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Book Reviews

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Book Reviews

MONITORING TOXIC GASES IN THE ATMOSPHERE FOR HYGIENE AND POLLUTION CONTROL by William Thain, The British Petroleum Company Ltd., linen, format 257 × 179 mm, 159 pages, including 26 figures (mostly representing instrumental background) and 10 tables, and a subject index of 2½ pages, printed by Pergamon Press Ltd., Oxford OX3 0BW, England 1980, price \$23.00.

The book presents the principles of atmospheric monitoring and indicates where difficulties may occur. It has been assumed that the reader is familiar with the conventional techniques of analysis. The contents of the book are largely drawn from experiences and information gained in the British Petroleum Company Ltd. and in the Chemical Industries Association, as well as from manufacturers of monitoring equipment and other laboratories. A selection of readily available instruments or devices from Europe and North America are described. But they have rather been chosen to illustrate points of design, operation or procedure, which are important in atmospheric monitoring.

The book starts with specification of toxic hazards and their measurement. Monitoring is necessary in the working area (area or personal survey, leak detection) or in the environment around a factory (including effluents and emissions). With the necessary security precautions flame-ionisation, photo-ionisation, thermionic detection, mass spectrometry, electron capture, heat of combustion measurement and thermal conductivity, chemiluminescence, electrolytic conductivity, coulometry, electrolytic reactions, colorimetry, interferometry, spectral absorption, flame photometry, solid state sensors, gas chromatography or liquid chromatography may be used as techniques. Portable (personal) and fixed monitors are described.

Sources of error in sampling and measurement (including noise effects and instrumental stability) are explained. Indicator tube detectors and paper tape detector systems are based on color change. Two other chapters deal with total and selective sample collection, especially to recover organics such as vinyl chloride, benzene, toluene, carbon tetrachloride and other chlorinated hydrocarbons, solvents, aminoaromatic compounds, aldehydes and others. The different systems and their advantages

and disadvantages are discussed, as well as possibilities for sampling pumps, which have still to be improved. Important chapters deal with the preparation of gaseous and liquid standards for calibration of instruments and evaluation of methods and the statistics of monitoring (confidence limits) and conclude with future possibilities.

The book is interesting for the constructor of monitoring instruments—who likes to recognize where improvements are necessary—and for the users, who get ideas about possibilities and limitations. In many cases simplifications of monitoring instruments are still needed. But there is on the other side also a need to improve the analytical methods towards lower concentrations, especially if metabolites, impurities and/or effects on biological materials and organs are involved. The book gives also information about selected recent relevant publications up to 1979. Unfortunately the subject index does not include chemical substances to permit an easy access to problem oriented answers, that is to say to find preferred methods for monitoring chemical substances individually. The determination of vinyl chloride is a preferred subject throughout the volume.

E. MERIAN

ENREP (ENVIRONMENTAL RESEARCH PROJECTS IN THE EUROPEAN COMMUNITIES): DIRECTORY OF SOLID WASTE AND CHEMICAL WASTE by the Commission of the European Communities, Directorate-General (Scientific and Technical Information and Information Management, Luxembourg), format 296 × 210 mm, linen, four volumes, published by Peter Peregrinus Ltd., P.O. Box 26, Hitching, Hertfordshire SG5 1SA, England, prices: Volume 1 and any one of Volumes 2, 3 or 4 £25.00, Volume 1 and any two of 2, 3 or 4 £34.00, All four volumes £40.00.

- Volume 1 contains the Main List of appr. 1000 research projects, the Organisation Index, and the Project Personnel Index
- Volume 2 contains Subject Indexes in Danish and English
- Volume 3 contains Subject Indexes in Dutch and French
- Volume 4 contains Subject Indexes in German and Italian.

Up to now, several publications of national environmental research catalogues have been published, such as in

- Great Britain: Department of the Environment: Register of Research, first edition 1975, second edition 1977, third edition 1979

- Federal Republic of Germany: U MPLIS-U FOKAT-Umweltforschungskatalog of the Umweltbundesamt (including Austrian projects), first edition 1975, second edition 1976, third edition 1979
- The Netherlands: TNO-Onderzoek naar Milieu en Natur, TNO Delft, first edition 1972, second edition 1975, third edition 1978
- Sweden: Environmental Information System 1974–1977, Stockholm
- Belgium: Environmental Research (two volumes), Brussels 1977
- Switzerland: Environmental Research, by the Swiss Association for Environmental Research, first edition 1974, second edition 1978/1979.

In the mean time working groups of the European Communities (ENREP-Secretariate Mr. Roland Colbach, Commission of the European Communities, Jean Monnet Building, Luxembourg-Kirchberg) have collected a cooperative information system by focal points on national basis in the member states.

ENREP is a computer-based permanent inventory of environmental research projects within the member states of the European Communities. It covers the whole environmental field and is regularly reviewed to include new research projects and to up-date existing ones, providing a comprehensive source of current information on environmental research. ENREP is also used to produce directories. Since there are more than ten thousand projects included in the information system, it has been decided to structure printed directions sectionally. As a first subject-oriented catalogue an ENREP-directory of solid waste and chemical waste has been published.

This first in a series of directories contains data on more than 1000 research projects, covering types of solid and chemical wastes; their quantitative reduction, collection, transport, treatment, utilisation and disposal; the reclamation of usable materials; management aspects; but does not include air or water pollution. Environmental analytical chemistry is only considered, when strictly related to waste.

On 180 pages in Volume 1 one finds the titles of research projects and, if available, brief descriptions, within seven chapters according to their origin (Denmark, France, Federal Republic of Germany, Ireland, Italy, Netherlands, United Kingdom). As further information each project description includes the name of the research organisation, at least a postal address for contacting the organisation, project personnel, and some times funding and/or co-operating organisations, status and dates of start and completion. All the information is given in the original language. At the end of this first volume an organisation index on 11 pages and a project personnel index on 9 pages is included.

