JACS
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY

BOOK REVIEW

pubs.acs.org/JACS

Review of Enantioselective Chemical Synthesis: Methods, Logic and Practice

Enantioselective Chemical Synthesis: Methods, Logic and Practice. By E. J. Corey and László Kürti (Harvard University, Cambridge, MA). Direct Book Publishing: Dallas, TX. 2010. vi + 328 pp. $75.00. ISBN 978-0-615-39515-9.

This book by Corey and Kürti is a masterpiece of logical presentation, excellent graphics, and informative content that will be an important resource for decades to come. The deceptively thin volume (325 pages) is organized into three rather distinct sections, corresponding to the "Methods", "Logic", and "Practice" mentioned in the title. Part I, "Tools for Enantioselective Synthesis" is half of the book and takes on nearly all of the strategically important enantioselective reactions arranged according to five categories: formation of C−H, C−O, C−N, C−C bonds and cyclizations. The latter two categories are by far the most extensive. Each category is further broken down into individual subcategories, identified in large type at the top of every page and ranging from a single page to as many as seven in the case of the enantioselective Diels−Alder reaction.

Individual subcategory entries in Part I consist of related methods for a particular transformation, including such reactions as enantioselective hydrogenation of C═C and C═X, epoxidation, osmylation, alkylation, aldol, and so on. For each transformation, several examples of carefully selected reactions are provided that illustrate important variations in methods or substrate categories, but there are no tables. Explanations and comparisons are quite informative for the most important reactions, but much of the discussion is terse and serves more as a framework for citations. The Index is very limited and rarely includes conceptual topics. Instead, there are extensive references to reviews as well as historical references to key developments following each subcategory. This approach results in more homework for those "not skilled in the art", but it is perfect for all who read the original key papers but do not retain everything in them. Advanced graduate students will recognize the methods, concepts, and reagents, but the individual subcategory entries are not the place to learn about first principles. The text assumes knowledge of the concepts of stereochemistry, as well as familiarity with organic synthesis and organic mechanisms corresponding to a good first-year graduate experience. The most important mechanisms and transition-state models are illustrated, but many others are not. The less-experienced student or nonspecialist will need to consult the original publications and the review literature to learn about mechanistic aspects as well as to find broader coverage and a discussion of scope. On the other hand, Part I will be an outstanding resource for nonspecialists seeking to match strategic bond assembly with chiral target structures or absolute configurations of catalysts with the configuration of products. This book will save countless hours of searching on the part of interested readers by making the most important enantioselective reactions easily accessible. The graphical presentation and organization within each scheme of Part I are so well done that after a few minutes with the book the reader knows where to find every part of every diagram. Reactants are color coded, as are the reagents and the chiral ligands or their complexes, and the colors are used consistently throughout.

Part II, "Planning Enantioselective Syntheses", consists of a condensed presentation of retrosynthetic analysis along with a section entitled "Pre-transition-state assemblies" in which mechanistic insights that govern enantioselectivity for some of the most important reactions are described. As in other sections, the authors use color to the reader's advantage in these excellent diagrams. Part II is distinct in style by comparison to Part I and provides relatively more discourse and explanation. Retro-synthesis is a topic that is now widely appreciated due to the efforts of the senior author over many years. Nevertheless, this concise treatment is well-worth reading and rereading and is recommended for anyone who plans syntheses of nontrivial molecules. The focus on enantioselectivity works especially well.

Part III, "Enantioselective Multi-step Syntheses: Examples", changes styles again: this time to underscore how the methods presented as "Tools" (Part I) can be applied to synthetic problems using the planning concepts of Part II. The 46 examples come from the senior author's studies, and leading references are provided to parallel work by other groups. For each synthesis, concise annotated schemes cover "Background" and the "Abbreviated Retrosynthetic Plan", followed by the "Pathway of Synthesis" in a graphical outline format. The schemes are exemplary for informative content, completeness, and visual impact. There is none of the dreaded letter coding of synthetic steps and crowding of reagents into singly spaced captions. Also welcome are the highlights given as "Key Steps in Scheme", where concise comments are provided to explain the selectivity, reactivity, and mechanism for the most important steps. Like the other sections, Part III is very accessible, uncluttered, and effective as a resource for learning and for teaching.

The references include the title as well as full bibliographic details, and the authors have taken care to include extensive recent reviews and modern examples. The result is a level of ease for visually retrieving information that will make this book the key resource in a crowded field of books, reviews, and monographs. The book will provide faster access to much of the literature on tools of enantioselective synthesis than does any electronic resource.

If you teach, study for an advanced degree in organic chemistry, write proposals or manuscripts about chiral substances, or plan enantioselective syntheses in an industrial setting, buy this book by Corey and Kürti. You and your co-workers will use it.

Edwin Vedejs

University of Michigan, Ann Arbor

10.1021/ja2011127

Published: February 22, 2011