

Macrocyclic chemistry: aspects of organic and inorganic supramolecular chemistry

By B. Dietrich, P. Viout and J.-M. Lehn

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In the preface of this book Lehn writes that it is based on a series of lectures in macrocyclic chemistry, given by him, and that the lecture notes were extended by the other two authors. He also states that it should cover the vast field of macrocyclic chemistry extensively but not exhaustively.

The book is divided in two main parts, the first on Macrocyclic Synthesis, the second is titled Macrocyclic Complexes - Cryptates. Part I is almost pure chemistry, with chapter 1 discussing general synthetic principles, chapter 2 special cyclization reactions and chapter 3 ring-closure methods. It is an impressive and rather comprehensive collection of methods employed in the synthesis of macrocyclic compounds, and covers, among others, porphyrin synthesis, crown ethers, macrolides and macrocyclic lactams. Cryptands are treated in part II of this book. In the discussion of macrolides I missed mention of the interesting macrolactonization method of Yamaguchi, used to produce macrocyclic oligolides from chiral 3-hydroxybutyric acid. This method led to isolation of cyclic compounds with from three to ten 3-hydroxybutyric acid units; interesting in view of the importance of PHB (polyhydroxybutyric acid) as a biodegradable polymer. To fully understand part I, however, a fairly thorough training as an organic chemist is a prerequisite.

Part II is probably more interesting for structural chemists. After introducing the principles of complexation of cations by macrocyclic compounds, chapter 1 discusses synthetic macrocyclic complexes, mainly of the crown ether type. Illustrated with typical examples, all important aspects are treated: complementarity of macrocycle cavity and cation, anion effect, participation of water, second coordination sphere, heteroatoms other than oxygen as complexation sites. Chapter 2 deals with natural macrocyclic ionophores and discusses structural aspects of valinomycin group ionophores, cyclic peptides and the nactins. Ionophores of the nigericin group are not mentioned; they are, of course, not really macrocyclic molecules - forming rings only *via* end-to-end hydrogen bonds. This chapter gives the impression of a somewhat arbitrary collection of compounds, but nevertheless brings home the important points. Chapter 3, dealing with cryptands, is the largest (115 pp.), and the reader can feel that this is where the authors are really at home and at their best. The coverage here is extensive and exhaustive. After discussing synthetic strategies, structural and thermodynamic aspects of metal cryptates are treated, with emphasis on stability and selectivity.

For whom, then, is this book? It will be an excellent introduction for advanced students who start working in this field, either as synthetic or structurally oriented chemists. They get an up-to-date overview, competently written by the experts, and a broad list of references which will lead them further into the subject. It will also be helpful for researchers working in other fields who want to know what is going on in supramolecular chemistry. Specialists will not find a lot of new information, but will surely want to have this book on their shelves. Crystallographers will probably find the book rather weighted toward chemistry; on the other hand, synthetic chemists will find valuable structural information - mostly in pictorial and, therefore, easily digestible form.

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