Organic Process Research & Development **2001**, *5*, 665−670

Book Reviews *

Organic Synthesis on Solid Phase: Supports, Linkers, Reactions. Florencio Zaragoza Dörwald. Wiley-VCH: Weinheim. 2000. 474 pp. DM 268. ISBN: 3-527-29950-5.

Summary:

The art of performing organic synthesis on solid-supports (SS) has seen an exponential growth in the number of publications and collections of new books (see: *Angew. Chem., Int. Ed*. **2001**, *40*, 255) due to increasing interest in the combinatorial chemistry. Readers will find the book by Florencio Zaragoza Dörwald (FZD) a practical guide to SS chemistry at their fingertips with an exhaustive list of citations. It is noteworthy that FZD has covered the literature until mid-1999. Thus, we have a book that is published in a timely manner. In over 474 pages covering 16 chapters and a detailed subject index, all key functional group transformations using SS are summarized. The first three chapters cover the general techniques, analytical protocols, and type of supports for organic synthesis and linker chemistry.

The author has dedicated about 100 pages in this book describing a plethora of linkers used for SS chemistry, thus aptly justifying the subtitle of the book. Interestingly, chapter 3 is the largest in the book with 48 tables. These tables show detailed structure of the linker, reaction conditions for cleavage of the linker, structure of the product, yield, purity, and appropriate reference. Having this information in a tabulated format makes this book a must-have for any lab, where SS chemistry is practiced. I am sure this book will save a lot of library trips or article requests by the readers.

The remaining 13 chapters describe preparation of organometallic compounds, hydrocarbons, alkyl and aryl halides, alcohols and ethers, sulfur compounds, organoselenium and nitrogen compounds, phosphorus compounds, carboxylic acids and carbonic acid derivatives, and a variety of heterocycles and oligomeric compounds. Each chapter begins with a brief introduction and a series of tables with short summary. In this work FZD has used a common format for all of the tables in chapters 4−16. All synthetic transformations show the structure of the starting support, reaction conditions, product formed, and a pertinent reference. If closely related examples have been published, author has provided a "see also" notation in each table. Since all tables on transformation chemistry are presented in identical style, the readers will find it very convenient to read and understand the content.

A unique feature of this book is in 21 short experimental protocols presented in each chapter. These protocols are presented with a gray background, so that they are easy to find in the text. These experimental protocols are hand-picked by FZD from the original literature and transformed into a reproducible method that can be repeated in the lab by a chemist. Once again, having this information makes the book valuable because reader need not consult the original article. FZD must be commended for picking the "hottest recipes" in SS chemistry and placing them in the book at the right place.

Overall, the book is well organized and makes an excellent reference book, with the exception of the presence of excessive white spaces that could have saved a few trees and perhaps reduced the cost of this book. The book is highly recommended to industrial chemists and all combinatorial chemists working hands-on in the lab. In the preface, FZD writes that the motivation behind writing this book was to provide a clear-cut answer to questions related to SS chemistry and create a practical guide for bench chemists. There is no doubt on my mind that FZD has been very successful in meeting the objectives.

Yogesh S. Sanghvi

Isis Pharmaceuticals, Manufacturing Process Development, 2292 Faraday Avenue, Carlsbad, California 92008, U.S.A.

OP0001180

10.1021/op0001180

Experimental Organic Chemistry. Daniel R. Palleros. John Wiley & Sons: New York. 2000. 833 pp. $86.95. ISBN 0-471-28250-2.

Writing a book on practical organic chemistry must be a daunting task: there are already a plethora of excellent textbooks available, including *Vogel's Textbook of Practical Organic Chemistry*, which must be one of the most respected and established texts in organic chemistry. Palleros' book does not aim to compete with *Vogel*, instead it is directed at teaching laboratories and enthusing undergraduate chemists. In this goal it succeeds admirably. The basic techniques are covered in an efficient, if standard manner, in a short first section. Interestingly the main section of the book pays equal attention to both the theory and the actual experiments. This is unusual for a purportedly practical book but works very well. Each chapter begins with a succinct introduction to the concept being covered that frequently shows the relevance of the chemistry in a much wider context that should enthuse students and avoid the occasionally esoteric image of chemistry. In this context the units covering polymers, proteins, enzymes, and nucleotides were especially good. The actual experiments themselves are well-thought-out. Of particular merit is the introduction of *pre-lab* questions as well as the ubiquitous *post-experiment* problems. These encourage students to contemplate the tasks they are about to perform. In such a manner they should learn much more from the experiment and hopefully make fewer mistakes during the practical. The final section looks at spectroscopy.

