

Book Reviews

DETECTION AND MEASUREMENT OF HAZARDOUS GASES. Edited by C. F. CULLIS and J. G. FIRTH.
Pp. x + 226. Heinemann. 1981. Price £25. ISBN 0 435 71030 3.

As a collection of articles by specialists in several aspects of the problems associated with the detection and determination of hazardous substances in air, the appearance of this volume is timely. Its seven chapters are more concerned with ways of approach than with details of methodology and this tends to make for a very readable account. The general introduction by the Editors is followed by an interesting account by J. H. Burgoyne of the history of the detection of dangerous gases in air and of the various laws (in the UK and USA) invoked to control them; references range from Pliny the Elder to 1978 Regulations.

As well as acting as a joint Editor, J. G. Firth has provided a major chapter on methods used for the measurement of flammable gases and vapours, covering various types of sensors and sensing systems in particular, including instrumental standards and applications. The difficulties encountered in making such measurements are fully stressed and much good advice is given on the possible approaches. Oxygen deficiency is dealt with by L. R. Cooper detailing chemical methods, use of flame lamps, paramagnetic methods and electrochemical cells; the use of portable oxygen detectors incorporating alarm systems and the effects of response time are also included. Various general means of monitoring toxic gases in work-place atmospheres are depicted by B. Miller and P. O. Kane. These include short-term, "spot" tests, detector tubes, continuous and repetitive monitors, paper tapes, impingers, infrared and ultraviolet analysers, gas-chromatographic detectors and fixed point and mobile approaches to sampling. A very important subject is the use of personal monitoring devices that are efficiently described by D. T. Coker, though with some unavoidable overlap with subjects dealt with in previous chapters.

The longest chapter, perhaps as is only to be expected, is that by R. P. Harvey on statistical aspects and air-sampling strategies. The treatment is necessarily mathematical but also clearly illustrated with examples and shows the pitfalls that need to be avoided in the interpretation of apparent results. The final chapter by A. F. Smith deals effectively with the need for, and methods of preparing, standard atmospheres of the materials under test. Static and dynamic procedures, including diffusion, saturation and injection methods, are described in general terms with some emphasis on the problems encountered. With 171 references these aspects of the work are widely covered.

All in all, this book provides an excellent commentary on many aspects of hazardous gases and their determination. Critical assessments have been made and clearly expressed and the wisdom thus distilled will be of interest and use to all those currently concerned with the multi-faceted problems of health and safety at work. The clarity of presentation is to be commended.

D. C. ABBOTT

MAINTAINING AND TROUBLESHOOTING HPLC SYSTEMS: A USER'S GUIDE By DENNIS J. RUNSER.
Pp. xvi + 163. Wiley-Interscience. 1981. Price £17.65. ISBN 0 471 06479 3.

This manual covers all the main aspects of operation of HPLC equipment. Its title is, however, rather misleading in that the central theme of the book is the development of what the author calls CPMA, "chromatographers' preventative maintenance attitude." This is all very well and should be emphasised but maintenance, and especially troubleshooting, are something different. There is too much description of equipment, mostly first generation HPLC equipment at that, and too little discussion of the best ways to identify faults and correct them. So often one is faced with the problem of deducing a specific malfunction of the equipment from certain faults revealed at the output end (pressure read-out, recorder output, etc.). For example, you suspect that one of the check valves of your pump is failing to hold pressure. How do you then find out which one of up to four valves it is? Or, if you have no flow from the chromatograph, how do you find out if and where the blockage is occurring? Topics like these, and particularly the simple tests one can make, are covered too briefly in comparison with the much simpler matter of describing proper maintenance procedures.

The book is generally well written but one has the feeling that the author is too far removed

from the laboratory bench and that his recipes for troubleshooting are too simple and do not really cover the faults that often develop. The book will be most useful as an operating guide to those starting in liquid chromatography, those who find that even relatively simple problems of troubleshooting can be baffling. Experienced chromatographers will have moved beyond this book and although they may well learn something useful in the direction of CPMA they will generally have developed more sophisticated troubleshooting procedures than the author describes.

For a book of somewhat limited life the price does seem high and I believe that the publishers ought to have considered production to a lower price.