In three different volumes one finds the six subject indexes (each about

105 pages) in the six languages of the European Communities. Under each heading (about 800 descriptors important for the section "Waste") the titles of the projects in the original language and the references to project-numbers in Volume 1 are mentioned. The subject indexes are not yet structured optimally, and need therefore some imagination from the side of the user. Improvements to this drawback are being worked out. For the time being one must not be astonished to find similar projects under different quasi-synonyms.

ENDOC is another directory already published by Peter Peregrinus Ltd. It includes information and documentation on about 400 organisations throughout the member states of the European Communities, indexed by subject in the six languages. Especially those centres are mentioned, which have available document information on environment subjects.

E. MERIAN

COMPUTERS IN ACTIVATION ANALYSIS AND γ -RAY SPECTROSCOPY. Proceedings of the A.N.S. Topical Conference at Mayaguez, Puerto Rico, April 30–May 4, 1980. Published by Technical Information Center/U.S. Department of Energy, 1979.

Quantitative γ -ray spectrometry provides the base for a group of radio-analytical methods which are essential in modern analytical practice.

The measurement of radionuclides in the environment, neutron activation analysis, nuclear reactor flux measurements and innumerable radiotracer studies all depend on the detection and evaluation of photo-peaks in a γ -ray spectrum. In addition to this there is a rapid growth in the field of X-ray spectrometry which presses for more sophisticated methods of spectrum-treatment. The number of elements or radionuclides which are determinable, the precision and accuracy attained and the amount of work to be spent depend on the skill with which the programme has been devised.

It is understandable therefore that the art of processing γ -ray spectra has developed considerably over the last year.

The present book contains the proceedings of the Conference organized at Mayaguez, Puerto Rico, in May 1978 by the American Nuclear Society, to get a survey of the state of the art. The book gives information on three types of procedures:

- On-line and interactive processing with small computers.
- Off-line processing with large computers, usually by curve-fitting.
- Least-square reduction in which the γ -ray spectrum is described as a linear combination of the spectra of the individual radionuclides.

The applications can also be divided into three classes:

- Instrumental neutron activation analysis including X-ray spectrometry.
- Naturally occurring radionuclides, including satellite surveys of the moon and the planets.
- Prompt capture γ -rays.

The proceedings clearly show the convergence of the procedures from the leading laboratories: A common code of practice is noticeable when it comes to the mathematical description of the peaks and the background. The same holds for the use of smoothing procedures and the choice of off-line against on-line computers. Most of the work is done off-line, the dedicated computers being reserved for fast work, often on short-lived radionuclides.

For those who need or want to keep abreast of the progress in the field of γ -ray spectrometry, the present book is indispensable. Price and printing quality are attractive as is customary with books edited by the U.S. Department of Energy.

H. A. DAS

PRACTICAL MASS SPECTROMETRY—A CONTEMPORARY INTRODUCTION. Editor B. S. Middlebitch; 387 pages, \$29.50; 1979, Plenum Press, New York and London. ISBN 0-306-40230-0. Reviewed by A. de Kok, Department of Analytical Chemistry, Free University, Amsterdam, The Netherlands.

The present volume consists of 13 chapters written by 16 authors who cooperated in a course on mass spectrometry based upon the contents of this book.

After an introduction for the true novice (Ch. 1), the instrumentation for mass spectrometry (Ch. 2) is treated with the help of three commercially available mass spectrometers. An extensive discussion of GC-MS (Ch. 3) follows. This starts with a concise introduction on the basic principles of GC, and includes an excellent survey of the possible applications of

derivatization to control both the chromatographic and MS behaviour of compounds with the aim of enhancing the informative elements in GC-MS data. Selective ion detection techniques are dealt with in the separate Ch. 4. In my opinion, Ch. 5—on concentration techniques for volatile samples using selective adsorbents—is somewhat outside the scope of a book on MS. Ch. 6 presents a good description of automatic data processing, although in places rather difficult to understand for a novice in computer techniques. Chs. 7–9 pay special attention to the problem of identifying compounds by comparing mass spectra of samples with reference spectra stored in MS collections. The final four chapters present examples of applications of MS in a broad range of disciplines, such as environmental and pharmaceutical chemistry; petrochemical industry; cosmo- and geochemistry. Many applications of GC-MS, largely in biochemistry (steroid chemistry) are included in Ch. 3.

References at the end of each chapter are limited to selected review papers and books. The exercises provided in most chapters allow the reader to evaluate his comprehension of the matter, with answers being given at the end of the book. Unfortunately, (reaction) equations have not been numbered.

The intention of the authors was to compile a book for the novice in MS who wants to know how a mass spectrometer can perform and how it can be applied. Instead of treating issues like history, mathematical theory, instrumentation and spectrum interpretation exhaustively, the authors therefore focus attention predominantly on basic principles and applications of MS. To my opinion, in this respect the authors have fully succeeded: the book has been written in a comprehensive way and it makes easy reading. Besides, the fact that each chapter has been written by one or more specialists considerably augments its quality.

Negative points are the rather meagre attention that has been paid to alternative ionization methods (especially FI, FD and CI in the negative ion mode), and the complete omission of the coupling of liquid chromatography and MS. Besides, a separate chapter about spectrum interpretation—essential for everyone who wants to do MS in practice, but deliberately omitted by the authors—is sorely missed. Despite these shortcomings, this moderately priced book can be recommended to newcomers in the field of MS.

Dr. A. de KOK