Book Reviews*

Residue Reviews. Volumes 66 and 68. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N.Y. 1977. Vol. 66: ix + 212 pp. $22.80. Vol. 68: ix + 154 pp. $19.80.

These two volumes arrived packaged together and are filled with timely content and should see immediate use.

Volume 66 contains reviews on analysis of tin compounds, on the interaction of algae and pesticides, on metabolism of synthetic pesticides by anaerobic organisms, on toxicological evaluation of miscellaneous pesticides, and on analysis for polychlorinated biphenyls. Volume 68 contains reviews on fenitrothion (an insecticide used in forest spraying), on metabolism of lindane, on parathion, on determination of arsenic in foods, and on fluorine in foods. In the last review, the dangers of fluoridation of water supplies are described, whereby fluoride may be concentrated in foods by cooking or even in watering of crops, such that the borderline between toxic and beneficial effects of fluoride may unwittingly be overstepped.

Tetrahedron Reports on Organic Chemistry. Volumes 2 and 3, and Nos. 31 to 49. Administrative Editor: T. STEPHEN. Pergamon Press, New York and Oxford. 1978. Vols. 2 and 3: ca. 200 pp. (not consecutively numbered). $55.00 each. Reports 31 to 49: 12 to 33 pp each. $10.00 each.

Volumes 2 and 3 contain ten individual Reports each, hardbound. Both the bound Reports and the subsequent ones in the form of separate pamphlets are reprints of review articles that have appeared in *Tetrahedron*, and thus have already been received by library and individual subscribers. At 30¢ to 80¢ per page, they are exceptionally expensive, and, as reprints, they will be redundant for subscribers.

The reviews themselves are unquestionably useful, and their authoritativeness is above reproach, for they are for the most part written by the foremost contemporary organic chemists. Western chemists will find those that are written by chemists from eastern Europe a valuable way of keeping abreast of developments they may have missed in their ordinary reading. However, one wonders about the utility of putting such diverse subjects as photoenolization, catecholboranes, and biosynthesis between the same covers. The fact that the book-form collections are numbered separately for each of the ten reports included in them detracts further from their utility, for it is impossible for the Table of Contents to give page numbers as an aid to finding a review, and an index is also impossible. There is not even a preface to explain what these volumes are intended to be.

Analytical Methods for Coal and Coal Products. Volume I. Edited by C. KARR, JR. (Morgantown Energy Technology Center). Academic Press, New York. 1978. xviii + 580 pp. $49.50.

This is the first of what is apparently planned as a two-volume work. It consists of 19 contributed chapters and is subdivided into sections: Physical Properties of Coal; Proximate and Ultimate Analysis of Coal; Trace Elements in Coal and Coal Products; and Coal-Derived Liquids.

The problems of analytical chemistry of coal are numerous and severe, owing to the great diversity of elements and organic structures present. The importance of solving them has grown in recent years as the potential diminution of petroleum supplies has directed new attention to coal as a major energy source, and as concern for environmental pollution has developed. The chapters in the present book are written by chemists heavily involved in the practical application of analysis of coal, and provide a documented perspective of the role of chemical, physical, and spectroscopic methods. There are lots of graphs and tables, photographs of apparatus, and a good index.

Catalytic Hydrogenation of Organic Chemistry. Procedures and Commentary. By M. FREIFELDER. John Wiley & Sons, New York. 1978. xiv + 191 pp. $18.50.

This book is the result of the extensive experience of a specialist in heterogeneous catalytic hydrogenation. It is largely a collection of procedures for specific compounds, which include detailed directions and notes rather like those in "Organic Syntheses." However, there are also general comments in each chapter on choice of catalyst, scope, preferred conditions, etc. The fourteen chapters are organized according to class of compound to be hydrogenated, except for a one-page introductory chapter and one on reaction conditions (including notes on equipment). Each chapter has a short bibliography.

The most obvious shortcoming of the book is a result of its tight connection to the author's personal experiences; coverage is not comprehensive. For example, the chapter on acetylenes begins with the heading "saturation of the acetylenic bond", but the discussion and the procedures do not deal with that subject at all, but only with partial reduction to alkenes. With this limitation, it is a potentially useful book, especially when used as a practical supplement to more general works on this aspect of synthesis. There is a subject index, but it is much shorter than the table of contents.

