

Book Review

Transition Metal Complexes of Cyclic Polyolefins; by G. Deganello, Academic Press, London/New York/San Francisco, 1979, X + 476 pages, \$87.50.

This book is the latest addition to the series of "Organometallic Chemistry" monographs edited by P.M. Maitlis, F.G.A. Stone, and R. West. The aim of the book is to give a fairly comprehensive account of the synthesis, structure, reactivity and, where appropriate, fluxional behavior and catalytic applications of cyclic polyolefin metal complexes. The coverage in the book is limited to polyolefins which contain more than six carbon atoms in a single ring and have at least three carbon-carbon double bonds. Within this framework, the ambitious aim of the book is nicely achieved.

The book is divided into five chapters and an appendix. Each chapter is organized around a particular type of ligand system and treats the metals in order of increasing atomic number: Thus, although the table of contents is sparse, the logical organization together, with a useful subject index, allows the reader to identify quickly particular subject topics in the book.

The first two chapters treat cycloheptatriene and other seven-membered ring olefins, and cyclooctatetraene and ring-substituted cyclooctatetraene-metal derivatives, respectively. Not surprisingly, together these chapters represent the lion's share of the book, 313 pages and approximately 650 references. In addition to the synthesis of the various complexes, detailed account is given of the reactivity of the seven- and eight-membered rings attached to metal carbonyl fragments and the catalytic activity of cyclooctatetraene derivatives of zirconium and iron is highlighted also. It is well known that many of these complexes have given rise to interesting rearrangement processes in solution and sometimes even in the solid state. The fluxional behavior of the relevant complexes is nicely discussed throughout these pages. In fact, for the newcomer to this field, the section dealing with the fluxional behavior of $[\text{Fe}(\text{CO})_3(\eta^4\text{-C}_8\text{H}_8)]$ will provide an interesting historical perspective of the trials and tribulations faced by several leading research groups in search of the solution structure of this stubborn molecule. Chapter two concludes with a concise but useful summary of lanthanide and actinide complexes of cyclooctatetraene.

The next two chapters deal in turn with cyclooctatriene, bullvalene and related polyolefin metal complexes, and derivatives of bicyclo $[6.n.0]$ trienes. (Most of the chemistry of pentalene and its derivatives are described in this chapter, whereas, in this reviewer's opinion, this could have been done more appropriately in Chapter II since many of these complexes are obtained from rearrangement of cyclooctatetraene). The last chapter is a compendium of miscellaneous other cyclic polyolefins and includes cyclononatriene, cyclododecatriene and higher annulenes. The studies listed in these chapters provide interesting examples of transition metal promoted rearrangements of particular polyolefinic ligands, the trapping and subsequent disengagement of otherwise inaccessible organic molecules.

To emphasize the fact that, with the exception of $[\text{Fe}_2(\text{CO})_6(\eta^6\text{-C}_7\text{H}_8)]$, all complexes of the type $[\text{M}_2(\text{CO})_6(\eta^6\text{-polyolefin})]$ have the same asymmetric structure and possess identical fluxional behavior, the concluding appendix in the book brings together the presently available spectroscopic data on these complexes and also gives a good discussion of the variable temperature ^{13}C NMR data as it relates to the common mechanism of the fluxional process.

Throughout the book a very appreciated feature is the generous use of factual original literature data collected in tabular form. There also are numerous reproductions of original spectra which, especially in the case of variable temperature studies, allow for easy visualization of the point being discussed. Liberal use of illustrations, in the form of schemes and schematic diagrams of molecular structure, is also made in discussing the reactivity and structure of relevant complexes. The schematic figures of molecular structures are consistent throughout the text and, with very few exceptions, are readily understandable. Similar consistency should have been maintained in all other respects as well, but minor lapses do occur. For instance, free energy of activation is sometimes listed as ΔG^\ddagger or ΔF^\ddagger . Also, in discussing the ^1H NMR spectra of two closely related $\eta^3\text{-C}_7\text{H}_7$ molybdenum complexes on pages 31–35, the numbering scheme of the proton resonances is different in the two compounds. Maybe inevitably, because of the large number of figures, schemes and tables, some errors have gone undetected at the proof-reading stage (for instance, on page 69 Fig. I-29 shows correct *endo* positioning of protons H_7 and H_{14} , but in the text *exo* stereochemistry with respect to $\text{Fe}(\text{CO})_3$ groups is stated; page 105, Scheme I. 72, the reagent is R_3O^+ ; page 188 the discussion of the bonding applies to complex 31 and not 32; in Chapter III the numbering scheme for complex 19 does not correspond to the assignment of the ^1H NMR spectrum listed in Table III. 3; on page 426 the different Ni (CDT) complexes (17, 18, 19) are mislabeled). Although not very serious, the mistakes nevertheless distract the reader from the otherwise high quality of the book.

References are included through early 1977, and even though significant advances have, in the meanwhile, been made in several areas of this burgeoning field, the book contains such an enormous wealth of information that it should be the standard reference for chemists actively working in this field or the starting point for those wishing to join this exciting field of research. It is unfortunate indeed that the prohibitive purchase price, \$ 87.50, probably will relegate the book to the shelves of university and company libraries only.

Department of Chemistry,
University of Alberta,
Edmonton, Alberta (Canada)

J. TAKATS