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### Book Reviews

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## Book Reviews

ENVIRONMENTAL RESEARCH AND PROTECTION: INORGANIC ANALYSIS, edited by Wilhelm Fresenius and Ingo Lüderwald (with a Preface by Hans Wolfgang Nürnberg), D-6204 Taunusstein and D-6200 Wiesbaden, 301 pages (in English and German), including 128 tables and 213 figures (but unfortunately without index), soft cover, format 275 × 207 mm, ISBN 3-540-13469-7, Springer-Verlag Berlin Heidelberg New York and Tokyo (1984), DM 42, or approx. US\$ 15.30.

Inorganic chemical pollutants such as SO<sub>2</sub> and NO<sub>x</sub>, which also act as the major precursors of acid rain, as well as ecotoxic heavy metal and metalloid compounds (derivatives of cadmium, lead, mercury, copper, zinc, nickel, chromium, arsenic, selenium etc.) have gained considerable significance as regards the ecotoxic burden on vegetation, soil and natural waters, and as air pollutants. The volume represents the proceedings of a symposium at the Nuclear Research Center Jülich (KFA) from June 13-16, 1983 on "Inorganic Analytical Chemistry in Environmental Research and Environmental Protection" (a report on the symposium was for instance published in *CHEMOSPHERE* 13, Nr. 7, N 18-30 (July 1984)). Of the 48 oral and the 37 poster presentations 66 papers are published. They are structured into seven sections: Sea Water/Analysis and Quality Control/Atmosphere and Deposition/Inland Waters/Sea Water/Soils and Sewage Sludges/Biotic Materials.

Research on the level, fate and transfer as well as on the ecotoxic and toxic impact in inorganic pollutants has gained considerable significance in science and furthermore as a sound scientific basis for relevant environmental protection regulations, in research politics and in public awareness. It is evident that high-quality analytical chemistry has a key function in the correct and reliable judgement of the burden of pollution on the environment and consequently the

achievement of a sound ecotoxicology. Contamination or losses of samples must be avoided, as well as the use of expensive instrumentation with only insufficient analytical expertise. Analytical chemists are urged to prohibit the adverse developments—of increasing the sea of false data—in their responsible role as scientists and as citizens who know what can go wrong. In an effort to provide chemists and environmental protection agencies with a viable tool for combatting ecotoxic pollution, these proceedings provide an up-to-date and comprehensive survey of currently available methods of analyzing chemical pollutants. Limits of high quality and new possibilities—which may initiate inspiration and may increase expertise—are well presented.

ATMOSPHERIC DIFFUSION, THIRD EDITION, by F. Pasquill and F. B. Smith, Meteorological Office, Bracknell, Berkshire, U.K., 437 pages (including a valuable glossary of symbols, an introduction, 97 figures, 48 tables, 31 pages of references, and an index of 7 pages), soft cover, format 228 × 152, ISBN 0-85312-426-4, Ellis Horwood Series in Environm. Science, Chichester, U.K. (1983), £12.95.

The largely re-written study of the dispersion of windborne material from industrial and other sources, is a realistic approach to a constant problem of present times. Apart from the introduction the book is structured into 6 chapters:

- Turbulence in the Atmospheric Boundary Layer
- Theoretical Treatments of the Diffusion of Material
- Experimental Studies of the Basic Features of Atmospheric Diffusion
- The Distribution of Windborne Material from Real Sources
- The Estimation of Local Diffusion and Air Pollution from Meteorological Data
- Dispersion over Distances dominated by Mesoscale and Synoptic Scale Motion

Physical processes and mathematical models are thus described on the dispersion of plumes of gas or fine particles, e.g. those released from power station and factory chimneys, in terms of meteorological parameters. For instance effects of turbulent mixing on a passively

suspended material and convective motions in boundary layers. Theoretical estimates of likely concentration levels from specified sources are also important for an intelligently planned monitoring survey. Two main areas (besides the handled reactions during deposition) of considerable interest in environmental research are covered: the first is localised industrial air pollution in urban environments, the second is the long-range transport of pollution to areas which are particularly sensitive to resulting depositions. One misses however some practical case studies, for instance related to automobile exhausts, or to long-range transports of metal compounds. Also the behaviour of nitrogen oxides, of ozone and of hydrocarbons is not referred to the index. For sulphur dioxide one finds however four sub-descriptors: budget over large regions or between countries, deposition, industrial stacks, and flows within cities.

