

BOOK REVIEWS

Studies in Organic Chemistry. I. Complex Hydrides and Related Reducing Agents in Organic Synthesis, A. HAJÓS, Research Institute for Pharmaceutical Chemistry, Budapest, Hungary. Elsevier Scientific Publishing Company, 52 Vanderbilt Avenue, New York, N.Y. 10017. 1979. 398 pp. 16 x 24.8 cm. \$76.00.

Since the years 1955-1956 when three monographs on complex hydrides were published the number of complex (and even more complex) hydrides and their applications has increased immensely. Although several reviews of narrower scope have been written, a comprehensive monograph systematically covering the whole field has been lacking. Hajós's book "Complex Hydrides" is, therefore, a welcome addition to the literature.

The introductory chapter demonstrates the versatility and selectivity of twelve typical complex hydrides in a table indicating reductions of twenty-six basic types of bonds and functions. The table is very useful for rapid orientation since it shows at a glance which reagent is suitable for reductions of particular functions, especially in the presence of other functions.

A detailed and comprehensive discussion on the merits of the individual hydrides takes place in the following eight chapters on alkali and alkaline earth hydrides (4 p.), boranes (13 p.), alanes (7 p.), and on the complex hydrides of boron (40 p.), aluminum (94 p.), silicon (38 p.), tin (34 p.), and transition metals (33 p.). Separate chapters deal with the analysis of complex hydrides (6 p.), techniques of selective reductions (11 p.), and the mechanism and stereochemistry of reductions with complex hydrides (29 p.). Finally, an appendix provides supplemental literature to the end of 1977.

Within the individual chapters, descriptions of the preparations of the hydrides are followed by comments on their handling and properties, including helpful tables of solubilities of the seven most important hydrides, LiBH_4 , NaBH_4 , $\text{NaBH}(\text{OMe})_2$, NaBH_2CN , KBH_4 , LiAlH_4 , and $\text{LiBH}(\text{O-tert-Bu})_2$, in various solvents. This material is followed by a discussion of the applications of the hydrides to reduction of individual types of compounds. Examples are illustrated in equations showing general as well as specific instances, the latter ones accompanied by yields. All the examples are documented by references listed at the end of the respective chapters: a total of 1800 references are given in the book.

The book is equipped with an author index (23 p.) which facilitates location of references in the text as well as in the respective lists of references, and with a thorough subject index (30 p.). The latter is highly specific: only very few entries refer to a large number of pages.

The gap of a quarter of a century between the monographs on the traditional complex hydrides and Hajós's book shows in the balance of its contents. While the universal LiAlH_4 still occupies the largest individual portion of the text (45 p.) the center of gravity has shifted toward the more selective reagents such as boranes, alanes and modified complex hydrides. A special merit of the book lies in its treatment of these newer reagents including silicon, tin and transition metal hydrides.

One important reference that is lacking is to the superb monograph on Lithium Aluminum Hydride and Related Reagents written by J. Rudinger and M. Ferles (Czechoslovak Academy of Sciences, Prague, 1955). This book (370 p.) is an exhaustive review up to the end of 1953 and contains 2100 references and 253 pages of tables listing reaction conditions and yields of some 4000 reductions. Although it is written in Czech the tables are universally intelligible as they list the compounds by empirical formulae.

A few inaccuracies can be spotted in the book. In Table 1 on p. 17, reduction of alkyl halides with sodium borohydride would have been better marked by the symbol (\approx) rather than (+) since it does not always take place. The symbol (\approx) for the reduction of alkyl halides with sodium cyanoborohydride should have been replaced by (-) as documented on p. 65 of the book. Vinyl halides can hardly be labeled as "inert" (p. 123) since they are reduced by complex hydrides sometimes even more readily than alkyl halides (p. 54, 144). Reduction of tetrachloropyrazine to trichloropyrazine (p. 124) is not a good example of "high regioselectivity". Reference to magnesium aluminum hydride in the subject index (p. 388) should be p. 167, not 147.

These negligible errors do not detract from the value of Hajós's monograph which is an indispensable aid to students, teachers and especially organic chemists engaged in synthesis. It is regrettable that such a useful book is priced so highly that many chemists who should have it on their shelves will not be able to afford to buy it.

