This is also corroborated by the fact that another work with an almost identical title has appeared in print nearly simultaneously. The knowledge of the role of metal ions in biological systems has now reached the stage that allows a deeper understanding of the effect and regulation processes of bioinorganic functional units. Detailed insight into the occurrence of metalloprotein centers builds a basis for this understanding, and the current development in this area is collected in this Handbook.

The Handbook is ordered systematically according to the relevant elements. It comprises a short preface by the editors and 21 subsequent, independent chapters by prominent experts in which all essential metals present in metalloproteins are competently covered: Na, K, Mg, Ca, V, Mn, Fe, Co, Ni, Cu, Zn, Mo, W, and an additional short section on Cr. The especially important metals zinc, copper, and iron even have three or four chapters dedicated to them. The final Chapter 23 ties everything together and attempts to identify future developments in bioinorganic chemistry, which has bloomed so rapidly in the last half century. It is clear that topics such as the nature of the metal–ligand binding, dynamic aspects, conformational control, supramolecular organization, and the evolution of metalloproteins will play a prominent role.

On using the Handbook, the reader will appreciate the fact that the contributions from all 42 authors are homogeneously and uniformly structured and that the literature is cited in a standard manner, so that the book gives a good overall impression. Each chapter has its own Table of Contents and list of abbreviations and begins with a short, concise, general introduction to the fundamental coordination chemistry and to the bioinorganic relevance of the metal covered in the chapter. This is followed by a detailed description of the metalloproteins whose three-dimensional structure is known, that is, has been determined by X-ray crystallographic analysis. The available information on occurrence, characterization and function of the metalloproteins whose 3D structure is still unknown is summarized in the following section, and the fourth subchapter sketches the fundamental enzymatic catalytic mechanism and discusses the specific structure–function relation of the metal.

Although the Handbook is a successful collection of an incredible amount of information, the quality of some of the graphical material is unfortunately not optimal. It is also unfortunate that the editors have almost completely foregone the use of color—only a few color pictures are collected at the beginning of the book. Color pictures would have certainly been more attractive and instructive for the visualization of the coordination environment of the active centers of the metalloproteins as well as for the general representation of the protein structures.

The strong point of the Handbook is undoubtedly the structural description of the metalloprotein centers. Spectroscopic characteristics are mostly only briefly mentioned, and deeper insight into the electronic structure of the bioinorganic coordination unit, for example, is hardly conveyed. In most of these cases, the original references or specific review articles will have to be consulted. But how else could the complex process of water oxidation in Photosystem II be summarized understandably in three pages for anyone other than the expert? Anybody searching for references to synthetic model compounds will hardly find any. But biomimetic coordination compounds are clearly not the subject of this Handbook, and separate books could be written on that topic. The particular value of this book, as the title implies, is in its quality as a reference work. This book will be an invaluable source for readers who require a quick overview of the biological function and occurrence of an essential metal, the construction of a particular metalloprotein, or the relevant literature for a bioinorganic protein system. Each chapter includes a comprehensive reference section (almost 4500 references!) that covers the literature until 1999, in some cases, even 2000. Just as useful is the detailed Keyword Register at the end of the book, which leads directly to the required information or to the relevant literature.

It is unavoidable that such a reference book for an exceptionally active research area is in danger of being overtaken by current developments. New metalloprotein structures are being published almost daily. For example, in the short time since the publication of the Handbook, the structures of important metalloenzymes such as N_2O reductase with its Cu_4S center, the CO dehydrogenase with its $NiFe_4/S$ cluster, and even the Photosystem II of a water-oxidizing cyanobacterium have been resolved. In many cases, their active centers are different to those predicted on the basis of spectroscopic and biochemical evidence, or on the basis of model studies, and therefore incorrectly described in the Handbook. Although this does not diminish its value as a standard reference book for bioinorganic chemistry, there will be a place for an updated issue in the future.

The "Handbook on Metalloproteins" is not a textbook. Beginners and students are not the target group for this Handbook, and it cannot replace a classical textbook that emphasizes the fundamental principles of bioinorganic chemistry and functional relations. But scientists whose research, even if only marginally, involves bioinorganic chemistry will find this Handbook to be an excellent reference work and to contain a wealth of information. This book is warmly recommended for such scientists, and is an absolute must for libraries.

