Environmental Analytical Chemistry. 2nd Edition. Edited by *F. W. Fifield* and *P. J. Haines*. Blackwell Science, Oxford 2000. 512 pp., paperback £ 24.99.—ISBN 0-632-05383-6

The authors' declared aim in this book is to bring together environmental chemistry and analytical chemistry in a way that can be clearly understood. Certainly quite a task! Unfortunately it must be said at the outset that the authors have only partially achieved that bold ambition.

The book's 20 chapters are arranged in two parts, the first devoted to general analytical principles and methods, and the second using that as the basis for discussing applications to problems of environmental analysis. The authors begin with an outline of the present status of environmental analysis, explaining, for the benefit readers new to the subject, the basic characteristics of analytical methods and how they are used. Then, correctly (and in contrast to many well-established textbooks of analytical chemistry), they go straight into the processing and interpretation of analytical data and the calculation of error limits. Unfortunately, however, they do not introduce the reader at this point to such important matters as calibration, limits of detection, and the validation and reproducibility of analytical methods. Unfortunately, this superficiality is typical of many parts of the book, and appears in other parts of the first 12 chapters that are devoted to analytical methods. There are many instances where one has ask why minor points deserved to be treated in such detail, or even mentioned at all, whereas other essential ones have been unaccountably omitted or merely touched on. One need only point to the long description of NMR spectroscopy, in contrast to the extremely brief treatments of ICP and ICP–MS methods, which does not reflect the extent to which these methods are used in practice. Of course, one cannot expect an introductory textbook of this kind to provide extensive and detailed treatments like those in monographs on analytical chemistry, but concise treatments appropriately focussed on the key topics would have improved the book. Also one must question whether a chapter on basic chemical principles needs to discuss concepts such as chemical bonding or acid–base theory; here the authors should have relied on their readers already having such knowledge. However, despite these reservations, the first 12 chapters of the book provide a satisfactory overview of the most frequently used analytical methods (conventional elemental analysis, thermal analysis, electroanalytical methods, spectroscopy, and chromatography), in other words the main repertoire of modern analytical methods. In addition to these conventional techniques there are very useful descriptions of the use of biological indicators, the measurement of ionizing radiations, and radionuclides; by including these the book stands apart from others in the same subject area.

The following eight chapters, which are concerned with actual problems in environmental analysis, create a more positive impression than the part on analytical methods. As well as describing analyses of different environmental media, this second part discusses some other advanced analytical methods that are appropriate to special problem areas. The chapters range over the broad field of environmental chemistry, with contributions not only on the three main environmental compartments (soil, water, atmosphere) but also on special problem areas such as old toxic waste tips, ecotoxicology, and radioactive contamination. Here, even the reader not directly involved in analytical or environmental chemistry can learn something of the complexity of the many kinds of environmental analysis problems that must nowadays be addressed. In these sections, the treatment of technical matters such as sampling, selectivity, and analytical methodology is appropriately brief, to avoid burdening the reader with too much difficult detail. Nevertheless (and this is certainly what gives the book its special appeal), it clearly emerges that solving environmental analytical problems requires interdisciplinary detective work and a high level of expertise in using the whole range of analytical techniques. Thus, the book achieves at least a part of its declared aims, although it can only serve as an hors d'oeuvre to lead one into further reading on the subject. The book contains examples and exercise problems in many places as an aid to individual study and deeper understanding; however, it would also have been useful to provide a more comprehensive and up-to-date bibliography (with comments) in each chapter. The quality of the figures seriously fails to do justice to the book; in a third edition the publishers need to provide more than these poorly scanned drafts.

To summarize, the book can serve as an introduction to environmental analysis and environmental chemistry, and is also suitable for readers with only a limited knowledge of chemistry. The attempt to strike a balance between an elementary presentation and building a solid foundation of knowledge is unsuccessful in some parts; too often the descriptions are superficial or not sufficiently relevant and up-to-date.

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Chiral Catalyst Immobilization and Recycling. By *Dirk E. De Vos, Ivo F. J. Vankelecom* and *Pierre A. Jacobs*. Wiley-VCH, Weinheim 2000. xx + 320 pp., hardcover DM 248.00 (ca. € 126).—ISBN 3-527-29952-1

Since Ojima's first book on *Catalytic Asymmetric Synthesis* in 1993 and the recent second edition, it is hard to set a new benchmark in this area. However, those books are focused on stereocontrolled catalysis in solution, and very little is mentioned about the rapidly growing field of immobilized chiral catalysts. Recently, De Vos, Vankelecom, and Jacobs took a completely new approach as editors of *Chiral Catalyst Immobilization and Recycling*. They have attracted a wide variety of highly recognized experts from industry and academia, and have thus managed to present this topic in a balanced and attractive way.

The book is divided into 12 chapters, four of which are of a more general nature, introducing concepts, supports, and separation techniques for immobi-

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lized chiral catalysts. The main part of the book addresses individual areas, such as immobilized enzymes, various aspects of enantioselective hydrogenation, catalytic heterogeneous dihydroxylation and epoxidation, C–C bond formation, and diastereoselective catalysis.

