

**Chiral Recognition in the Gas Phase.** Edited by Anne Zehnacker (French Center for Scientific Research, Orsay, France). CRC Press (an imprint of Taylor & Francis Group): Boca Raton, FL. 2010. xviii + 226 pp. \$99.95. ISBN 978-1-4200-8227-2.

Library bookshelves are populated with texts dedicated to chiral recognition, asymmetric synthesis, enantiomeric separation, and the like. Unlike most of these books, which focus on condensed phases, Zehnacker's edited text covers chiral recognition in the gas phase. Recognizing the major efforts made in gas-phase chiral recognition and enantiomeric determination in the past decade, in particular by mass spectrometry (MS), the editor and 20 contributing authors have produced this well-timed book to provide an inclusive summary of the subject. The authors have good credentials, and their coverage of the corresponding topics is informative and thorough.

The book opens with an introduction by the editor, who has done a nice job of summarizing the specifics covered in the individual chapters. Although she intended to provide comprehensive coverage of gas-phase chiral recognition, the coverage is uneven, with 7 of the 11 chapters focusing on mass spectrometric approaches. The first four chapters cover non-MS techniques for chiral recognition in the gas phase, including photoelectron circular dichroism, microwave spectroscopy, vibrational spectroscopy, and supersonic expansion. These techniques have been limited to relatively small and volatile molecules that serve as model systems to understand the interaction between polarized light and asymmetric molecules.

The chapters on MS approaches to chiral recognition generally include introductions in which overviews of the techniques are provided, which results in some degree of redundancy among several chapters. In my opinion, the recent advances in mass spectrometric analyses of chiral molecules are largely due to the introduction of two soft ionization methods, electrospray ionization (ESI) and matrix-assisted laser desorption ionization, with which every type of chiral molecule could be introduced, in theory, into the gas phase. Bearing this in mind, fast-atom bombardment MS (Chapter 5) for chiral recognition has only historical meaning rather than as an alternative method as presented in this chapter. In addition, only ionic forms of chiral

molecules can be analyzed by MS, which has raised the question of whether the information obtained from MS is applicable to corresponding neutral species in the condensed phase. The editor should be given credit for including a chapter (10) in which solution-phase is compared with gas-phase chiral recognition based on ESI-MS. The conclusion of two individual studies (see Schug, K. A.; Frycak, P.; Maier, N. M.; Lindner, W. *Anal. Chem.* **2005**, *77*, 3660–3670 and Wijeratne A. B.; Schug, K. A. *J. Sep. Sci.* **2009**, *32*, 1537–1547), however, reveals that there are disparities between solution- and gas-phase chiral recognition. The observation of charge dependence of enantioselectivities in mass spectrometry indicates that MS would be better considered as a high-speed, highly sensitive detection tool rather than as a means to investigate structural mechanisms of enantioselectivities. In this respect, this book nicely covers a wide range of chiral molecules and asymmetric reactions analyzed by various mass spectrometric strategies.

Although the editor recognizes that the kinetic method based on metal-ion complexes has the most potential to measure enantiomeric excess with high sensitivity, there is no chapter in which this method is thoroughly discussed. In Chapter 8, the use of small DNA sequences as references for discriminating enantiomers of amino acids with the kinetic method is described, but the chapter has a narrow focus and lacks an in-depth discussion about the method's potentials and limitations.

Although most of the techniques and strategies covered in this compilation were developed almost 10 years ago, and recent work has only brought incremental improvements, great strides continue to be made in MS as applied to the biological and pharmaceutical sciences. This book, therefore, might well serve as a landmark summary that marks the sunset of an interesting area of research or the dawning of a major MS application on the horizon. Either way, this book is a valuable resource for graduate students and new researchers who are fascinated by the nature of chirality or interested in making contributions to this field.

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