

## books

### Mass spectrometry — the Swansea proceedings

*Advances in Mass Spectrometry 1985, Parts A & B, edited by J. F. J. Todd, Wiley, 1986. £ 195.00 (1661 pages) ISBN 0-471-90831-2*

Advances in Mass Spectrometry, Vol. 10, presents the proceedings of the Tenth International Mass Spectrometry Conference, held at Swansea in September 1985. This series is an informative collection of articles on mass spectrometric research in the preceding years. The volume consists of two books. Part A (565 pp) contains the text of the 5 plenary and 26 keynote lectures from leading scientists in the various fields, while part B (1096 pp) contains all the other oral and poster presentations.

Part B has been divided into 14 sections: liquid chromatography-mass spectrometry, gas chromatography-mass spectrometry, ion structures and mechanisms, instrumentation and novel techniques, laser-induced ionization and excitation, high-temperature studies and inorganic analysis, isotopic measurements, cluster ions, physical and theoretical, data processing, biomedical applications, pyrolysis mass spectrometry, new spectra, tandem mass spectrometry and desorption ionization. The contributions are limited to a maximum size of 2 pages and their quality varies considerably. Some authors have managed to formulate their findings well in spite of the limited space, whilst others have restricted themselves mainly to references. In some of these contributions the authors have tried to cram in so much information that the figures have become too small for normal reading. The list of the contents of part B given in part A does not completely agree with that given in part B. Quite a number of contributions from the section tandem mass spectrometry have been removed to the category new spectra, a section which can be considered as a compi-

lation of material that is not easily classified. Fortunately the elaborate subject index allows the user to easily find his subject of interest or at least some useful references.

Part A contains reviews on the subjects mentioned above. The contribution of E. C. Horning on the applications of mass spectrometry in biology, pharmacology and medicine is an incomplete historical review of instrumentation and methods applied in this field. Mechanistic aspects of organic mass spectrometry are reviewed by H. Schwarz in an elegant contribution that focuses on the relationship between keto- and enol-type ions. J. C. Lorquet et al. discuss the impressive developments in the more fundamental aspects of gas phase ion chemistry in case studies of  $\text{H}_2\text{CO}^+$  and  $\text{CH}_3\text{ONO}^+$ . J. F. J. Todd reviews the instrumentation. I particularly enjoyed his clearly written and well illustrated section on ion transport methods in sector

and hybrid instruments. Clusters and macromolecules is the topic of a fine contribution by P. J. Derrick where, for instance, the occurrence of 'magic numbers' in the mass spectra of inert gas clusters is explained.

The 26 keynote lectures in section 2 are generally well written articles which I think would be of benefit to both beginning and more experienced mass spectrometrists.

In conclusion, I found Vol. 10 of Advances in Mass Spectrometry to be a very useful book to get up-to-date information on the impressive developments in various aspects of mass spectrometry, though Part B is best considered as a compilation of 515 abstracts with useful information and reference data.

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### A scholarly reference book

*Electroanalysis — Theory and Applications in Aqueous and Non-aqueous Media and in Automated Chemical Control, by E. A. M. F. Dahmen, Elsevier, 1986. Dfl. 375.00 (US\$ 166.75) (xvi + 384 pages) ISBN 0-444-42534-9*

The author justifies the writing and publication of a book on electroanalysis by stating that there are few up-to-date comprehensive textbooks on this subject. Although this observation is correct, he has himself omitted from the bibliography to the introductory chapter at least one recent book which deserves inclusion (Plambeck, 1982).

The book consists of three parts. Part A comprises 220 pages and pres-

ents a systematic treatment of electroanalytical techniques. Part B, consisting of about 70 pages, deals with electroanalysis in non-aqueous solutions and part C is supposed to give an account of electroanalysis in automated chemical control.

The major part of the book, part A, gives a good insight into electroanalytical techniques and the underlying theoretical aspects. The text is well written but despite its length the majority of techniques are discussed only in a rather condensed way. This is mainly due to the fact that the author has not clearly differentiated between important and less important techniques. Even completely obsolete techniques have been included. For this reason it will be very difficult for the newcomer in the field to find

out which sections are of real practical importance in modern electro-analytical chemistry and which sections are of historical interest only. Some examples of obsolete techniques are oscillographic polarography, polarovoltroly and graphical endpoint determination by means of the 'rings' method.

