



BOOK REVIEWS

Encyclopedia of Chemical Technology: 4th Edition Volume 9: Elastomers, Polystyrene to Expert Systems: J. I. KROSCSWITZ and M. HOWE-GRANT (editors), Wiley, New York. 1994. Pages xxviii + 1112. £185.00. ISBN 0-471-52677-0.

A total of 74 authors, based in either the U.S. or Denmark, have contributed to this latest volume in the 4th edition of the encyclopedia. The contents page lists 43 separate entries ranging from Elastomers (continued from Volume 8) to Expert Systems.

The topic dealt with in most detail here is Enzymes and there are three separate entries for this subject: Enzyme Applications (industrial and therapeutic), Enzyme Inhibitors and Enzymes in Organic Synthesis. Apart from reference to general texts on enzymes over 600 references are quoted in this interesting and informative section.

Topics where chemistry and electricity overlap are also well covered. For example there are sections on Electrical Connectors, Electrically Conductive Polymers, Electroanalytical Techniques, Electrochemical Processing, Electroless Plating, Electrophotography, Electroplating and Electroseparations. The somewhat brief entry on Electroanalytical Techniques (22 pages) covers active techniques, passive techniques and static and dynamic measurements. Electronic Materials and Electronics, Coatings are also presented.

Specific chemicals or chemical classifications encompass Epinephrine (adrenaline) and Norepinephrine, Epoxy Resins, Esterification (e.g., batch processes for methyl, ethyl and *n*-butyl acetate), Esters, Ethanol, Ethers, Ethylene and Ethylene Oxide. The batch process Evaporation is also covered.

There is a one page entry on Environmental Impact which details the coverage of environmental issues in the many volumes of the Encyclopedia. It is evident that many articles include such issues and examples in volume 9 are Exhaust Control, Automotive and Exhaust Control, Industrial.

Other topics that complete this volume are Embedding, Emulsions, Enamels (Porcelain or Vitreous), Energy Management, Engineering (Chemical Data Correlation), Engineering Plastics and Expectorants (together with Antitussives and Related Agents).

The expected high standard of these volumes is maintained with this latest offering and the contributors and editors are to be congratulated on their continuing efforts to produce a major work for chemical practitioners.

P. J. COX

Handbook on Metals in Clinical and Analytical Chemistry: H. G. SEILER, A. SIGEL and H. SIGEL (editors), Dekker, New York, 1993. Pages: xx + 753. \$195.00. ISBN 0-8247-9094-4.

A total of 80 authors from all over the world have contributed to this multi-authored text and although individual styles are apparent the editors have very successfully combined all the contributions into the 58 chapters of the book. The overall aim is to summarize current knowledge on the role of metal ions in clinical chemistry—the exposure of humans to metals, metabolism, and the various analytical methods used to determine metals in biological matrices. The chemical symbols of the 61 metals and metalloids covered are shown occupying the periodic table on the cover of the book.

The handbook can be considered in two parts with part one consisting of an introduction, a general survey of the role of metals in clinical chemistry, various analytical methods, sampling and quality control and assurance. Here there are short chapters on spectrophotometry, AAS, ISE, voltammetry, ion chromatography, GS-MS, ICP-AES and ICP-MS, and neutron activation analysis and γ -ray spectrometry. These chapters are general surveys of available methods, for example, the chapter on AAS (22 pages) consists of introduction, flame AAS, electrothermal AAS, chemical vapour generation AAS, preconcentration and separation. The chapter on ISE (7 pages) is rather short. Part one also contains a chapter on the determination of metals in human hair.

Part two of the handbook contains 43 chapters on individual metals. The six platinum-group metals are treated together in one chapter and the lanthanides, with the exception of gadolinium which is dealt with separately, are also covered together. In general, the organisation of the chapters on the individual metals is: Chemistry, Distribution and technical uses, Physiology, Analytical determination, Abbreviations (where appropriate) and References. There is a vast amount of information presented which makes this book a major reference work. On the whole the analytical determinations—with the emphasis on AAS—are mentioned succinctly but numerous references (over 3500 throughout the book) to the primary literature are given. A flaw in reading the text was an unfinished sentence in the chapter on beryllium (page 259).

Some interesting points from the book related to clinical chemistry include: the use of Ba salts as contrast agents in radiology due to their high densities, some non-toxic forms of arsenic (including its elementary form), organotin complexes as antitumor agents, ^{99m}Tc as the most widely used isotope in diagnostic nuclear medicine, the uses of Pt complexes in cancer therapy, and the use of Li in the treatment of affective disorders (e.g., manic depression).

Although it would be possible to expand almost every chapter in the handbook and produce a book from each (indeed Dekker produce a series of volumes in the Metal Ions in Biological Systems series) the extensive information offered in the one text is very welcomed. A related text by the same editors is: *Handbook of Toxicity of Inorganic Compounds*.