Laboratory Handbook of Paper and Thin-Layer Chromatography. By J. GASPARIČ (Charles University) and J. CHURÁČEK (University of Chemical Technology, Pardubice). Translated by Z. PROCHÁZKA. Translation Editor: R. A. CHALMERS. John Wiley & Sons/Halsted Press, New York. 1978. 362 pp. $42.50.

This book is part of the Ellis Horwood Series in Analytical Chemistry (Ellis Horwood, Ltd., Chichester, U.K.). It is not quite what the title implies; it is largely a book on qualitative organic analysis based on R_f values of derivatives together with color tests.

The first quarter of the book presents the general techniques of paper and thin-layer chromatography in succinct form with a practical emphasis. This section concludes with a list of firms supplying materials and equipment (including the major American firms as well as European) and a list of general references (mostly reviews and books). The remainder of the book is classified by class of compound, for each of which are described the recommended derivatives for chromatography. For each class of compound, a paragraph or two of general statements (choice of stationary and mobile phases, etc.) is followed by specific laboratory procedures for preparation of derivatives, accompanied by tables of R_f values, a representative selection of substrates on a variety of chromatographic systems, and directions and recommendations for examining the developed chromatograms. Everything is documented; for hydrocarbons alone, 78 references are cited. The scope of the work may be judged by the fact that it covers not only the main classes of functional compounds, but also dyes, optical brighteners, vitamins, purines, organophosphorus compounds, etc. At the end of this very practical book are a list of detection reagents with directions for their preparation, a list of compounds chromatographed, and a subject index.

Topics in Current Chemistry. Organic Chemistry. Managing Editor: F. L. BOSCHKE. Springer-Verlag, New York–Berlin–Heidelberg. 1978. 271 pp. $49.00.

There are four substantial reviews in this volume, sufficiently unrelated that a subtitle more restrictive than "Organic Chemistry" would be difficult to devise. They conform to the stated purpose of the series to present "critical reviews of the present position and future trends in modern chemical research."

The stereochemistry of penta- and hexacoordinate phosphorus derivatives is reviewed by W. S. Sheldrick. It is treated from the point of view of structure rather than reactions, and there is much tabulated information on molecular parameters.

Under the title "Complex Bases and Complex Reducing Agents", P. Caubère reviews a subject to which he has been the major contributor. In this context, "complex" refers to mixtures rather than to coordination complexes. About ten years ago, he and Loubinoux made the remarkable observation that mixtures of sodamide and sodium alkoxides would bring about benzyne reactions with bromobenzene in high yields, whereas under similar conditions, neither base was effective alone. From this was developed the concept of activation of sodamide by the presence of other, weaker, bases. The concept was then extended to sodium hydride, which ordinarily acts only as a base. When mixed with sodium *tert*-amyl oxide and nickel acetate, it becomes an effective reducing agent, able to reduce ketones, replace halogen on benzene rings by hydrogen, etc.

* Unsigned book reviews are by the Book Review Editor.

Electrocyclic ring closure accompanied by elimination and leading to aromatic systems is the subject of a review by J. C. Jutz. In it, he shows how the advent of the Woodward-Hoffmann rules has stimulated new, highly efficient syntheses of aromatic ring systems formerly accessible only by laborious, multistep processes.

The last review, "Some Newer Aspects of Mass Spectrometric *ortho* Effects", by H. Schwarz, takes up the reaction of hydrogen transfer between cis substituents in 1,2-disubstituted alkenes and benzenes, with emphasis on mechanistic principles.

These reviews are of high scientific quality. They sometimes suffer from the fact of being written in English by those not native to the language, and one must accept with forebearance some rather murky phrases, such as "with the help of complexing cations substrates". It is a pity that there is no subject index, but only a cumulative contributor index for Vols. 26 to 73.

The Sadtler Handbook of Infrared Spectra. Edited by W. W. SIMONS. Sadtler Research Laboratories, Inc., Philadelphia, Pa. 1978. vii + 1089 pp. $150.00.

The Coblentz Society Desk Book of Infrared Spectra. Edited by C. D. CRAVER. The Coblentz Society, 761 Main Ave., Norwalk, Conn. 06851. 1977. iii + 498 pp. $90.00.

The first of these two books is a massive volume, even though it is an abridgement of the "Sadtler Standard Spectra, IR Grating"; it still contains about 3000 spectra. It is meant to be a convenient reference for use in graduate and undergraduate courses and for routine identification work in industry. Its use is, of course, not limited to the specific compounds included, for their spectra may serve as representatives for whole groups.

