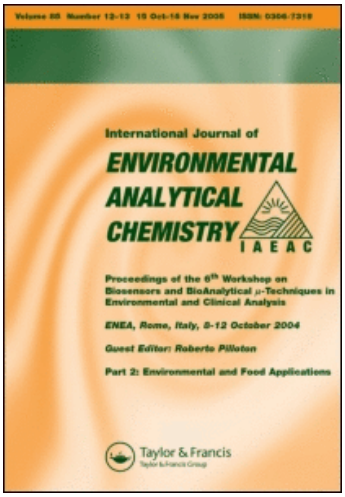

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Book Reviews

ION-SELECTIVE ELECTRODES IN ANALYTICAL CHEMISTRY, VOL. 2, H. Freiser (ed.), Plenum Press, New York, 1980.

Ion-selective electrodes (ISE's) have come of age. It is true that not all expectations raised in the early seventies have been fulfilled, but nevertheless ISE's belong to the standard laboratory equipment in many fields such as for instance water control, food analysis, clinical analysis and environmental analysis. Although several monographs on ISE's are available most of them date back to before 1975. Workers as well as newcomers in this field will therefore be very much helped by this series edited by H. Freiser, because it covers the literature up to the beginning of 1979. The volume comprises three well-written chapters and an extensive literature compilation.

The first chapter by R. K. Kobos deals with potentiometric enzyme methods. After a short discussion of soluble as well as immobilized enzyme systems, a more detailed summary of the various enzyme electrodes is presented. Most of these electrodes consist of a gas-permeable membrane on which the enzyme is attached in conjunction with a gas-sensing electrode (e.g. NH_3 or CO_2). In a concluding section some prospects of future developments are given.

The second chapter, written by Freiser, gives a survey of so-called coated wire electrodes (CWE's). In this type of electrode the electro active species is incorporated in a thin polymeric film coated directly on a metallic conductor. Although the mechanism is not well understood, they give reproducible and reliable results. The attractive aspect is that these electrodes can easily be prepared at low costs and that they are capable of extreme miniaturisation.

Another type of miniature electrodes is the CHEMFET (chemically sensitive field effect transistor) discussed in the third chapter by J. Janata and R. J. Huber. The well-known ISFET (ion-sensitive FET) belongs to this family of electrodes. All these devices consist of a membrane placed directly on the insulated gate of a field effect transistor. After a comprehensive theoretical section several practical aspects are considered. These fascinating electrodes are not yet commercially available and their preparation is restricted to highly specialized laboratories. Practically the

same text has been published already by the same authors in Ion-selective Reviews (ed. J. D. R. Thomas), vol. 1, 1979.

The last chapter comprises a compilation of ion-selective membrane electrode literature by R. P. Buck *et al.* Buck is well-known from the authoritive biennial reviews in Analytical Chemistry on this subject.

The book is well arranged. The volumes 1 and 2 present a good picture of the state of the art at the beginning of the 1980s of the field of ion-selective electrodes and should be present in libraries of analytical, clinical and environmental laboratories.

W. E. VAN DER LINDEN

PESTICIDE ANALYTICAL METHODOLOGY by John Harvey, Jr. (E. I. Du Pont de Nemours and Company) and Gunter Zweig (U.S. Environmental Protection Agency), ACS Symposium Series 136, 406 pages (including 177 figures, 54 tables and an index of 18 pages), linen, format 235 × 160 mm, ISBN 0-8412-0581-7, American Chemical Society, 1155 Sixteenth Street, N.W. Washington, D.C. 20036, 1980, US$38.00.

This volume is based on a symposium jointly sponsored by the Divisions of Pesticide Chemistry and Analytical Chemistry at the 178th Meeting of the American Chemical Society, Washington, D.C., September 9–14, 1979. It contains twenty methodological papers of great interest to analytical chemists, to environmental chemists, to human toxicologists and to ecotoxicologists. After the successful efforts in the past to achieve higher sensitivity it is now improving the selectivity, resolving power, and identification capability for sub-microgram quantities of pesticide residues which has priority. Sixteen authors from the U.S.A., 2 from Canada, 1 from the Federal Republic of Germany and 1 from India—who represent developments by the chemical industry, by instrument manufacturers, by university institutes and by governmental institutes—explain new instruments, new techniques and new results in the analytical chemistry of pesticides per se, in the environment and in different matrices. Each chapter contains valuable literature references.

