

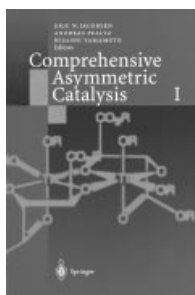
## Performance Enhancers

**Comprehensive Asymmetric Catalysis.** Vol. I—III. Edited by *Eric N. Jacobsen, Andreas Pfaltz, and H. Yamamoto*. Springer-Verlag, Heidelberg 1999. xlviii + 1493 pp., 1640 figs., hardcover DM 1.298.00.—ISBN 3-540-64336-2

**Catalytic Asymmetric Synthesis.** 2nd Ed. Edited by *Iwao Ojima*. John Wiley & Sons Ltd., Chichester 2000. 864 pp., hardcover £ 80.95.—ISBN 0-471-29805-0

Asymmetric catalysis belongs to one of the hottest but also fastest moving topics in organic chemistry. The vast number of new catalysts, ligands, additives, substrates, and new reactions makes it difficult to keep up with the pace, without getting lost in the flood of information. Two new monographs that appeared almost at the same time have now tackled the difficult task of giving a complete but readable review of asymmetric catalysis.

To provide an up to date account on asymmetric catalysis has been the aim that the team of editors E. Jacobsen (Harvard University), A. Pfaltz (University of Basel), and H. Yamamoto (Nagoya University)—being spread out on three continents—wanted to realize with



the pertinent book consisting of 3 volumes. To cut a long story short: in collaboration with the “contribution of numerous experts”, as stated modestly in the preface of the book, this goal was reached in a splendid way. Around 60 well-reputed authors were contracted, who—to a great extent were the inventors of the described asymmetric catalyses—have documented the status quo on transition metal catalyzed reactions in 42 chapters

The complete area of asymmetric catalysis written down on only 1500 pages, is that possible? Certainly not, if the authors had tried to comprehensively list all known examples of a certain reaction type. However, it was planned from the start that the chapters should be written in such a way that a representative overview is given, describing the scope and limitation of the most important asymmetric catalyses. This has been exactly realized in a marvelous way: All the chapters have been divided in short, very lucid subchapters, which describe important points such as mechanisms and include models of asymmetric induction, choice of catalysts, practical aspects, alternatives, and future developments. Nevertheless, there is no short coming of actual examples given: all the chapters describe a great number of specific examples detailing all the important experimental data such as reaction conditions, yields, and selectivity. The comprehensive list of references also makes it easy to find more specific and detailed information if needed.

The book covers almost all the important classes of asymmetric catalysis, with very few exceptions, e.g. should asymmetric aminohydroxylation not have been covered? It begins with all the possible variants of hydrogenation, followed by oxidation, and ends with reactions where C-C bonds are formed. The logical structure of dividing the book into a total of 42 main chapters that have in part further subchapters is

extremely well done. At the beginning of each chapter the reader can find a detailed table of contents: in this way it becomes easy to concentrate on a certain topic.

A great idea has been the inclusion of chapters that do not qualify yet as catalytic asymmetric synthesis, e.g. the chapter on the Pauson-Khand reaction. In this chapter the catalytic, but not as yet asymmetric, as well as the stereoselective variants, which are only stoichiometric in the catalyst, are described. The symbiosis of these two aspects remains for the fantasy of the reader and stimulates future research activities. The high actuality and the quality of the chosen examples is very convincing: after working through the chapter the reader will gain the impression of having learnt about the most promising variations of a given catalysis.

Besides the types of reactions, the book also describes general concepts such as homogenous, heterogenous, or combinatorial catalysis, as well as immobilized catalysts. Reactions with biocatalysts are beyond the scope of this book series although a chapter on catalytic antibodies is included.

I also very much like the general chapters on the historical development (who could have authored this better than H. Kagan?) and the general principles of catalysis, in which the systematic listing of the all-stereogenic reactions should be a valuable source for graduate students in chemistry.

Finally, the concluding practical examples from industrial applications are interestingly written and give impressive examples on additional aspects that have to be considered for practical applications.

My only criticism is the poorly compiled index that has not only too few entries (5 pages; the table of contents with 4 pages is almost as long), but also not all the relevant hits are found for a given keyword (e.g. there is only one

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reference for binaphthol and two for bisoxazolins). Fortunately, there is also a CD-ROM version of the book, which offers everything that can be desired in the age of electronic media. The CD-ROM version runs on a PC under Windows, nevertheless, fans of Macintosh Computers do not have to abstain from the electronic version: the CD-ROM can be used flawlessly by running *Virtuell-PC*. The public domain-programs Acrobat Reader and ISIS Draw, which are provided on the CD, as well as a standard Webbrowser (Microsoft Explorer or Netscape) are needed. The installation of all necessary components is very simple and is carried out automatically by the setup routine, and after only a few minutes one can use the online version. Search features by text as well as by structure make the program very easy to use. Nevertheless, the accuracy on doing a structure search, although close, will not reach 100%. The online version is more than just a 1:1 copy of the printed book: I especially like that the schemes are shown in separate windows, making use of the CD-ROM, especially for lectures and other presentations, an excellent tool.