Spectra are reproduced four to a page. They cover the unusually broad range from ~300 to 4000 cm^{-1} and are linear in wave number. Arrangement is in groups of the same function, and access is made easy by several indexes: one in order of appearance in the book; one in alphabetical order of the names; a "Spec-Finder," which is keyed to the location of the strongest bands; and a detailed table of contents. In addition, at the start of each functional group section, the principal bands correlatable with that function are described. There is no text outside of the Preface.

The second of these books is similar in aim, but it includes fewer spectra (under 1000), with the compensating factor of finer detail (the spectra are one-third longer than those in the Sadtler book). Spectra are presented two to a page and are linear in wave number, covering the range 400–4000 cm^{-1}. There is more textual material than in the Sadtler book. Short chapters on the following topics appear: history of the Coblentz Society; bibliography of general works on infrared spectroscopy; specifications for spectrum evaluation; operating parameters of dispersive spectrometers; interpretation of infrared spectra. The range of structural types is somewhat larger, including, for example, organometallic and inorganic compounds.

Arrangement is by structural type, as in the Sadtler book. Access for simple compounds is not unduly difficult by simple browsing, but there is also a formula index and alphabetical index. The latter is not as helpful as it might have been, owing to the schizophrenic nomenclature. The compilers seem to favor systematic names, but unfortunately have fastened on Chemical Abstracts indexing code names rather than IUPAC names. The former are designed for computer handling in indexing, and in many cases fall short in communicating to readers. The greatest sin, however, is inconsistency, and one finds "butanamide" but not "butyramide" in the index, whereas "isobutyramide" and "propanamide, 2-methyl" are both entered for the isomer. In spite of the presentation of alternative names for most compounds, with cross-index entries, "benzylamine" and its derivatives are nowhere referred to or indexed under that commonly used name. In this respect, the Sadtler index is to be preferred.

Both are good books. The Coblentz Society book is better suited to a slim budget, but in the bigger and more costly package of the Sadtler book the price per spectrum is much cheaper. The other differences must be assessed against individual preferences.

Theory of Organic Reactions. By N. D. EPIOTIS (University of Washington). Springer-Verlag, New York. 1978. xiv + 290 pp. $49.00.

The "theory of organic reactions" referred to in the book's title is in actuality two related approaches involving the application of molecular orbital theory in a qualitative fashion to a wide variety of chemical processes. The two techniques in question differ in defining systems in terms of static or dynamic models. Both approaches have been developed by the author.

After three introductory chapters, the author discusses reactivity according to a classification of reaction type. These chapters show great variation in length which must in part reflect the author's interests. Several particularly short chapters interspersed throughout the text are addressed to specific points of interest. The overall organization is logical.

The book is not a text. Many approaches, generally utilized by others in the field, are not at all presented or presented principally in contrast to the autbor's own techniques. The book contains a prologue, an epilogue, and a separate chapter devoted to contrasting the "accepted viewpoints" with those of the author. I do not believe I have ever before read as personal an approach to any area of chemistry.

I believe the specialist would find this a provocative and interesting volume.

Gerald Jay Gleicher, *Oregon State University*

Molecular Reaction Dynamics. By R. D. LEVINE (Hebrew University) and R. B. BERNSTEIN (Columbia University). Oxford University Press, New York. 1974. vi + 250 pp. $11.50.

It has been four years since the introduction of this book, a time appropriate to now evaluate how valuable it has been in the instruction of reaction dynamics principles. For a modern up-to-date introduction to the subject of reaction dynamics, Levine and Bernstein's book is the best. Supplemented with appropriate lectures, this book forms the core of very successful courses of instruction in reaction dynamics. It can also form the entire basis for an independent introduction to the subject. With in-depth discussions of energy partitioning and energy transfer, molecular scattering, cross sections, classical trajectories, intermolecular potentials, and numerous modern experimental techniques, the authors amply cover all of the microscopic and macroscopic features of reaction dynamics. There are, of course, always new subjects, such as the authors' own information theory approach to chemical dynamics, which are not covered. But the book is far from being out of date and still represents one of the best sources of introductory as well as more advanced material on the subject.

