

effects of catalyst composition and pretreatment on the product distribution in HDS, hydrodenitrogenation and hydrodeoxygenation reactions.

HDS can also be carried out with soluble metal complexes, this being explored in some of the early chapters. Angelici discusses the coordination chemistry of thiophenes and its relevance to the HDS reaction while Bianchini and Meli first look at hydrogenation and hydrogenolysis of unsaturated organosulphurs before considering desulphurization reactions. Hydrogen is a key component of HDS processes and molecular hydrogen complexes have been postulated to be important intermediates in HDS by soluble complexes, an area nicely described in a chapter by Morris. Finally in this section, Kaim *et al.* look at the phenomenon of charge transfer in a number of heterobi- and tri-metallic complexes which are held together by bridging sulphide ligands.

The last chapter, by Gosselink from Shell, takes a very industrially oriented look at metal sulphides in the context of refinery processes and is extremely useful in providing an industrial perspective in which to frame the work discussed in the earlier chapters.

For those in the area of metal sulphide chemistry or for those wanting an entry point to this field, the book has much to commend it, although at £99 for 364 pages it cannot be described as good value.

DUNCAN W. BRUCE
University of Exeter, UK

Liquid Chromatography–Mass Spectrometry

W. M. A. Niessen

2nd edn, Marcel Dekker, New York, 1999

viii + 634 pages. US\$195

ISBN 0-8247-1936-0

This second edition (634 pages, 18 chapters) represents Volume 79 of a vast series of monographs devoted to the many aspects of chromatography. The combination of liquid chromatography with one or another type of mass spectrometer as the detector/analyser system has undergone dramatic changes in the past 10 years and commercial instruments are now largely computer-controlled. The LC–MS combination undoubtedly represents the most versatile, sensitive and reliable technique for identifying low-volatility components of complex mixtures; electrospray and atmospheric-pressure chemical ionization are now the major interfaces.

After three introductory chapters, a further eight are devoted to the technology involved in combining liquid chromatography with mass spectrometry as the detector system. This is followed by five chapters on environmental, biochemical, pharmaceutical and other areas of interest. The final two chapters are concerned with

related techniques. The extensive lists of references included for each chapter will be invaluable to any specialist in the field; most references are post-1983, and there is a short but useful section on library searching.

There are, however, many criticisms of the way material is presented and there are many errors. It would have been helpful to a non-specialist reader if the many abbreviations (such as APCI, TIC, CAMM) had been listed and defined in a glossary. It would also have been helpful if the book had included a summary of the commercial instrument manufacturers and the current costs.

Some of the descriptive parts are oddly worded: for example, fragmentation of M^+ , formed by electron impact, is described as obscuring the molecular ion (p. 34), and the need to vaporize a molecule for electron impact study is referred to as a disadvantage rather than a limitation of the method (p. 33). It would have been better if structural formulae had been numbered (X, XI etc.) and referred to as such in the text. Sections of the text would have been more readable and understandable if structural formulae had been included for specific compounds that are named and discussed, e.g. the alkaloid ajmalicine, on p. 467. A number of the structural formulae that are included have grotesque errors, often with two- or three-coordinate C and two-coordinate N (e.g. pp. 375, 425, 431, 432, 484). Grammatical errors and the erroneous use of words abound and it is also unfortunate that spelling errors in the text have been incorporated in the index. On p. 42, Eqn 2.15 does not include a term for the velocity of the ion, and on p. 539 we are told that fullerenes such as C_{60} are not detected by proton NMR!

Even with the criticisms mentioned above, this volume undoubtedly updates information in an important technological area and will therefore be of considerable use to the many specialists.

FRANK GLOCKLING
University of Oxford

Catalysis by Di- and Polynuclear Metal Cluster Complexes

R. D. Adams and F. A. Cotton (eds)

Wiley-VCH, New York, 1998

x + 555 pages. £100.

ISBN 0-471-23930-5

This is a good, very much needed book which discusses an area very much at the forefront of modern inorganic chemistry. The authors are experts in the area and their expertise shows. This is a well considered text and embraces most of the current work and views on catalysis by di- and poly-nuclear metal cluster complexes. Themes range from concepts and models for characterizing homogeneous reactions catalysed by transition-metal

clusters (Rosenberg and Laine) to metal cluster catalysts dispersed on solid supports. There is plenty here for those of us involved in either catalysis or clusters, or both.