Such an exposition, in which the state-of-the-art aspects are not highlighted, makes the text less digestible than it might otherwise have been and makes it very difficult to do some selective reading. The reader is obliged to go through the complete text. Some minor points of criticism can be made regarding three of the figures: Fig. 3.15b p. 117, the rising part of the peaks should be convex instead of concave; Fig. 3.17b and c p. 122, it is suggested incorrectly that the negative charge on the mercury drop is homogeneously distributed throughout the whole interior; Fig. 3.25 p. 131, polarographic maxima of the 1st kind exhibit a more peak-shaped character: the rising part being linear, almost up to the maximum, followed by a vertical drop to the limiting current.

From the discussion in part B it is

evident that the author has a broad experience in the field of non-aqueous solutions. It is a very readable account of the subject.

The title of part C might give the impression that the content deals with process analytical chemistry. It is true that the introductory section discusses general aspects of process control and optimum sampling frequency but the major part gives an account of automated chemical procedures to be used inside the laboratory. Only in the last three pages some information is given about plant control and environmental control.

The overall conclusion is that the author has presented a scholarly reference book on electroanalytical techniques that will be appreciated best by those who have already some experience in the field. At US\$ 166.75, the price of the book is certainly high.

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## Indispensable tool for ESR specialists

*Electron Spin Resonance, Vol. 10A, by M.C.R. Symons (senior reporter), Royal Society of Chemistry, 1986, £ 59.50/US \$ 107.00 (x + 199 pages) ISBN 0-85186-841-X*

This review begins with a chapter on organic radicals in solution, dealing mostly with radical cations. Indeed, during the period covered by this book there has been growing interest in radical cations formed by Y-radiolysis in rigid solutions. The first experimental evidence for a  $C_{2v}$  ground state for the  $\dot{C}H_4$  species is reported. Also the results concerning the radical cations of vinyl monomers of the general form  $CH_2 = CR_1R_2$  are recalled because of their possible role in some cationic polymerizations. Since the radical cations of electron

donors can play an important role in the conductivity of organic metals, the most important results of some recent studies are also reviewed.

The second chapter deals with organic radicals in solids, mostly with spectroscopic aspects of charged and neutral radicals. There are descriptions of mechanistic studies of some reactions, such as the one describing the cycloaddition reaction of dimethylacetylene in fluoro-chlorinated matrices. The fact that reactions of the cation radicals of deuterated methyl and ethyl formates reveal isotope effects is emphasized again. The geometrical characteristics of some reactions in crystals are clarified.

The third chapter of the book concerns triplet and biradical species, particularly photoexcited triplets and their uses in biomolecules.

One of the most interesting parts of the book is the fourth chapter, on the applications of ESR in polymer chemistry. Polymer degradation is the first important subsection. Ionizing radiation covers several areas of special interest, since electron beam and X-ray microlithography are becoming important in the manufacture of integrated circuits of submicronic size. Also, satellites are subjected to high photo radiation intensities, and studies are under way to find out how to protect polymeric materials against degradation. There is also a growing interest in sterilization. Polyolefins, fluorinated polymers, vinyl polymers, polyamides and cellulose are reviewed. One of the most interesting findings quoted by the review is the fact that OH radicals are probably the major intermediates in the Y-radiolysis of polysaccharides. ESR has proved to be useful in fundamental studies on the high radiation sensitivity of the halogenated aromatic polymers such as poly(*p*-chlorostyrene). Photodegradation and mechano-chemical degradation really deserved a special section. In the field of mechano-chemical degradation, the fact that about 40% of chain cleavages by mechanical fracture in polypropylene occur by heterolytic scission is one of the major, and surprising, discoveries. It appears from the bibliography that the initiation of radical polyaddition is still a matter of investigation, and that quenching or trapping is almost the only technique suitable for determining the nature or structure of an active species. Quite logically, solid state polymerization is described in more detail, since it allows accurate studies to be made of the intermediates. The technique using spin probes and spin labels is in widespread use in the study of polymer structures. The text goes over the studies of polyolefins, vinyl polymers, polyethers, polyesters and various copolymers. Organic polymers containing paramagnetic species in their side chain can be used as conducting resins, redox polymers or antioxidants. In this context the synthesis of a polyacrylic resin containing tetraphenylporphin side groups is extremely interesting since the intro-