Stephen R. Leone *Joint Institute for Laboratory Astrophysics*

Physicochemical Applications of Gas Chromatography. By R. J. LAUB (University College of Swansea, Wales) and R. L. PECSOK (University of Hawaii). John Wiley & Sons, New York. 1978. xxi + 300 pp. $23.50.

The application of gas chromatography to measurement of physical and chemical data has been around almost as long as GC. It has continually attracted a small but dedicated, generally talented group of practitioners. These developments would be largely of academic interest were they not put to use, and indeed one sees more and more papers in the chemical engineering and physical chemistry literature in which this nonanalytical type of GC is the experimental technique of choice.

In the present concise volume the authors have for the most part thoroughly covered the field while managing to keep their own prejudices in some perspective. Howard Purnell, to whom the book is dedicated, is such a strong and inventive spirit that no one who has worked with him, including the authors (and the reviewer), leaves without picking up the strongest possible views on certain matters, some of which are evident in the monograph.

The work is written not only to summarize what has been done but to invite new experimenters to try GC when they need physicochemical data. The second and third chapters are concerned with the basic theory, sparing the reader the tedium of derivations available elsewhere, and with detailed, well-documented discussions of sources of systematic and random errors written from experience, and of instrumentation for physicochemical measurements. These are especially useful and important chapters for the uninitiated.

Thermodynamic measurements—interaction viral coefficients, solute activity coefficients, complex equilibrium constants, and adsorption parameters—are covered in the next four chapters. Cruickshank's approach is generally adopted for determining B_{12} and γ_1^∞. A considerable body of data is tabulated. The longest and most subjective chapter, complexation, summarizes, while playing down, the development of the controversy, still unresolved, between the camps of Martire and of Purnell.

Rate constants and on-column reactions are more lightly discussed

in Chapter 8. Gas-phase diffusion coefficients using a GC with an empty column are the subject of the next chapter, along with a discussion of the determination of liquid-phase D_l with an LC, an unexplained departure from the restriction of the work to GC.

The final chapter shows how to use retention time correlations and other chromatographic parameters to estimate physical properties such as boiling point, vapor pressure, molecular weight, etc.

I recommend the book not only to chromatographers, but especially to chemical engineers and experimental physical chemists.

David C. Locke, *City University of New York, Queens College*

Physical Organic Chemistry Through Solved Problems. By JOSEPH B. LAMBERT (Northwestern University). Holden-Day, Inc., San Francisco, Calif. 1978. xii + 265 pp. $10.95.

As the title suggests, this book presents a series of problems covering selected topics in physical organic chemistry. Every problem is accompanied by a detailed answer and leading references to pertinent primary and secondary organic chemical literature. The material is presented at an appropriate level for students who have completed a one-year course in undergraduate organic chemistry and who have thereby acquired a basic understanding of the principles of kinetics and thermodynamics as they pertain to the elucidation of organic reaction mechanisms.

The book is divided into eleven chapters which deal in turn with the following areas of physical organic chemistry: configurational and conformational analysis, organothermochemistry, equilibrium solvent and isotope effects, equilibrium electronic effects, ionic equilibria, introduction to kinetics, kinetic isotope effects, kinetic solvent effects, kinetic electronic and steric effects, homogeneous catalysis, and orbital symmetry. The book also includes two suggested outlines for a second-year course in physical organic chemistry. The first outline is based upon a physical organic principles approach, while the second is organized around a reaction mechanisms approach. Both outlines are fully referenced to pertinent text problems. Author and subject indexes are also included.

Topic coverage is generally thorough and parallels that of other established intermediate-level mechanistic and physical organic texts. The answers provided to problems are often more suggestive than definitive, serving to stimulate and provoke further thought on the part of the reader. Problems are drawn primarily from the late 1960's and early 1970's chemical literature; a few examples are drawn from more current (mid-1970's) literature.

The book should prove to be of interest and value to advanced undergraduate and beginning graduate organic chemistry students as well as to instructors of second-year organic chemistry courses. This latter group will undoubtedly find this book to be a treasure trove of useful examination questions.

Alan P. Marchand, *University of Oklahoma*

Biochemistry of Foods and the Biocatalysts. By ISHAH I. SHAHIED. Vantage Press, Inc., New York. 1977. xii + 470 pp. $12.50.

