Applied Organometallic Chemistry

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Book Review

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Chirality in transition metal chemistry: molecules, supramolecular assemblies and Materials

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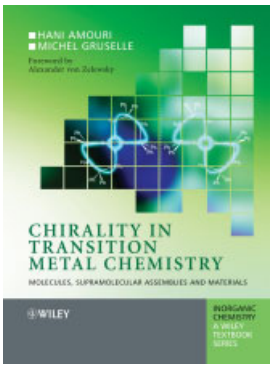

This soft-bound textbook opens up the world of transition metal stereochemistry in considerable detail, highlighting the significant recent advances in this most varied yet undervalued of subject areas. As is pointed out in the preface by Professor Alex von Zelewsky, there are numerous books covering methodologies to direct, control and predict the orientation of four groups around a single carbon centre. However, there is sadly a severe deficiency in accessible texts discussing the structural possibilities that can occur around many metal ions. As highlighted within the book, metals offer a range of coordination-numbers, geometries and spatial orientations with an almost infinite set of ligands, giving rise to a wonderful variety of shapes, a large proportion of which have non-superimposable mirror images. As such, the book offers an extremely exciting new addition to the study of inorganic chemistry, and should be compulsory reading for students entering their final year of undergraduate studies or starting a Ph.D. in structural inorganic chemistry.

The text is broken down into six well-structured chapters and builds on the seminal text by Professor Alex von Zelewsky, published some 12 years ago. Following a brief overview of the book in Chapter 1, the second chapter outlines the basic principles, defining and clarifying specific terminology, and looking at descriptors and the appropriate use of nomenclature, before moving on to discuss the properties of enantiopure materials and the principles of resolution and preparation of non-racemic materials. Subsequent chapters then build on this by looking at a variety of different areas in which chiral metal containing complexes are employed.

The third chapter examines the stereochemistry within a number of organometallic systems, typical of those used in homogeneous asymmetric catalysts. This is followed by a discussion of chiral recognition, through a series of diastereomeric interactions; a wide range of different systems are discussed, and the chapter highlights a number of interesting approaches that could be employed to investigate new chiral systems. Chapter 5 then advances the discussion in the area of supramolecular chemistry, in particular the isolation of oligomeric metal complexes, where an understanding of the metal centred stereochemistry has become essential, driven by the need to characterize large molecular structures. Two areas are considered: those isolated through the self-assembly of labile metals complexes and the more detailed stepwise synthetic procedures with kinetically inert metals and appropriate predetermined precursors. The final chapter then explores the area of materials chemistry by examining several interesting phenomenon, including the isolation of chiral conductors, enantiopure magnets and porous metal-organic frameworks. Included within this section is an extremely interesting exploration of chiral induction in liquid crystalline materials. The book then finishes with a brief examination of chiral surfaces, citing several examples of planar chirality arising from the orientation of molecules on a flat surface.

There is evidently considerable need for a book such as this, which concisely covers the topics highlighted. The combination of theory and recent examples is well thought through and offers the reader considerable insight into the current level of understanding, although at times it does have the appearance of a series or review articles rather than a text book. On the disappointing side, the quality of the figures does detract from the text, and in a number of areas a little more depth, such as in the discussion of circular-dichroism spectroscopy, would have been helpful. On balance however, the book is a significant development for students wishing to explore this undervalued subject area, and my well thumbed copy will certainly enhance my final year teaching.

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