J. H. KNOX

PHOSPHORUS IN SEWAGE SLUDGE AND ANIMAL WASTE SLURRIES. Edited by T. W. G. HUCKER and G. CATROUX. Pp. viii + 443. Reidel. 1981. Price Dfl75; \$39.50. ISBN 90 277 0317 5.

This book provides a detailed report on the proceedings of the EEC Seminar, organised jointly by the EEC and the Institute for Soil Fertility, Haren (Gr.), held in June 1980.

The layout follows the pattern of lectures given at the seminar, with the topical eutrophication of the Great Lakes serving both as an introduction and also as an underlining of the importance of the possible environmental and ecological problems associated with waste dumping on agricultural land.

The papers provide a wealth of experimental detail both on field and laboratory studies; coupled with background details on each delegate's particular area this provides a comprehensive coverage of the subject. In addition to the effects of phosphorus addition to the soil the related subjects of nitrogen levels and metallic element contamination are also covered.

Whilst care has been taken to standardise the units used in the book and two standard analytical methods for phosphorus are given, it is surprising that no automated method of analysis is provided to deal with the large number of samples associated with field trials.

A list of participants and their locations is a valuable addition to the references given in the lectures.

Apart from a printing error on page 10 of the copy received for review the standard of presentation is high and the book is recommended as a valuable addition to any technical library on soil utilisation of waste phosphorus.

I. L. JONES

BASIC ANALYTICAL CHEMISTRY. By L. PATAKI and E. ZAPP. *Pergamon Press Series in Analytical Chemistry, Volume 2.* Pp. xiv + 463. Pergamon Press. 1980. Price \$25 (softback). ISBN 0 08 023850 5 (hardback); 0 08 026271 6 (softback).

The possibility of encapsulating the most important aspects of modern analytical chemistry in a single volume has attracted many authors. All have had to face the dilemma familiar to every teacher of the subject; how much weight should be given on the one hand to the fundamental principles of analysis and to classical techniques, and how much, on the other hand, to the instrumental methods that are overwhelmingly popular in modern laboratories? The present authors seem to entertain no doubts on this score; their introduction states unequivocally that they wish to convey "not a lexical knowledge but an understanding attitude towards the underlying principles. . . ." The result is that, of their six major chapters, only one complete chapter and parts of another are devoted to instrumental methods. Compared with other books that deal with both classical and instrumental methods (Fritz and Schenk, for example, or Kenner and Busch), instrumental analysis thus gets pretty scant treatment. So compressed is the material in these sections that accuracy is sacrificed in the interests of brevity. Thus electrophoresis is described as "a special method of paper chromatography," scattering by colloidal particles is described as Rayleigh scattering, and the value of mass spectrometry is said to be diminished by the availability of gas chromatography! High-performance liquid chromatography does not rate a mention at all. These sacrifices are made in the interests of the remaining parts of the book, in which the treatments of chemical equilibria, qualitative and quantitative analysis and organic analysis are more thorough. If anything, these chapters err on the side of providing unnecessary detail; are the principles of analytical chemistry better appreciated by a knowledge of the solubility product of thallium chromate? I would like to have seen less of this obscure detail and more on instrumental methods, in the interests of a better balanced book. There is some evidence that the chapters on qualitative and quantitative analysis were written by different authors, and that they did not co-ordinate their

efforts sufficiently; the structures and reactions of dimethylglyoxime, salicylaldehyde and the tetraphenylborate ion each appear twice. What is worse, the two structures for dimethylglyoxime are not the same, and only one of the paragraphs in each instance is cited in the (generally indifferent) index. The presentation of the book is neat enough in a somewhat old-fashioned way. There are commendably few misprints, although one or two are serious, *e.g.*, the wavelength of microwaves is given as 1–300 nm. The chapters contain no individual references, although there is a general bibliography. Overall, this book does not completely succeed in its aims. Many of its chapters could be read with profit, but its poor treatment of modern instrumental analysis prevents a whole-hearted recommendation, bearing in mind the strong competition from other textbooks.

J. N. MILLER

THE INTERNATIONAL PHARMACOPOEIA. Third Edition. VOLUME 2, QUALITY SPECIFICATIONS. Pp. 342. World Health Organization. 1981. Price SwFr36. ISBN 92 4 154151 2.

