

Book Reviews

Organic Chemistry. Second Edition. By G. Mark Loudon (Purdue University). Benjamin/Cummings: Menlo Park. 1988. xxx + 1259 pp. \$58.25. ISBN 0-8053-6643-1.

Loudon's new organic chemistry text follows an organization plan based mainly on the various functional groups. Their names, arranged in a logical sequence, provide a majority of the chapter headings. Virtually all organic chemistry texts of recent vintage have followed a similar plan, yet vary considerably from one another in regard to the "logical" order of functional groups. Whatever may be the merit of this plan of presentation, it nevertheless poses a serious pedagogical question. To take a specific example, should the chapter on alcohols include their preparation via addition reactions of aldehydes, ketones, and esters even though the reactions of those carbonyl compounds are not explicated until much later in the book? Most textbook authors appear to answer in the affirmative, presumably in order to consolidate under one heading all methods for the synthesis of alcohols. But the student, in that case, must be content with a necessarily incomplete understanding of reactions that he is expected to *memorize*—a situation contrary to what we all agree should be the spirit of the course. Loudon's text bypasses the problem: under each functional group are described its reactions but, in most cases, not its synthesis. This solves the pedagogical problem but leaves the problem of locating the various methods for preparation of a given functional group. To that end Loudon has provided "Appendix IV", a five-page "Summary of Synthetic Methods". This is arranged by functional group, giving for each all of the discussed methods of synthesis along with numbers corresponding to the sections of the book where they are presented. Students of synthesis will also benefit greatly from Appendix V, which lists the 19 methods described in the book for forming a carbon-carbon bond, as well as from the Author's remarks on the general strategy of formulating a synthesis.

Contrary to the general trend for organic chemistry texts, this second edition is about 200 pages shorter than the first! Most of the deletions were very wisely chosen, no chapters were omitted, and in fact, a new chapter on pericyclic reactions was added. Loudon's familiarity with contemporary organic chemical research literature is reflected in the problems as well as the text. The writing is exceptionally lucid and is characterized by more than the expected amount of humor and novelty of expression. The Author's treatment of stereochemistry and reaction mechanisms is particularly clear in spite of his restrained use of only one color!

Some criticisms are in order. Loudon exhibits several annoying peculiarities in word usage, such as his unusual definition of "torsional strain" (p 75), his application of "conformations" to *E*- and *Z*-alkene isomers (pp 92 and 129), his statement that "the simplest method of racemization is to mix equal amounts of each member of an enantiomeric pair" (p 139), and his use of the expression "arrow formalism" in place of "mechanism". Some will criticize Loudon's text for the almost complete omission of such traditional topics as the free-radical halogenation of alkanes and the synthesis of alkynes from alkenes by base-promoted double dehalogenation reactions. Most surprising, however, in view of the otherwise excellent coverage of organic synthesis, is the lack of emphasis on protecting groups. Although acetal protection of ketones and amide protection of amines are included, there is nothing on the protection of alcohols or carboxylic acids.

The above shortcomings do not detract seriously from the classroom effectiveness of Loudon's *Organic Chemistry*, 2nd edition. After one semester's use, my students reported a significantly higher level of satisfaction with the text than was the case for recent past classes using other texts.

Samuel G. Levine, *North Carolina State University*

Principles of Organometallic Chemistry. Second Edition. By P. Powell (University of London). Chapman and Hall: London and New York. 1988. xv + 414 pp. \$39.95. ISBN 0-412-27580-5.

The second edition of *Principles of Organometallic Chemistry* is a revision of the text originally co-authored by G. E. Coates, M. L. H. Green, P. Powell, and K. Wade, published in 1968. The present text is intended as a textbook for advanced undergraduate students rather than as a comprehensive treatise. The author states that such a text should present a well-balanced overview of the field and should not be excessive in length. For the most part, these goals are realized in a well-organized,

easy-to-read format. The text is organized by periodic groups rather than by reaction type with additional subdivision for transition-metal complexes by the electron number of the principal ligand. The relevance of organometallic chemistry to industry is interspersed throughout the text, adding a unique dimension to the discussion. The omission of the application of organometallic reagents to the synthesis of natural products was intended to avoid diverting the attention of the reader from the main point; however, since there are now many excellent examples of the direct application of novel organometallic chemistry to natural product synthesis, this omission seems somewhat inappropriate. A strong point of the text is the inclusion of study problems at the end of Chapters 3-12. A booklet containing the answers is available from the publisher. Also, at the end of each chapter, there are key references to review articles and texts. The selection of references is clearly geared toward the undergraduate and is not extensive, yet provides the student with an adequate bibliography to begin to search the literature for more specific information.

Chapters 1 and 2 serve to introduce the topic and include a historical perspective as well as an overview of the methods to prepare metal-carbon bonds. The discussion of thermodynamic stability is well done and is continued throughout the text, clearly defining these complexes as reactive compounds. Chapters 3 and 4 discuss main-group organometallic chemistry and show a strong relationship to inorganic chemistry. Reactivity, stability, structure, and bonding are adequately covered. The incorporation of relatively lengthy sections on organoboron and -phosphorus chemistry seem out of place while the discussion of silicones is more appropriate.

Chapter 5 introduces transition-metal organometallic chemistry and includes a molecular orbital description of the 18-electron rule. The use of formal oxidation state of the metal is not considered. Typical reactions, such as addition, elimination, and ligand exchange, are illustrated with use of metal-carbonyl complexes. Chapters 6-10 detail transition-metal chemistry including ligand classification, symmetry elements and structure, insertion reactions, carbene and carbyne complexes, as well as cyclopentadienyl and arene complexes. Allyl and dienyl complexes are employed to introduce the analysis of ligand dynamics by ^1H and ^{13}C NMR.

Three separate chapters are also included, covering cluster compounds, mechanistic details of industrial processes (homogeneous catalysis), and a short discussion of lanthanide and actinide complexes. The mechanistic chapter introduces catalytic cycles and includes oligomerization, the Wacker process, the Monsanto Acetic Acid process, syngas chemistry, hydroformylation, and the Fischer-Tropsch process. A reasonably comprehensive index completes the text.

In summary, this text should provide advanced undergraduates with a good overview of organometallic chemistry. Since the book is also available in paperback, text adoption at low cost to the student is also a positive feature.

Russell J. Linderman, *North Carolina State University*

New Directions in Electrophoretic Methods. Edited by J. W. Jorgenson (University of North Carolina) and M. Philips (USDA). American Chemical Society: Washington, DC. 1987. ix + 275 pp. \$64.95. ISBN 0-8412-1021-7.

This volume, arising from a symposium sponsored by the Divisions of Agricultural and Food Chemistry and Analytical Chemistry at the National ACS meeting in Chicago, 1985, broadly covers the field of electrophoresis. Topics covered include different sorts of gels, the use of capillaries, isoelectric focusing, isotachopheresis, two-dimensional electrophoresis, and preparative electrophoresis. For the novice, there is enough detail to understand what it would be like to apply the technique to one's own problem. Also, sufficient theoretical background is given explicitly or by reference. There is an unfortunate use of the letter "t" to mean both "time" and "distance" in Chapter 14, so that the development of the transport equations is obscure.

The chapters are efficiently, but nicely written. Pictures and diagrams are well chosen and executed. All together, the book makes for an excellent introduction to a field in which more chemists will find themselves in the future.

S. G. Weber, *University of Pittsburgh*