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### Book Reviews

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## BOOK REVIEWS

**TROPOSPHERIC OZONE RESEARCH**, edited by Oystein Hov, 499 pages, Springer-Verlag, Berlin (1998). ISBN 3-540-63359-6. DM 198.00

This is vol. 6 of the series on the *Transport and Chemical Transformation of Pollutants in the Troposphere*, issued from the EUROTRAC project, that addresses one of the principal concerns in recent years regarding the atmospheric environment. That is the formation of ozone and other photo-oxidants over much of Europe in summer.

The book starts with an overview about tropospheric ozone research (TOR) and follows with very well documented reviews on Spatial and Temporal Variability of Tropospheric Ozone over Europe, The Emission and Distribution of Ozone Precursors over Europe, Photochemical Ozone Production Rates at Different TOR Sites, Exchange of Ozone Between the Atmospheric Boundary Layer and the Free Troposphere, Stratosphere-Troposphere Exchange, and Ozone and Its Precursors in Europe: Photochemical Production and Transport Across Regional Boundaries.

The book also includes 31 individual reports from investigators all over the continent on Ozone Monitoring and Measurements, Transport and Transformation of Ozone, Monitoring of Atmospheric Constituents, Vertical Profiles and Transport of Ozone, and Modelling Studies.

The volume finally contains a list of scientific publications (1988-1995) from the subproject. As such, it provides a thoroughful insight into the current scientific views about ozone in Europe.

**CHEMICAL PROCESSES IN ATMOSPHERIC OXIDATION**, edited by G. Le Bras, 314 pages, Springer-Verlag, Berlin (1997). ISBN 3-540-60998-9

The book is vol. 3 of the same series of the preceeding reported and somewhat related to the same topic, the oxidation of atmospheric constituents which can lead to the production of photo-oxidants such as ozone.

In order to understand and model the complex reaction sequences involved in the above processes it is necessary to have a comprehensive understanding of reaction mechanisms and accurate estimates of kinetic parameters for relevant gas-phase atmospheric reactions.

This book presents recent advances laboratory studies of chemistry related to tropospheric ozone, and includes the following topics: the oxidation of simple organic compounds,  $\text{NO}_x$  kinetics and mechanisms, OH radical production and rate constants for the OH attack on more complex organic compounds, peroxy and alkoxy radical reactions, photooxidation of aromatic and biogenic compounds, the interaction between radical species, the nitrate radical and its role in night-time reactions as well as the sources and sinks of  $\text{HO}_x$  and  $\text{RO}_x$  radicals.

As the other volumes in the series it also includes the list of publications (1988–1995) of the project participants, which represent the state-of-the-art of the topic from the European perspective. Therefore, it is a reference document for all those working in the field.

**CLOUD MULTI-PHASE PROCESSES AND HIGH ALPINE AIR AND SNOW CHEMISTRY**, edited by S. Fuzzi and D. Wagenbach, 286 pages, Springer-Verlag, Berlin (1997). ISBN 3-540-62496-1, DM 148.00

The vol. 5 of the ten-volume series on the EUROTRAC project *Transport and Chemical Transformation of Pollutants in the Troposphere* is devoted to ground-based cloud experiments (Part I) and pollutant deposition in the high Alps (Part II).

Among the chemical and physical processes involved in the transformation of pollutants between their sources and their ultimate deposition, those associated with clouds, aerosols and precipitation must be rated as the most difficult both to study and to understand. These were poorly understood when the project started. The interaction of trace gases and atmospheric particles with cloud droplets, liquid-phase chemical reactions, and the chemistry of the cloud ice phase were subjects whose understanding was (and in part still is) inadequate for providing a framework for atmospheric and transport models that would provide a reasonably accurate description of the role of clouds in tropospheric chemistry.

This book presents a variety of recent advances in this field, including the properties and composition of aerosol particles, chemical transformation and scavenging processes, the relationship between liquid-phase chemistry and cloud micro-physics, entrainment, evaporation and deposition, trends in high Alpine pollution, transport processes, and developments in instrumentation

The combination of overviews on the different topics, including future directions for research, with individual reports of nearly all European groups working in the field, together with their 1988–1996 publications, gives to this book the label of an essential reference for academic and research activities in the area.

**INSTRUMENT DEVELOPMENT FOR ATMOSPHERIC RESEARCH AND MONITORING**, edited by J. Bösenberg, D. Brassington and P.C. Simon, 394 pages, Springer-Verlag, Berlin (1997). ISBN 3–540–62516-X. DM 168.00

This is vol. 8 in the series *Transport and Chemical Transformation of Pollutants in the Troposphere* (ed. P. Borrell et al.), issued from the EUROTRAC project, within the EUREKA initiative.