**LEAD IN MAN AND THE ENVIRONMENT**, by Jennifer M. Ratcliffe, Laboratory of Toxicology, University College Medical School, London, U.K., 240 pages (including an introduction, 23 tables, 30 figures, 25 pages of references (practically none from German speaking studies), and an index of 5 pages), linen, format 238 × 161 mm, ISBN/-85312-257-1, Ellis Horwood Ltd. Series in Environmental Science, Chichester, West Sussex PO19 1UD, U.K. (1981), £27.50.

The various and topical problems of lead compounds to illustrate the principles are brought together: the measurements (not too much is said about analytical chemistry and speciation) and the evaluation of environmental hazards, the derivation of biological standards and the ways in which sources of lead intake and acceptable limits of exposure and integrated into control strategies. The volume is structured into eight chapters:

- Health Effects of Lead I: Exposure, Biological Indices of Dose, Relative Risks in different Populations, Nutritional Factors, Synergism and Antagonism,
- Health Effects of Lead II: Biochemical and Cellular Aspects, Haematological Effects, Renal Effects,
- Health Effects of Lead III: Neurological Effects (including Animal

- Models), Epidemiological Studies of Lead Neurotoxicity in Children, Measurement of Lead Levels in Mentally Retarded and Hyperactive Children,
- Biological Guidelines (Comparisons of Levels),
  - Lead in the Environment: Lead in the Atmosphere (incl. Particle Characteristics, Ambient Concentrations, Transport, Deposition and Fate, Lead in Soils), Lead in Vegetation and Foodstuffs from atmospheric Sources, Other Sources of Lead in Food, Lead in Water, Lead in Paints and other Miscellaneous Sources,
  - The Contribution of Inhaled and Ingested Lead to the Body,
  - Epidemiological Surveys of Blood Lead Levels with particular reference to Children (incl. Conclusions and Implications for Control), and
  - Control Strategies for Lead: Air Quality Standards, Legislative and Technical Aspects of Stationary Source Control, Control of Automotive Lead Emission.

One finds very valuable information, mainly related to the United Kingdom and to the United States of America, especially useful data related to human exposure, uptake and effects (but little information related to cycles, long-range transport (e.g. to Scandinavia), behaviour in waters (including estuaries and seawater), and uptake by water organisms). The occupational exposure of adults to lead is not discussed, but for instance the removal of lead from petroleum, the relationship between airborne lead and blood-lead, comparisons between airborne lead and dustborne lead, and necessary reflections in legislation. The book can be recommended to all concerned with risk assessment and lead control.

**ANALYTICAL TECHNIQUES FOR HEAVY METALS IN BIOLOGICAL FLUIDS**, edited by Sergio Facchetti, Joint Research Centre, Ispra (Varese), Italy, 288 pages (including 70 tables, 73 figures, references at the end of each contribution, and an index of 4 pages), linen, format 248 × 172 mm, ISBN 0-444-42212-9, Commission of the European Communities and Elsevier Science Publishers B.V., NL-1000 AE Amsterdam (1983), US\$ 83.00 or Dfl. 195.00.

The important book contains 13 lectures presented during a course held at the Ispra Establishment from 22nd to 26th June 1981, which

lectures were however reviewed and updated since then. The discussions held during the course mainly emphasised the real need for absolute techniques, the growing importance of advanced multielement analysis and the vital importance of a continuous external quality control for which national and international organizations could also take responsibility. The book reflects the increasing importance of sensitive and accurate determination of heavy metals in biological fluids for reliable exposure monitoring and should therefore provide food for thought for toxicologists as well as chemists and engineers in the field of environmental and occupational health. The main emphasis of the book is on toxic metal compounds, in particular of lead, arsenic, nickel and cadmium. Especially sample pretreatment by ashing techniques is comprehensively discussed, and analytical methods are presented in comparative ways.