The first chapter, written by industrial chemists, outlines the challenges in the field for both industry and academia. It summarizes and comments on many recent developments, although some topics, such as separation techniques for soluble supports, combinatorial approaches, and catalytically active molecularly imprinted polymers (MIPs) are only mentioned briefly. For the academic reader the current industrial requirements in terms of TOFs ($>500\ h^{-1}$) and TONs (>1000) may appear overwhelming, but are important benchmarks for new immobilized chiral catalysts. In Table 3 the authors compare some typical existing and some potentially useful immobilized catalysts. In the case of catalytic hydrogenation of C=C bonds, the table indicates that various rhodium diphosphines supported on a soluble non-crosslinked polymer show TOFs ten times higher than those of comparable heterogeneous systems supported on crosslinked polymers. At the same time, however, the authors question the use of soluble polymeric supports because of the lack of suitable separation techniques. The modern advanced membrane filtration technique is described as complicated and expensive. This is outdated! The field of membrane technology for catalysis in general is advancing rapidly, and commercially available systems can be afforded even by the academic user. There are even some large-scale industrial processes that rely on membrane filtration as a separation technique. For example, BASF uses this technique to separate a polymer-stabilized rhodium catalyst from impurities in a continuous hydroformylation process (Patent DE 19801437).

In the following chapters, different approaches to immobilization and phase separation of chiral catalysts are reviewed. The section on catalyst immobilization on inorganic supports contains a very useful and comprehensive table of all inorganic supports that have been used in enantioselective catalysis up to now. I really appreciated the amount of useful information summarized in this table, but unfortunately there are few tables of this kind in the book. At the same time the authors raise some important issues concerning catalyst recycling: for example, there are still groups who apparently do not re-use the supported catalyst. They also warn against some unsuitable approaches to immobilization, thus possibly saving time and effort for other groups working in this area in the future. The following chapter shows that crosslinked (insoluble) and non-crosslinked (soluble) organic polymers can also be used as catalyst recovery vehicles. It also demonstrates that the use of polymer-supported enantioselective catalysts is a rapidly growing field.

A chapter on immobilization of enzymes may seem surprising at first glance, but this area has really advanced fundamentally in the last decade. The emphasis is on technologies applicable to industry rather than on the latest developments in pure research. Cost reduction through genetic engineering and efficient recycling of the enzymes makes this technique feasible for the industrial production of fine chemicals. Also, a broad range of immobilized enzymes are now commercially available for academic laboratories, and this chapter will help in understanding the different kinds of carrier systems, separation techniques, and the operational stability of immobilized enzymes.

Apart from the shortcomings mentioned above, no major mistakes were noticed. Redundancy between the chapters has mainly been avoided. Only the topics of catalytic dihydroxylation and epoxidation are covered twice, in Chapters 3 and 10. In some parts of the book the artwork looks slightly antiquated, but the message is always clear.

The critical description and evaluation of immobilized chiral catalyts in this book will be of great help for chemists in industry and academia, and it should be available in every chemical library. It is also recommended to interested scientists working in the area of stereoselective catalysis.

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Biomineralization. From Biology to Biotechnology and Medical Application. Edited by *Edmund Baeuerlein*. Wiley-VCH, Weinheim 2000. xxii + 294 pp., hardcover DM 268.00 (ca. € 137).—ISBN 3-527-29987-4

Biomineralization is the process whereby living organisms produce inorganic solids (minerals) which they use. The extent to which such processes determine our environment is often not recognized: calcium phosphate keeps our bodies upright (through bones) and provides us with "tools" for dealing with our food (teeth); biologically generated calcium carbonate forms mountain ranges (made of calcareous algae and mollusc shells) and plays a role in our "balance" (in the form of minute crystals in the organ of the inner ear that controls balance). More than sixty different inorganic solids are known to occur in biological systems. A particularly fascinating aspect of biominerals is their esthetic appeal, as seen in the delicate structures of algal skeletons (e.g., of radiolaria, coccoliths, foraminifera, and diatoms), elaborate snail shells, and nacreous mother-of-pearl in mollusc shells, none of which have up to now been replicated by chemical synthesis.

The book reviewed here has a wide-embracing title, raising high expectations for a comprehensive treatment of the subject. Regrettably, that promise is not entirely fulfilled. About half of the book is devoted to iron oxide minerals, with the rest divided approximately equally between siliceous deposits and calcium carbonate. Calcium phosphates are not covered, and as these minerals are of particular interest for medical applications of biomineralization (e.g., for repairing bones or teeth), the last part of the subtitle, "Medical Application", is hardly justified. The fact that the book only deals with unicellular organisms, and thus does not cover mineralization in higher life-forms, is only mentioned on the back cover.

Is that limitation a cause for criticism? I think not—it would probably be impossible to treat the whole subject fully, including all known biominerals, within 300 pages. This book is not a work of reference, but a collection of articles based on papers presented at a confer-

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