Book Reviews

Metal-catalyzed Cross-coupling Reactions. Edited by François Diederich and Peter J. Stang. Wiley−VCH, Weinheim. 1998. xxi + 517 pp. 17 × 25 cm. ISBN 3-527-29421-X. $140.00.

The indisputable importance of organometallic reactions in organic synthesis presents a significant challenge to the modern practitioner. No longer a specialty area, organometallic techniques have become a required part of the chemist's toolbox, especially for carbon−carbon bond formation. Although many chemistry departments have responded to this situation by incorporating transition-metal reactions into mainstream organic synthesis courses, it is not unusual to find nonspecialists who are intimidated by the sheer volume of the organometallic literature or by "unfamiliar" reagents and transformations. This book, edited by Diederich and Stang, fills an important need by providing a comprehensive yet accessible entry into the general area of metal-promoted coupling reactions. The timing of this book could not have been better, given the current push toward appropriating many of these techniques for solid-phase and combinatorial chemistry applications.

The book focuses on the large and pervasive subtopic of cross-coupling reactions, emphasizing carbon−carbon bond-forming reactions. It consists of 11 chapters contributed by respected and well-known figures in the field. The coverage is very broad. Some of the chapters focus on the reactions of a particular metal or metals (palladium, nickel, boron, tin, zinc, silicon), whereas others are organized according to the organic substrates (palladium-catalyzed coupling reactions of propargylic compounds, 1,4-additions to conjugated dienes). The best-known name reactions in this area, such as the Stille and Suzuki couplings, are fully discussed. Indeed, two chapters concern the Heck reaction: one from a mechanistic and methodological perspective and the second focusing on the use of intramolecular Heck reactions in natural product chemistry. There is an excellent balance between fundamentals and applications, so that the reader can easily move from basic concerns of scope, reagents, and mechanism to an appreciation of the utility of a given process in complex, demanding settings.

The editors and authors have done a fine job of imposing a uniform style of content and presentation across the various chapters. There is some overlap between chapters, but this does not constitute a problem, given a reasonably comprehensive subject index and a very detailed table of contents. (An author index consisting of only last names mentioned in the text is less useful.) The very best aspect of this book is its attention to matters of practical import, with issues such as catalyst selection, stereochemistry, and solvents given close attention. Each chapter contains an introduction (often containing a historical summary of an area), a list of abbreviations, and, most welcome, several representative experimental procedures. There are only minor stylistic differences between the chapters and few typos. The book is very attractively presented and invites browsing.

This book constitutes an excellent introduction to an important topic for the nonspecialist and will undoubtedly be a good resource for card-carrying synthetic organometallic chemists as well. Although not cheap, it is fairly priced and should find a place on the bookshelves of many practicing chemists in industry and academia.

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Structure-based Ligand Design. Edited by K. Gubernator and H.-J. Bohm. Wiley-VCH, Weinheim. 1998. xiv + 153 pp. 17.5 × 24.5 cm. ISBN 3-527-29343-4. $135.00.

The monograph begins with a very informative introduction covering the fundamentals, issues, and practice of structure-based ligand design. In the second chapter, the editors complement this introduction with a brief but useful survey of recent ligand design work for a diverse array of biological targets. This is followed by five chapters chronicling specific ligand design case studies: renin and HIV-1 protease, zinc endoproteases, β-lactamase, sialidase, and HIV-1 reverse transcriptase. The work in renin and HIV-1 protease is the classic example of modern substrate-based design of enzyme inhibitors, as well as how the groundwork established in one project can be successfully transferred to a newer target. Zinc endoproteases have received much attention recently, and the chapter devoted to this class of proteases is a good overview of this diverse set of proteins. The chapter on β-lactamase inhibitors illustrates how detailed knowledge of the mechanism of action can be used in concert with crystal structures of the complex to aid in the design of more effective inhibitors. The combination of protein crystallography and molecular modeling, applied iteratively based on observed structure−activity relationships, is highlighted in the chapter on sialidase inhibition. The chapter on HIV-1 reverse transcriptase provides an interesting, although disappointingly nondetailed, account of an approach to ligand design when the structure of the target is not available.

The book closes with chapters on computational approaches in structure-based ligand design and an outlook on the future of this field. The chapter on computational approaches includes a section on one of the most difficult challenges facing molecular modeling researchers, the prediction of ligand binding affinities. The chapters are all well-written and illustrated, and each contains an adequate number of recent and seminal references. The book has an extensive subject index (although it does not have an author index). *Structure-based Ligand Design* should have a broad

appeal to a number of chemistry communities including medicinal, biological, and computational. Unfortunately, the price set by the publishers may limit this book to the library shelf.

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Strategies for Organic Drug Synthesis and Design. By Daniel Lednicer. John Wiley & Sons, Inc., New York. 1998. xv + 502 pp. 16.5 × 24 cm. ISBN 0-471-19657-6. $79.95.

The syntheses of active pharmaceutical agents comprise a special and unique place in organic synthesis. Certain considerations must be met in order for a drug to be cost-effectively produced on a multiton scale. Many drugs both in the marketplace and in development are significant synthetic challenges in this regard. Author Lednicer attempts to provide some insight into these challenges and to indicate how they have been met in his well-known compellation, *The Organic Chemistry of Drug Synthesis*. The material for this new monograph is taken from that original series, although with a different twist. Where the earlier series concentrated on how various classes of drugs were prepared on a manufacturing scale, this monograph emphasizes the strategy and tactics used in the design of a drug synthesis. It discusses the synthetic organic chemistry involved in the synthesis of these drugs.

The book consists of 15 chapters that discuss various classes of drugs, based upon their structural type. Chapter 1 provides information on prostaglandins, protease inhibitors, and retinoids. Chapters 2 and 3 cover compounds based on substituted and polycyclic aromatic rings. Chapters 3 and 4 discuss steroids; Chapter 6 covers nonsteroidal estrogens. Opioid analgesics are presented in Chapter 7. The remainder of the chapters cover compounds based on their ring type and size, five- or six-membered, heterocyclic and fused type ring systems. Chapter 14 discusses β-lactam antibiotics. The monograph contains a useful cross index of compounds as well as a reaction index and subject index. References are located at the end of each chapter.

Anyone interested in the synthetic aspects of pharmaceutical research will find this monograph interesting reading.

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