

One final point is, perhaps, worth making. In the foreword to these volumes, the editor (Rudolf Warnke) stresses that the First Supplement of the Formula Index was compiled and printed "with extensive use of computers". It would be worth the Gmelin Institute and Springer-Verlag considering that, in 1987, most chemists possess an IBM (or IBM compatible) microcomputer (or have easy access to one). I would have thought that an index of this size and complexity would be ideally suited to a database format, and could be issued and sold on floppy disc, vastly enhancing its usefulness and enabling chemists with specialized interests to compile their own personalized index to the Handbook. I certainly hope that some consideration will be given to this suggestion—if the index is already computerized, producing such a database should be relatively easy. This would be a rather different exercise to the recently announced Gmelin Formula Index Database (GFI), which appears to be for on-line access only.

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Metal Ions in Biological Systems, Volume 22. ENDOR, EPR, and Electron Spin Echo for Probing Coordination Spheres; Edited by Helmut Sigel. 1987. 328 pages, bound, illustrated. \$89.75 (U.S. and Canada); \$107.50 (All other countries).

This is an interesting book, covering a range of specialised techniques within the broad area of physical studies of metalloenzyme structure and functioning. The techniques discussed generally involve investigations of relatively weak hyperfine interactions of ligands with the central metal atom. There are five chapters, of which two are short and three longer.

Hüttermann and Kappl review the ENDOR technique. Around a thousand-fold better resolution of hyperfine couplings, than that obtainable with EPR, is available when using ENDOR. Coupling from ligand nuclei and neighbouring atoms up to 6 Å from the metal atom are frequently detectable by ENDOR. Sensitivity, however, is lower than that of EPR. Theory, instrumentation and techniques are reviewed, but the chapter is mainly concerned with results, with emphasis on copper and haem systems. ENDOR can now be considered a well-established technique in this area of research and its use is expanding. A limitation, however, is that satisfactory procedures for computer simulation of ENDOR spectra as an aid to their interpretation, have yet to be developed.

A brief chapter by Kalbitzer is highly specialised, describing effects of ^{17}O on the EPR spectra of manganese complexes of nucleotides bound to proteins, in which the isotope is specifically incorporated into the phosphate groups of the nucleotide. Manganese here replaces the magnesium which functions *in vivo*. Examination of the broadening of the EPR spectra makes it possible to find which of the oxygens coordinate to the metal.

A further brief and specialised chapter by Gampp, discusses use of EPR for studies of solution equilibria, in the case where complexed and free paramagnetic species have different EPR spectra. Computing procedures, where the parent EPR, spectra are not known and where as many as four separate species having overlapping EPR spectra are present are discussed. So far the techniques seem to have been

applied to low molecular weight complexes (e.g. of copper) only. Their future application to enzymes might have exciting possibilities but obviously the anisotropy of the spectra would not make matters easy.

Makinen and Wells discuss in some detail use of saturation studies in EPR. Though data are often difficult to analyse, the field is a particularly interesting one, in so far as it can yield information on distances between metal centres in proteins. In suitable circumstances, investigations of relaxation processes can even in principle provide information on structure and dynamics of protein molecules.

The final chapter by Tsvetkov and Dikanov is on variations of electron spin echo techniques. The theory is fairly extensively discussed, with a shorter section on biological applications giving considerable emphasis to the pioneering work in this field of Mims and Peisach. On the whole, to date, spin echo techniques have been relatively little used in the biological field, so that their true potential remains difficult to assess.

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Small Ring Compounds in Organic Synthesis, Volumes 1 and 2, edited by A. de Meijere (*Topics in Current Chemistry, Volumes 133 and 135*), Springer Verlag, Berlin, 1986 and 1987; Volume 1, vii + 163 pages, DM 124, ISBN 0-387-16307-7, Volume 2, vii + 160 pages, DM 128, ISBN 0-387-16662-9

It is about a hundred years since cyclopropane and cyclobutane were first prepared, but it is only over the last twenty-five years or so that their potential in synthetic organic chemistry has begun to be realised. The first section of Volume 1 by Trost makes the reason for their utility clear; the strain inherent in their structures makes these molecules much more reactive than larger ring analogues. Cyclopropyl anions in the form of lithium or copper derivatives, with particular reference to heteroatom substituted compounds, are discussed in detail. Other topics considered include spiroannulation, vinylcyclobutane rearrangements and secoalkylation, and a wide range of synthetic applications is also described. The chapter is well referenced, into 1984. Volume 1 is completed by a chapter by Wong, Lan and Tam, on the applications of cyclobutane derivatives in organic synthesis. This account is organised according to the routes of ring fission, considering reactions in the presence of acids and bases, nucleophiles and electrophiles, thermal, oxidative and reductive ring openings. The points made are well-illustrated with examples drawn from all areas of synthetic organic chemistry. Again the chapter is well referenced, with the papers cited being published into 1984.

The second volume will probably prove to be more interesting to the organometallic chemist. In the first section Krief discusses the synthesis and synthetic applications of 1-metallo-1-selenocyclopropanes and cyclobutanes, and related 1-metallo-1-silylcyclopropanes. These species are particularly nucleophilic and can be used both to prepare a wide range of functionalised cyclopropanes and cyclobutanes, or to prepare homologues by ring expansion processes. Selenium compounds first became widely used in organic synthesis in the 1970's; from this article it is clear that this continues to be an active and developing field. In the final chapter of