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Book reviews

Metal Ions in Biological Systems, Volume 21: Applications of Nuclear Magnetic Resonance to Paramagnetic Species; edited by Helmut Sigel. Marcel Dekker, Inc. New York. 1987, 328 pages, US $89.75 (U.S.A. and Canada), U.S. $107.50 (elsewhere), ISBN 0-8247-7592-9

Volume 21 of the series Metal Ions in Biological Systems is devoted to proton NMR studies of paramagnetic biological systems. The importantce of NMR over wide areas of research has been increasing rapidly in recent years, and the technique is now quite widely used in structural studies of metalloenzymes. While there are many books on biological applications of NMR, this is the only one with which the reviewer is familiar that is devoted to this important part of the field. The book consists of six chapters each by a different author, and succeeds in covering the field in considerable depth. Each of the chapters is of excellent quality, making the book a particularly valuable one.

The first chapter, by Navon and Valensin, is on nuclear relaxation times as a source of structural information, and deals with the now classical technique of "mapping" enzyme active sites by the use of paramagnetic probes, such as manganese ions. It also goes on, outside the field of metal ions, to describe the use of nitroxide spin labels to study for instance the extent to which residues are "buried" in proteins and the investigations of antibody binding sites by the use of nitroxide spin labelled haptens.

The chapter by Bertini et al. presents a general discussion of nuclear and electron relaxation in relation to bioinorganic systems, and of how these properties may be best exploited in future research in this area. Que and Marony discuss NMR of magnetically coupled systems in metalloproteins. They emphasise results obtained, not only on two-iron ferredoxins, but also on the two-iron systems with bridging oxygen ligands that occur in a number of proteins such as hemerythrin, ribonucleotide reductase, and uteroferrin. Another chapter, by Satterlee, is concerned with haem proteins. This is an extensive field, and while the author says he does no more than illustrate the highlights, he is to be congratulated on a remarkably concise coverage of a great deal of work. Clayden, Moore, and Williams discuss conformation analysis from dipolar shifts in haem compounds. While this technique has proved valuable with small molecules the authors admit that to date there is a dearth of studies on haemoproteins. However, this may change in due course.

The final chapter, by Koenig and Brown, relates not to metalloproteins but to the clinical use of NMR imaging, a topic considerable importance, since they state that there are now 200 whole-body imagers in the U.S.A. Contrast in imaging depends on differences in relaxation times of protons in different tissues. The chapter is concerned with the possibilities of using endogenous or exogenous paramagnetic metal ions to influence the relaxation times and hence the contrasts.

It is perhaps well to end on a note of caution. While NMR is by now of the very greatest importance in structural studies of paramagnetic metalloproteins, the authors of several chapters stress that in this field NMR cannot stand by itself, and must always be used in conjunction with information from other spectroscopic studies, or from X-ray crystallography, or both.

School of Chemistry and Molecuar Sciences,
University of Sussex, Brighton, BN1 9QJ (Great Britain)
R.C. BRAY

Organometallic Chemistry, Volume 14. E.W. Abel and F.G.A. Stone (Senior Reporters). The Royal Society of Chemistry, London, £96.00. ISBN 0-851186-621-2, ISSN 0305-0074.

This is the latest volume in the well-known series of annual reviews of the literature of organometallic chemistry. It covers the year 1984, and follows largely the pattern established by that of its preceding volume, both in its organisation and in the manner of its presentation. Thus, the manuscripts are reproduced by a direct photographic process. As pointed out in my review of Volume 13, this inevitably leads to certain inconsistencies between chapters, and also occasionally to errors, which might have been corrected had authors had proofs available to them.

A new author is Dr. M.J. Winter, who writes on complexes containing metal–carbon σ-bonds for the transition elements of groups 3–7, including carbene and carbyne complexes. This contribution replaces a similar one in Volume 13 by Karel and Watson. The chapter on compounds of biological interest, by B. Ridge, which appeared in Volume 13, has no counterpart in the present text.

The presentation of formulae and reaction diagrams is clear but, in several instances, space for this purpose is used uneconomically. For example, p.34 contains just five relatively simple formulae of complexes having either a 5- or a 6-membered ring.

Readers will be familiar with some of the limitations of this undertaking which follow from the need to present the whole of a year's organometallic chemistry in approximately 500 pages. As an illustration of the concentration of material, one might refer to Chapter 6 by D.A. Armitage where, for the silicon group, there are 1010 references and the material is covered in 35 pages (excluding the bibliography).

Chapter 16, once again, has a very useful compilation of structures of organometallic compounds, as determined by diffraction methods, by D.R. Russell. This includes results on 1565 compounds, stemming from 1207 references. The most frequently occurring element is silicon (181 compounds), with Fe (173), Rh (133), W (125), and Ru (111) as the next most studied.

Undoubtedly, the present volume will be much used. It is unfortunate that not even an Author Index is provided.

School of Chemistry & Molecular Sciences,
University of Sussex, Brighton, BN1 9QJ (Great Britain)
MICHAEL F. LAPPERT