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### Book Reviews

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## BOOK REVIEWS

**CHIRAL ENVIRONMENTAL POLLUTANTS. TRACE ANALYSIS AND ECOTOXICOLOGY**, by R. Kallenborn and H. Hühnerfuss. 209 pages. Springer, Heidelberg, FRG (2001). ISBN 3-540-66423-8. DM 249.00 USD 129.00

The simple principle that two chemical structures can be identical but not superimposable, is nowadays a basic research objective in at least four main scientific disciplines: biology, chemistry, physics and mathematics. In the last decade, the separation and detection of enantiomeric persistent organic pollutants in different environmental matrices has shown the potential in assessing enzymatic transformation processes, which are relevant for understanding the fate and effects of those chemicals. However, until now, no effort has been made to give a comprehensive survey of enantioselective trace analysis and to reflect the future of this promising new field of analytical research.

The central topic of the book is to present the state of the art and future development of environmental enantioselective trace analysis and its implications in ecotoxicological studies. Areas such as toxicology, ecotoxicology, synthetic chemistry, biology and physics are covered in detail, in order to explain the different properties of enantiomers in environmental samples. Three chapters deal, respectively, with Enantioselective chromatographic methods for the analysis of chiral environmental pollutants, Chiral xenobiotics in the environment, and Enantioselective toxic and ecotoxic effects of drugs and environmental pollutants. The last chapter deals with future perspectives of enantioselective analysis for regulatory purposes and environmental modelling. The topics presented in the book are very well illustrated with practical details and case studies, as well as almost 500 references.

This monograph is highly recommended for environmental trace analysts, analytical chemists, ecotoxicologists and food scientists.

**CHEMILUMINESCENCE IN ANALYTICAL CHEMISTRY.** Edited by A.M. Garcia-Campaña and W.R.G. Baeyens, 621 pages, Marcel Dekker, Inc. New York (2001). ISBN 0-8247-0464-9. USD 225.00

Chemiluminescence (CL) was first applied as an analytical tool in the early 50s, and routine applications started to develop in the 70's, although the coupling to modern LC techniques was not fully explored until the 90's. The aim of the editors of this book was to provide the reader with a wide overview of chemical reactions producing light, with emphasis on the analytical uses of the phenomenon and its recent applications. This comprehensive volume details advances in current theories, mechanisms, technologies and trends of CL for solving qualitative and quantitative problems in diverse areas of analytical research, emphasizing physicochemical principles.

Taking advantage of the sensitivity, selectivity, wide detection range and versatility of CL-based technologies, the book discusses static solutions and flowing stream measurements of CL applied to organic and inorganic analysis. Solutions to detection limitations in narrow-bore liquid chromatographic and capillary electrophoretic set-ups, and the use of electrophoretically mediated microassay of enzymes are extensively described. It also illustrates a range of applications in analytical research, biotechnology (medical and industrial) and quality control areas. Finally, recent advances in CL signal reagents in immunoassay techniques and DNA analysis, and developments in CL sensors are reviewed.

Overall, the book will be of interest to graduate and undergraduate students, and analysts working in food, clinical, toxicological and environmental disciplines, as well as to control managers, and, in general, to researchers applying CL-based techniques.

**ADVANCES IN CHROMATOGRAPHY.** Vol. 41, edited by P.L. Brown and E. Grushka, 425 pages, Marcel Dekker, Inc. New York (2001). ISBN 0-8247-0509-2. USD 195.00

Following the highly regarded standards of this distinguished series offering new perspectives of fundamental and merging areas of chromatographic

science, this volume includes ten contributions dealing with: Fundamentals of capillary electrochromatography; Membrane extraction techniques for sample preparation; Design of rapid gradient methods for the analysis of combinatorial chemistry libraries and the preparation of pure compounds; Molecular imprinted materials for highly selective sample clean-up and analyte enrichment; Biomembrane chromatography applications to purification and biomolecule-membrane interactions; Transformation of analytes for electrochemical detection; Trace metal determination and speciation by HPLC; Temperature-responsive chromatography; Carrier-gas in GLC; Chemistry and analysis of catechins in tea.

**WATER: A MATRIX OF LIFE.** 2nd Edition, by F. Franks, 225 pages. The Royal Society of Chemistry, Cambridge, UK (2000). ISBN 0-85404-583-X. UK £ 18.95.

After sixty years of intensive study we are far from understanding what makes the only inorganic liquid, occurring in our planet, the absolute prerequisite for organic life, as we know it. The present book discusses current scientific knowledge of water, its remarkable properties, its influence on dissolved substances and its usually neglected but controlling role in life and ecology. First published in 1983, the present edition has been completely updated and extended.

