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Book Reviews

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Book Reviews

BIOLOGICAL MONITORING OF HEAVY METAL POLLUTION: LAND AND AIR (Pollution Monitoring Series) by M. H. Martin, University of Bristol, and P. J. Coughtrey, Associated Nuclear Services, Epsom, Surrey, 475 pages (including 105 figures, 73 tables, 87 pages with references (mostly 1976 to 1981), and a species and subject index of 15 pages), linen, Format 229 × 152 mm, ISBN 0-85334-136-2, Elsevier's Applied Science Publishers Ltd., Barking, Essex, 1982, £39.—

The book describes in a complete and excellent way the use of biological materials for indicating and monitoring heavy metals in the terrestrial environment. It particularly focuses attention on the problems which affect both the use of biological materials and the interpretation of results obtained with them. Plants have for a long time been recognised as potential indicators and monitors of heavy metals, but an important feature of the book is the section describing the use of animals, especially invertebrates, as biological monitors of heavy metals in the terrestrial environment. Monitoring serves not only to provide information on past and present concentrations of toxic materials in various components of the environment, but also to provide information on the processes of environmental release, transport, accumulation and toxicity. Personnel who might employ biological techniques, depend on this expertise and on the background of knowledge that exists for interpretation.

Indicators show the presence or absence of heavy metals, for instance to recognize geological metal-ore deposits or to get information about environmental quality. Other criteria for monitoring are the necessity for regular surveillance, and the quantification of how much pollutant is present. The plant and animals used as monitors must occur in some abundance throughout the area of study, and should respond (for instance by accumulation and/or effects) to changes in the degree of pollution. Biological

monitoring gives thus a better indication of a system's pollution stress than only pollution measurement, provided that enough is known about the system itself. The authors however quantified data about concentrations in specific organs of organisms (without discussing the analytical methods used), and state that there is no justification for using biological monitoring where direct physical and chemical methods can achieve comparable results as quickly and as cheaply. The authors believe also that in the near future the greater use of multi-element analytical techniques and monitoring techniques using aerial and satellite survey data will expand the scope of monitoring possibilities.

The book is structured in eight chapters (chapter 3, 4 and 5 being treated most extensively):

1. Introduction.
2. Biological Indicators of Natural Ore-bodies: Geobotanical and Biogeochemical Prospecting for Heavy Metal Deposits.
3. The Use of Vegetation for Monitoring Airborne Heavy Metal Deposition.
4. Plants as Monitors of Soil Contamination.
5. The Use of Terrestrial Animals as Monitors and Indicators of Environmental Contamination of Heavy Metals.
6. The Use of Imported Biological Materials as Monitoring Agents.
7. Retrospective and Historical Monitoring.
8. Biological Monitoring in Perspectives.

The volume deals with the effects of most heavy metals with a specific gravity greater than 5 and borderline metals. Surprisingly the sensitive element aluminium is practically excluded, and should be dealt with in a second edition. Apart of the multitude of useful applications given and explained, each chapter ends with important conclusion remarks.

ERNEST MERIAN

INFORMATION RESOURCES IN TOXICOLOGY, by Philip Wexler, 333 pages (including a subject index of 16 pages, and a Journal Article Index of 23 pages), hard cover, format 234 × 160 mm, ISBN 0-444-00616-8, Elsevier/North Holland, Inc., New York, 1982, US \$45.—, dfl. 105.—

This guide is an attempt to direct readers interested in toxicology to

English written sources (primarily in the United States) of information in the field. It is a selective and annotated list of information resources in the fields of chemical, physical and biological hazards to man including plant and animal toxins. The emphasis is on health effects. Topics such as waste management, ecology and environmental impact, where man is not considered a key component of the biosphere, are rather peripheral to the scope. Also alcohol, tobacco, drug abuse, allergy, hypersensitivity, and mechanical and traffic hazards have not been emphasized. It could not be avoided to select somewhat arbitrarily in providing a core list of the most necessary and useful informations.

The user finds therefore a selection of short reviews of handbooks, reports, periodicals, data bases, directories, journals, organizations, education addresses in the U.S.A., and some other information related to toxicology, when he looks for first indications, for instance for an access to first informations in a new field of interest. Chapter 20 deals additionally with information handling.

In the lists of books and of journal articles, some subchapters give for instance author names, title, and literature reference, also in the fields of analytical toxicology, of carcinogenesis, mutagenesis, teratogenesis (including testing), environmental toxicology, food, metals, pesticides, etc. The IARC-monographs, the publications of the National Research Council, and the W.H.O.-Environmental-Health Criteria are especially enumerated up to 1980. The list of organizations is, however, too American oriented, and it is a real gap when societies such as the European Society of Toxicology, the British Toxicology Society, the Society of Ecotoxicology and Environmental Safety, and the International Association of Environmental Analytical Chemistry with their multidisciplinary activities are just not mentioned. For the same reason one misses also relevant European publications and educational addresses. The book is thus very incomplete to use it as a who-is-who, to find out which is the relevant literature and who are the relevant scientists in a specific field. The book may have a certain interest in a library as a register, if one takes into account that there are limitations in using it.

