

Book review

TOPICS IN CARBON-13 NMR SPECTROSCOPY, Vol. 3, G.C. Levy, ed., Wiley, New York, 1979, xii + 397 pages, \$35.00

It is indeed unfortunate that the first chapter of this book is not well done, for it is not representative of the remaining chapters. Further, the first section of this chapter is notably inappropriate, and because this is the first contact the reader has with the book, it tends to alienate the reader. On the other hand, the last five chapters are informative and well written.

The book opens with a multi-authored multi-sectioned chapter of experimental techniques that are largely unrelated, except for the sections concerned with probe construction. The first section deals with proton decoupling methods, but only a few of the many techniques are covered, and those that are covered are at least four years old and have been covered in other standard texts. For example, "Interpretation of Carbon-13 NMR Spectra," by Wehrli and Wirthlin is far superior in its treatment of this important subject. The second section deals with sensitivity optimization in terms of probe construction, and is an excellent overview for those building or modifying probes for either iron or superconducting magnets. However, the author of this section has a far more comprehensive treatment in Prog. NMR Spectroscopy 12, 41 (1978). The third section covers the construction of small receiver coils for microsamples. Again, it is intended for those building their own probes. The modification of Varian XL-100 probes for 18-20 mm tubes is described in the next section, which is written in general enough terms to be applicable to other iron magnet systems. A very brief overview of nmr software is presented next, but it is too short to be of much value. The sixth section is an excellent introduction to the extremely important and recently developed technique of two-dimensional Fourier transform (2DFT) spectroscopy. The advantages, disadvantages and limitations are well covered. This is one of the few places that treat this subject so well and so comprehensively. The technique is new, and destined to become very important in the near future. The next section is a very short, but very useful coverage of temperature measurements of samples in probes. The final section is a treatment of new pulsed excitation methods, and is an excellent introduction to this important, specialized technique.

Chapter 2, "Physical Chemical Applications of ^{13}C Spin Relaxation Measurements," is well done, and deals primarily with the mechanisms of relaxation and the use of relaxation times to study molecular motion. It will be useful mainly for physical chemists, and of little value for the typical organic chemist. However, some useful applications of these measurements to the study of polymers is given near the end of this chapter.

Chapter 3 is a 112-page comprehensive literature survey of " ^{13}C NMR of Nonaromatic Heterocyclic Compounds," and contains 362 references. Monocyclic systems from three to eight membered rings are discussed in detail, with one page devoted to larger rings. Polycyclic fused and bridged ring systems are also covered. This chapter is an absolute must for those working in this area.

NMR spectra of solids are becoming increasingly more common, and the importance of Chapter 4, entitled "High Resolution ^{13}C NMR of Solid Polymers," cannot be over-emphasized. It was written by two prolific experts in this field, and begins with an appropriate 23-page introduction to the general technique, including instrumentation. The remaining 17 pages describe applications to solid polymers, mostly of the industrial type. Clear and lucid descriptions, such as this one, are not easily found for this subject.

Chapter 5, "High-Power Double-Resonance Studies of Fibrous Proteins, Proteoglycans, and Model Membranes," logically follows Chapter 4, and gives excellent coverages of elastin, collagen, cartilage, hemoglobin, and model membranes.

The concluding chapter is a well written discussion of the mechanistic applications and kinetic aspects of ^{13}C CIDNP. Particular attention is given in the first part of the chapter to azo compounds, peroxides, and aldehydes and ketones. The second part deals with experimental details.

Organometallic chemists will find Chapter 4 the most useful one, but only if they are working with relatively insoluble materials, with polymers, or with substances that have a special or unique nature when in the solid state. The next most useful topic is the section in the first chapter dealing with 2DFT. This technique, while time-consuming to implement, can be of great value to all types of chemists. Chapters 2, 3 and 6 would be of secondary importance. Overall, the book is of moderate value to organometallic chemists.