"macromolecular metal complexes" covers all these kinds of polymers, including also those in which a metal is bonded covalently, coordinatively, or ionically to a polymer chain or network (only considered briefly on page 19). Macromolecular metal complexes are treated in some books, several reviews, and regular IUPAC conferences. But this is never mentioned in the book. Only very few examples of the now extensive literature on three-dimensional coordination polymers are given (page 15), and the well-known polymeric phthalocyanines are not treated. Because polymeric metal complexes are also treated in the book, a more appropriate title would be "Inorganic, Organometallic and Metal Complex Polymers".

Chapter 1 is entitled "Inorganic Polymers and Classification Schemes". As already mentioned, not only inorganic and organometallic polymers but also examples of other types of combinations of polymers and metals are given, which are classified in different ways as follows: classification by connectivity (number of atoms attached to a metal); classification by dimensionality (1-, 2-, 3-dimensional structures); classification between Type I (metal atoms as part of the polymer backbone), Type II (ligand of a metal complex as part of the polymer backbone), and Type III (metal anchored to a polymer backbone). The latter three-type classification was not introduced by the author mentioned on page 17 but by me in a book published in 1996. Archer gives a further classification into metal-containing polymers (metal coordination polymers, organometallic polymers, metallocene polymers) and main group inorganic polymers (polysiloxanes, polysilanes, polymeric phosphacenes, polyheterophosphazene, polyoxothiazenes). All these systems of classification are confusing because examples are distributed under them. It would be better to treat examples of metals in polymers using only one method of classification, and then to mention briefly that other classifications exist.

Chapter 2 treats "Inorganic Polymer Synthesis" (a better title would be: Synthesis of Inorganic, Organometallic, and Metal Complex Polymers!). This chapter is subdivided with examples of step-growth synthesis, chain polymerization, ring-opening polymerization, reductive coupling and redox polymerization reactions, and condensation oligomerizations/polycondensations. It is very valuable to get information about methods for the preparation of compounds with the combination of metals in polymers. But some important results are missing. For example, electropolymerization is mentioned only with thiophene-containing Schiff bases and polypyridyl complexes on page 65. But numerous papers and reviews exist describing the electropolymerization of suitable substituted porphyrins and phthalocyanines (mainly published in the period 1990–2000).

Chapter 3 describes various methods for characterization: determination of molecular mass, gel permeation chromatography, end-group analysis, determination of thermal parameters, spectroscopic methods (MS, NMR, ESR, UV/Vis/NIR, IR, Raman, Mössbauer, X-ray). This 80-page chapter contains very useful examples of the analysis of polymers containing metals. But in most cases the fundamentals of these methods are also treated over several pages, which is not necessary here and does not contribute to the aim of the book.

Lastly Chapter 4 concentrates on the practical chemistry of such polymers. This means in general the properties of these materials and some applications. Inorganic elastomers, interface coupling reactions, dental polymers/adhesives, medical polymers, high temperature polymers, lithographic resists, preceramics, conductivity NLO, luminescent polymers, magnetic materials, and catalysts are mentioned. This chapter is very useful, even though some properties are missing, such as electrocatalysis (for fuel cells) and photoelectrochemistry. Most chapters describe only very few examples, e.g., for catalysts, conducting materials, and porphyrins in energy or electron transfer.

Some criticisms have been mentioned at the beginning of this review and in discussing the main chapters of this book. Summarizing now, the book presents a good overview with selected examples. Each chapter contains some exercises. The formulas and figures are clear and free of errors. Therefore this book is valuable for students in advanced courses of macromolecular chemistry and material science. Experts in the field of metals in polymers are better served by more extensive books and reviews. Unfortunately, books and reviews of this field are only rarely mentioned in this work.

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Fundamentals of Electroanalytical Chemistry. By *Paul M. S. Monk.* (Series: Analytical Techniques in the Sciences.) John Wiley & Sons Inc., New York 2001. 361 pp., softcover £ 34.95.—ISBN 0-471-88140-6

This series of books is intended as a resource for distance-learning of analytical techniques. From that point of view, the book fulfills its aims. It consists of ten chapters describing the main techniques for which equipment is commercially available. Each chapter contains self-assessment questions so that the reader can frequently check his or her understanding of the methods presented; the answers to these questions are given at the end of the book in a condensed format.

The book starts with an explanation of electrochemical nomenclature and methodology, which follows the IUPAC recommendations. However, the author has mostly chosen the "non-Cartesian" convention of plotting negative potentials to the right and positive potentials to the left. This so-called "polarographic convention" or "American convention" should be banned from modern textbooks, as it is a potential source of confusion for non-electrochemists. Indeed, the book contains current versus potential curves where sometimes the cathodic current is given as positive and sometimes as negative.

As a matter of fact, even the author gets confused, as for example on page157, where one reads "the oxidation occurs on the forward scan of the CV, with the oxidation taking place during the reverse part". The correct text should have been "reduction occurs when the current is negative [although shown as positive, p.158], and oxidation when the current is positive".

