Book Reviews*

Methods of Biochemical Analysis. Volume 29. Edited by David Glick (Stanford University Medical Center). John Wiley & Sons, Inc., New York. 1983. viii + 507 pp. $59.95.

This series presents reviews covering innovations and improvements in both methodology and instrumentation in the field of biochemical analysis. The eight chapters in this volume are written by either the originator or an experienced user of the methods. While the reviews are in general well written, as in most volumes by multiple authors, they are somewhat uneven. Each review is well referenced, including early 1982 references. The additional inclusion by some authors of a glossary or list of abbreviations will be helpful to those unfamiliar with some of the specific classes of chemicals discussed.

The first review, Interaction Between Biomolecules Studied by Phase Partition, is a brief discussion of phase partition with seven recent examples of molecular interactions detected and quantified by this technique. Next, Gel Sieving Electrophoresis: A Description of Procedures and Analysis of Errors provides an excellent discussion of the analysis of proteins by varying the sieving properties of gels. This review contains an exceptionally easy-to-follow experimental methods section. High Performance Liquid Chromatography: Analytic and Prepartive Application in Protein Structure Determination provides a good review of basic instrumentation and numerous examples of separations of amino acids, peptides, and proteins. James and Lumry bring the use of the pHstat into the computer age in Recent Developments in Control of pH and Similar Variables.

The longest review (118 pages), Biochemical and Biophysical Applications of Electron Spin Resonance, is almost equally divided between theory–background and applications. Two reviews on mass spectrometry are included. Negative-Ion Mass Spectrometry—Fused-Silica Capillary Gas Chromatography of Neurotransmitters and Related Compounds gives a good accounting of this recently introduced technique, while Analysis of Steroids by Mass Spectrometry provides a review of the more traditional use of mass spectrometry. The last and shortest (12 pages) review, Methods for Determination of Lysozyme Activity, covers a topic with the least general applicability to the cross section of chemists and biochemists who consult this excellent series.

While each review focuses on specific classes of compounds, the perceptive chemist should come away with a grasp of the wide-ranging power of the individual methods. Some annoyances are present. One subsection on Possibilities to Adjust the Partition Coefficient contains only a cited reference with no discussion. The inclusion of a computer program for an HP-97 with limited applicability seems inappropriate to this reviewer in a review volume.

This virtually mistake-free volume is reasonable in price, making it a must for any up-to-date library. Since this volume succeeds in continuing the fine traditions of the preceeding volumes, many chemists may wish to purchase their own copy.

Gary L. Anderson, *University of Iowa*

Comprehensive Chemical Kinetics. Reactions in the Solid State. Volume 22. Edited by C. H. Bamford and C. F. H. Tipper (University of Liverpool). Contributors: W. E. Brown (Rhodes University, South Africa), D. Dollimore (Salford University, England), and A. K. Galwey (Queen's University, Northern Ireland). Elsevier Scientific Publishing Co., Amsterdam and New York. 1980. xiv + 340 pp. $110.75.

This book is the most recent volume of a series of books on chemical kinetics. The subject matter specifically deals with the kinetics of reactions where all reactants are in the solid phase and thus includes solid-phase decompositions and some solid–solid reactions. There is some overlap with the subject matter of N. B. Hannay, "Treatise on Solid State Chemistry. Reactivity of Solids" [Vol. 4, Plenum Press, New York, 1976], which is referenced in the first chapter. However, because the emphasis in Hannay's treatise is not on chemical kinetics, this book complements it in many ways and is a welcome contribution to chemical kinetics, which has seen a remarkably small number of reviews on solid-state reactions. I think the Contributors and Editors have done a good job of reviewing this subject, for which the literature is extensive, in a very compact volume. Since the review is brief, the contributors admit to being selective in their discussions of the literature. Despite brevity, however, there are 1294 references, which are extensive enough to make this volume a useful reference text even to experts in the field. A considerble amount of discussion is given to dehydrations of hydrates, which are probably the best understood solid reactions and have been investigated most intensively. The dehydration of clay minerals, metal carboxylates, and hydroxides is also discussed. Brief discussions are included on the decompositions of a variety of solids, including oxides, hydrides, carbides, nitrides, sulfides, azides, fulminates, cyanamides, carbonates, sulfates, phosphates, metal–halogen compounds, permanganates, ammonium salts, and coordination compounds. Solid–solid reactions that are surveyed include catalysis by a solid product or a solid additive; reactions between solids yielding spinels, molybdates, tungstates, and complex iodides; double decomposition reactions; and a few other miscellaneous reactions.