After an introduction to the origin and distribution of water in the prehistoric life, several chapters report on the structure and physical properties of liquid water as well as of crystalline water. The aqueous solutions of electrolytes, and apolar and polar molecules, are reviewed with respect to the different water-solute interactions and hydrophobic/hydrophilic competitions taking place in the medium. Particular attention is paid to the properties of liquid water outside its "normal" temperature range, which is reported as "unstable" water, and to those of the supersaturated and vitrified solutions. The solvent effects of water on rates of chemical reactions performed in aqueous solutions are also considered. The second part of the book is devoted to the role of water in the chemistry and physics of life. Finally, with emphasis on developments over the last two decades, attention is drawn to some extra-scientific issues that are, however, of extreme importance to society, such as water quality, usage and management, economics and politics.

**THE SULFUR PROBLEM. CLEANING UP INDUSTRIAL FEEDSTOCKS**, by D. Striling, 93 pages. The Royal Society of Chemistry, Cambridge, UK (2000). ISBN 0-85404-541-4. UK £ 55.00.

The aim of the book is to demonstrate the importance of eliminating sulfur contaminants from the environment and the measures necessary to effect this. Using a systematic and pedagogical approach, the reader is first presented with the problem, including the major sources, uses and environmental effects of sulfur, such as the acid rain. Current technology for solving it, particularly catalytic hydrodesulfurisation, is then outlined together with appropriate theory on the synthesis, structure and sorption behaviour of the materials used. Relevant characterisation techniques are described with reference to typical sorbents, to demonstrate how the sorption behaviour of the material correlates with their properties. The book blends together aspects of environmental chemistry, materials/solid state chemistry, surface chemistry, catalysis and separation processes to address the problem of sulfur contaminants in a wide range of feedstocks.

In summary, the book is an introductory presentation of the current research and problem-solving issues to academics and industrialists.

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**CHEMISTRY IN THE MARINE ENVIRONMENT**. By R.E. Hester and R.M. Harrison. Vol. 13, Issues in Environmental Science and Technology. 98 pages. The Royal Society of Chemistry, Cambridge, UK (2000). ISBN 0-85404-260-1. UK £ 25.00.

This book contains 5 chapters written as overviews by international experts in marine chemistry. The first chapter provides an introduction to the chemical oceanographic processes and factors that are controlling them such as high ionic strength of seawater, the presence of a complex mixture of organic compounds and the sheer size of oceans.

The second chapter is concerned with the interactions and exchanges that occur between ocean and atmosphere and which exert major influences on climate. The well-known effect of the carbon cycle on climate and the presence of other greenhouse gases that can be generated by biological processes such as  $N_2O$ ,  $CH_4$ ,  $CO$  and  $CH_3Cl$  are presented in this chapter.

The third chapter reports on the use of uranium–thorium radionuclides and other transient tracers such as freons and CFCs in oceanography, in terms of ocean circulation and sediment accumulation. These tracer techniques underpin much of the large-scale oceanographic programmes, such as WOCE (World Ocean Circulation Experiments) and JGOFS (Joint Global Flux Studies).

The next chapter overviews the opportunities and challenges involved in developing new pharmaceuticals from the sea. Many of the marine natural products have no terrestrial counterparts and offer unique opportunities for drug applications. Examples of successful marine-derived drugs are given and the potential for obtaining many more new pharmaceuticals from the sea is clearly demonstrated.

The final chapter addresses issues related to industrial and sewage discharges, the effects of nutrients from agricultural runoff in coastal zones, and the contamination by crude oil, petroleum products, plastic pollutants and heavy metals. The use of risk assessment and bioremediation methods are reviewed and a number of specific case studies involving persistent organic pollutants and the use of antifouling paints are detailed.

The volume will be of interest to environmental scientists, chemical oceanographers and to national and international policymakers concerned with marine pollution. Certainly, it is expected to be essential reading for students in environmental and oceanography science courses.

**QUANTITATIVE CHROMATOGRAPHIC ANALYSIS.** Chromatographic Science Series, Vol. 85, by Th. E. Beesley, B. Buglio, and R.P.W. Scott, 378 pages, Marcel Dekker, New York (2000). ISBN 0-8247-0503-3. USD 150.00.

The first part of this book covers all aspects related to quantitative analysis in chromatography including sample handling (i.e. collection, transport and storage), sample preparation steps and the chromatographic determination itself. In this part, aspects related to chromatographic detection and affecting the quantitative analysis, such as the dynamic range, noise and data processing are described. The second part is focused on specific quantitative aspects of several chromatographic techniques such as gas, liquid and thin layer chromatography. Moreover, selected applications of each analytical technique are presented.

In summary, this book will provide fundamental understanding of the chromatographic techniques and a practical guidance in the many analytical

procedures employed. The practical examples included are selected to illustrate the scientific principles behind the analytical procedures but also to demonstrate the wide diversity of sample types that can be analyzed by chromatographic techniques.