Chapters 3 and 4 present the physical principles of potentiometry, ion-selective electrodes, and redox titration. The concepts of electrode potentials and electromotive force (emf) are introduced using an empirical rather than a theoretical approach. Many experimentalists may appreciate that, but there is a risk that readers will, for example, regard an ion-selective electrode as a "black box". Potentiometric titrations are robust and accurate methods widely used in industry, and these two chapters may certainly be of use for many laboratory technicians. Perhaps a short presentation of the concept of Pourbaix diagrams would have been useful.

In Chapter 5 the author treats coulometry in a rather superficial way, completely omitting some important analytical techniques such as Karl Fischer titration or quantitative analysis of metal ions by electrogravimetry. Instead, different concepts such as stripping voltammetry or microelectrodes are included in this chapter, together with some concepts of the Goüy–Chapman theory.

Amperometric methods are described in Chapters 6 and 7 under the titles "Analysis by dynamic measurement, A: System under diffusion control" and "Analysis by dynamic measurement, B: System under convection control". This separation of the methods is rather puzzling and can be a source of confusion. For example, polarography, where the convection linked to the fall of a mercury drop plays an important role in resetting the concentration profiles near the electrode, is placed in Chapter 6, whereas diffusion-controlled redox reaction on a rotating disk is placed in Chapter 7. However, the two chapters review the major techniques such as polarography, cyclic voltammetry, pulsed methods, rotating disk electrodes, etc., with emphasis on the experimental aspects. It is regrettable that the illustrations of polarograms are taken from the textbook *Electrochemical Methods: Theory and Applications*, by A. J. Bard and L. Faulkner, which were themselves taken from earlier works. Those should have been cited directly.

Modern instrumentation yields much better results than those presented here. The part on cyclic voltammetry is nicely complemented in Chapter 10 by a description of some simulation packages.

A series with the title *Analytical Techniques in the Sciences* should certainly have included a section on amperometric detection in chromatography, and the part devoted to enzyme electrodes (several billions of which are being sold every year) is much too brief. Additional methods such as impedance or spectro-electrochemical techniques are presented in Chapter 8, while Chapter 9 provides some tips on electrode fabrication. Usually, analytical chemists rely on commercial electrodes and this chapter only concerns those interested in DIY.

The bibliography lists the major textbooks in the field, accompanied by brief personal comments. The glossary at the end is useful for all newcomers to the field of electroanalytical techniques, as electrochemists have, over the years, developed a jargon that repels many chemists from using any electrochemical method.

The originality of the book lies in the combination of practical tips with the descriptions of the different methods. However, the main criticism is that the author writes perhaps too much from a physical chemist's perspective rather than as an analyst. To conclude, this book is recommended for all those who wish to learn about the different electroanalytical methods by themselves.

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Kinetics of Homogeneous Multistep Reactions. By *F. G. Helfferich*. (Series: Comprehensive Chemical Kinetics, Vol. 38. Series editors: R. G. Compton and G. Hancock.) Elsevier Science, Amsterdam 2001. 426 pp., hardcover $ 244.00.—ISBN 0-444-82606-8

This volume is the latest in a long-running series which has taken on the ambitious task of covering all aspects of the field of chemical kinetics, both theoretical and practical, and both historical and modern. The current volume is part of a section entitled "Modern Methods, Theory, and Data".

Although Professor Helfferich intends this volume to be a practical hands-on guide for chemists and engineers working in commercial development, he makes it clear in the introduction that he wishes to address what he calls "fundamental kinetics". Defined as the study of reactions as composites of elementary steps, this view of kinetics differs from what physical chemists, organic chemists, or chemical engineers typically mean by kinetics. Pioneering work in this area dates back to the beginning of the twentieth century and is associated with names such as Michaelis and Bodenstein, familiar even to chemists who are not kinetics practitioners. The relationship between fundamental studies and practical applications is more intimate in this area of kinetics than in many areas of research in chemistry, fueled by advances in in situ measurement techniques. This is, I believe, one of the main reasons behind the "resurgence of interest in reaction kinetics" noted by the author.[*] Although his background and experience stem from bulk chemical applications, this resurgence is also strongly evident today in the pharmaceutical and fine chemicals industries.

The first five chapters of this book are devoted to fundamental concepts, definitions, and general descriptions given in a style such as might be found in a standard textbook of chemical engineering kinetics. It is the remainder of the book, and in particular Chapters 6 and 7, that sets this book apart from such standard texts. Chapters 6 and 7 discuss mathematical descriptions of multistep reactions and elucidation of reaction networks, providing a unique translation of chemical information into mathematical description. Chapters 8–10 apply these concepts to the topics of homogeneous catalytic reactions, chain reactions, and polymerizations, respectively.

[*] In that context, I found it odd that recent developments in the area of microkinetic analysis are not mentioned in this work. Although published examples to date have involved heterogeneous catalytic reactions (which are not covered in this book), the concepts are general and undoubtedly will soon be applied more generally to complex reaction networks. (For background on microkinetic analysis, see G. Yaluris, J. E. Rekoske, L. M. Aparicio, R. J. Madon, J. Dumesic, *J. Catal.* **1995**, *153*, 65.)

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