The book can be divided into three main parts. The first is dedicated to biological monitoring in occupational and environmental health. Examples of biological indicators and evaluation of human exposure to specific metals, e.g. lead and arsenic, are given. The second part considers the analytical aspects of heavy metal determination by covering sample pretreatment and analytical techniques. After a lecture on the ashing in trace element analysis of biological material by B. Sansoni, Nuclear Research Centre, D-5170 Jülich, the following reviews including newest practical expertise should be considered:

- General Analytical Aspects of the Determination of Lead, Cadmium and Nickel, by M. Stoeppler, Nuclear Research Centre, D-5170 Jülich,
- Spectrochemical Techniques, by N. Omenetto, Joint Research Centre, Ispra,
- Heavy Metals Determinations by Atomic Absorption and Emission Spectrometry, by J. M. Ottoway, University of Strathclyde, Glasgow, Scotland,
- Applications of Voltammetry in the Analysis of Toxic Trace Metals in Body Fluids, by H. W. Nürnberg, Nuclear Research Centre, D-5170 Jülich,
- Blood Lead Determinations by Atomic Absorption Spectrometry and Anodic Stripping Voltammetry Techniques, by W. Leyendecker, Joint Research Centre, Ispra,

—Isotope Dilution Mass Spectrometry applied to Lead Determination, by P. R. Trincerini and S. Facchetti, Joint Research Centre, Ispra.

The third part examines external quality assurance. Many of the lectures stress the need for an international biological quality control programme.

**ELSEVIER'S DICTIONARY OF CHEMISTRY (INCLUDING TERMS FROM BIOCHEMISTRY;** English, French, Spanish, Italian, and German), compiled by A. F. Dorian, 692 pages, linen, format 248 × 174 mm, ISBN 0-444-42230-7, Elsevier Science Publishers B.V., NL-1000 AE Amsterdam and New York, N.Y. 10017 (1983), US\$ 12.50 or Dfl. 295.00.

There is a growing interest to study internationally frontier crossing pollutants, but also to exchange scientific knowledge between countries (also to save costs). It is thus important to understand scientific literature in various languages, and also to handle indexes and databanks in foreign languages, that is to select appropriate terms or descriptors. Also in the broad field of chemistry and biochemistry there is this need to allow scientific work to freely proceed. This dictionary thus fills an important gap, and is—additional to the Multilingual Descriptor System of the Commission of the European Communities—of great use to researchers, scientists, students, translators and technical editors.

On the first 486 pages one finds the basic table with 9013 chemical terms in alphabetical order in English. For each descriptor a code number and the translations into French, Spanish, Italian and German are given. For a new edition the selection of terms should be made more systematical, although it is understandable that it is not easy to define logical scopes of chemistry (including biochemistry), especially since the publisher wants—as he writes—to provide a link between organic chemistry, physiology, genetics and medicine. One misses for instance important terms, such as benzpyrene (benzo(a)pyrene), organophosphorus compounds, caoutschouc, tyres, plasticisers, tensides, food additives, fire retardants, etc. Some descriptors are selected somewhat arbitrarily: for instance carcinogens is in the list, mutagens not (but mutator gene?); insecticide, herbicides, fungicides are included, but pesticides, biocides, and seed

dressings not; one finds translations for chromatography, gas chromatography and mass spectrometer, but not for liquid chromatography, polarography, voltammetry, neutron activation, and atomic absorption spectrometry; also plasma and blood corpuscles are in the list, while blood, serum, liver, kidney, urine, etc. are missing.

On the following 200 pages the relating French, Spanish, Italian and German terms are listed alphabetically, including the code number. It is thus possible to find any translation in the first part with the help of the code number in the sequence of the English alphabet.

**MDS, MULTILINGUAL DESCRIPTOR SYSTEM FOR THE EUROPEAN INVENTORIES ON THE ENVIRONMENT** (in Danish, Dutch, English, French, German, and Italian), by a Working Group of the Environmental Protection Information Group (ENIG), Luxembourg, 500 pages, soft cover, format 296 × 211 mm, EUR 8638 EN or ISBN 0-86341-007-3, Commission of the European Communities and Peter Peregrinus Ltd., Hitchin, Hertshire SG5 1RJ, U.K. (Pilot Edition September 1983).