It is hoped that this book will act as a directory to help both experienced or beginner analysts in achieving the necessary resolution in the time required and also obtaining quantitative results with high accuracy and precision.

**ANALYSIS OF SURFACTANTS.** Second edition, by Th. M. Schmitt, 637 pages, Marcel Dekker, Inc. New York (2001), ISBN 0-8247-0449-5. USD 225.00

This updated edition published a decade ago incorporates recent literature and various surfactants appeared since then. The book is organized in 19 chapters on individual instrumental analytical methods including the characterization methods of each surfactant class, the separation techniques (high-performance liquid chromatography, gas chromatography, thin-layer chromatography, supercritical fluid chromatography, capillary electrophoresis) and detection techniques (ultraviolet and visible spectrophotometry, infrared and near infrared spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry, titration of surfactants and miscellaneous methods such as polarography, gravimetry, ELISA, surface tension, etc.).

Compared with the former edition, molecular spectroscopy has been extended and a chapter on capillary electrophoresis has been added. The chapter on titrations has been reworked to discuss the exciting developments made in the past decade. Some additional surfactants have been added because of their commercial importance, namely ether carboxylates and ester quats. ISO standards are referenced when available as well as the recent literature.

Many procedures are described in enough detail to permit an experienced analyst to understand the principles behind and even to use them for exploratory work. Therefore, this book is of interest for every analytical chemist working in the field of surfactant analysis.

**ODOURS IN WASTEWATER TREATMENT: MEASUREMENT, MODELLING AND CONTROL.** Edited by R. Stuetz and F.B. Frechen,

437 pages, IWA Publishing, London (2001). ISBN 1-9002222-46-9. USD 125.00

This book addresses one of the problems of most recent public concern, the release of odours from the wastewater treatment works and its careful management to avoid annoyance.

In the Part I, an introduction to how humans perceive odours is presented, and the biological mechanisms involved and their interpretation in relation to the number of complaints. An overview of the basis for regulations and policies used to enforce environment protection is also presented. Part II describes the formation of odours and volatiles in sewer networks and sources of odours in wastewater treatment. Particular attention is focused on the role of microbial interactions and the physical factors that lead to odour release during wastewater treatment. The importance of accurate sampling and measurement methodologies in field and laboratory studies is outlined in Part III. Special attention is devoted to the European Standard draft for olfactometry and the use of novel sensor arrays as surrogate for odour measurement. Part IV covers the practical aspects for assessing and predicting the release of nuisance odours from wastewater treatment in order to provide effective control measures. The techniques used to predict the emission of odours from different wastewater sources are discussed focusing in the Odour Emission Capacity measurement. An overview of the methodologies used to treat odours including the addition of chemicals to sewer and waste waters is presented in Part V. The different mechanisms involved in the chemical, physical and biological treatment of odours of such deodorization technologies are also discussed.

The book has been written for engineers and scientists who are involved in the field of research, odour regulation, formation, measurement, modelling and treatment. The content of the individual chapters reflects the interdisciplinary nature of the subject and surely would be of interest to a broad audience.

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THE PHYSICAL CHEMISTRY OF NATURAL WATERS. By F.J. Millero, 654 pages, John Wiley & Sons, New York (2001). ISBN 0-471-36278-6. UK £ 89.50.



Among the disciplines relevant to marine and environmental chemistry, physical chemistry stands out as an important one but also as a difficult one to which some students and researchers feel uncomfortable to deal with. The present book is an important effort to provide a revision of those aspects of physical chemistry more relevant to the marine chemist and the geochemist. The author is a world authority in the field and this book benefits from this expertise. Thus, the text will be useful as a textbook for advanced graduate students and for researchers dealing with natural waters. However, this book is not a comprehensive coverage of all aspects of physical chemistry, for example, such as atomic chemistry, but it covers efficiently those topics that have received more attention among geochemists.

The book begins with an introduction to basic thermodynamic concepts. After the introductory concepts on kinetics such as rate processes in solutions and transport properties are introduced, the book deals with ionic interactions and the physical-chemical properties of natural waters with special attention to seawater. The section dedicated to fundamental physical-chemical processes is finished with a review of chemical equilibrium and estimation of thermodynamic properties of natural waters, such as activity coefficients and partial molal properties of electrolyte mixtures. All these concepts are used in the last two chapters to understand and review two important topics: the kinetics of oxidation and reduction of metals and the oxidation of hydrogen sulfide. This book covers effectively some difficult and important topics of marine physical chemistry, but the title is somehow misleading, because some aspects are not covered at all. For example, the physical-chemical processes affecting the cycling of organic matter in the marine environment and natural waters are largely omitted, just to cite a central issue in geochemistry. However, the book will be useful to anyone interested on a coverage of thermodynamics and kinetics applied to natural waters.

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