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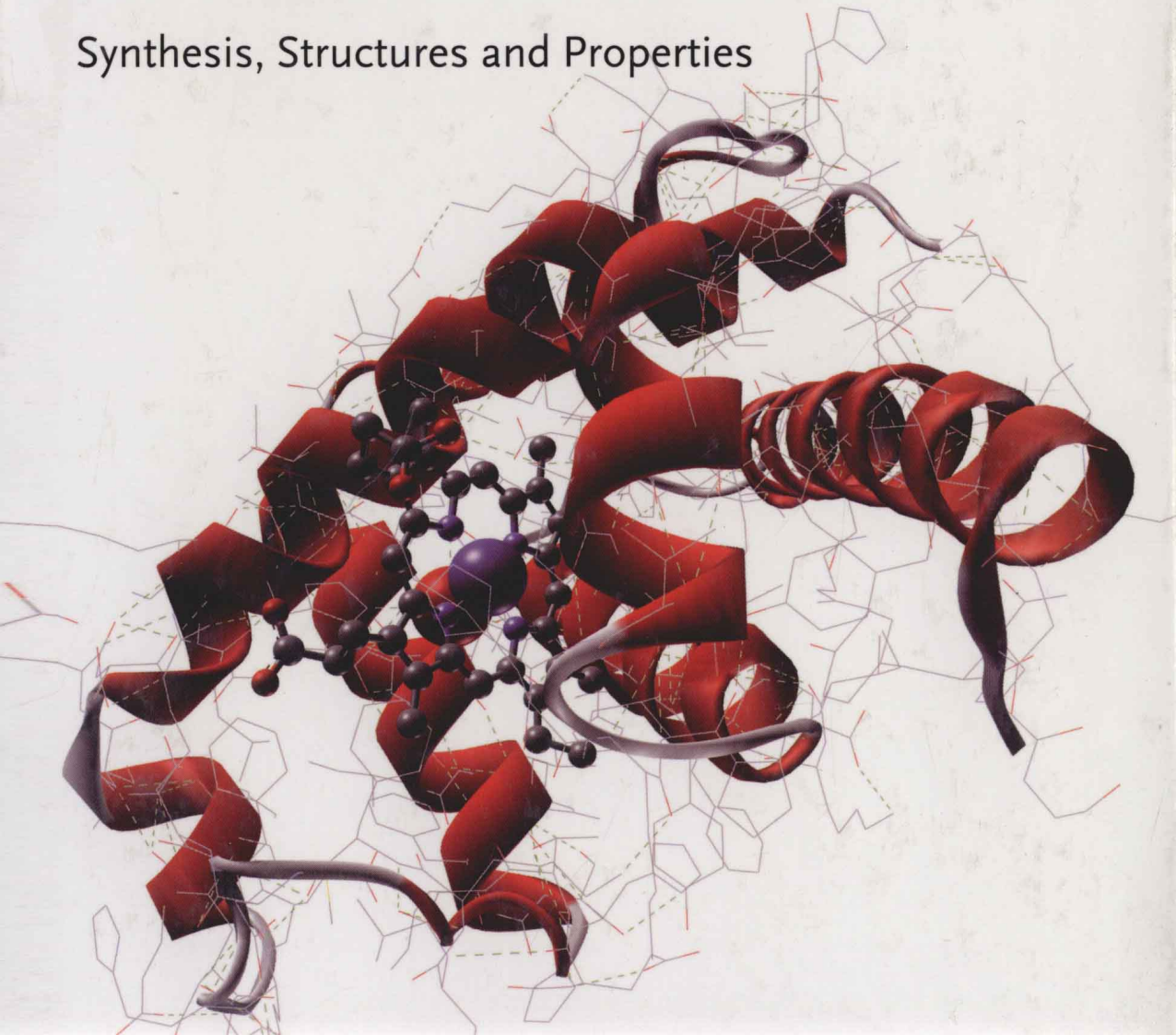
Metal Complexes and Metals in Macromolecules

Synthesis, Structures and Properties



Dieter Wöhrle, Anatolii D. Pomogailo

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Synthesis, Structure and Properties

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Dedicated to G. Manecke in memoriam,
V. Kabanov (Russia), E. Tsuchida (Japan).
To founders of the science on macromolecular metal complexes.

Preface

This book fills a gap in our knowledge of an intensively developing field of science: the chemistry and physics of macromolecular metal complexes (MMCs). This branch of science has appeared at the intersection of macromolecular, organometallic, physical and catalytic chemistry, and physics. On the one hand, it is difficult to generalize numerous data on MMCs because of the need to coordinate the efforts of specialists whose interests are primarily in specific fields of chemistry. Researchers in organic and high molecular branches of chemistry deal with syntheses of metal complexes and metals in macromolecules, whereas specialists in physical chemistry work on problems of structure, the nature of bonds and the catalytic properties of MMCs. On the other hand, as the contents of this book show, the field of MMCs possesses all the features typical of an independent branch of chemistry that operates with specific objects and its own construction principles and methodology. In general, the stage of accumulation of experimental data is almost complete. However, at present many ideas are being elaborated and discussed; some of them (the development of the theory of bonds in macromolecular complexes, the stabilization of thermodynamically unstable structures by polymers, etc.) have still not been formulated. The present state in this area is characterized by efforts to understand the experimental materials and to find fundamental *structure–properties* correlations. Progress in the area of MMCs is a result of intensive work in the fields of catalysis, photochemistry, living chemistry and the science of materials. These investigations have already made a valuable contribution to the solution of general problems in theoretical chemistry. It should be pointed out that the combination of metal complexes and metals with natural macromolecular proteins is the fundamental prerequisite for activity and selectivity in several life functions.

Chapters 1 and 2 of Part A PREFACE introduce into definitions, classifications, history, properties and biological systems of macromolecular metal complexes. Then part B SYNTHESIS AND STRUCTURES contain at first in chapter 3 kinetics and thermodynamics of formation of these complexes. The following chapters 4 till 8 describe in detail the various synthetic routes for the preparation of macromolecular metal complexes. Part C with chapters 9 till 14 is devoted to PROPERTIES. The most important ones are binding of small molecules, physical and optical sensors, catalysis, photocatalysis and electron/photon induced processes. In chapter 15 few closing remarks are made.

We believe that this book will be useful both for researchers who have experience in the synthesis and application of MMCs and for young scientists

who wish to deal with this interesting area of science. Experimental procedures and methods for studying the main MMCs are given, and the book contains several references to the most important and fundamental work in this field.

Authors from many countries have worked amicably and productively to create this book. We are pleased and thankful that well-known experts contributed very engaged and in time with chapters of extreme high level. Undoubtedly, Professor D. Wöhrle was the driving force of the author collective; he initiated the publication of the book and expressed the main concepts of its construction.

We wish to thank all the contributors for their creative work on this book. We are also grateful to Rita Fofana and Dr. Gulzhian Dzhardimalieva for their invaluable assistance.

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