Modern Carbonyl Olefination – Methods and Applications; edited by T. Takeda; Wiley-VCH: Weinheim, **2004**; hard cover, 349 pp, £100.00 / €150.00, ISBN 3-527-30634-X

Carbonyl olefinations inevitably belong to the most important tools in organic synthesis since they ideally combine a high degree of convergence with excellent chemo- and stereoselectivity. Therefore, it is very surprising that this book is the first endeavor to summarize the seemingly different olefination methods and, hence, filling a long existing gap in the bookshelf of synthetic monographs. Here, as the editor Takeshi Takeda clearly points out in his preface, the marked mechanistic similarities literally demand a common discussion, in particular, since the early days of the Wittig reaction, tremendous efforts have been made to refine and establish more and more selective and specific methodologies for the olefination of carbonyl compounds.

Not surprisingly, the first chapter is intended to the Wittig reaction (by Michael Edmonds and Andrew Abell), where a historical appreciation to Wittig and Geissler opens the concise review on the most important mechanistic and stereochemical issues and developments of phosphorous ylid and related carbonyl olefinations. Since the Wittig and related reactions have already been reviewed in the past, this chapter rather displays an introductory character citing the most important references. In chapter 2 (by Naokazu Kano and Takayuki Kawashima), Peterson and related reactions are extensively and comprehensively reviewed, emphasizing stereochemistry and reaction mechanisms as well as numerous accesses to α-silyl carbanions, the crucial starting points for this olefination reaction. Finally, the germyl, stannyl and plumbyl Peterson reactions are also introduced, thereby demonstrating the vibrant development of this methodology. The Julia reaction is broadly presented by Raphaël Dumeunier and István E. Markó in chapter 3. Mechanistic, stereochemical and synthetic investigations are illustrated by many instructive examples and applications in complex molecule synthesis. Metal carbene complexes in carbonyl olefinations are the focus of chapter 4 by Takeshi Takeda and Akira Tsubouchi. Here, the overview commences with the well-established Tebbe and related reactions, over the conceptually elegant transformation of readily available thioacetals to olefins through the intermediacy of titanium carbenes, finally to conclude with molybdenum and tungsten carbene olefin metathesis-carbonyl olefination domino reactions. Low-valent chromium, zinc or titanium mediated olefinations, such as olefinations with the Nysted reagent or Takai-Utimoto olefinations applying geminal dihaloalkane and chromium(II) chloride as reagents, are highlighted by Seijiro Matsubara and Koichiro Oshima in chapter 5. In particular, the appealing application of the Takai olefination with iodoform to the synthesis of iodoalkenes, that have found extensive use in natural product syntheses, nicely demonstrates the conceptual beauty of metal carbenoid reagents in olefination methodology. In chapter 6 (by Michel Ephritikhine and Claude Villiers) the McMurry coupling and its related reactions are summarized with a dedication of the particular conditions and the breadth of synthetic scope. Interestingly, the McMurry reaction has reached an increasing level of application in the synthesis of natural and nonnatural products. The development of cyclizations that are even catalytic in titanium manifests the importance and dynamics in the field of organometallic reagents and catalysts. Finally, the book closes with a discussion of asymmetric carbonyl olefinations (by Kiyoshi Tanaka, Takumi Furata, and Kaoru Fuji) that have been a logic extension of the Wittig reaction from the early days on, in particular, since differentiation of enantiotopic carbonyls, dissymmetrization of prochiral carbonyl compounds, and kinetic resolutions of racemic aldehydes and ketones can be very important strategies in complex molecule synthesis. In this final chapter, stereochemical, mechanistic and synthetic examples from the first attempts of asymmetric carbonyl olefination to very recent strategies are presented and critically discussed.

This excellent new book summarizes in a concise fashion the current knowledge as well as the major recent developments in a 50-year old, yet rapidly evolving, field. With many mechanistic, stereochemical and synthetic examples, the topics are clearly and didactically well presented. It addresses graduate students as well as specialists, both in academia and industry, who are concerned with carbonyl olefinations in their daily work. Therefore, this book deserves a special place on the bookshelves of synthetic organic chemists.

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