The International Pharmacopoeia is published by the World Health Organization by virtue of a resolution of the Third World Health Assembly, its purpose being to improve the quality control of all drugs and pharmaceutical substances.

The First Edition was published in two volumes (1951 and 1952), followed by a supplement in 1959. The Second Edition appeared as a single volume in 1967, again followed by a supplement in 1971. This Third Edition will appear in five volumes. The first volume was published in 1979 and contained descriptions of 42 general methods of analysis.

Volume 2 contains quality specifications for 126 individual pharmaceutical substances, for some of which no international quality specifications have previously been used. This collection of recommended methods and specifications is not intended to have a legal status as such in any country, unless expressly introduced for that purpose by appropriate legislation, but is intended to serve as reference so that national requirements can be established on a similar basis in any country. It is expected that they will be applied by many developing countries for pharmaceuticals used by their health systems. Further specifications are to be published at intervals in the three remaining volumes.

J. BREW

PARTICLE SIZE MEASUREMENT. Third Edition. By TERENCE ALLEN. *Powder Technology Series*. Pp. xxii + 678. Chapman and Hall. 1981. Price £24.50. ISBN 0 412 15410 2.

Terence Allen writes good books, takes great care in the collection of his material and has a good critical assessment. This is reflected in the latest version of his book "Particle Size Measurement." As the Editor of this series pointed out in the First Edition, "It is . . . becoming increasingly necessary to understand industrial processes involving the production, handling and processing of solid particles." The measurement of particle size is of increasing importance with respect to these industrial processes and hence the need for this book and its progress to a Third Edition.

It is encouraging to see the author place so much attention on the need for correct sampling procedures. This subject forms the first section, the initial chapter dealing with sampling processes, the second with the sampling of dusty gases in gas streams and the third delving into sampling and sizing from the atmosphere. This also illustrates a second point, namely the growing awareness of the need to monitor and control the environment. Chapter 4 deals with particle size, shape and distribution and has been greatly enlarged. The mathematical handling of particle size data is clearly and carefully presented. Other chapters then follow dealing with sieving and microscopy, *i.e.*, actual methods of measuring particle size and distribution. It is, of course, necessary to introduce appropriate theory so there are chapters dealing with interaction between particles and fluids in a gravitational field and the dispersion of powders. These serve as an introduction to chapters on incremental methods of sedimentation size analysis and cumulative methods of sedimentation size analysis. There is a further chapter on fluid classification concerned with elutriator, counter-flow and cross-flow methods. The next two chapters have been expanded and there is now a fuller statement on disc centrifuges and an expanded statement of the Coulter principle. Radiation scattering methods and permeametry and gas diffusion techniques find a place, followed by an enlarged section dealing with gas adsorption techniques. It seems a pity that this is separated from an excellent statement on the determination of pore-size distribution by gas adsorption as the experimental data are the same in both instances. This intervening chapter deals with other methods for determining surface area; it is efficiently presented but does break up the connection

mentioned above. The mercury porosimetry chapter continues the process of pore-size distribution and is a good technique, extending the data into a different size range. Finally, there is a useful chapter on on-line particle size analysis.

This book is presented within a limited compass of pages, which adds merit, the information given is adequate and forms a basis for any new reader on the topic and provides background material for those already working in the field. Lastly, for today's conditions, the price is just about correct.

D. DOLLIMORE

ANNUAL REPORTS ON NMR SPECTROSCOPY. Volume 11A. Edited by G. A. WEBB. Pp. x + 282. Academic Press. 1981. Price £35; \$84. ISBN 0 12 505311 8; ISSN 0066 4103.

This volume has five separate articles, each of which must be itemised adequately to describe the volume:

1. NMR of amino acids, peptides and proteins (1977-79), by H. W. E. Rattle. With 400 references and 64 pages, this article keeps closely to its title and the limiting dates therein. In essence each of the individual references is introduced with a helpful comment relating to the interest of its content for organic chemistry and biochemistry, as well as for NMR.

