnetic Resonance: Biochemical Application. Edited by A. FRIGERIO. Tamburini Editore, Milan. 1972. vii + 83 pp. Price not stated.

This soft-bound volume contains an Introduction and four papers presented at the Symposium on EPR held in Milan in April 1972. The papers, which are illustrated, contain reports of original research. There is no index.

Physical Chemistry. Fourth Edition. By WALTER J. MOORE (Indiana University and University of Queensland). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1972. xiii + 977 pp. \$16.95.

Succeeding editions of this by now classic text have been quite extensively rewritten. Even those chapters not significantly revised in content have been done over with different wording, new figures, and often a snappy new title (for example, Chapter 2, formerly called "The First Law of Thermodynamics," has become "Energetics"). More substantive changes in the Fourth Edition include expanded coverage on the quantum theory of atoms and molecules and a new chapter on group theory. Statistical mechanics is introduced at a much earlier stage (Chapter 5 rather than Chapter 15) thus making it available in the treatment of solutions and chemical equilibria. The chapter on chemical reaction rates has been expanded to include some recent theoretical and experimental developments—molecular beam scattering, chemical relaxation, Monte Carlo methods, and some applications of irreversible thermodynamics. The last is covered much too casually to be of pedagogical value *per se*, but Moore does give us a tantalizing glimpse of the subject and provides references for follow-up. The previously separate chapters on photochemistry and spectroscopy have been combined, while the chapter "Nuclear Chemistry and Physics" has been dropped from the Fourth Edition. In total, the new edition is increased by slightly more than 100 pages, to just under 1000 pages. Moore has wholeheartedly espoused SI units in all branches of physical chemistry—the Bohr radius becoming 0.0529 nm, Trouton's rule constant $92 \text{ J K}^{-1} \text{ mol}^{-1}$, for example. But, as if to prove the persistence of old ways, we find $-Ze^2/r$ for the Coulomb potential energy in the Schrödinger equation (p 630) [although $-Ze^2/4\pi\epsilon_0 r$ in the Bohr theory (p 590)] and an occasional "g" or "cm" slips in elsewhere.

Moore's lively and lucid style, good humor, philosophical and historical sidelights, and keen insights combine to make his book a pleasure to read. He delights in interdisciplinary interjections, particularly on biological applications of physicochemical principles—a focus of his own recent research interests. A decision to adopt Moore as an undergraduate text must, however, be approached with some caution. Run-of-the-mill students in a first physical chemistry course are likely to experience some difficulties with Moore's breezy exposition unless the lecturer is willing to be quite meticulous in filling in details. It appears that something of the pedagogical patience which marked the First and Second Editions—and made them more accessible to beginning students—has been lost in the course of revision. For honors level students, on the other hand, particularly those already familiar with some more elementary physical chemistry text, Moore can be an excellent choice. It might also be appropriate for a graduate course in general physical chemistry, where such still exists.

Since the First Edition appeared in 1950, this work has been in the forefront of the trend in undergraduate physical chemistry toward greater mathematical sophistication and emphasis on the microscopic viewpoint. Professor Moore has thereby made a very significant contribution to chemical education, and few physical chemistry texts published in America during the present generation have escaped his very considerable influence.

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