

## Book reviews

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### **Transition metal reagents and catalysts: innovations in organic synthesis**

Jiro Tsuji

John Wiley & Sons, Ltd, Chichester, 2000

xv + 477 pages. £125

ISBN 0-471-63498-0

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It is abundantly clear that the modern-day synthetic organic chemist relies, to an ever-increasing extent, on the host of transition-metal-based reactions that can now be selected from his armoury. At the highest level, transition metals that can function as catalysts to achieve crucial carbon–carbon bond-forming reactions and to transform prochiral substrates into enantiomerically pure building blocks have revolutionized the art of organic synthesis, both in important industrial processes and in academia.

As always, however, the most successful practitioners are those who understand the mechanistic subtleties of the reactions that they elect to use, especially in more complex multifunctional environments. In this book, Professor Tsuji not only provides an excellent overview of the current state of the art, but additionally takes time in the opening chapters to illustrate key industrial processes and lay the foundations of mechanism upon which these reactions are based, thus providing a clearer mental picture for those synthetic organic chemists who are less familiar with the processes of counting electrons and considering more ‘unusual’ geometries around a metal centre. Although this chapter is relatively short, it is a vital component of the book.

The following five chapters are organized by substrate, with necessarily artificial divisions being made between the reactions of organic halides and pseudohalides, allylic compounds, conjugated dienes, propargylic compounds, and alkenes and alkynes. The remaining chapters form a miscellany of themes and include areas such as the reactions of transition metal carbene complexes, encompassing both catalytic metathesis and cyclopropanation reactions, as well as a further chapter on reactions involving Fischer carbenoids and the use of stoichiometric metal carbonyls of iron, cobalt and chromium for protection and activation. The important areas of catalytic hydrogenation, transfer hydrogenation and hydrosilylation are also grouped together, as are reactions promoted and catalysed by palladium(II) compounds. In terms of overall organization, chapters can therefore be found that are classified by substrate class, by reaction type, and by the metal itself and, at first sight, this appears to imply that a unifying overall theme is difficult to maintain. Synthetic organic chemists who tend to relate to named reactions, such as Heck, Stille, Suzuki and Pauson–Khand, will find them in the index

more easily than in the chapter sub-headings. Since carbon–carbon bond formation is pre-eminent, this is essentially an organometallic book, and reactions such as asymmetric epoxidation and vicinal dihydroxylation are not covered.

Even though it is almost impossible to organize and provide a comprehensive coverage of this vast area in a single volume, the author has, nevertheless, provided an excellent compilation of those reactions that are currently of wide-ranging synthetic utility to the organic chemist. The emphasis is, of course, correctly placed on carbon–carbon bond formation and catalytic reactions, but all of the important stoichiometric reagents are also there, thus providing inspiration for young researchers to take up the challenge of further development. The book is richly adorned throughout with very recent examples that amply demonstrate the power of transition metals in complex multifunctional organic synthesis, and make browsing a veritable pleasure.

Those of us who were inspired by the author’s seminal book in 1975 can recognize that, once again, his expert knowledge gleaned over many years and his careful selection of topics have combined to create a worthy successor that should be a valuable addition to the library of any modern-day synthetic organic chemist.

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### **Solid-phase synthesis and combinatorial technologies**

Pierfausto Seneci

John Wiley, New York, 2000

xii + 637 pages. £70.95

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The impact of parallel and combinatorial approaches to small-molecule synthesis since the late 1980s has been enormous. Initially, these approaches were largely limited to developments in the pharmaceutical industry,