

Book Reviews

J. L. Atwood, J. E. D. Davies and D. D. MacNicol (eds.): *Inclusion Compounds, Volume 4, Key Organic Host Systems*, Oxford Science Publications, Oxford 1991. ISBN 0-19-855292-0, 511 pp., £55.

Inclusion Compounds, published in 1984 in three volumes, was aimed at providing a comprehensive and up-to-date survey of the field of inclusion chemistry. Since then, much new work has appeared in this rapidly growing area, and certain topics which previously received only little coverage have now developed in such a way as to deserve full chapters. This is one of the objectives of *Inclusion Compounds, Volume 4*, which is devoted to organic host molecules and – as the previous volumes – contains in-depth contributions by leading scientists in their particular fields of interest.

Four chapters deal with organic clathrates, starting with a review (apparently the first on this subject) on the ‘helical tubuland family of diols’, by Bishop and Dance. The now well-known acetylenic hosts are covered by Toda, with a large section of his chapter devoted to optical resolution; and the scissor-type hosts are presented by Weber. It is interesting to see, in the chapter written by Goldberg, a different perspective on the structural aspect of these two categories of host lattices.

Two chapters give an excellent coverage of the chemistry (Gutsche) and inclusion properties (Andreotti, Ugozzoli, Ungaro and Pochini) of calixarenes. Lariat ethers, their design, synthesis, properties and applications are covered in great detail by Gokel. Bridged pyridine hosts and their complexes with metal cations are described by Bell and Sahni, whilst trisbipyridine- and triscatechol-type hosts are covered by Ebmeyer and Vögtle.

Finally, there are two chapters on subjects which will certainly be the object of important future developments: multidentate anion complexation (by Katz) and catalytic applications of cyclophanes (by Murakami, Kikuchi, and Hisaeda).

Just like the previous volumes of the series, *Inclusion Compounds, Volume 4* is a reference work and will be of great interest and usefulness to all those concerned with the most recent aspects of supramolecular chemistry.

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J. L. Atwood, J. E. D. Davies and D. D. MacNicol (eds.), *Inclusion Compounds, Volume 5: Inorganic and Physical Aspects of Inclusion*, Oxford University Press, Oxford, New York, Tokyo, 1991, ISBN 0-19-855293-9.

The objective of this fifth volume of *Inclusion Compounds* is to focus attention on the various aspects of research which can be done on inclusion phenomena and to provide a comprehensive, up-to-date survey. In order to meet this objective, the

editors have brought together distinguished authors from Canada, Germany, Italy, Japan, U.K., U.S.A. and U.S.S.R. (CIS) who present their particular fields of interest.

The first chapter by H. Gies (36 pages and 59 references) provides an impressive survey of clathrasils and zeolites: inclusion compounds with silica host frameworks. This chapter focuses on host-guest interaction as revealed from synthesis, structural studies and solid-state NMR spectroscopy.

Chapter 2 by J. A. Ripmeester and C. I. Ratcliffe (53 pages and 130 references) is devoted to solid-state NMR studies of inclusion compounds. The chapter begins with a section giving perspective to the technique of CP/MAS NMR spectroscopy and reviews the results obtained by NMR techniques on clathrate and inclusion compounds.

Catalytic aspects of inclusion in zeolites is the subject for Chapter 3 by N. Herron (14 pages and 17 references). The chapter contains interesting insights into the general concepts of zeolite inclusion phenomena related to catalysis.

Chapter 4 by J. M. Thomas and C. R. Theocharis (32 pages and 81 references) is entitled 'The structural chemistry and reactivity of organic guests in layered aluminosilicate hosts'. An historical introduction draws attention to the explosive growth in the studies carried out on sheet aluminosilicate intercalates. The chapter reports mainly on the behaviour of layered aluminosilicates and their pillared progeny.

Chapter 5 by G. Alberti and U. Constantino (41 pages and 83 references) is a useful review chapter on intercalates of zirconium phosphates and phosphonates with sufficient references to allow the interested reader to dig deeper.