M. HUDLICKY, *Department of Chemistry,
Virginia Polytechnic Institute and State University*

Recent Advances In Phytochemistry. Volume 12. Biochemistry Of Plant Phenolics, Edited by T. SWAIN, Boston University, J. B. HARBORNE, University of Reading and C. F. VAN SUMERE, University of Ghent, Belgium. Plenum Press, 227 West 17th Street, New York 10011. 1979. ix+651 pp. 16 x 23.5 cm. \$49.50.

This volume presents the proceedings of the first joint symposium of the Phytochemical Societies of Europe and North America which was held in Ghent, Belgium in August 1977. The contributing authors are amongst the leaders in their fields. The book comprises 19 chapters which when classified according to content fall roughly into 3 major groups: Separation and Structure determination (2 chapters, 60 pages), Biosynthesis, Chemistry and Metabolism (12 ch., 420 pp.) and Functional Aspects (5 ch., 150 pp.) although there is some overlap. Most major categories of phenolic natural products are covered although xanthenes are significant by their absence.

The first major group essentially presents an up-date of the "Separation and Structure Determination" chapters in "The Flavonoids". Discussion of glc and hplc is detailed and experimental data for both is conveniently summarized in two large tables. Spectroscopic techniques emphasized by Chari and Wagner include mass spectrometry (with timely descriptions of refinements such as FD, FI and CI techniques) and ^{13}C -nmr (in considerable detail).

The second major group, Biosynthesis, Chemistry and Metabolism includes a range of chapters introduced by one on the shikimate pathway and another entitled "Introduction to the enzymology of phenyl-propanoid biosynthesis". It is perhaps disappointing to the non-biochemist that the bulk of the latter chapter is devoted to a rather specialized discussion of the 3 "core-sequence" enzymes rather than to a more generalized introduction. More specialized chapters follow on the role of cinnamoyl CoA thioesters, aspects of flavonoid, coumarin and lignin biosynthesis and the biosynthesis of gossypol and of aromatic amino acids (by fungi). This last chapter by Wat and Towers is a particularly interesting account incorporating many readily comprehended diagrams. The unique array of 2° products formed only by fungi makes this chapter a most significant contribution. Other chapters in this second group include those on oxidases (which concentrates on the dual hydroxylase and oxidase activities of polyphenol-oxidase) and on the metabolism of phenolics (especially flavonoids) in plants. Several chapters contain sizeable descriptions of the chemistry (as distinct from the biochemistry) of the titled compounds. This is particularly so with the chapters on quinones and tannins and to a lesser extent with the chapter on lignin. The authors of the lignin and tannin chapters have presented with clarity, highly condensed reviews of the history, structure determination and taxonomic distribution of these polymers. It is unfortunate that the otherwise excellent tannin chapter is marred by a number of errors in the presentation of structures and their numbers e.g. structures 46 (no number), 70 (non existent?) 56 and 57 (carbocations?), 71 and 41 (equivalent), 50 (labelled 5c) etc. The use of the word "equation" beneath many single structures is also puzzling.

The third group of chapters covers such subjects as the photosensitization properties of furanocoumarins, the function and physiology of phenolics and their conjugates in plants, phenolics in the environment and phenolics of pharmaceutical interest. These chapters are perhaps the most readable of all, especially the compilations of Swain and Wagner which cover the less abstract subjects of environment and pharmaceuticals respectively. The discussions of the function of phenolics in plants, although creditable efforts by the authors, suffer I feel, from the same limitations as previous articles on this subject in that central roles for many plant phenolics are simply not yet defined.

The book as a unit is well ordered and I was particularly impressed with the number of cross-references given and by the lack of duplication. The indexing is adequate although not generous for a book of this size. To me the book shows no sign of being out of date in spite of the 2 year time lag between its publication and the conference. This time lag is surprising in view of the "camera-copy" type of reproduction which saves time (but which gives poorer quality copy than traditional print). Numerous minor errors occur throughout suggesting rushed proof-reading but these do not detract particularly, except where they result in "nonsense" sentences such as occur for example on pages 35 (para. 2), 195 (para. 2) and 448 (line 9). Overall, the book is a highly valuable, almost encyclopedic repository of information on the biochemistry of plant phenolics. The high price may limit its appeal to individual buyers, but in my opinion it is a "must" for all libraries serving the needs of research scientists and post-graduate students in the plant phenolics field.

KEN R. MARKHAM, *Chemistry Division, D.S.I.R. Petone, New Zealand*