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BOOK REVIEW

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# Book Review of Dynamic Combinatorial Chemistry: In Drug Discovery, Bioorganic Chemistry, and Materials Science and Dynamic Combinatorial Chemistry

**Dynamic Combinatorial Chemistry**. Edited by Joost N. H. Reek (Van t Hoff Institute for Molecular Sciences, Amsterdam, The Netherlands) and Sijbren Otto (University of Groningen, The Netherlands). WILEY-VCH Verlag GmbH & Co. KGaA: Weinheim. 2010. x + 202 pp. $130. ISBN 965-3-527-32122-3.

**Dynamic Combinatorial Chemistry: In Drug Discovery, Bioorganic Chemistry, and Materials Science**. Edited by Benjamin L. Miller (University of Rochester, NY). John Wiley & Sons, Inc.: Hoboken, NJ. 2010. x + 266 pp. $84.95. ISBN 978-0-470-09603-1.

Jean-Marie Lehn once remarked on the field of dynamic chemistry that one must "*look at mixtures as being a rich medium, not just a nuisance*". Indeed, both of these edited books provide a rich mixture of information on this exciting and evolving new field of chemistry known as dynamic combinatorial chemistry or DCC. It was somewhat surprising to see two books on this subject published in the same year by related publishers, but I was eager to see the different editorial slants from Reek/Otto and Miller—key contributors in this field of study, all of whom have written chapters in their respective compilations.

Both books begin with historical perspectives to define and place DCC into its current context and outline its experimental design and requirements. DCC relies heavily on supramolecular chemistry, and as such, this aspect is a key component in both books. In simple terms, dynamic combinatorial chemistry combines dynamic chemical diversity—relying on reversible interactions—with a selection and amplification process in response to external stimuli under thermodynamic control. The beauty of this chemistry lies in the potential to simplify the complexity of a dynamic mixture by thermodynamically choosing and amplifying select library members from this mixture. Reek and Otto's book is somewhat more organized and provides a more comprehensive and sometimes more critical look at the experimental considerations and requirements of DCC; all in all, it has more of a textbook feel to it. For example, Chapter 2 has an extensive discussion of the importance of template concentration and library size, including the description of library simulations using specifically designed DCLSim software. Extensive cross-referencing among the chapters within the book and the closing chapter on "Trends and Perspectives" also contribute to its overall cohesiveness. Ramström, the only author common to both books, excellently covers the biomolecular side of DCC in Chapter 5 in collaboration with Amorim, Caraballo, and Norberg in the Reek/Otto book; in Miller's book, he is a coauthor of Chapter 6 on dynamic combinatorial resolution with Angelin, Larsson, Vongvilai, and Sakulsombat.

After the introductory chapter, Miller's book dives right into the deep end of the DCC mixture with two excellent chapters on protein-directed dynamic combinatorial chemistry (Greaney and Bhat) and nucleic acid targeted dynamic combinatorial chemistry (Gareiss and Miller), where well-chosen specific examples are described in great detail, always emphasizing the essential and innovative aspects of the DCC methodology. Important DCC breakthroughs are described in both books, in which the authors are often describing their own research, with more focus on small-molecule and biomolecular applications of DCC. Each highlights the importance of analytical methods in characterizing dynamic combinatorial libraries, and both include one chapter dedicated to DCC in materials/polymer science.

Differences include an interesting and cutting edge chapter on complex self-sorting systems (Ghosh and Isaacs) and a concise but noteworthy chapter on chiral selection in DCC (Becker and Gagné) in Miller's book. Reek and Otto's book has a solid chapter on the development of synthetic receptors using DCC (Escalante and Furlan) and unique chapters on catalytic applications (Breuil and Reek) and analytical applications (Severin) of DCC. The production quality of Reek and Otto's book is better overall and is reflected in the higher price tag.

Overall, both books are very readable and well structured, with up-to-date references and similar quantity and quality of schemes, figures, and tables with minimal use of color. It is difficult to pinpoint deficiencies in either book because this new field is continually being defined and redefined where the "selection" process depends highly on the specific needs of the reader. Indeed, both books cover, unsurprisingly, similar material, although with different emphasis and direction. After reading both books, I felt satisfied having obtained a good background of DCC and its current directions. I also felt encouraged to continue to peruse the evolving developments in this dynamically growing domain of chemistry. I was pleased that both offerings are worthy of high commendation and that I did not have to make the difficult decision of recommending one book over the other; both are worthy candidates to be on library, faculty, and graduate student bookshelves.

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