Chapter 6 by T. Iwamoto (36 pages and 48 references), provides the readers with an impressive survey of the structural features of inclusion compounds of multi-dimensional cyanometal complex hosts, including Hofmann-type hosts and its possible modifications. Numerous clear and well drawn figures aid the presentation of molecular structures.

Chapter 7 by Y. A. Dyadin, I. V. Bondaryuk and F. V. Zhurko (63 pages and 133 references), deals with clathrate hydrates at high pressures. This review attempts to discuss phase transformations in the systems where clathrate formation occurs under pressure and to correlate the phase transformations with the structures of the clathrate hydrates and of the initial components.

Chapter 8 by D. H. Busch and N. A. Stephenson (35 pages and 83 references) refers to the inclusion chemistry of the transition metal cyclidenes. Structural aspects, synthesis and reactions of cyclidene complexes are discussed in detail.

K. Harata's contribution (34 pages and 50 references) looks at recent advances in the X-ray analysis of cyclodextrins and modified cyclodextrins and of their complexes, focussing attention especially on methylated cyclodextrins. The author demonstrates how chemical modification affects the macrocyclic conformation and host-guest interaction of cyclodextrins.

The final chapter by J. C. Lockhart (19 pages and 83 references) deals with chemical sensors, which constitute an exciting and promising field of research.

Inclusion Compounds Volume 5 provides a wealth of information invaluable to any research worker in several areas in the study of mainly inorganic and physical aspects of inclusion. Within the areas selected the authors have made a worthwhile

contribution to this field of study, have provided comprehensive reference material and produced a publication that will be read with interest by chemists, physicists, crystallographers and pharmacists.

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George Gokel: *Crown Ethers and Cryptands*. Monographs in Supramolecular Chemistry, No. 3. Series Editor J. Fraser Stoddart. Royal Society of Chemistry, 1991, xii + 190pp, UK price £49.50. ISBN 0-85186-996-3.

This authoritative monograph is part of a new series on supramolecular chemistry, and is directed at senior undergraduate and graduate students. The author is well aware of the immensity of the field he has tackled, and is to be congratulated both on keeping the volume down to a realistic size, and on tackling the subject at a level appropriate for the intended readership. He has achieved a fine balance between the many arms of the subject, while at the same time showing chemistry's 'human face'.

The organisation is logical, first giving the reader some historical perspective on the development of the field (Chapter 1), progressing through the synthetic methods (Chapter 2, 40 pages) and complexation studies (Chapter 3, 31 pages). Structural aspects of free and complexed crowns are considered in Chapter 4 (27 pages) and finally a representative set of applications is discussed in Chapter 5 (50 pages), followed by the bibliographic section. The reader is led through this work, commencing with the simpler crowns, to the present state of supramolecular chemistry involving the crown and cryptand molecules, and towards the frontiers – the multimolecular assemblies to which the new generation training today will be aiming.

Historical perspective is given interest by *vignettes* of some early discoveries, especially personal recollections from the author's postdoctoral years at the time of Cram's entry into the field, and a selection of stories which both illustrate the creative process at work, and draw together the threads of the whole macrocycle idea from its several sources. Gokel is at pains to point out the lack of evidence for toxicity of crowns, citing an LD₅₀ in one study approximating that of aspirin! yet stressing that caution is still required for all untested compounds. There is a generous bibliography, comprising Chapter 6, citing over 100 books, reviews and summary articles, dating to 1990, and with a sprinkling of articles from the primary literature (including the important *Organic Synthesis* preparations of dibenzo-18-crown-6 and 18-crown-6) which should be helpful to a researcher entering the field, and to macrocycle chemists in general. Even the reviewer found items she had not previously met. To carp a little, the reviewer was disappointed not to see a reference to the original Pedersen crown paper in the *Journal of the American Society*, nor one to the announcement of the cryptands in *Tetrahedron Letters*, by Dietrich, Lehn and Sauvage, two papers which are the *fons et origo* of

the subject, and surely required reading for any new research student. This criticism apart, the book succeeds admirably in its aim as a monograph for new researchers; many more senior researchers will add it to their bookshelves, partly because of the realistic price.

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