There is growing need to store and search internationally scientific publications in the fields of environmental research. There must thus be some convention about terms to be used for description and for indexing, and information on correct translation. Many environmental terms are additionally not yet found in excellent dictionaries, because they are either new, or have changed their meaning somewhat in changing applications through the last years. The Multilingual Descriptor System of the Commission of the European Communities fills this important gap, and all scientists (trying to get a better interdisciplinary exchange of knowledge), indexers, translators and technical editors will be interested to use this important volume covering more than 1500 terms. These lists were intentionally not extended further, to exclude quasi-synonyms and descriptors, which should be avoided because they are misleading or too detailed (even not understandable for other disciplines) for the purpose intended. Furthermore clarity and transparency of expressions in a changing new science do not increase in accuracy with application of unlimited numbers of terms. The lists contain however non-



descriptors, which should not be used (also because they are not distinguishable or translatable), but for which indications are given how to substitute them. Each descriptor has been assigned a 6-digit code, which is common to all language variants.

On the first 282 pages one finds introductions, user guides, explanations for environmental classification (with the introduced hierarchy it is easier to find terms), and alphabetical lists of terms (with references to code numbers and to classification) in Danish, Dutch, English, French, German and Italian. For using MDS as dictionary in the fields of environmental research, it is necessary to take the code number from these alphabetical lists, and to find the translations in the following second part of MDS under the appropriate heading.

On the following 212 pages lists of terms are included in classification code order. The system has 21 main subject categories, and some categories are divided into sub-categories. A two-letter identifier combined with two-digit numbers is providing unique identification or classification. At the end of each sub-category typical national descriptors are mentioned, which are difficult to translate. One finds advice how they should be replaced to avoid misunderstandings. Mono-lingual compound words should anyway be adequately expressed through a combination of two existing descriptors (e.g. atmosphere + models).

**THE ORIGIN OF THE CHEMICAL ELEMENTS (AND THE OKLO PHENOMENON)**, by Prof. Paul K. Kuroda, Dept. of Chemistry, University of Arkansas, Fayetteville, Arkansas 72701, U.S.A., 176 pages (including an introduction, 48 tables, 24 figures, three appendices, and a subject index of 5 pages), cloth, format 249 × 172 mm, ISBN 3-540-11679-6, Springer-Verlag Berlin Heidelberg New York (1982), DM 92.00 or approx. US\$ 36.80.

The author reviews major developments in the field of nuclear geochemistry and cosmochemistry, which background is of importance to environmental chemists to get a better understanding of background information (cosmic abundance, searches for "missing" elements in nature, the Oklo Phenomenon (Pre-Fermi reactors; discovery 1972 of the fact that chemical elements were not only synthesized in stars, but that a nuclear "fire" had existed on the

earth with large-scale transmutations of elements), discoveries of extinct nuclides (e.g.  $^{129}\text{I}$  and  $^{244}\text{Pu}$ ), isotopic anomalies in the early solar system, etc.). Schematic diagrams explain the nuclear processes by which elements are synthesised. Reports on the natural occurrence of superheavy elements and of  $^{244}\text{Pu}$  in nature and the related uncertainties are also discussed. But "discovering" of new artificial elements may be over-emphasized by contemporary scientists. In the introduction the author informs about his geochemical investigations of volcanoes and hot springs. Besides the book is structured into six chapters:

- Abundance of the Elements (incl. Goldschmidt's, Virginia Trimble tables, etc.)
- Elements 43 (Technetium) and 61 (Promethium) in Nature
- The Oklo Phenomenon (e.g.  $^{239}\text{Pu}$  and other Isotopes in Pitchblende)
- Synthesis of the Elements in Stars (Assignment of Isotopes to Processes)
- Plutonium-244 in the Early Solar System (in this chapter the author describes for instance the excess of  $^{129}\text{Xe}$  in meteorites and unsolved problems in xenology, as well as the search for super-heavy elements in nature)
- Isotopic Anomalies in the Early Solar System (in this chapter the author describes for instance the origin of lithium, beryllium and boron, and the early decay of palladium-107 to silver-107 (changing isomer ratios)).

