showed no decrease in resistivity but a change in color to green and attendant changes in its FTIR spectrum typical of a doped polyene.[16]

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Registry No. *t*-BuC≡CCH=CHC≡CBu-*t*, 102745-35-7; *t*-Bu(C≡CCH=CH)$_2$C≡CBu-*t*, 102745-36-8; *t*-Bu(C≡CCH=CH)$_3$C≡CBu-*t*, 102745-37-9; *t*-Bu(C≡CCH=CH)$_5$C≡CBu-*t*, 102745-38-0; *t*-Bu(C≡CCH=CH)$_7$C≡CBu-*t*, 102745-39-1.

Book Reviews[*]

Solubility Data Series. Volumes 21 and 22. Volume 21: Edited by C. L. Young and P. G. T. Fogg. Volume 22. Edited by T. Mioduski and M. Salomon. Pergamon Press: Oxford and New York. 1985. Volume 21: xvi + 344 pp. $100.00. ISBN 0-08-026177-9. Volume 22: xx + 398 pp. $100.00. ISBN 0-08-030709-4.

In the continuation of this mammoth series of compilations of critically evaluated data on solubilities, Volume 21 reports on ammonia, amines, phosphine, arsine, stibine, silane, germane, and stannane in organic solvents and Volume 22 reports on scandium, yttrium, lanthanum, and lanthanide halides in nonaqueous solvents. Characteristically for the series, not only are numerical data given but much auxiliary information bearing on the reliability of the figures. Source and purity of materials used, and the methods of determination followed, are described, and estimates of errors by the compilers are reported. These volumes will probably remain the last word on the subjects for a long time.

Verzeichnis der Hochschullehrer und Forschungsinstitute für Chemie in der Bundesrepublik Deutschland. By ADUC and GDCh. VCH Verlagsgesellschaft: Weinheim and Deefield Beach, FL. 1985. 350 pp. DM 180.00. ISBN 3-527-26125-7.

The bulk of this book is a listing of chemists in Western Germany, in the style of the "ACS Directory of Graduate Research" and "Chemical Research Faculties, an International Directory". The arrangement is alphabetical according to location, beginning with Aachen. Indexes of individual names and of subject area supplement the main portion. The latter index is especially useful, and the presence of one in the domestic ACS Directory would be a great help to editors. This book differs from the ACS Interntional Directory in having telephone numbers and in listing a few more publications.

Inorganic Chromatographic Analysis. Edited by John C. MacDonald (Fairfield University). John Wiley & Sons: New York. 1985. xiii + 450 pp. $65.00. ISBN 0-471-86263-0.

This book is the latest addition to the prestigious "Chemical Analysis" series of monographs on analytical chemistry and its applications. The book is intended to provide an introduction to modern inorganic chromatographic analyses and to direct the prospective user to the most useful procedures. Throughout the 10 chapters, the knowledge and experience of each contributing author are reflected in a logical and concise treatment. The book is very readable and the references, compiled at the end of each chapter, cover the chemical literature through about 1982.

The book begins with a brief introduction of the different chromatographies, which include adsorption, partition, size exclusion, and ion-exchange chromatography. Chapter 2 discusses the theory of chromatography and factors influencing the distribution of solute molecules between the mobile and stationary phases. Basic instrumentation for gas chromatography and high-performance liquid chromatography are presented in Chapters 3 and 4, respectively. The following three chapters are devoted to separations of inorganic and organometallic compounds using gas chromatography, high-performance liquid chromatography, and thin-layer chromatography. Ion exchange in radiochemistry and ion chromatography are covered in Chapters 8 and 9. The remaining chapter deals with computer online database literature searching and includes examples of computer printouts of literature searches in inorganic chromatography.

This book contains many of the recent advances in inorganic chromatographic analysis. It is a valuable addition to every analytical chemist's library and a useful reference book for a graduate course on chemical separations.

William E. Acree, Jr., *Kent State University*

Chromatography, The State of the Art. Volumes I and II. Edited by H. Kalász and L. S. Ettre. Adadémiai Kiadó: Budapest. 1985. xi + 903 pp. $75.00. Volumes I and II: ISBN 963-05-4081-9.

