

The Chemistry of Process Development in the Fine Chemical and Pharmaceutical Industry, 2nd Edition; by C. Someswara Rao; Techbooks World: New Jersey, 2006, hardcover, 1312 pp, US\$ 225, ISBN 9-777-6260-2

I was intrigued to learn that the second edition of C. Someswara Rao's *The Chemistry of Process Development in the Fine Chemical and Pharmaceutical Industry* had been published. As other reviewers have commented, the first edition is an outstanding book in many ways, giving an immense coverage of the field of process development chemistry. I was eager to see what changes had been made for the new edition. In terms of content, there is very little difference between the two editions. The editorial mentions that some errors were corrected and some updates included. The most significant change, however, is the inclusion of a completely revised index. One of the major issues with the first edition was navigation of the book, as the index was not comprehensive. With a book of this size (>1300 pages), covering such a broad range of chemistry, a comprehensive index is essential. The newly included general index, reaction-type index, and reagent index make it much easier to obtain key information quickly. A problem that was not rectified, however, is the layout of the references. Locating a key reference can be time-consuming owing to the way references are indexed and formatted, and the layout of the references could be much improved. However, given the amount of valuable information available, it is worth investing the time to find the desired reference. There are also a couple of minor errors in the schemes, which is nearly inevitable with a book this size. Overall, these are minor complaints.

The first edition has been reviewed elsewhere, but given the quality of the book and limited readership its title may cause, it is worth covering the content of the book in more detail. Although this book is designed for process chemists, any synthetic organic chemist would find value in consulting the volume. The book begins with a discussion on the nature of process development, giving an overview of what process development entails and what factors are important. It also includes a multitude of real-world examples that show how experimental procedures have been optimized. The next chapter gives a survey of some organic reactions through the eyes of a process chemist. In this section the author gives valuable details of modifications that make the reactions more efficient and alternative strategies that might prove useful. The third chapter covers chiral technology, providing various strategies to access chiral compounds. Topics discussed include asymmetric synthesis via chiral auxiliaries, reagents and catalysts, and resolutions using diastereomeric salts, entrainment, kinetic resolution, etc. Each topic is backed up with practical examples including variations and modification to enhance the performance of these crucial reactions. The fourth chapter discusses strategies for the simplification of organic reactions and processes, includ-

ing telescoping, in situ reagent formation, one-pot and domino-like reactions.

In the subsequent three chapters, Dr. Rao has compiled a vast compendium of information for improving and controlling reactions. Chapter 5 discusses the modification of reagents and the effects of the rate and order of addition of reagents. These latter issues can often be overlooked, particularly on smaller scale, and are of vital importance in developing reliable and controlled reactions. Chapter 6 is an incredibly valuable section, providing over 100 pages of examples on the fine-tuning of organic reactions through the use of additives. There is nothing quite like it elsewhere; it is a gold mine of information for any practitioner of organic chemistry, whether working on milligram- or full-scale production. It is well complimented by Chapter 7 (>160 pages), which discusses choosing the best reagent to effect a given transformation, considering safety, toxicity, ecological impact, and optimal reactivity.

Chapter 8 discusses by-products and side reactions, which are a major consideration to the process chemist. The author provides details of how to decrease, control, or eliminate troublesome by-products through modification of reaction conditions or the application of alternate methods. Solvents and their effects are covered in Chapter 9. This section is rich in examples of how changing the reaction solvent can have a dramatic effect on the outcome of a wide range of reactions. It also discusses the unexpected and unwanted participation of solvents as reagents in reactions. Phase-transfer catalysis is discussed in the following section, which covers many applications of this valuable technique. Another essential consideration for the process chemist is work-up, purity, and purification, which is covered in Chapter 11. Included are many tips on dealing with troublesome work-up procedures. The final section discusses the safety assessment of chemical process technology, and is the only section not written by Dr. Rao.

In summary, this book is a unique compendium of synthetic organic chemistry viewed through the eyes of an experienced process chemist. There is simply no other publication quite like it, and it is a credit to the author's dedication. Some sections are very focused on process chemistry, and others are much broader in scope. Although the book is written with the process chemist in mind, it has so much useful information that anyone involved in synthetic organic chemistry should have access to it. The information on how to modify and improve reactions is valuable to anyone who is struggling with a tricky reaction whether on the milligram or multi-kilogram scale. The tips and tricks provided impart a vast amount of experience to the reader. There is so much valuable information in this book that a short book review cannot truly do it justice. Highly recommended!

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