Book Reviews

Methoden der Organischen Chemie (Houben-Weyl), 4th Edition, Volume IV/1c, Reduktion, Part I, H. Kropf, volume editor, A. W. Frahm, J. Lehmann, W. Meise, H. Muth, P. Pachaly, E. Reimann, H.-J. Rimek, M. Sauerbier, P. Tinapp, and F. Zymalkowski, volume authors. 1980. xxxi + 912 pages, DM 780. Volume IV/1d, Reduktion, Part II, H. Kropf, volume editor, J. Bracht, A. Hajós, P. Hartter, H. Muth and M. Sauerbier, volume authors. 1981. xliii + 1000 pages. DM 860. Georg Thieme Verlag, Stuttgart/New York.

Reduction is one of the key processes in organic chemistry, and we have here nearly 2000 pages devoted to all aspects of the reduction of organic compounds. The Houben-Weyl series, we remind the reader, is complementary to the Beilstein handbook. The properties of individual organic compounds are not given here; rather the Houben-Weyl volumes focus on the *chemistry—what* has been done and *how* it was done. The chemistry is brought systematically and critically in well-organized discussions that are very thorough and which are backed up by an abundance of references to the original and the review literature. Both text and many tables bring a wealth of information. Detailed experimental procedures from the literature also are provided. There are many equations and figures, and these will be helpful to the reader.

Volume IV/1c covers catalytic hydrogenation in all its many aspects. A 90-page section brings general discussions of heterogeneous and homogeneous catalytic hydrogenation, catalytic transfer hydrogenation, and the stereochemistry of catalytic hydrogenations. The applications of various metal catalyst systems, all of which are familiar to the organometallic chemist, are discussed in the section devoted to homogeneous catalysis: chromium carbonyl complexes, pentacyanocobaltate(II), dicobalt octacarbonyl $(Ph_3P)_3RuCl_2$, $(Ph_3P)_3RhCl$, and other rhodium complexes, iridium complexes, including $(Ph_3P)_2Ir(CO)Cl$, $H_2PtCl_6/SnCl_2$, $(\eta^5\text{-}C_5H_5)_2Ti(CO)_2$, and soluble Ziegler catalysts. Here, as is usual in the Houben-Weyl series, the emphasis is on practical aspects of the chemistry to the almost complete exclusion of mechanistic considerations. So there is no mention of the catalytic cycles involved in which organometallic intermediates play an important role. Nonetheless, for the organic chemist whose aim is the hydrogenation of a given organic compound these general sections will be useful and informative. However, it is the following sections which provide the really useful information for the synthetic organic chemist: over 450 pages in which the applications of catalytic hydrogenation are detailed in a discussion which is organized according to the organic functions which are reduced.

Volume IV/1c concludes with the first two sections of the chapter on reductions with inorganic reducing agents. The remaining three sections of this chapter are found in Volume IV/1d. Included in this chapter are the following inorganic reducing agents: nonmetal compounds (I^-, HI, $S_2O_4^{2-}$, N_2H_4, $(RO)_3P$, H_3PO_2, etc.); metals; simple and complex metal hydrides; metal salts (Sn(II), Ti(II), Ti(III), V(II), Cr(II), etc.) and metal carbonyls; so there is much organometallic chemistry in this chapter. (This will not be apparent to the uninformed reader since, as noted before, mechanisms are not discussed.) Further chapters in Volume IV/1d deal with the few examples of reductions using organometallic compounds as reducing agents, with electrochemical reductions, and with biochemical reductions which utilize microorganisms.

In each chapter, as in the first, the discussion is organized in terms of the organic functions which are reduced. However, the chapters usually begin with a general discussion of the applications of the class of reducing agents being covered, including brief accounts of the preparations of these reagents.

Each volume contains an author index and a compound index. The latter is organized in seven categories, each of these alphabetically. This index, together with the very detailed table of contents, allows one to find just about anything one might be looking for. For the chemical public at large it is unfortunate that this outstanding, definitive account of reduction in organic chemistry is written in German, not in English. The Houben-Weyl series is now nearly complete; however, since the earliest volumes date from the 1950s, it may be hoped that supplementary volumes will be issued to bring the topics covered earlier up-to-date. If this done, we hope that Houben-Weyl will follow the lead of Beilstein and Gmelin and bring out such books in English.

The price of these volumes largely precludes individual ownership. However, all academic, industrial, government chemistry libraries should have these excellent books on their shelves.

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Handbook of High Resolution Multinuclear NMR. By C. Brevard and P. Granger. John Wiley and Sons, New York. 1981. xvii + 229 pages. $24.50.

This handbook is divided into two parts. Part One (four chapters, 77 pages) includes a chapter on NMR parameters (i.e., sensitivity, receptivity, chemical shifts, coupling constants, relaxation times, and relaxation mechanisms), a chapter on the Fourier transform method (the rotating frame, pulse angles, the free induction decay, the digitalization process, and display of the spectrum), a chapter on the nuts and bolts of spectrum acquisition (sample preparation, lock systems, references, spectral manipulations, decoupling procedures, special pulse sequences, sensitivity enhancement, and resolution enhancement), and finally a chapter concerning dynamic measurements (T_1 and T_2 measurements and spin-locking measurements).

The book has been printed from a typescript but the layout and format are in general readable although some figure captions tend to run into the text. Typographical errors are not excessive. The book is exactly as the title states—a handbook. The four chapters provide a compilation of information, and without a knowledge of basic NMR theory and spectrometers, this section of the book will not be of great utility. Chapter 3 which is entitled "Spectrum Recording" is probably the most useful chapter. For example, helpful information concerning the correction which must be made when sample and lock substances are different is given. A section of FID and spectrum manipulations (e.g., left shifting the FID or zero filling the beginning of the FID to correct base line distortion) as well as a section on special pulse sequences is well-done. One disappointment of a book of this type on multinuclear NMR is that although 87 of 116 magnetically active isotopes have a nuclear spin value I greater than $^1/_2$, nowhere is there a section dealing with multiplet intensities which result when the coupled nucleus does not have $I = {}^1/_2$. It does not appear to be generally well-known that these intensities are different for each value of I.

Part Two of this book is entitled "Isotope NMR Fingerprints" and is a handy compilation to have at one's fingertips. Nuclei are listed in increasing atomic number and for each nucleus one finds a listing of the spin, natural abundance, receptivity relative to ^{13}C, gyromagnetic ratio, quadrupole moment (if applicable), and the resonance frequency in a field corresponding to exactly 100 MHz for Me_4Si protons. In addition the spectrum of a test sample (compound, solvent, concentration, lock, and temperature are given) with its relevant acquisition and processing parameters is shown. A chemical shift scale is shown, and typical coupling