Atmospheric research and monitoring has been increasingly demanding instruments having fast responses, being chemically specific and sensitive enough to detect small changes in concentrations at sub-ppb levels. This book gives an account of three such techniques, namely laser sounding (Lidar measurements), which provides instantaneous vertical profiles of ozone, aerosols and other compounds in the troposphere, differential optical absorption spectroscopy (DOAS), which is able to measure simultaneously in real time a number of species including free radicals, and tunable diode laser spectroscopy (TDLAS), which offers the possibility of measuring particular species and making eddy correlation measurements of their fluxes. Each technique is extensively reviewed with respect to the instrumental developments, improved methodologies (data acquisition and processing) and accuracy assessment, and then the results of a number of detailed studies are presented.

The book reflects the european state-of-the-art of these techniques and the current direction of research in the area.

**SAMPLING AND SAMPLE PREPARATION**. Practical guide for Analytical Chemists, edited by M. Stoeppler 202 pages, Springer-Verlag, Berlin (1997). ISBN 3–540–61975–5. DM 148.00

Sampling and sample preparation are often an important source of errors in trace analysis, because of the lack of representativity of the sample to be analyzed or an adequate sample handling. This booklet addresses this important question providing well-documented and illustrated procedures for sampling and sample preparation prior to trace and ultratrace metal analysis.

The editor of this book, has successfully collected the contributions of a number of experts in the field covering in great detail the operational aspects to be taken into account by routine and research analytical practitioners. Chapters include sampling of biological and human specimens, wet precipitation (rain and snow), sea and fresh waters, soils and wastes, industrial materials and food products, and sample preparation by pressure digestion and microwave assisted decomposition among other oxidative and leaching procedures.

In summary, this is a reference book that should not be on the shelf of the library but on the hands of environmental analytical chemists with the aim of improving the quality of data produced and, thus, contributing to a better understanding of the occurrence and fate of trace elements in the environment.

**TRACE DETERMINATION OF PESTICIDES AND THEIR DEGRADATION PRODUCTS IN WATER**, by D. Barceló and M.C. Hennion, 542 pages, Elsevier, Amsterdam (1997). ISBN 0-444-81842-1. USD 273.00

The book covers a critical compilation of analytical methods used for the monitoring of pesticides and their degradation products in water. It contains up-to-date material with more than 1000 references, and is the direct result of the authors' experience in the field of pesticide analysis. The book is structured in six chapters, starting from general aspects of pesticides like usage, physicochemical parameters and occurrence in the environment. A second chapter is devoted to sampling from water matrices, stability methods of pesticides in water and quality assurance issues. The general chromatographic methods for pesticides are reported, including the newly developed electrophoresis methods and GC-MS and LC-MS confirmatory analytical methods. Sample preparation methodologies, including off-line and on-line techniques are extensively described in the next two chapters, with a comprehensive list of examples of pesticides and many metabolites, including the use of advanced automation methods based usually on solid phase extraction techniques coupled to different GC and LC-methods. The final chapter is devoted to the development of biological techniques, immunoassays and biosensors, for the trace determination of pesticides in water samples that can be used in most cases without any sample pre-treatment and so are useful as early warning methods.

The content of the book is so comprehensive that should solve most of the problems encountered in pesticide analysis, both for newcomers and expert laboratories looking either for a multiresidue analysis or for a tailor-made determination of a pesticide and/or a polar metabolite. Therefore, it is really an essential material for all university and industry analytical departments active in this area.

**TOXICANTS IN THE AQUEOUS ECOSYSTEM**, by T.R. Crompton, 382 pages, J. Wiley & Sons, Chichester, U.K. (1997). ISBN 0-471-97272-X. £75.00

This book provides a comprehensive overview on the occurrence, toxicity and analysis of toxicants in the aqueous ecosystem. This includes natural waters such as rivers, lakes, coastal and open seawaters, as well as the sedimentary matter and the biological species present in these waters.

After introductory chapters on toxicity evaluation based on water and animal tissue analyses, the available information on the toxicity towards fish and invertebrates of various types of pollutants -metals, organometallic compounds and organic compounds- is reviewed. Then, specific examples of the effects of these toxicants on organisms living in continental and marine waters are discussed. Tabulations are also given of the actual levels of such compounds found in a wide range of environmental samples taken throughout the world. These include waters, sediments and marine creatures, phytoplankton, algae and weeds. All chapters are extensively referenced (more than 1700 references). A further feature of the book is the discussion of appropriate analytical methods and the detection limits achievable by the various techniques compared with the concentrations likely to be encountered in the different samples.