The material is well presented with the first three chapters providing orientation and a survey of experimental methods and kinetic theories used to investigate solid-state reactions. These chapters provide excellent preparation for the discussion of experimental data and conclusions in the following three chapters. This quality and brevity make the book easy to read and excellent for familiarizing one with the field of solid-state kinetics. The volume will be useful to persons interested in this field or related areas and should be available in university libraries. In view of the cost of the book, personal ownership is probably only justifiable for persons who need to make intensive use of references on the kinetics of solid-state reactions.

Adolph L. Beyerlein, *Clemson University*

Patterns in Crystals. By Noel F. Kennon (University of Wollengong, Australia). John Wiley & Sons, New York. 1978. 197 pp. $25.00 (paperback $12.50).

This book is a basic introduction to symmetry operators, point groups, and space groups in crystals. The first 8 chapters (out of 22 total) develop "definitions" and "concepts" (which are printed in boldface type and numbered for later reference) for the two-dimensional-plane groups. Later chapters expand these principles to three dimensions in the discussion of lattices, unit cells, Bravais lattices, Miller indices, d spacings, and macroscopic and microscopic symmetry. Other subjects include compounds and their space groups, crystal defects, and a brief introduction to the diffraction of X-rays by crystals.

This book is designed for the hobbyist or beginning scientist in a related field who needs a brief introduction to crystals and symmetry. No previous knowledge is presumed and only the simplest mathematics are used.

William M. Butler, *University of Michigan*

Ionization Potential and Appearance Potential Measurements, 1971–1981 (NSRDS-NBS 71). By Rhoda D. Levin and Sharon G. Lias (National Bureau of Standards). U.S. Government Printing Office. Washington, DC. 1982. iv + 628 pp. $12.00 (U.S.), $ 15.00 (foreign).

This volume up-dates through 1981 the collection of literature values of ionization and appearance potentials which has been compiled under the auspices of the National Bureau of Standards, and is dedicated to Henry Rosenstock *in memoriam*. These tables have been, through the years, and should continue to be, of real value to analytical researchers developing methodology to ionize selectively an analyte in a mixture, designing derivatives to enhance positive or negative ion formation, or correlating fragmentation patterns with functional groups. These tables have also been invaluable to the theoretically inclined chemist who is interested in the relations of molecular and electronic structure and energetics of species in the gas phase, pristine and uncluttered by solvent. The original reports of these measurements are widely dispersed through the literature and a single (essentially) complete compilation with complete bibliographic citations is extremely convenient even (especially?) for the specialist to use.

The editors of the present volume have given up the earlier practice of evaluating the measurements, in order to bring the collection rapidly up to date. This is a reasonable compromise. The editors have sought to standardize terminology by using Chemical Abstracts nomenclature and registry numbers. This is always a mixed blessing since familiar compounds such as uracil and adamantane are more easily recognized by computer when disguised as 2,4[1H,3H]pyrimidinedione and tricyclo(3.3.1.1^{3,7})decane, RN 66-22-8 and 281-23-2, respectively.

To the analytical mass spectroscopist, a major disappointment is the relatively small number of new entries from 10 years of literature which address more complex molecules. Have no measurements been made of dioxin and its isomers? Diethylstilbestrol? Phencyclidine? This volume suggests that the analytical community has turned its efforts to refining

*Unsigned book reviews are by the Book Review Editor.

existing measurements rather than to expanding its repertoire. By contrast, numerous species of strain and aromaticity have been studied, e.g., the tetra-*tert*-butyl derivatives of tetrahedrane and cyclobutadiene. The organic chemists continue to make new species and ion chemists continue to measure their energetics.

