

Book Review

Molecular Catenanes, Rotaxanes and Knots. A Journey Through the World of Molecular Topology. Edited by J.-P. Sauvage (sauvage@chimie.u-strasbg.fr), C. Dietrich-Buchecker (dietrbuc@chimie.u-strasbg.fr). Wiley-VCH, Weinheim. 1999. XIV+368pp. 248 DM/126.80 EUR/220 SFR. ISBN 3-527-29572-0

Shu-Kun Lin

Molecular Diversity Preservation International (MDPI), Saengergasse 25, CH-4054 Basel, Switzerland
Tel: +41 79 322 3379; Fax: +41 61 302 8918; E-mail: lin@mdpi.org

Received: 28 October 1999 / Published: 16 December 1999

The parts of a molecule are connected by chemical bonds such as the covalent bond, the ionic bond, the hydrogen bond, etc. However, as described in many examples in this book, the parts of a molecule cannot split if the rings are interlocked. These parts might be otherwise themselves individual molecules. Many fascinating experimentally observed structures are given in this book. A good pictorial representation of catenanes, rotaxanes and knots is shown on page 246.

In 1997 Summer when I was attending an IUPAC Congress where Stoddart gave a lecture, I considered having "Molecule of the Year" reported in our journal *Molecules* every year, and a molecule in my mind was olympiadane (page 254 of this book).

Twelve chapters appear in this book prepared by twelve international leading experts and their collaborators and associates. Every chapter of this multi-author book is written by one or more authors on different but related subjects. The mathematical characterization of these molecular structures and the prediction of their existence are presented. The other authors mainly describe the design and preparation of these compounds.

The twelve chapters listed are the following:

- 1 Chemical Topology - Statistical Musings
- 2 A Knot - Theoretical Approach to Molecular Chirality

- 3 Soft And Hard Molecule-Based Magnets With A Fully Interlocked Three-Dimensional Structure
- 4 Transition Metal-Incorporating Catenanes
- 5 Catenanes And Rotaxanes Motifs In Interpenetrating And Self-Penetrating Coordination Polymers
- 6 Molecular Knots: From Early Attempts To High-Yield Template Syntheses
- 7 Organic Template-Directed Syntheses Of Catenanes, Rotaxanes And Knots
- 8 Amide-Based Catenanes, Rotaxanes and Pretzelanes
- 9 Polymer Chains In Constraining Environments
- 10 Polycatenanes, Poly[2]-Catenanes and Polymeric Catenanes
- 11 Polyrotaxanes: Syntheses and Properties
- 12 Synthetic DNA Topology

Construction of supramolecular structures is based on complementarity rules (transition metal-ligand interaction, organic acceptor-donor complexes, hydrogen bonding, etc.). When comparing to other supramolecular structures, the steric complementarity relation between the cavity or empty space and the molecular moiety to fill the available space is thought to play a special role in topologically bonded structures. Furthermore, in many cases the steric complementarity can lead to the formation of desirable topological structures by elegantly using template effects. Many compounds of such structures are thus produced in solid states and sometimes in solutions. I am always interested in these kinds of fascinating experimental fact which is becoming more and more abundant, particularly in supramolecular chemistry. There must be a general, novel theory behind all these kinds of complementarity rules.

All chemists, not only those researchers working on this interdisciplinary field, will welcome this state-of-the-art work. During the journey through the world of molecular topology we enjoy catenanes, rotaxanes and knots, their synthesis, properties, and applications and the theory of interlocking and interpenetrating molecules.

Acknowledgements: I am grateful to Professor J.-P. Sauvage (sauvage@chimie.u-strasbg.fr) and Wiley-VCH's Sonja Karlein (skarlein@wiley-vch.de) for their kind assistance.

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