In conclusion, it is not an overstatement that this book series, especially in combination with the printed and online versions, is a masterpiece.

With 860 pages, half the size of the previously discussed book, but no less significant, the second edition of *Catalytic Asymmetric Synthesis*—a classic in asymmetric catalysis—shows itself in a new light. It is almost unfair to speak of a second edition, so much has changed in comparison to the first one, even though it is only 7 years old. Although the number of general reaction types has only changed slightly (from 9 to 11) the number of subchapters has been almost doubled (from 11 to 21). Like the previous book, the route to success has been to ask the leading experts for a description of the catalytic processes to which they had significantly contributed. In most cases the authors who had already described that topic for the first edition, have significantly modernized the chapters or have even rewritten them. Only in two cases have addenda been only to the original chapters of the first edition. Also, the chapter on asymmetric dihydroxylation has remained in

its original form. Nevertheless, since the development of that topic has been overwhelming, a completely new chapter containing the most recent discoveries has been written. This solution was well done, because now there is a chapter which describes the discovery and the development of the reaction from the discoverer Barry Sharpless himself, as well as a second chapter with a most recent compilation of new results, written by Carsten Bolm and co-workers.

As successfully done in the first edition, the chapters are ordered by general reaction types, starting with heteroatom transfer (hydrogen, oxygen, nitrogen) and finishing with the broad variety of C-C coupling reactions. Given the vast amount of material in some of the chapters, I would have wished a bigger emphasis to be placed on structuring the contents at the beginning of each chapter, especially since the index is also not too detailed. Nevertheless, the chapters themselves are very well structured in content, making it easy to find a certain reaction. I especially like the clarity, in which the the majority of material has been presented. Information on details of reactions have been ordered in tables, while the key reactions themselves are explained with a few examples graphically as well as in the text. I also very much like the inclusion of chapters such as asymmetric amplification and autocatalysis as well as asymmetric polymerizations, which as yet do not belong to the main stream of asymmetric catalysis.

A great idea is also the appendix, in which one can find the graphics of all ligands with the corresponding literature reference, ordered by chapters. This way one can get at a glance the overall picture of all chiral ligands that are used for a certain reaction. It is not possible to search in the opposite direction, e.g. to look for all the reactions which can be carried out with a certain ligand (often ligands used can be found at quite a few places in this overview), nevertheless, thanks to the highly sensitive eyes of chemists for structures, the listing of the ligands also allows fast answers to be found. In this way, the author of this review was surprised when he found on page 840 the listing of an azabisoxazoline, a class of ligands which his group thought to have introduced to the liter-

ature only 3 months after the appearance of this book. A quick run to the library made it clear very fast that, in this case (fortunately!), one of the very few typographical errors of the current book had been encountered.

**Conclusion:** No matter if one looks for a specific reaction in catalysis, or if one only wants to get an overview of a certain topic, reading one of the books reviewed here will bring the desired information, but is also fun to do. A recommendation in favor of one of the two books can not be given in a clear cut-way, the reader will have to decide for him/herself. The question, if with an identical book theme and with in-part identical authors many parts of the books must be at least similar to each other, can also be answered only with yes and no. There are indeed some parts which are basically identical (e.g. hydrogenation of carbonyl compounds), however the division of the book *Comprehensive Asymmetric Catalysis* into many subchapters has resulted in identical reaction types being discussed even by the same authors being viewed from different angles, as is, for example, impressively demonstrated in the chapters on the aldol reaction by Eric Carreira. Both books including the CD-ROM version is a must for every library; an individual, who must reach the decision in favor of one of the books, has to ask himself: should he buy a detailed, but easily readable overview (recommendation: *Comprehensive Asymmetric Catalysis*, book version), a detailed overview that is well suited for lectures but not for easy reading (recommendation: *Comprehensive Asymmetric Catalysis*, CD-ROM version), or should he buy a complete and easily readable, maybe not quite as detailed, but also less expensive overview (recommendation: *Catalytic Asymmetric Synthesis*)? Also for those who have already bought the first edition of *Catalytic Asymmetric Synthesis*, the investment in the second edition can be strongly recommended.

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