2. Carbon-carbon coupling constants: discussion by P. E. Hansen, with 192 references and 32 pages.

3. Carbon-carbon coupling constants: data by V. Wray and P. E. Hansen, with 108 references and 92 pages. This belongs together with (2) and many of the references are common. Article 3 is really one long table of numerical values and is essentially complete for 1977-79 publications, but excludes all values given in the earlier, companion table (V. Wray, *Prog. Nucl. Magn. Reson. Spectros.*, 1979, **13**, 177). The discussion chapter is more a text indicating what has been discovered rather than a true discussion. The full paragraph, "Couplings similar to $^3J(C_1-C_2)$ in naphthalene are reported in tryptophan (1061)¹⁶¹ and norbomycin (576)¹⁶²." indicates the style.

4. Calcium and magnesium NMR in chemistry and biology, by S. Forsen and B. Lindman, with 108 references and 43 pages, is the most readable article. Neither ^{25}Mg nor ^{43}Ca is a convenient nucleus for NMR, being of low and very low natural abundances, respectively, and each with a quadrupole moment. Relaxation rates are rapid and so the lines are broad and spin-spin couplings are very seldom observed. However, the amount of information derivable from line widths and chemical shifts is considerable and biologists should read this account of what NMR can reveal about the behaviour of these important ions in biological systems. Fig. 4 for Mg^{2+} and Fig. 18 for Ca^{2+} show the marked dependence of line widths on pH; they resemble indicator curves and show how the NMR can be used for pH measurements in these biological materials.

5. ^{13}C NMR of Group VIII metal complexes, by P. S. Pregosin, has 227 references and 45 pages. This gives a full bibliographic account of this subject with reference to stereochemical as well as merely chemical structures with emphasis on 1976-78.

Any attempt to review the whole book leads one to recognise that at this level NMR is a fully established tool and that it is chemists in the specialities covered who will need these annotated bibliographies; not too many individuals will need the whole volume. The reviewer suspects that before many years have passed only abstracts of such articles will be published and the full text, probably with photographic copying of typescript, will merely be available in microfiche form. With the general lack of funds and of storage space, libraries will not stand the form of these volumes much longer. It may even be that improved computer searching of data bases may make them irrelevant.

D. H. WHIFFEN

COMPUTER NETWORKS IN THE CHEMICAL LABORATORY. Edited by GEORGE C. LEVY and DAN TERPSTRA. Pp. xviii + 221. Wiley-Interscience. 1981. Price £17.50. ISBN 0 471 084719.

It is fairly obvious that, as analytical laboratories are becoming cluttered up with microcomputers and mainframe computers are being operated in a more flexible manner, the next major computer-analytical problem will be linking them all together. Fortunately, a lot of effort has been directed towards it in the past, and the present position is very well reviewed by the timely publication of these papers, which were presented at the ACS Meeting in Houston in March 1980.

Their origin is evident: they are by enthusiasts and specialists. For most, a high level of computing experience is taken for granted, but there is a good introductory overview and several papers

that relate practical experience acquired during the installation and operation of computer networks. These are interspersed reports by frontier developments such as the FORTH computer language and the WARPATH/INDIAN system. Bearing in mind that in this area the *avant garde* position is adopted as central or dumped without a tear being shed at an unseemly rate, the reader may feel sympathy with the views of the team from General Electric: "We have learned, however, that a time comes to abandon one's pet approaches in favour of the more concentrated effort put forth by equipment manufacturers."

In short, this is an ephemeral work, but one that should be of great interest and stimulation to computer enthusiasts and to laboratory managers.

D. BETTERIDGE

FLOW INJECTION ANALYSIS. By JAROMÍR RŮŽIČKA and ELO HARALD HANSEN. *Chemical Analysis Series, Volume 62*. Pp. xiv + 207. John Wiley. 1981. Price £20. ISBN 0 471 08192 2.

The reviewer must declare an interest: in 1975 he spent one of the most stimulating and profitable weeks of his scientific life in the laboratory of the authors, learning all about flow injection analysis (FIA). It did not take long to appreciate that this was a technique which, by virtue of its flexibility, ease of construction and speed of operation, opened up continuous flow analysis, conceptually and practically, to those whose means or interest did not stretch to the Technicon AutoAnalyzer. To judge by the spate of publications and other expressions of enthusiasm a large number of analysts have similarly fallen under the spell of the method, which they have probably learnt about through the papers and lectures of the authors. The appearance of this book, which details and discusses the methodology and philosophy of the Copenhagen School of FIA and also gives recommended procedures for the determination of many substances by FIA, is warmly welcomed.

