

Book Reviews

Carbon-13 Nuclear Magnetic Resonance Spectroscopy. Second Edition. By G. C. Levy (Florida State University), R. L. Lichter (Hunter College, City University of New York), and G. L. Nelson (General Electric Company). John Wiley and Sons, New York. 1980. xiv + 338 pp. \$22.50.

The first edition of this book appeared in 1972 and, as the authors point out, the routine use of ^{13}C NMR has expanded tremendously since then. This new edition has also been expanded greatly from the original 222 pages. The tables include many new entries, and the discussions of both routine and special applications have grown apace. Excellent reference is made not only to the original literature, but also to other general and special topic texts as well as to the increasing number of spectral collections. The descriptive discussions are clear and easily read, presenting material with sufficient depth and background to develop a solid understanding of ^{13}C NMR. The scattered problems are illustrative, although several are frankly impossible to solve for someone just entering this field.

A comparison of Levy, Lichter, and Nelson's 2nd edition with that of Breitmaier and Voelter's " ^{13}C NMR Spectroscopy" illustrates the relative merits of this book. Both groups of authors have done extensive research in the field, and their expertise is clearly evident in the essentially complete coverage of topics. Both books are approximately the same length, although the content is greater in the latter, which is typeset rather than typed. The differences in the quality of publication that thus results is reflected in price, with the latter costing 2-3 times the former. In general, the former is an excellent introduction while the latter is more of a survey and reference work.

The two books differ in several important respects. When discussing specific functional groups and classes of compounds, Levy, Lichter, and Nelson describe general trends and usually present tables of data only for the group under discussion. Breitmaier and Voelter include chemical shifts, for example, of *all* of the carbons in the compounds described. (In using the 1st edition of the former, I have repeatedly been forced to go to the original literature for additional data.) The compound and subject indices of the latter contain 22 pages compared to 9 for the former. The instructional value of both texts would be greatly enhanced by the inclusion of 50-100 identification problems, perhaps in a companion volume—Breitmaier and Voelter have many illustrative examples but no problems. Levy, Lichter, and Nelson present an excellent chapter on polymers which includes many of the more recent developments involving relaxation studies and NMR of bulk samples. Breitmaier and Voelter only mention polymers in a few scattered references.

The general approaches of these two books seem fundamentally different but complementary. Breitmaier and Voelter have compiled a basic reference text with extensive tables and detailed discussions of fundamentals and behavior. Levy, Lichter, and Nelson present a broader overview of ^{13}C NMR which is easier to assimilate and apply, especially for the novice. I began learning ^{13}C NMR by first studying Levy and Nelson's 1st edition and then going to other texts (e.g., Stother's monograph) and the original literature. I recommend the same approach to my students now with this 2nd edition: read it first and then consult Breitmaier and Voelter's book for a different, often deeper coverage.

Either of these two books will serve well for assigning (most of) the peaks of simple molecules, especially with the increasing availability of spectral collections for comparison. For complex or unique structures, the techniques involving, for example, long-range and off-resonance coupling, relaxation behavior, two-dimensional spectroscopy, and selective decoupling are required. Finally, to apply the full potential of ^{13}C NMR, an understanding is needed of developing areas such as those employing isotopic labeling, dynamic NMR, and solid-state investigations. The sequential or simultaneous use of both books is recommended for developing this awareness, especially in conjunction with actually practicing the techniques.

The increasing number of applications and capabilities of ^{13}C NMR for routine and specialized investigations make it imperative that chemists in all fields develop an awareness of its potential. This 2nd edition of Levy, Lichter, and Nelson's book provides an excellent introduction to the field and is highly recommended for private and public libraries—no active researcher should be without a copy.

Lon J. Mathias, *Auburn University*

Vibrational Spectroscopy of Molecular Liquids and Solids. Edited by S. Bratos and R. M. Pick (Université Pierre et Marie Curie). Plenum Press, New York. 1980. ix + 464 pp. \$49.50.

The subject matter of this book reflects the current trend toward a comparative study of states of aggregation of matter which is being encouraged by improvements in experimental methods and developments in the study of mesophases like plastic crystals. The text constitutes Vol. 56 of the NATO Advanced Study Institute Series B and comprises a collection of lectures presented at the 1979 NATO Summer School on "Vibrational Spectroscopy of Molecular Liquids and Solids" in Menton, France. An elegant discussion of the theory of intermolecular forces by A. D. Buckingham occupies Part I of the book. Parts II and III are devoted to experimental and theoretical spectroscopic studies of molecular dynamics in liquids and solids, respectively. There are altogether 21 papers which are in the original typescripts by contributors. Consequently, the style of presentation (which is generally informal) and frequency of typographic errors vary from one author to another. However, the typographic errors should cause no problem to the experienced reader even in the articles where they are frequently encountered.

Scientists concerned with orientational disordering in crystals will feel well served by Part III. An important feature of this section is the use of symmetry adapted functions in describing correlation orientational distribution functions. Those concerned with liquid crystals will sadly miss a similar coverage. There is a useful substance index at the end of the text.

Chodziwadzwa C. Mjojo, *Chancellor College, University of Malawi*

Progress in Biomass Conversion. Volume 1. Edited by Kyosti V. Sarkanen and David A. Tillman (College of Forest Resources, University of Washington, Seattle, Washington). Academic Press, New York, London, Toronto, Sydney, and San Francisco. 1979. xii + 259 pp. \$16.50.

The emphasis in this collection of articles is on the use of wood for fuel. A survey of United States and European practices for recovering energy from municipal waste is included as well as a discussion of the silvicultural energy farm. The chapters on pyrolysis of wood residues and methanol from wood may be of interest to chemists and chemical engineers. References and an index are included.

M. C. W. Smith, *Ann Arbor, Michigan*

Solid Waste Conversion to Energy: Current European and U.S. Practice. Pollution Engineering and Technology Series. Volume 11. By Harvey Alter (Resources and Environmental Quality Division, Chamber of Commerce of the United States, Washington, D.C.) and J. J. Dunn, Jr. (Black and Veatch Consulting Engineers, Silver Springs, Maryland). Marcel Dekker, Inc., New York and Basel. 1980. vii + 168 pp. \$24.75.

This book should be interesting and useful to anyone concerned with solid waste disposal.

M. C. W. Smith, *Ann Arbor, Michigan*

Topics in Enzyme and Fermentation Biotechnology. Volume 4. Edited by Alan Wiseman (Department of Biochemistry, University of Surrey, Guildford, U.K.). Ellis Horwood Ltd., Chichester. 1980. 242 pp. \$69.95.

Two chapters devoted to medical uses of enzymes will be of particular interest to physicians. Enzymes may be used to replace ones that are missing as in the case of congenital disease. They may remove undesirable substances or deplete a nutrient required specifically by a tumor or cancer. Enzymes used in therapy must be substrate-specific, pure, stable, and not too expensive. They may be delivered in the form of liposomes, microcapsules, or red blood cells that have been emptied and refilled with enzyme. Extensive historical and present medical uses of enzymes are described. Biochemical engineers and biochemists will find useful information in the chapters devoted to solid substrate fermentation, measurement of process variables, and immobilization of microbial cells. References and an index are included.

M. C. W. Smith, *Ann Arbor, Michigan*