A chapter on cleanup presents a general challenge for all types of analytical techniques. Practical methods examined include HPLC, GLC, TLC, and FTIR. The use of HPLC in pesticide metabolism studies, automation of HPLC, evaluation of LC columns, and improvement of mobile-phase selectivity in reversed-phase chromatography are discussed. Developments in the fields of electrochemical, amperometric and fluorogenic detection are described. Recent developments in TLC, especially those applied to the forensic chemistry of pesticide poisonings,

and the assessment of human exposure to pesticides are also presented. Chemical derivatization techniques, negative ion spectroscopy, and immuno-chemical technology are included.

The final chapters deal with applications of these analytical methods to specific compounds and substrates such as tetrachlorodibenzo-p-dioxin, organotin compounds, and airborne pesticides. For instance L. A. Shadoff determined 2,3,7,8-Tetrachlorodibenzo-p-dioxin in human milk with extraction, partition, and liquid chromatography. In a collaboration study the results of 7 different institutes were compared, and the methodologies discussed. According to T. E. Stewart *et al.* the GC/MS methodology presented for the determination of triphenyltin hydroxide residues in crops provides for greater specificity than any other currently available method, and exhibits excellent sensitivity. R. F. Moseman *et al.* stress that the development of analytical methodology for the assessment of human exposure to pesticides is a complex process. Information about transformation, storage, excretion, analytical behaviour of paerent compounds and metabolites should be gathered and a sound quality assurance programme should be applied. Besides the chapters of analytical techniques S. N. Tewari discusses the distribution of pesticides in human organs as determined by quantitative thin-layer chromatography (in actual cases of poisoning with organo-phosphorous, chlorinated organic and carbamate compounds), and Br. D. Hammock the potential of immunochemical technology for pesticide analysis. In the latter case antibody formation, antigen purification, immunization procedures, assay optimization, attributes and limitations are studied. Of general interest is also the chapter by J. N. Seiber *et al.* about analysis of organochlorine, organophosphate and dinitroaniline residues in the air near agricultural sites. Influences of drift losses, atmospheric reactivity and precipitation fate processes are carefully considered, whereas still too little is known about residue distribution between particulate and vapour phases.

ERNEST MERIAN

PARTICULATES IN WATER, CHARACTERIZATION, FATE, EFFECTS, AND REMOVAL by Michael C. Kavanaugh (James M. Montgomery, Consulting Engineers, Inc., Pasadena) and James O. Leckie (Stanford University, Stanford) ACS Advances in Chemistry Series 189, 401 pages (including 145 figures, 56 tables and an index of 11 pages), linen, format 235 × 160 mm, ISBN 0-8412-0499-3, American Chemical Society, 1155 Sixteenth Street, N.W. Washington, D.C. 20036, 1980, US$59.50.

The volume is based on a symposium sponsored by the Division of Environmental Chemistry at the 175th Meeting of the American Chemical Society, Anaheim, California, March 13–15, 1978. It contains sixteen papers of multidisciplinary interest of a forum of specialists from universities, from the U.S. Geological Survey and from Consulting Engineers Inc., who exchanged ideas, methods, and models used to investigate the fate and effects of particulates and their associated materials in various aqueous environments. Twelve papers were given by experts from the U.S.A., 2 from the Federal Republic of Germany and 2 from Switzerland.

The knowledge about particulates in water has developed more slowly in comparison to the knowledge of air particulates. The size spectrum of particulates in water extends from colloidal humic substances 1 nm in size, to large aggregates such as fecal pellets or marine snow with sizes up to 10^{-2} m. Some fractions may be living, and the distribution of shapes, densities, surface chemical properties, and chemical composition may vary wildly with size. The difficult and complex characterization of aqueous particulates makes use of electron microscopic techniques, special preparatory methods for sizing and large volume sampling. Fractionation techniques used to prepare samples for physical and chemical characterization of different size classes have proved to be time-consuming and of questionable accuracy. Finally, all sampling and size measurement techniques are subject to errors due to possible changes in the size distribution during sample collection, storage, and instrumental analysis.

Papers on applications of size distribution measurements for selection, process modeling, and control of solid/liquid separation processes demonstrated the analytical value of particle counting compared to cumulative measurements of particulate concentration. Modeling particulate dynamics in rivers and the ocean provides new insights into the fate of contaminants associated with particulates. The variety of questions on the characterization, removal, fate, and effects of particulates in water, includes:

—What are the sampling and measurement problems associated with the physical and chemical characterization of particulates in water?

—Are the particulates discharged into receiving waters a sink or a source of contaminants in aquatic environments?

—How are adsorbed or incorporated pollutants distributed in the size classes of the particulate size spectrum?

—How do particle dynamics in acquatic environments influence the fate of contaminants associated with the particulate phase?

—Can the characterization of the physical, chemical, and microbiological properties of the particulates as a function of size be used to improve

the accuracy of management and design decisions for water quality control?