ERNEST MERIAN

WATER ANALYSIS, Volume I, Inorganic Species, Part 1, by Roger A. Minear, University of Tennessee, Knoxville, and Lawrence H. Keith, Radian Corporation, Austin, Texas, 287 pages (including 21 tables, 63 figures, many equations, and a subject index of 13 pages), linen, format 234 × 163 mm, ISBN 0-12-498301-4, Academic Press Inc. (London) Ltd., 1982, US \$39.50, £26.50

The two editors and nine contributors from California, Colorado, Maryland and Ontario (Canada) present in the first of three volumes the theoretical and practical aspects of understanding and determining trace level components that are found in natural, pristine and polluted waters. Whereas Volume II will deal with specific analytical methods and instruments for individual inorganic species, this Volume I presents a background on the inorganic constituents found in water. It is thus structured in six chapters:

- Origin and Nature of Selected Inorganic Constituents in Natural Waters (with a general treatment of the sources of representative species found in both natural and waste waters).
- Redox Potential: Its Measurement and Importance in Water Systems.
- Alkalinity and Acidity.
- Conductance: A Collective Measure of Dissolved Ions (Although conductance measurements of the total amount of dissolved species are widely applied, their limits of use and interpretation have to be discussed in detail. The underlying theory is presented with the practical applications to guide the reader in the proper use and interpretation of conductance data).
- The Theory and Measurement of Turbidity and Residue (These measurements relate to undissolved, suspended matter, and refer thus to another indirect and surrogate method to monitor some of the components of water. The in-depth treatment of light scattering theory principles gives the reader a sufficient understanding of the complexity of turbidimetric responses to apply and interpretate data intelligently.).
- A Summary of Methods for Water-Quality Analysis of Specific Species (In this last chapter analysis considerations, classical methods of analysis, spectroscopic and instrumental methods, electrochemical methods and chromatography are discussed, and it is thus an introduction to the forthcoming Volume II).

The useful book makes an excellent impression with its logic content and structure, and one looks forward with even greater interest to the future volumes. This Volume I starts with the description of the trace inorganic constituents in waters of 15 important metallic species and of three nonmetallic species (boron, fluoride, cyanide), giving information about their possible chemical reactions, complexation with inorganic ligands, and complexation with organic ligands. One misses however information on the behaviour of the important elements aluminium and magnesium in waters. The book ends with the basic principles of important analytical procedures, comparing their detection limits. With the next Volume (II) covering specific analytical methods and instruments, this Volume (I) can be recommended as a good introduction.

ERNEST MERIAN

INORGANIC REACTION CHEMISTRY (SYSTEMATIC CHEMICAL SEPARATION), by Duncan Thorburn Burns, Queens University of Belfast; Alan Townshend, University of Birmingham; and A. G. Catchpole, Kingston Polytechnic, 248 pages (including 18 tables, 25 figures, many schemes and formulae, a list of reagents, and a subject index of 8 pages), linen, format 237×161 mm, ISBN 0-85312-118-4), Ellis Horwood Series in Analytical Chemistry, Division of John Wiley & Sons, Chichester, 1980, £25.00.

The book covers the theory and practice of semi-micro qualitative analysis. It provides a comprehensive treatise on the hosts of analytically useful reactions of the elements, and the methods by which they are utilized for qualitative analysis. Less common metals and anions, and spot tests are also included. The techniques can additionally be used to examine corrosion, pollution, and contamination of metals. The Volume—compiled by MAQA-teachers (Midlands Association for Qualitative Aalysis, formed 1954)—contains up-to-date and extensive information on inorganic reactions and improved separation procedures. It is planned to add a second volume “Reactions of the Elements and Their Compounds”.

The volume is structured in six chapters:

- Aspects of the History of Qualitative Analysis.
- The Physico-Chemical Basis of Reactions in Aqueous Solution, including Information on Organic Reagents and Visual Effects in Flames.
- The MAQA-Scheme, a Theoretical Interpretation of Systematic Inorganic Qualitative Analysis. This scheme allows cation separation, anion separation and identification.
- Techniques and Apparatus for Semi-Micro Qualitative Analysis.
- Systematic Semi-Micro Qualitative Inorganic Analysis—Experimental Procedures (This chapter deals with preliminary examination, preparation of solutions, separation of cations, separation of anions, tests for particular substances, and analysis of mixtures and of insoluble substances).
- Ring-Oven Techniques in Qualitative Inorganic Analysis.

The readers learn to handle small amounts of material by quick, simple, and cheap methods. These methods have still value besides alternative instrumental procedures. Qualitative analysis additionally has still a great pedagogic value, and acquaints with reagents, chemical reactions, removal of interfering cations and anions, and separations, which are also important in quantitative analysis. Since it is more and more recognized that speciation is important for effects, it is interesting to learn that some methods can distinguish between different chemical forms of the elements (As(III) and AsO_3^{3-} , or Cr^{+++} and CrO_4^{2-}). Newest and correct information has been taken over from *Mikrochimica Acta*. Normally about 10 mg samples are analysed. With the ring-oven technique it is even possible to achieve the qualitative analysis of a single drop of (about 50 μl) sample solution. The book gives a lot of information about how to avoid mistakes by fully understanding reactions. A drawback is however, that the authors do not say too much about the limitations of the various methods presented.

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