However, readers of this journal expect reviewers to be critical, and so a caveat and a criticism must be entered. First, in the best scientific sense, this is a polemical book. There are three areas of controversy in FIA: the origins of the method, its methodology and its theoretical basis. Some of the disputations are tedious—one daily expects to learn that the Elder Pliny discovered it, and theories have already been devised to show that it does not work—but they are very live issues, on which the authors, like everyone else in the field, hold strong views. The beginner who may be inclined to take this text as gospel should be aware that there are disputable statements on almost every page and that there are more viewpoints and approaches to FIA than are represented here. H. Mottola, E. Pungor and K. K. Stewart, in particular, may feel that their work is not given the attention it deserves. These are matters of spirited controversy, and the imbalance arises because the authors have written the book from the forward trenches rather than at H.Q.

It is unfortunate that the expertise of the authors has not been matched by the Editors. Rarely can a book in such a major series have been so carelessly edited. It would have helped the reader, especially the beginner, to have had the chapter on "Theoretical Aspects" placed at the end when topics of current interest are discussed. As it is, following on a chapter on "Principles," which contains a very useful and adequate account of the theoretical basis of the method, it confuses. Throughout, the reader is irritated by imprecise definitions and loose statements, which should have been picked up by any half-awake Editor. These defects mar a text in which the individuality, enthusiasms and expertise of the authors stimulate the reader, in a way that is not common with standard works. They can be taken care of in the next edition of what is sure to become a standard text.

D. BETTERIDGE

ANALYTICAL CHEMISTRY OF POLYCYCLIC AROMATIC COMPOUNDS. By MILTON L. LEE, MILOS V. NOVOTNY and KEITH D. BARTLE. Pp. xii + 462. Academic Press. 1981. Price \$60. ISBN 0 12 440840 0.

Recent interest and concern over environmental health hazards associated with carcinogens has focused attention on the products produced by the combustion of fossil fuels. Polycyclic aromatic hydrocarbons (PAHs) comprise one of the largest groups of chemical carcinogens known today, which has stimulated developments in analytical methodology to determine the levels of individual compounds present in the environment. Although there is now an extensive literature on this subject, this book is one of the few to concentrate on analytical aspects.

The first three chapters contain background information on the physical and chemical properties of PAHs and their occurrence, toxicology and metabolism. Nomenclature is at present confused as

a result of IUPAC attempts at systematisation, so that a summary of the rules together with four appendices listing the structures and names of PAHs and their heterocyclic analogues provide a useful reference. Some solubility data in water are also presented. Sources of PAHs and their distribution throughout the environment are discussed, mainly by citation of recent reviews, although more detailed attention is paid to tobacco smoke and airborne particulates. Metabolism and interaction with nucleic acids and other cellular constituents are described and an appendix lists the carcinogenic activity of the major compounds of interest.

The analytical section of the book (285 pages) covers the sampling, extraction, concentration, clean-up and detection of PAH compounds. Chromatographic and spectroscopic techniques are discussed in depth. Detailed methodology is described only diagrammatically and by reference to the original paper.

The advantages and disadvantages of competing and complementary techniques are reviewed. Obviously, the inclusion of column and paper separations is for historical completeness, as modern methods are now based on GLC and HPLC. Detectors and ancillary techniques are also included.

This book provides a useful and comprehensive reference to analytical methods for PAH compounds. Although it gives little guidance to the uninitiated, leaving the analyst to make his own selection, this is perhaps inevitable in a field containing so many compounds of interest in widely differing matrices. The current state of knowledge permits few incontrovertible statements. However, this volume does provide a sound basis on which the analyst can make his own judgement. Each chapter is complete with a comprehensive list of literature citations coupled with an extensive and useful subject index. Although slightly expensive, the book is well produced with clear diagrams and tables. The volume is perhaps more suitable for library than personal use.

N. T. CROSBY