Proceedings of the Budapest Chromatography Conference, Budapest, Hungary, 1983. In English. Two volumes containing 60 typescript papers by leading chromatographers and biochemists of Eastern Europe and many other countries. Many of the papers report research in biochemistry in which chromatography has played an important part. More than a dozen describe separation of proteins and peptides. Five papers are on separation of amines and amino acids and eight are on drugs and metabolites. Papers on chromatography itself give an interesting picture of the state of the art in Eastern Europe. Eight papers cover GC. Many kinds of column liquid chromatography, including ion, precipitation chromatography, and capillary LC, are reported. There are several advanced applications of thin-layer chromatography, as might be expected, since Hungary is a center for sophisticated overpressure TLC apparatus. Although the range of subjects is very broad, readers with a special interest can scan the subject or author index to find theirs. Titles in the table of contents are also grouped by general category. References to Eastern European literature will be useful to some. These volumes will be valuable additions to chromatography and biochemistry libraries.

J. G. Atwood, *The Perkin-Elmer Corp.*

An Introduction To Macromolecules. By Leo Mandelkern (Florida State University). Springer-Verlag: New York. 1983. xi + 162 pp. $18.90. ISBN 0-387-90796-3 (hardcover); 0-540-90796-3 (paperback).

Polymer chemistry is fast becoming recognized as one of the most important areas of modern chemistry for both its practical considerations (about half of all chemists work in this field) and the biological, medical, and theoretical aspects of this realm of human endeavor. This excellent book by Professor Mandelkern brings some of these important considerations into sharper focus. There are many polymer textbooks available today, but this small book meets an important need. Most polymer texts are aimed at the organic chemistry areas, with almost no consideration of the physical aspects of the macromolecules. Some other texts are geared more toward the engineers, with very little organic chemistry presented. In actual fact, a polymer chemist needs to know much about both aspects concerning macromolecules. Although it is true that there are specialized books available in almost every conceivable area involving macromolecules, most of these are far too detailed for use in an introductory polymer chemistry course. Professor Mandelkern's book makes no attempt to span all these areas but concentrates on an excellent overview of the physical chemistry of polymers and then explains how these molecular properties exert their effect on living systems in the last third of the book. Obviously many details are not covered, but this was not the purpose of the book. In my opinion, this book should be a valuable supplementary text for other polymer books which tend to omit the areas covered. It should also prove useful as an optional text for the basic courses in organic, physical, and biological chemistry.

Charles G. Gebelein, *Youngstown State University*

Free-Electron Lasers. By Thomas C. Marshall (Columbia University). Macmillan Publishing Company: New York. 1985. xii + 191 pp. $24.95. ISBN 0-02-948620-3.

Since the first stimulated-scattering experiments at Stanford only 10 years ago, the conceptual and practical development of the free-electron laser as a powerful source of electromagnetic radiation has been extremely rapid. Within the next few years, chemists will begin to acquire access to these devices for spectroscopic and photochemical research. The optical power and tunability of FELs in the far-infrared and soft X-ray regions is truly unique, while their efficiency and power in the ultraviolet

[*]Unsigned book reviews are by the Book Review Editor.

through the near-infrared is sufficient to merit interest for particular applications.

This first book on FELs begins with an introduction to the theory of stimulated-scattering in the single-electron limit, allowing the reader to develop insight into FEL physics. The author gradually adds to the theory the complexities of space-charge and non-uniform axial electron motion. The last third of the book describes FEL experimentation in considerable detail which gives the reader a perspective on the present accomplishments and remaining technological challenges of this field. The presentation is very readable, despite the theoretical nature of the subject. Spectroscopists with a casual interest in the development of this new light source would find the first and last two chapters entertaining and informative. Those individuals who anticipate having access to an FEL facility in the near future or who are contributing to proposal efforts to establish such a facility would benefit by reading the entire volume.

Joel M. Harris, *University of Utah*

International Tables for Crystallography. Brief Teaching Edition of Volume A. Space-Group Symmetry. Edited by Theo Hahn. D. Reidel Publishing Co.: Dordrecht, Holland. 1985. vii + 119 pp. $8.50. ISBN 90-277-1964-0.