As is always the case in volumes of this sort, there is some overlap and a range of styles but the information is there for those involved in both research and teaching. Much, of course, is highly speculative, and there's nothing wrong with that! There are no serious omissions and there is the odd bonus. Certainly, the chapter devoted to catalysis by colloids (Lewis) is very welcome.

Overall, a good, useful book which will be of benefit to both researchers and teachers.

B. F. G. JOHNSON
University of Cambridge, UK

Metallized Plastic—Fundamentals and Applications

K. L. Mittal (ed.)

Marcel Dekker, New York, 1998

xiv + 372 pages. US\$175

ISBN 0-8247-9925-9

The word 'fundamentals' in the subtitle of this book hints at accessibility to the beginner. But some disappointment may be forgiven when it becomes apparent that there is no lucid introduction to a set of unifying principles, and no stepwise revelation of the implications of those principles; in fact the contents are recently updated versions of 28 papers, delivered to a symposium in 1993, involving about 84 contributors. The plain fact is that very few symposia are dedicated to covering the fundamentals of any subject at all, and few collections of papers presented at conferences are anywhere near as accessible to the beginner as single-author books.

So I conclude that this book is not for beginners. It is actually for those already active in metallized plastics. There must be many industrial scientists engaged in this field. It is part of a much wider trend to the greater use of various different materials in juxtaposition. No longer do we simply have metals competing with plastics, we combine them to achieve more than either one could achieve by itself. Other examples of combining materials are metal-matrix fibre composites, plastics filled with minerals or silver-coated glass microspheres, aluminium/resin laminates, and syntactic foams.

The papers are well written and authoritative and have been grouped in three categories. The first deals with metallization techniques, such as vapour-phase metallization of plastics, selective metallization of optically variable devices, and the solid-phase dispersion of ultrafine metal particles, which have different properties from those of bulk metals, into a polymer by thermal relaxation. One interesting paper discusses the diffusion of noble metals and other metals at high temperatures into polyimide film. Any attempt to accelerate the

process rapidly results in a traffic jam, but low deposition rates enable many single atoms to diffuse into the bulk resin. Their progress can be mapped using radiotracer techniques.

Another paper describes the introduction of silver atoms into aramid fibres and films by exposing the aramid to solutions which are later chemically reduced to silver. This procedure is followed by electroless plating.

The other two sections are slightly shorter than the first. One deals with interfacial interactions and the other with the modification of plastics surfaces. The 'interfacial' papers tend to deal with fundamental aspects, but there is also one on the computer simulation of dielectric relaxation at metal-insulator interfaces. The final (modification) section discusses practical topics such as the adhesion of metals to fluorocarbon polymers, the surface modification of polymers by plasma and ion bombardment, and fracture mechanisms of thin metallized plastics. This last paper focuses on the measurement of the fracture energy between a thin metal film and a polyimide substrate. A non-linear approach was used because linear elastic fracture methods give an inequality in the energy balance concepts.

This book can certainly be recommended to industrial libraries where companies are active in the field of metallized plastics, and some postgraduate scientists in universities will undoubtedly find one or two topics relevant to their work, but the general reader may prefer a different format.

Each paper has a few references. The page layout is uniform and pleasing. As is customary with research papers, there are many graphs and other figures. There is a reasonable index.

GEOFFREY PRITCHARD
Kingston University, UK

Handbook of HPLC

E. Katz, R. Eksteen, P. Schoenmakers and N. Miller (eds)

Marcel Dekker, New York, 1998

xi + 1008 pages. US\$225

ISBN 0-8247-9444-3

There are many books available on HPLC, mainly in the form of specialized texts covering either theory or specific application areas. This book, however, provides a comprehensive overview of HPLC fundamentals, techniques, instrumentation and applications in one volume. The book is split into four sections to reflect the above areas, each section comprising a number of chapters by contributing authors. Each of the 29 chapters tends to be complementary and there is very little overlap for a book of this size. The chapters also contain extensive reference lists and a good number of useful tables, and figures.