

Book Review

Stereoselective Synthesis. Houben-Weyl, *Methods of Organic Chemistry*, Volume E21b. Edited by G. Helmchen, R. W. Hoffmann, J. Mulzer, E. Schaumann. Thieme: Stuttgart, 1995, 1052 pp., hardback. DM 2840 (Subscription Price DM 2556). ISBN 3-13-219504-9.

This reviewer has critiqued the first English language volume of this series and has now had the opportunity to read the succeeding volume (E21b) and comments follow.

This second volume on "Stereoselective Synthesis" continues where the previous one left off, namely, "Synthesis of Chiral Compounds by C-C Bond Formation". The present volume contains over 1,000 pages devoted exclusively to a clear and rather complete overview of 1,2-additions to carbonyl and imines as well as conjugate additions to unsaturated carbonyls, imines, sulfoxides, sulfones, nitro compounds, and oxazolines by chiral and achiral reagents. The organization of this volume is again very well positioned to keep the reader focused on the specific topic and then proceed to the related areas covered. For a reference work this series has so far been very convenient to read and enjoy.

The addition to carbonyl groups is preceded by a solid discussion of all the stereochemical models presented by Cram, Ahn, Felkin, Prelog, Karabatsos, Cornforth and Cieplek. The exceptions to these are also included as well as the need for more sophisticated predictive models. Nevertheless, a well laid out overview of the stereochemical aspects involved is presented. The discussion of numerous routes to chiral hydroxy compounds and the effects of stereocenters both in the attacking nucleophile (e.g. enolates, azaenolates, hydrazones, sulfoxides, nitronates, etc.) and the carbonyl substrate are adequately discussed. A variety of organometallic reagents are presented along with their preparations which makes the presentation very practical as well as informative. The use of chiral

auxiliaries, both external and internal, as well as chiral organometallics is discussed.

The next section deals with additions to imines using chiral nucleophiles and the chiral amino compounds they produce. Once again we are treated to a lengthy discussion on substrate-induced, auxiliary-induced, and reagent-induced stereochemical control. A wide array of intermolecular and intramolecular reactions including sigmatropic rearrangements are surveyed. Virtually every reasonable C=N linkage undergoing stereo-biased addition, including the short-lived N-acyliminium salt, are included. The addition compounds also vary from cyanide (Strecker synthesis) to organometallics, both chiral and achiral.

The last section in this volume covers enantio- and diastereoselective addition to olefinic systems such as conjugate additions and SN2' processes. There are numerous examples as well as procedures for carrying out these reactions involving a variety of organometallic reagents. Vinylogous substitution reactions involving allylic and propargylic substrates undergoing SN2' displacement are amply discussed and an easily scanned table of many examples is presented. A discussion of both the organometallic employed and the nature of the leaving group in the allylic system is also included in this very interesting chapter.

Additions to conjugated esters, ketones, nitriles, oxazolines and amides by metallated sulfones, sulfoxides, phosphonates, sulfoximes among others are included. Effects of substitution in various sites are discussed as well as sites of asymmetry both in the substrate and the nucleophile. Intra- and intermolecular reactions are included and the effects of catalysts and solvents.

In summary, every major aspect of addition to carbonyls, imines and especially activated olefins is included in this fine resource. The presence of this volume along with its co-volumes seems to represent a very valuable place to evaluate stereoselective progress to date.

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