This book is intended for use as part of a three-volume set.[1,2] One especially useful feature of the second volume[2] should be mentioned; Henry Rosenstock and his colleagures have provided an interesting and authoritative review of the experimental techniques used to measure ionization potentials and electron affinities, as well as a discussion of the roles of autoionization, predissociation, delayed (metastable) dissociations, and activation energies and argue, contrary to widespread assumption, that fragmentation does occur from excited electronic states in large molecules.

(1) J. L. Franklin, J. L. Dillard, H. M. Rosenstock, J. T. Herron, K. Draxl, and F. H. Field, "Ionization Potentials, Appearance Potentials and Heats of Formation of Gaseous Positive Ions", U.S. National Bureau of Standards: Washington, D.C., 1969; NSRDS-NBS 26.
(2) "Energetics of Gaseous Ions": H. M. Rosenstock, K. Draxl, B. W. Steiner, and J. T. Herron, *J. Phys. Chem. Ref. Data*, *6*, Suppl. 1 (1977).

Catherine M. Fenselau, *Johns Hopkins University School of Medicine*
Joel F. Liebman, *University of Maryland Baltimore County*

Handbook of Environmental Data on Organic Chemicals. 2nd Edition. By K. Verschueren (Agricultural University of Wageningen). Van Nostrand Reinhold Co., New York, Cincinnati, Toronto, London, and Melbourne. 1983. vi + 1310 pp. $99.50.

This 1.9-kg handbook tabulates a vast quantity of data relevant to the environmental impact of some 1400 organic compounds. The properties listed include the following: some physical and chemical data; air pollution factors such as odor, sources, atmospheric reactions, sampling and analytic methods; water pollution factors such as biodegradation, BOD, COD etc., "amenities reduction", adsorption, wastewater treatment; and biological effects such as toxicity (TLm, LDm, etc.), carcinogenicity and mutagenicity, bioconcentration, as they apply to various species.

All of the properties considered are defined in a 135-page introduction, which includes tables and plots for solubilities, octanol–water partitioning, bioaccumulation, toxicity, odor indices, etc., and interrelations for an homologous series of compounds.

As might be expected, the coverage of all these topics for each chemical is very uneven, ranging from little more than the chemical formula and one environmental factor to several pages of data. This reflects the amounts of data available in the literature.

The second edition is twice as long as the first, but this is due more to an increase of data for the chemicals included rather than a great increase in the number of chemicals. Such numerical comparisons are (first edition in parentheses) as follows: pages, 1310 (659); compounds, 1370 (1000+); references, 2400 (350). The addition of a formula index is welcome. There is, of course, no way to judge the quality of the information provided, but the references are available for that purpose. This handbook intentionally omits data on flash points, flammability limits, etc., which are safety rather than environmentally related.

Rane L. Curl, *University of Michigan*

NMR and Chemistry. An Introduction to the Fourier Transform-Multinuclear Era. By J. W. Akitt (University of Leeds). Chapman and Hall, London, and Methuen, Inc., New York. 1983. xiii + 263 pp. $39.95 in hardback; $16.95 in paperback.

This book is the second, revised edition of the book by the same author published a decade ago. In the preface to the second edition, the author cites the "explosive development of the subject" in that interval. The second edition, like the first, is devoted primarily to providing an explanation of the phenomenology of NMR spectroscopy for the nonspecialist, although the practicing spectroscopist may also find it extremely useful. In keeping with his idea of explaining the major concepts of modern NMR spectroscopy, the author has expanded the explanation of Fourier-transform methods and how they are used in NMR spectroscopy. Such standard techniques as selective population inversion and double resonance techniques are also discussed. Such techniques as high-resolution solid-state NMR and NMR imaging (which were only being developed or contemplated at the time of publication of the first edition) are examined in this new edition. Chapter 9 is quite useful, in that it provides illustrative problems which have been solved by the use of NMR spectroscopy of not only protons and carbons but other nuclei whose resonances are accessible with modern NMR instrumentation, such as ^{23}Na, ^{11}B, and ^{17}O. As a text, this book also provides exercises *with answers*. I would recommend it to the chemist who needs an overview of the uses of NMR spectroscopy in chemistry, whether acquaintance with the technique is only casual or more serious.

