

Developing Processes for Crystallization-Induced Asymmetric Transformation

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(*Org. Process Res. Dev.* 2005, 9, 800–813).

The development of one of the CIAT processes (pp 807–808, Scheme 15) was incorrectly ascribed to Tanabe researchers. This work was carried out at Kaneka Corporation, Japan.

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Book Reviews *

Organic Reactions, Volume 66. By L. E. Overman. Wiley: Hoboken, New Jersey. 2005. £71.50. 653 pp. ISBN 0-471-68258-6.

The series, *Organic Reactions*, continues to provide outstanding, comprehensive reviews of key reactions in organic synthesis. The latest volume has only two chapters. The first, a review of the allylic trihaloacetimidate rearrangement, sometimes called the Overman rearrangement, is reviewed by Larry Overman and Nancy Carpenter (University of Minnesota). In an easy-to-read style, the authors show what a useful reaction this is for converting allylic alcohols to rearranged acylated allylic amines and how the products can be further converted. Mechanistic rationales for the high selectivity, typical of 3,3-sigmatropic rearrangements, are presented. As usual, experimental details and a comprehensive tabular survey with over 200 references complete the review (107 pages).

The second, longer chapter, by Marc Noe, Michael Letaric, and Sheri Snow from Pfizer, with Stuart McCombie, covers asymmetric dihydroxylation of alkenes (516 pp). This is an excellent review of the topic, illustrating the scope of the reaction and experimental procedures. Since the usual oxidant, osmium tetroxide, is both volatile (bp 130°) and a low-melting solid (mp 40 °C), as well as being highly toxic, more detailed safety and environmental procedures could have been given. Some discussion on the use of the reaction on large scale would have been useful, particularly in relation to recovery and reuse of osmium.

Other, easier-to-handle sources of osmium are discussed, however, as well as secondary oxidants to minimise osmium use. I would have liked more detailed discussion of solvent effects on enantioselectivity in a separate section with tables of results—although the topic is mentioned several times, this is spread over several sections and is not so coordinated.

The experimental procedures include preparation of various ligands, immobilised ligands, and methods for immobilising osmium tetroxide on ABS polymer, as well as the use of such reagents/catalysts/ligands in synthesis. One kilogram-scale procedure (from the *Organic Process Research & Development* paper) is included.

The 400 pages of tables is testimony to the widespread use of this reaction since its discovery 25 years ago, with the catalytic version less than 20 years old.

Whereas chapter 1 contains a section on comparison with other methods, chapter 2 does not—this would have made an interesting discussion. Asymmetric epoxidation followed by ring opening or hydrolytic kinetic resolution of epoxides has been one large-scale process for converting alkenes to diols, presumably to avoid toxic osmium and expensive ligands.

Despite these criticisms, this chapter is an extremely valuable source of references, and the authors have done an excellent job in summarising the vast literature (764 references).

In conclusion, *Organic Reactions* continues to maintain the high standard of previous volumes, and the latest volume should be in every organic chemistry library, both academic and industrial.

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Industrial Catalysis: A Practical Approach, 2nd edition. By J. Hagen. 2006. Wiley-VCH: Weinheim. Price £115. 507 + xviii pp. ISBN 3-527-31144-0

The second edition of Professor Hagen's book on industrial catalysis has considerably wider scope than the earlier edition, which was focused very much on heterogeneous

*Unsigned book reviews are by the Editor.

catalysis. This is what he understands, and this is what he does best. The second edition is still predominately about heterogeneous catalysis with chapters on Fundamentals (122 pages); Catalyst Shapes and Production of Catalysts (15 pp); Shape Selective Catalysts: Zeolites (20 pp); Planning, Development and Testing of Catalysts (64 pp); Catalysis Reactors (20 pp); and Heterogeneously Catalysed Processes in Industry (32 pp).

The latter chapter is heavily focused on bulk and the larger-volume fine chemicals and on continuous processes such as oxidation, reduction, carbonylation, and polymerisation. The section on planning, etc. has some examples on the use of statistical methods in catalyst screening and in optimisation which process chemists may not have seen before. These chapters are well-written and are a valuable guide for process chemists into how heterogeneous catalysis is carried out in industry on large scale.

The earlier chapters on Homogeneous Catalysis with Transition Metals (44 pp) followed by Homogeneously Catalysed Industrial Processes (22 pp) seem to merely skim the surface of these very important topics, and the industrial applications were not discussed in detail.

Chapters on Biocatalysis, Electrocatalysis, Photocatalysis, Phase-Transfer Catalysis, and Environmental Catalysis and Green Chemistry provided a brief introduction to each subject but without getting into real depth. Given the limitations of space, this is not surprising. However, these chapters did not add much to the subject, and I felt many could have been omitted.

Since the text is based on the author's lecture course for chemical engineers at the University of Applied Sciences in Mannheim, Germany, each chapter contains some exercises, with the answers being provided in a separate "chapter". Two extra chapters not previously mentioned are about the economic importance of catalysis and future developments of catalysis.

References are listed at the end of the book rather than at the end of each chapter. These were incomplete and not particularly up-to-date. The latest reference in Chapter 2 (homogeneous catalysis) is 1988, and in the following chapter, 2001. Blaser's important book on *Asymmetric Catalysis on Industrial Scale*, Augustine's books on heterogeneous catalysis, and several recent books on biocatalysis are surprisingly not mentioned in the references.

In conclusion, the approach towards catalysis in this text is a little dated, is focused towards the bulk chemical industry, and will not endear the important topic of catalysis to the modern process chemist and chemical engineer. Some of the photographs in the text, which showed scientists/engineers working in high-pressure catalysis laboratories but not wearing safety spectacles, also indicate outdated attitudes to safety.

The book is only recommended to those who wish to gain an appreciation of heterogeneous catalysis and its application in the bulk chemical industry.

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