The book concludes with five appendices which give additional information on: a) the ranges of metal concentrations found in environmental waters; b) radionuclides in fresh and seawaters; c) metals, organometallic and organic compounds in sediments; d) toxicants in marine organisms, including phytoplankton; and e) the composition of potable water.

The extensive, accurate and valuable information contained in the book makes it a reference for environmental chemists and toxicologists working in the field.

**INORGANIC TRACE ANALYSIS: Philosophy and practice**, by A.G. Howard and P.J. Statham, 182 pages, J. Wiley & Sons, Chichester U.K. (1997). ISBN 0-471-97672-5. £ 22.50

This is the paperback edition of the book that was first published in 1993. Despite the time elapsed since then, the book has kept its freshness and stimulating reading.

The book is not intended for providing a detailed set of analytical procedures but for helping develop a thinking approach to trace analysis by pulling together scattered information on the techniques and materials which are used in trace analysis and by identifying the underlying principles, behind the development of trace analysis procedures. The sections on the working environment, laboratory

materials, storage, reagents, the water supply, working practices and trouble shooting are needed with basic concepts and philosophical sentences that invite the practitioner to think about what he is doing or is intending to do. Here are some: "Unless you know exactly what you want to study you will design a poor experiment". "Poorly chosen samples can only generate poor results". "Look to yourself as a source of contamination". "The blank is as important as the sample. One is useless without the other". "It may be more important to know the magnitude of your errors than to have minimized them all".

In this way the book provides a grounding for those new to the trace level aspects of inorganic analysis, and gives a source of additional ideas and information for workers already in the field.

**MOLECULAR MARKERS IN ENVIRONMENTAL GEOCHEMISTRY.** ACS Symposium. Series No. 671. Edited by R.P. Eganhouse, 426 pages, American Chemical Society, Washington DC, USA, (1997). ISBN 0-8412-3518-X. USD 129.95

As traditional in the ACS Symposium Series volumes, this is a comprehensive collection of studies on a timely topic involving a large cast of international scientists. Molecular markers are extremely powerful tools in studying environmental problems. Taken the concept from the basic organic geochemistry it has been found extremely valuable for the recognition of sources of organic matter, either natural or anthropogenic, in recent environments and for the assessment of the physical, chemical and biological processes that act on it.

The book is divided into three sections covering contemporary biogenic markers, fossil biomarkers and anthropogenic markers, including contaminant assemblages. The lead chapter of each section offers an overview of that theme area, whereby salient concepts are illustrated with examples from ongoing or recent research. Within the biogenic markers examples are given on the use of bacterial lipids and pigments in microbial ecology studies (e.g. the response of microbial populations to contamination). The use of fossil biomarkers for identifying sources of natural and pollutant hydrocarbons in aquatic and atmospheric environments illustrates the second major application of the concept. Finally, the section on anthropogenic markers (15 chapters) is extensively devoted to the fate of domestic sewage markers (LAS, LAB, TAM, fecal sterols, etc.) in the aquatic environment. Other markers discussed are azaarenes (combustion source), benzothiazole (road dust indicator), PAH in soot particles, toxaphene and PCBs.

This is certainly a key book that will be of interest to environmental scientists aiming to gain a better understanding of our contemporary environment and to assess the impact of human activities on it.

**MARINE CHEMISTRY, An Environmental Analytical Chemistry Approach**, edited by A. Gianguzza, E. Pelizzetti and S. Sanmartano, 407 pages, Kluwer Academic Pub., Dordrecht, The Netherlands (1997). ISBN 0-7923-4622-X

This volume includes the 23 lectures given at the International School on Marine Chemistry held in Palermo (Italy) on September 1996. The book introduces the general principles of reaction equilibria and kinetics involved in marine geochemical cycles. In this respect, the effect of ionic interactions and organic and inorganic colloids in thermodynamic and kinetic processes in natural waters is dealt with. The biogeochemical cycles of a number of components such as metal ions, organometallic compounds and nutrients are also summarized. Particular attention is given to the light induced processes in the marine environment, namely in the air-water interface, in the degradation of DOC and DON and in the bioavailability of trace metals.

The volume is also focused on the development and applications of analytical techniques for the determination of chemicals in seawater. Extensive coverage is given to sampling techniques for seawater and sediments, to sample preconcentration for trace metal and humic substances analysis and to hyphenated techniques for the determination of metals and natural and anthropogenic organic compounds, including organometallic species.

As it can be seen an advanced text book on marine chemistry that could benefit from a more accurate editorial revision but certainly that will be of interest to marine chemists, biogeochemists, environmental analytical chemists and all those already working in the field.

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