Cecil R. Dybowski, *University of Delaware*

Drug Metabolite Isolation and Determination. Edited by Eric Reid and J. P. Leppard (Guildford Academic Associates). Plenum Press, New York. 1983. xii + 289 pp.

The book we have here is the latest volume in the series of "Methodological Surveys in Biochemistry and Analysis". This volume is the collection of conference papers presented at the Fourth International Bioanalytical Forum held at the University of Surrey, Guildford, UK, September 7–10, 1981.

In the series this is the fourth volume devoted to analytical aspects; the other eight are biochemistry related. This volume is divided into five sections: techniques applicable to metabolite investigations; investigation of metabolites; investigation of conjugates; determination of particular drugs and metabolites and metabolite methodology; and the state-of-play. Each of the first four sections consists of several papers by different authors followed by a subsection devoted to notes and comments comprising the discussions at the conferences as well as post conference survey summaries. The last section, which is authored by the senior editor, consisting of the highlights from the articles in the front, is a bold attempt to condense too much into too small a place, a difficult feat which met with limited success.

Referring to Quantitative HPTLC in Assaying Body Fluids for Drugs and Metabolites by W. Ritter, Extracttion of Drugs and Metabolites from Plasma and Urine by M. J. Stewart, Isolation and Characterization of Amino Acid and Sugar Conjugates of Xenobiotic Carboxylic Acids by John Caldwell et al., and The Identification of Amitriptyline and Benzodiazepine Metabolites by Ian D. Watson et al. as interesting and informative is not intended to minimize the merits of several other noteworthy articles in the book.

The lack of clarity in figures and tables is probably the weakest part of this book. While the entire book can be considered good review material for most, the case histories, which cover a substantial portion of the book, would be of interest for new investigators to the field of isolation and identification of drug metabolites, as these are straightforward and well documented.

N. G. S. Rao, *North Dakota State University*

Chromatography in Organic Microanalysis. A Laboratory Guide. By Raphael Ikan (Hebrew University, Jerusalem). Academic Press, New York. 1983. 108 pp. $22.50.

Although the title makes me think of analysis for elements, the author actually means detection, and in some cases determination, of organic compounds on a micro scale. The first chapter is called Microsynthesis of Thin Layers of Silica Gel, but it is not really about synthesis, for the products are not isolated, and the reactions are not generally carried to completion. The chapter deals with reactions characteristic of particular structural types, and how to detect such reactions on a very small scale by carrying them out on silicon gel TLC plates. A frequent technique is to add the reactants at the starting line of the plate, one reagent on top of the other, followed if necessary by baking in an oven. The plate is then developed in the conventional way, and the product(s) is detected by spray reagents.

Other chapters deal with separation of geometrical and optical isomers by combinations of TLC, HPLC, and gas chromatography, with reactions carried out in proximity to the injection port of a gas chromatograph, and with applications of these methods to investigation of food constituents and to forensic analysis. Many specific examples are included, ranging from antioxidants in foods to ball-point pen markings.

Laboratory procedures for specific procedures abound, and they make interesting reading. In general, reactions can be carried out remarkably quickly, and with consumption of only extremely small amounts of material. Some of the procedures suffer from vagueness, as, for example, in the generation of acetophenone by a Friedel-Crafts reaction on a TLC plate; the directions state "The air-dried slide is sprayed with a solution of 2,4-dinitrophenylhydrazine." The kind of solution—solvent, presence or absence of acids, etc.—is not specified. In another procedure, cyclohexene is hydrogenated to cyclohexane, and reactant and product are to be separated by developing the TLC plate with hexane after first drying. Surely this is an extremely delicate procedure almost certain to fail as a result of loss of all components, unless extraordinary, but unspecified, precautions are taken.

There is an index, but it is inadequate, and omits significant topics found in the text. The references given in each chapter range from primary journals and books to a private communication from the Police Analytical Laboratory of Jerusalem, and are supplemented by recommended readings.

This is an unusual and intriguing book.