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Enzyme Kinetics. By *Hans Bisswanger*. Wiley-VCH, Weinheim 2002. xiv + 255 pp., hardcover € 119.00.—ISBN 3-527-30343-X

The life sciences are currently dominated by new disciplines such as "genomics", "proteomics", and "structural genomics". In the first two of these one aims to identify all the genes present in a cell (genomics) or all the proteins (proteomics), while in structural genomics the goal is to determine or predict the structures of all the proteins present in a cell. These research strategies are highly topical and yield many new insights, and are therefore receiving much attention. Thus, it may now almost be seen as rather old-fashioned to work on enzyme kinetics, a field in which the basic

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principles were already known in the early 1900s. The timing of the publication of Hans Bisswanger's book *Enzyme Kinetics* seems strange at first glance. However, on beginning to read the book it soon becomes clear that enzyme kinetics too can make an important, though often neglected, contribution to the understanding of cell biochemistry. The mechanism of an enzyme can only be understood when one combines a static picture, as presented by structural studies, with the dynamic considerations of enzyme kinetics. It is, of course, difficult for classical enzymology to compete for interest against the many new and attractive "omics" studies, and therefore this knowledge needs to be presented in an up-to-date and exciting form. Therefore this book, the "new Bisswanger", has come at just the right time.

Even in its first edition, which appeared in 1979, Hans Bisswanger's *Theorie und Methoden der Enzymkinetik* quickly became a standard work for lecturers and students in biology, chemistry, and medical science. The third edition of that work appeared in 2000 with the shortened title *Enzymkinetik*. That version is the first to be translated into English, as *Enzyme Kinetics*, the book reviewed here. The fact that Wiley-VCH decided to publish an English version is evidence firstly of the book's high reputation, and secondly of the dearth of up-to-date English language works on this subject. In this edition the opportunity was taken to give the book a new typeface and clearer diagrams, as previous editions were in a form more reminiscent of lecture notes. It is regrettable that the quality of the formula schemes was not also improved at the same time. However, the occasional appearance of German sub- or superscripts in the formulas does not interfere with the reader's understanding, as the meaning is always obvious from the context. Some minor errors in the third German edition have been corrected in this version. As a bonus the book is accompanied by a CD-ROM containing a useful program for processing data from enzyme kinetics measurements and displaying the results, thus adding further to the good visual impression given by the book.

The description of enzyme kinetics provided here is concise but always clearly understandable. It includes a short presentation of the mathematics, while putting special emphasis on practical aspects and the relevance to biochemical processes. The book contains as many mathematical formulas as necessary, but no more. This makes it a relatively easy book for the reader who is about to begin work in the area, or who has some previous knowledge but needs to refresh his or her memory. Some readers will perhaps feel a need for a more in-depth discussion of certain aspects than is given here. To remedy that, each chapter has a concise bibliography; it is mostly unchanged from the earlier editions of the book, no doubt largely due to the fact that hardly any publications on the subject have appeared in the last few years. One earlier work is the book by Irvin H. Segel with the same title, published by John Wiley and Sons in 1975. It treats the mathematical aspects in detail, but the reader must work through about a thousand pages.

Bisswanger's book covers enzyme kinetics in its widest sense, and does not allow the essentials to become lost under too much mathematical detail. The most important aspects receive a depth of treatment that is well-judged and appropriate, and the reader obtains a good overview of the whole subject. The structural concept of the book has remained mainly unchanged since the first German edition. The first part deals with bonding equilibria in a general way and with key aspects such as reactivity- or diffusion-controlled processes, cooperativity, and allosteric enzymes. This part ends by describing some illustrative examples, although these would have been even more useful if the structures of the enzymes had been shown.

The discussion of enzyme kinetics as such begins only in the second part of the book. The Michaelis–Menten kinetic model is explained, its graphical representation is discussed, and different types of enzyme control are described. Complex enzymatic mechanisms are discussed, as also are multisubstrate reactions and the effects of external variables such as pH and temperature. This part of the book has been extended by adding a chapter on isotope exchange, which fills a significant gap in the coverage. However, it is unfortunate that there is no chapter on the transition state, which has such an important role in the catalytic process.

The third part discusses the many different experimental methods for investigating enzyme kinetics. Because of the very large number of methods that have been used, it has only been possible to give an outline description of each one, and not every method could be mentioned here. Nevertheless, the descriptions are very clear, and they are supported by a comprehensive bibliography. It is regrettable that some important methods, such as single molecule spectroscopy and surface plasmon resonance, are not included.

The list of contents is clearly set out and gives a good picture of the thematic structure of the book. It is especially helpful because, owing to the similarity of the mathematical treatment of different topics, it gives cross-references between the first and second parts of the book where appropriate. The subject index is comprehensive and allows effective access to the key topics.

Enzyme Kinetics presents the subject in a clear and easily understandable form, and its readers should certainly discover (or rediscover) an interest in this area. The book offers an ideal introduction to the subject for students. However, it is difficult for enzyme kinetics, as an established discipline, to compete against the attraction of the new and successful "omics" research trends.

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