This book is a reprint of about one-seventh of the pages of its parent volume, at less than one-tenth the cost. The sections included in this Teaching Edition cover fundamentals of crystallographic symmetry, space group determination, and a guide to the use of the symmetry tables for the 230 space groups. Tables for 24 instructionally representative space groups are included here. Among the space groups selected are the most commonly encountered ones, thus, in most cases this book could serve as an adequate research reference as well as a teaching tool.

Christer E. Nordman, *University of Michigan*

Advances in Infrared and Raman Spectroscopy. Volume 12. Edited by R. J. H. Clark and R. E. Hester. John Wiley & Sons, Inc.: New York. 1985. xxi + 360 pp. $115.00. ISBN 0-471-90674-3.

This volume, like its predecessors, clearly succeeds in meeting the main objectives of this series, which are to provide up-to-date reviews in fundamental and applied infrared and Raman spectroscopy, especially on subjects of recent and continuing interest.

The first chapter describes methods by which infrared spectra of adsorbed species on electrode surfaces can be obtained with submonolayer sensitivity; numerous examples are given. A following chapter deals with another unconventional application of vibrational spectroscopy: a detailed theoretical treatment of magnetic Raman optical activity is presented, together with instrumental requirements and practical applications. Low-frequency depolarized scattering from liquids and solutions is also reviewed in another section of the book. Two chapters deal with biological applications: infrared spectral studies of DNA conformations and the effects of intermolecular interactions, such as with nucleohistones, are described, and a whole chapter is devoted to the vibrational analysis of the retinal isomers. The two remaining chapters have a more theoretical flavor: the resonance effect and depolarization in vibrational Raman scattering are described, and a unified view of Raman, resonance Raman, and fluorescence spectroscopy according to the density matrix approach is presented.

As can be inferred from the content of this book, the editors have succeeded in bringing together several unconventional applications of vibrational spectroscopy, some of which being destined to a bright future. This volume, together with the rest of the series, should find a place on the shelves of any institutional library.

Rodrigue Savoie, *Université Laval*

The Biotechnology of Malting and Brewing. By J. S. Hough (University of Birmingham). Cambridge University Press: New York. 1985. xiv + 168 pp. $39.50. ISBN 0-521-25672-0.

This book is not a guide to beer making but, rather, details the scientific principles involved. Microbiologists and biochemists interested in fermentation industries will find the discussions of the preparations of malt and wort useful. Also included are descriptions of hop growing, chemistry, and use in brewing. Other topics covered are yeasts, contaminants, fermentation, pasteurisation, stability, beer quality, and other aspects of beer production. Only four references are included.

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

Understanding Enzymes. Second Edition. By Trevor Palmer (Trent Polytechnic, Nottingham). Ellis Horwood Limited: Chichester; John Wiley & Sons: New York. 1985. 411 pp. $45.00. ISBN 0-470-20173-8.

This is a book intended to help students understand the concepts involved in enzymology. It contains 20 chapters arranged in three sections (structure and function of enzymes; kinetic and chemical mechanisms of enzyme-catalyzed reactions; application of enzymology). Each chapter has several problems, to which answers are given. Although the book gives few original references, there are suggestions for further reading at the end of each chapter. These are up to date and should lead satisfactorily to detailed treatments of most of the topics the book touches on.

The section on structure and function covers enzyme nomenclature, structural principles and methods, biosynthesis and properties of proteins, specificity, and examples of monomeric and oligomeric enzymes. Under kinetics and mechanism, the author treats energetics, catalysis, inhibition, active-site characterization, ligand binding, kinetics through sigmoidal behavior and allostery, and the principles of catalysis. The applications section deals with assays, isolation and purification, and uses of enzymes in analysis, medicine, and biotechnology.

No book so broad in scope can treat any one topic deeply. In fact, the treatment is generally very brief. As a rule, it is clear. The main value of "Understanding Enzymes" is that it does bring the chief topics and key words (in boldface) for each of its subject areas to the reader's attention, along with short definitions and examples. This should make it very useful for practicing scientists in other areas who want to know something about enzymology or for students just beginning to study enzymology, essentially as a guide to further study. I did not find serious errors. The book seems to me quite successful in achieving its aims.

Richard L. Schowen, *University of Kansas*