Although the author suggests the text for advanced courses in nutrition, food chemistry, endocrinology, and applied biochemistry, the depth of coverage is not adequate for these purposes. The book covers such a wide range of topics that treatment of many subjects is very elementary. In addition, up-to-date references to recent developments are lacking. A better use for the book would be for quick reference purposes. It contains very concise statements giving biochemical highlights along with formulas and typical reactions. However, there are errors in some descriptions and formulas.

The first half of the book covers the basic biochemistry of food components. The treatments are so concise in many instances that important aspects are left out. For example, discussion of water activity is lacking. The basic chemistry of carbohydrates has incorrect statements and formulas; on page 46, one formula for α-D-glucopyranose is incorrect and the description of Haworth formulas on page 49 is incorrect and opposite to the formulas shown.

Current topics, such as dietary fiber, new protein foods based on textured vegetable proteins, and naturally occurring food toxicants are missing. However, it is pleasing to see a short chapter on cereal chemistry and technology. The references at the end of this chapter are to early work; 1951 is the most recent.

The parts on vitamins and minerals have some of the deficiencies as described above. In particular, I feel that the reference lists, which take 1-2 pages at the end of each chapter, should have had more recent citations. For example, the chapter on vitamin D has only one reference more recent than 1945.

The section on hormones is the strongest part of the book. I found this to be well written and of value for ready reference.

The term "Biochemistry of Foods" can cover a great many topics. I have been critical because certain areas were left out or given minimal coverage. However, as a quick reference or resource to get an overview of formulas, reactions, and terms used in food biochemistry, the book can be useful.

Joseph D. Mullen, *General Mills, Inc.*

Polymerization of Organized Systems. Edited by HANS-GEORG ELIAS (Midland Macromolecular Institute). Gordon and Breach Science Publishers, New York. 1977. xii + 230 pp. $33.00.

This book is derived from papers and discussions at the third Midland Macromolecular Meeting. It is Volume 3 in a series of Midland Macromolecular Monographs. The book treats an area of basic macromolecular research of considerable current interest, namely efforts to prepare polymers of specific structures by controlled polymerizations of the monomers while oriented by such influences as monolayers, catalyst complexes, adsorption, matrices, and liquid crystals or mesophases. Such researches have been encouraged by the remarkable specificity found in many biopolymer structures and by the development of isotactic polymer syntheses from vinyl ethers, alkenes, and acrylic monomers under orienting conditions. This volume gives busy industrial polymer chemists and technologist, as well as students, the opportunity to keep in touch with a major area of recent academic and basic polymer research.

While a number of significant effects are reported, this area in the main is in an early stage of development where conflicting results and controversies need to be resolved by additional critical experiments. The book offers the communication between research workers needed to design the further significant research. It emphasizes that recent work and historical aspects have not been treated fully.

The book comprises 13 chapters by different groups of authors plus two short abstracts of papers published elsewhere. It is international, including authors from Brazil, France, Israel, and Russia, as well as three papers by H. Ringsdorf and coworkers of Mainz, Germany. The monomer types and polymers discussed in some detail include trioxane, propylene, methacrylic acid, methyl methacrylate, long alkyl acrylates and methacrylates, methacrylyloxybenzoic acid, vinyl oleate and stearate, and complexes of styrene sulfonates and of vinylsulfonic acid. The condensation polymerizations studied include those of *p*-hydroxybenzoic acid, amino acids and octadecylurea-formaldehyde. Perhaps polymerizations and copolymerizations upon or within preformed precipitated polymers in bulk, suspension, and emulsion systems might have received more attention. Specific orienting effects upon copolymer crosslinked structures and morphologies may have greater possibilities (including industrial ones) than suggested by the book.

Among the interesting results reported, mixed anhydrides between amino acids and adenylic acid polymerized in aqueous suspensions of montmorillonite gave polymers of DP 30 to 40. Surprisingly *d,l*-alanine gave water-soluble polymers but *l*-alanine gave water-insoluble products. Some of these polymerizations were designed to imitate possible prebiotic conditions. Acidic amino acids also were polymerized in clay structures. French researches on liquid crystalline polymers from acrylic Schiff bases were confirmed and extended in West Germany. Some monomers appear to polymerize faster in mesophases; others have been reported to polymerize more slowly. There is so far little evidence of steric control from free-radical polymerizations in liquid crystal or mesophases.

The book gives many recent references but few industrial ones or patents. A subject index of only 1½ pages is provided.

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