P. J. Cox

Introduction to Modern Vibrational Spectroscopy: M. DIEM, Wiley, New York, 1993. Pages: xiii + 285. £49.50. ISBN 0-471-59584-5.

Despite the title, this book is aimed at those taking an advanced course on vibrational spectroscopy, which for most universities nowadays would be given at graduate rather than undergraduate level. Although some truly introductory topics such as elementary group theory and quantum mechanics are covered, they are put in for the purpose of revision of concepts which should be already familiar to the reader. Though much basic knowledge is assumed, a book at this level does seem to be lacking. This book certainly has the potential for filling this gap.

After a brief introductory chapter, the next two chapters cover elementary quantum mechanics and the theory of vibrational and rotational spectroscopy. The coverage of introductory material in Chapters 1–4 is probably about right. Chapter 3 covers normal coordinate analysis, including the traditional force fields (Generalised Valence and Urey-Bradley), and also mentions the tremendous potential offered by *ab initio* calculations. This chapter has a reference list for further reading, but the author omits to mention some British books which are very useful in this area, in particular L.A. Woodward's *Introduction to the Theory of Molecular Vibrations and Vibrational Spectroscopy* (OUP) and P. Gans' *Vibrating Molecules*. Both of these are strong on the use of normal coordinate analysis, and Gans' book in particular is useful for the computational aspects.

Group theory is somewhat rapidly covered in Chapter 4; for those requiring a step-by-step approach we would recommend Kettle's book, *Symmetry and Structure*. Raman spectroscopy is covered in Chapter 5, and here there is some problem with balance. SERS and FT-Raman, for example, each merit only one page of discussion. This chapter also discusses detailed apparatus for the non-linear techniques, which seems out of place before the basic instrumentation is discussed in Chapter 6. Several small molecule 'case studies' are presented in the next chapter, possibly the most valuable chapter in the book from the point of view of the newcomer to the detailed interpretation of spectra and normal coordinate analysis.

In a book such as this it is probably impossible or unsatisfactory to cover the multitude of applications of vibrational spectroscopy. So do not be too shocked to find that, for example, the applications to polymers and catalysts receive no mention. Instead, the author chooses to concentrate on his research interests in the 'biophysical' applications of vibrational spectroscopy. The molecules discussed include peptides, DNA and lipids; there is also limited coverage of the Resonance Raman of haems and carotenoid proteins. This chapter is very successful, and will be extremely useful for those research groups working in the area. It seems likely that these techniques can usefully complement the new powerful NMR methods of protein structure analysis. This is followed by a chapter on vibrational circular dichroism, also of interest in peptide spectroscopy. The technique has not yet gained popularity, since it requires highly specialised apparatus. The reader is brought right up to date in the area, but inevitably the book ends rather abruptly on an indecisive note, involving a discussion of interpretation.

Sadly, the book is littered with typographical errors, including unfortunate errors in many of the equations. There are also errors in the treatment of various topics: for example, on page 102 the OH asymmetric stretch is incorrectly derived as B_1 , rather than B_2 . Here, as elsewhere, the greater use of diagrams would have helped to get over concepts and illustrate the applications. Also the style is irritating in parts; for example, three consecutive sentences occur each beginning with 'however'. Such problems should have been discovered during preparation, but the author should be encouraged to prepare a revised edition.

J. A. CRAYSTON and A. P. TAYLOR

Chemical Thermodynamics for Earth Scientists: P. FLETCHER, Longman, Harlow, 1993. Pages xv + 464. £24.99. Softback. ISBN 0-582-06435-X.

This is a well written and nicely structured book which provides an excellent coverage of thermodynamics and its applications. As is usual of books of this type, definitions of basic terms and brief examples of straightforward concepts (such as equilibrium and the phase rule) are provided in the early stages to encourage the reader. More detailed arguments are developed later but unlike many thermodynamic texts, it is possible to explore topics in later sections without having to constantly refer back to preceding chapters for essential derivations. Another positive feature of the author's style is the use of explanatory 'boxes', often for more detailed mathematical treatments. This allows the reader to follow a principle in the main text without being diverted by rigorous mathematical proofs.

The book begins with short introductions to system properties, bonding, solids and aqueous solutions. Ion interactions in solution are nicely dealt with in Chapter 4 as are the P-V-T properties of gases (Chapter 5). However, the early introductory chapter on redox reactions is short and might be better placed as part of the later chapter (Chapter 17) on electrochemical systems and redox. The fundamental topics, energy, thermodynamic equilibrium, thermodynamic laws and the excess functions due to mixing are described in Chapters 7 to 10. The section on phase transitions and phase equilibria provides a thermodynamic interpretation of phase diagrams for azeotropic systems leading into a treatment of ternary diagrams. There is a comprehensive section on the properties of liquid water (Chapter 13) and on the thermodynamic properties of aqueous electrolytes and non-ideality (Chapter 14).