

## Book Reviews

**Experimental Pulse NMR: A Nuts and Bolts Approach.** By Eiichi Fukushima and Stephen B. W. Roeder. Addison-Wesley Publishing Co., Inc., Reading MA. 1981. 539 pp. \$34.50.

It seems safe to say that at the present time most research chemists are practicing NMR spectroscopists. It is likewise evident to those involved with NMR service facilities that increasing numbers of biochemists, physiologists, and scientists in other chemically related disciplines are turning to NMR as a standard research tool. Interfacing these users to the NMR literature, which is extensive and highly specialized in its own right, and to the sophisticated commercial instrumentation now available is a challenge which, except in the area of spectral analysis, has not been met in a fully satisfactory way by the writers of previous monographs.

In an effort to bridge this gap, Drs. Fukushima and Roeder have written an extraordinarily useful text which provides broad coverage of both theoretical and instrumental aspects of NMR. The title "Experimental Pulse NMR: A Nuts and Bolts Approach", correctly emphasizes the practical outlook and the thorough coverage given to techniques, instrumentation, Fourier transform methods and hardware. It does not do justice to the two excellent theoretical chapters on relaxation (Chapter 3) and solids (Chapter 4), however. These chapters review, quite informally and in a way that does not require unusual mathematical sophistication on the part of the reader, many conceptually difficult theoretical ideas that underlie less common or emerging applications of NMR. Spin thermodynamics in solids, cross-polarization experiments, and the Hartmann-Hahn condition, the meanings of dipolar and Zeeman order, and the use of autocorrelation functions in relaxation theory are among the subjects covered. Successive topics are organized into stand-alone sections of 1-10 pages, and most sections end with a selected bibliography. Although the coverage is broad and the style informal, the text is by no means superficial; the book conveys a high degree of physical insight at the introductory level.

In the true "nuts and bolts" chapters, the authors discuss NMR hardware and techniques, and their selection of topics will delight all who, at one time or other, have attempted NMR experiments that are not described in the manufacturer's manual of operating instructions. They describe (among many other topics) the construction and tuning of probes, impedance matching, how to estimate S/N and how to remove coherent noise, what to do when the probe arcs, and how to use Fourier transforms intelligently. They also discuss pertinent features to be considered when evaluating commercial spectrometers. The choice of topics is based simply on utility to the NMR spectroscopist. Since doubled balanced mixers, magic tees, and directional couplers are widely used packaged components of NMR systems, their various applications are described. Coverage ranges from the erudite (rotating frame relaxation, 2-D NMR) to the mundane (how to remove dissolved oxygen from samples), but is always interesting, informative, and above all practical.

The format of brief well-referenced sections provides a satisfying introduction to the broad range of topics covered. A book with this outlook and general level of excellence seems overdue, and it is certain to become a standard reference on the shelves of active NMR laboratories everywhere.

**Robert R. Sharp**, *The University of Michigan*

**Steroid Analysis by HPLC: Recent Applications (Chromatographic Science Series. Volume 16).** Edited by Marie P. Kautsky (University of Colorado). Marcel Dekker, Inc., New York. 1981. XII + 424 pp. \$45.00.

The purpose of this volume is to give detailed descriptions by active investigators of selective applications of HPLC for the separation and analysis of steroids and related compounds. The book is designed to assist researchers as a laboratory handbook for the development of HPLC steroid-analysis methods.

HPLC procedures are described by 22 contributors in chapters covering the following topics: bile acids, cardiac glycosides, progestins, adrenocorticosteroids, estrogens, D vitamins, sterol intermediates in cholesterol biosynthesis, steroid hormones in adrenal and testicular cells and tissues, enzymic steroid reactions, separation of steroid epimers, and hormones in food and feeds. For each of these areas there are brief

descriptions of introductory and background material as well as some theoretical discussions. However, the emphasis is on a literature review of experimental methods and reports of procedures being used in the authors' laboratories. Although the book has a 1981 copyright date, for the most part, chapters appear to be completed in 1979 with very few 1980 references. Unfortunately, more authors did not use the approach taken in the chapter on adrenal and testicular hormones and include a literature update.

While the novice in HPLC methodology may have difficulty in using this book, others with even limited prior HPLC experience should find it a practical laboratory guide. The rapid growth in applications of HPLC methods for steroid research is impressive.

**J. E. Sinsheimer**, *The University of Michigan*

**Spirit of Enterprise. The 1981 Rolex Awards.** Edited by Gregory B. Stone. W. H. Freeman and Company, San Francisco. 1981. xx + 460 pp. \$15.95.

Montres Rolex S.A. of Geneva has again sponsored The Rolex Awards for Enterprise competition to encourage outstanding enterprises. This book is composed of descriptions of some of the projects that were submitted to the competition. They are divided into three categories. Applied Sciences and inventions, Exploration and Discovery, and The Environment. Of particular interest to chemists are chapters devoted to dialing chemical reaction equations, finding drought-resistant plants with chemistry, using alcohol for the automobile, and using cotton root herb for a contraceptive.

**M. C. W. Smith**

**Molecular Electro-Optics.** Edited by Sonja Krause (Rensselaer Polytechnic Institute). Plenum Press, New York. 1981. viii + 520 pp. \$59.50.

This volume is a collection of papers presented by the invited lecturers at a NATO Advanced Study Institutes Series on Molecular Electro-Optics held in Troy, New York in July 1980. C. T. O'Konski begins the book with a historical review of the researches into electro-optic phenomena, including a fascinating account of the pioneering work of the Rev. John Kerr, who used candlelight in the observation of the effect that bears his name because his discovery preceded the electric lamp. The bibliography of this chapter is an impressive documentation of the elucidation of the variety of electro-optic phenomena which we know today. A pedagogical introduction to electro-optic phenomena by B. R. Jennings also contributes to the readability of this book and prepares the reader for the formal, yet elegant, exposition by A. D. Buckingham of the measurement and fundamental meanings of the optical parameters of small molecules that may be determined in electro-optic experiments. Quite distinct from this approach are the several chapters that describe the utilization of electro-optic phenomena for the determination of fundamentally hydrodynamic parameters (e.g., rotational diffusion coefficients) of macromolecules, for which both formal theory and experimental applications are presented. Further chapters on detailed aspects of particular electro-optic phenomena include such topics as the theory of the Kerr constant, light scattering in electric fields, wavelength dependence of electric birefringence and dichroism, and polarized fluorescence in an electric field. There is also a useful, though not comprehensive, chapter on electro-optical instrumentation and methodology. The ten or so chapters on specific applications tend to concentrate on biological macromolecules, with two interesting exceptions, one on colloidal stability and the other on liquid crystals.

Professor Krause is to be congratulated for an excellent job of editing these rather disparate contributions and bringing them to a uniform format with tolerably consistent nomenclature and symbols. The extensive index will surely add to the value of this volume as a reference. Any worker in an area involving electro-optics will find some of the chapters of this book to be of interest, though few would be interested in all. This is the sort of book that should be in every library that serves scientists in the related fields.

**B. R. Ware**, *Syracuse University*