**METALS IN THE HYDROCYCLE**, by Dr. Wim Salomons, Delft Hydraulics Laboratory, Institute for Soil Fertility, NL-9750 RA Haren (Gr), and Prof. Dr. Ulrich Förstner, Technical University Harburg, D-2100 Hamburg 90, 349 pages (including an introduction, 83 tables, 149 figures, 42 pages of references, and a subject index of 17 pages), linen, format  $248 \times 173$  mm, ISBN 3-540-12755-0, Springer-Verlag Berlin Heidelberg New York Tokyo (1984), DM 98.00 or approx. US\$ 36.60.

The book provides an overview of recent developments in the study of trace metal behaviour on the earth's surface. Hydrocycles enable the various interactions of natural and man-made biogeochemical

factors to be presented in an integrated system. The volume is thus an excellent supplement to "Metal Pollution in the Aquatic Environment" (1979/1981), by U. Förstner and G. T. W. Wittmann, and provides extended crucial and recent information and data. Besides the introduction the book is structured into six chapters:

- Interactions with Ligands, Particulate Matter and Organisms (Bioavailability)
- Sediments and the Transport of Metals (including grain size effects, distribution and deposition, mobilization, sampling, quantification)
- Metals in the Atmosphere (including information on particles and deposition, environmental impact, continental or ocean derived metals in aerosols)
- Metals in Continental Waters (metal compounds in rocks, soils, rivers, lakes)
- Metals in Estuaries and Coastal Environments (behaviour during mixing)
- Metals in the Ocean (vertical and horizontal distribution, enrichment, particulates, cycling of trace metals between continents and oceans).

In the summary the authors give an outlook, and discuss open questions (especially in sampling, analysis, understanding of colloidal metal species, and speciation). Pollution problems still exists on local and regional scale, and modelling of processes becomes increasingly important. There is however still a lack of thermodynamic and kinetic data, and sediments are part of dynamic systems. Nevertheless the recommended book answers already many questions. Environmental impact can be assessed on case by case studies and on a better understanding of the processes affecting metals. Environmental changes induced by man, as acid rain, eutrophication, disposal of dredged material, are discussed in detail, and the biological impact of the processes affecting trace metals is illustrated by examples. Of great interest are also the analytical methods developed to determine physico-chemical forms of metals, as well as excellent comparisons of methods used to determine the complexing capacity of various natural waters. Geologists, chemists and ecologists will thus find the book a valuable source of information, especially if they are involved in research of trace metal cycling.

**HANDBOOK OF PARTICLE SAMPLING AND ANALYSIS METHODS**, by Prof. Dr. Charles H. Murphy, Kean College, Union, New Jersey 07083, U.S.A., 368 pages (including an introduction, 31 tables, 59 figures, references added to each chapter, and an index of 4 pages), linen, format 243×162 mm, ISBN 0-89573-116-9, Verlag Chemie International, Inc. Deerfield Beach, Florida and D-6940 Weinheim (1984), DM 165.00.

The user of the practical and excellent book learns how sampling and analysis are related to the goals and objectives of a particular type of study or investigation. The study of airborne particles is in fact motivated by a need to know as much as possible about their characteristics, concentrations, and spatial distribution in order to define their impact on the environment. The control should be governed by restriction of those substances that have identified characteristics known to be detrimental to the environment. Sampling methods and instruments are covered in away that allows the reader to find the one best suited to the objectives of his/her study. This is facilitated through a detailed description of the methods that includes principles, special features of sample preparation, errors, and interferences. Specification sheets are provided for instruments that are commercially available. The well printed volume is structured into three parts and 20 chapters:

- Fundamentals of Particle Studies (including an overall discussion on particle characteristics, units, terminology, and particle behaviour),
- Particle Sampling Instruments (with clear descriptions of available instruments, including information on producers, on application ranges, on additional requirements to make use of them, and on the results to be expected; the eight chapters deal especially with selection of instruments, with inertial separation sampling, with filtration, with condensation nuclei counters and diffusion devices, instruments utilizing particle electric mobility, optical particle samplers, miscellaneous methods, and calibration), and
- Methods of Particle Analysis (covering general laboratory procedures, particle size distributions, size distribution analysis, optical microscopy, atomic absorption spectrometry, X-ray fluorescence analysis, electron microscopy (ESMA and LAMMA are not included in the index), activation analysis and chromatography). Newer information of the Technical University Vienna should be included.

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