The answers to such questions and a better knowledge of the scientific facts gives to engineers and chemists—who are responsible for water quality management—the needed information about the characterization, fate, effects, and removal of particulates in water. Topics include the characterization of surface chemical properties of oxides in natural water; redox coprecipitation mechanisms of manganese oxides; adsorption reactions of nickel species at oxide surfaces; and poliovirus adsorption on oxide surfaces. Mathematical models are also included, for instance for the fate of copper in a marine environment, or the interactions between marine zooplankton and suspended particles. The characterization of particles in digested sewage sludge, and an integral water treatment plant design are also discussed.

ERNEST MERIAN

PESTICIDE MANUFACTURING AND TOXIC MATERIALS CONTROL ENCYCLOPEDIA

Editor, M. Sittig; 810 pages, $96; 1980, Noyes Data Corporation, Park Ridge, N.J., U.S.A. ISBN 0-8155-0814-X. Reviewed by A. de Kok, Section of Environmental Chemistry, Free University, Amsterdam, The Netherlands.

The present volume is a thorough revision of the previous Pesticide Process Encyclopedia published in 1977 and has been expanded by relevant information about pollution control, product toxicity and residue tolerances of the 514 commercial pesticide materials described.

In a ten-page introduction the nature of the pesticide industry is outlined with emphasis on production data, general uses and types of pesticide formulations. The following pages deal with the rules for registration and setting of residue tolerances for pesticides in agricultural products. All U.S. institutions responsible for these regulations as well as relevant literature references are cited. In another eight pages ways are evaluated to come to an environmentally more acceptable use of pesticides, e.g., by very efficient application of fairly toxic pesticides, development of biodegradable substitutes or the use of nonchemical, in particular biological, pest control methods.

The core of the book is an enumeration of "the A to Z of individual pesticides" (750 pages), the pesticides being arranged alphabetically by

common name. This covers for each pesticide its general function (briefly), chemical name, formula, trade names and an extensive description of the manufacture (primarily drawn from the referenced U.S. or British patents). If extensive investigations on the toxicity of a pesticide have been made, this information is furnished. At least, for each pesticide the LD_{50} value for rats and a corresponding rough toxicity classification is quoted.

Valuable information on production process wastes and their control is given. Allowable limits on exposure (threshold limit values in the factory workplace and water criteria of the U.S. EPA) as well as allowable tolerance levels on various individual raw agricultural commodities, animal feeds and human foods are tabulated.

The book is completed with a raw material index, a trade name index and a bibliography.

In my opinion, this book contains a mass of useful, updated information which is conveniently arranged and clearly introduced in a number of short chapters. It may not be missed on the book shelf of anyone who is involved, irrespective in which way, with the work on pesticides. Besides, the information/price ratio of the book may be called reasonable.

A. DE KOK

DICTIONARY OF CHEMICAL TERMINOLOGY (In Five Languages—English, German, French, Polish and Russian. Edited by D. Kryt, Warsaw, Poland). Elsevier Scientific Publishing Company, Amsterdam and New York. 1980, 612 pages, Price: US $95.00/Dfl. 195.00 ISSBN 0-444-99788-1.

This first multilingual dictionary on chemical terminology represents a compilation in five languages of mutually correlated terms from the basic fields of chemistry and from those related disciplines which are entering chemistry to an ever increasing degree. The most recent areas of development have also been taken into account with material drawn from the widest possible range of contemporary literature—handbooks, encyclopaedias, journals and various IUPAC and ISO publications in the relevant languages.

The Dictionary of Chemical Terminology contains 3805 entries, listed and defined in English and followed by their equivalents in German, French, Polish and Russian. Any term in the latter four languages can be located simply by using the alphabetical indexes at the end of the volume.

Subject Fields: atomic and atomic nuclear structure, chemical bond, chemical elements, chemical kinetics, chemical reactions, chemical

thermodynamics, chromatography, colloid chemistry, conformation, coordination chemistry, electrical properties of molecules, electroanalytical methods, electrochemistry, electronic and stereo effects of atoms and atomic groups, fundamental particles, gravimetric methods, groups of elements, isomerism, isotopes, macromolecular methods, magnetochemistry, mechanisms of reactions, molecular structure, nuclear reactions, optical methods of analysis, periodic table, phase changes, phase systems, photochemistry, quantum mechanics, radiation chemistry, radioactivity, radiochemical methods of analysis, radiochemistry, spectroscopy, states of matter, statistical mechanics, statistics and error estimation, surface chemistry, thermochemistry, types of reagents, volumetric analysis.

While any such dictionary will, by definition, have some shortcomings in certain order, it is undisputed that this compilation will serve a useful purpose in the chemical community.

ROLAND W. FREI