*Unsigned book reviews are by the Editor.

It succinctly deals with the fundamental concepts of ultraviolet−visible, infrared, nuclear magnetic resonance, and mass spectroscopy, striking an excellent balance of explanation to develop a student's ability to use these techniques. It covers this material better than some specialised textbooks. No book is perfect, and there are some minor shortcomings. Although the section on chromatography is very good, the omission of the use of co-spots in TLC analysis is, in this reviewers opinion, criminal. The diagrams are incredibly detailed, including, in many cases, clamp stands and electrical leads, yet the positioning of some of apparatus could be interpreted dangerously, especially for a number of the reflux setups. Overall, Palleros has produced an excellent book. Aimed at undergraduates, it contains well-thought-out experiments in an easily accessible manner. Bar a few minor quibbles I would place this book alongside Harwood and Moody as a book anyone involved in undergraduate teaching laboratories should read. I for one will certainly be utilising this book in our laboratory course.

Gareth J. Rowlands

Department of Chemistry, University of Sussex, Falmer, Brighton, BN1 9QJ, UK

OP0001234

10.1021/op0001234

Organic Synthesis Engineering. L.K. Doraiswamy. Oxford University Press: New York. 2001. 918 pp. £150. ISBN 0-19-509689-4.

The chemistry and chemical engineering community has waited a long time for a book on this topic. It is a brave attempt to "integrate the role of the organic chemist with that of the reaction engineer" the author realising that it is so "difficult to bring chemist and chemical engineer together to promote a common endeavour". The author has a list of 30 questions, which a chemist should be able to answer before processes developed by them could be examined for further scale up. Chemical engineers called these the essential thirty, whereas chemists dismissed it as the dirty thirty!

The author's aim is to introduce more chemistry into engineering, and he has certainly achieved that. The book comprises five sections:

Part I. Reactions and Reactors in Organic Synthesis: Basic concepts (122 pages).

Part II. Catalysis in Organic Synthesis and Technology (180 pages).

Part III. Reactor Design for Homogeneous and Fluid-Solid (Catalytic) Reactions (126 pages).

Part IV. Fluid−Fluid and Fluid−Fluid−Solid Reactions and Reactors (144 pages).

Part IV. Strategies for Enhancing the Rates of Organic Reactions (324 pages).

As one can see from the above and from the list of contents in the 26 chapters, this is an immense amount of work for one author. In part 1, chapters include rates and equilibria in Organic Reactions—thermodynamic and extrathermodynamic approaches; estimation of properties of organic compounds; reactions and reactors—basic concepts; and complex reactions. (The author defines the latter as where more than one reaction occurs simultaneously, i.e., most organic reactions with large molecules would be complex). In this section organic chemists may find the mathematics a little daunting and the organic chemistry a little puzzling. However, there are lots of practical examples given (e.g., reaction optimisation in the production of β-hydroxy-β-methylbutyrate) most of which come from the chemical engineering literature or from unpublished work of the author, his students at Iowa State University, (Ames, Iowa), or his former colleagues in India.

Part II covers catalysis by solids (zeolites, heteropolyacids, clays, acids, and bases, ion-exchange resins, etc. followed by a more theoretical treatment of the catalyst microenvironment), homogeneous catalysis, and asymmetric synthesis. Of course much of this area is covered by other monographs—to which the author comprehensively refers—but maybe not in a form that is appropriate for chemical engineers. Thus, chemists may find that they know a lot of this section already, although the examples quoted may not be so familiar and worth reading for this factor alone.

Part III will be the most difficult section for chemists, covering plug-flow, mixed flow, batch and semibatch reactors, continuous stirred-tank reactors, fluidised bed reactors, etc. as well as mixing, reactor choice for maximising yield and selectivity. For chemists working in multipurpose equipment, where the process has to be fitted to the equipment, this section may not be too relevant. Chemists may also disagree with the definition of a semibatch process which the author defines as, not only where the reagent is fed into the batch but also where the product could be simultaneously removed (most chemists would define this as a continuous process). In this section we see the difference between chemist and engineer—the chemist preferring a batch or semibatch process with all of its advantages and disadvantages (not really explained in the book), whereas an engineer seems always to prefer a continuous process (since it is easier to model?).

Part IV covers multiphase processes, particularly gas−liquid and gas−solid−liquid processes. The examples are mainly from the bulk chemical industry or simple aromatic chemistry (e.g., nitro reduction). The concern is with mixing and mass transfer and the deriving of rate equations, and therefore, chemists without a mathematical bent will struggle here.

Part V contains a section (enhancing the rate of reaction), which I guess is not in any other text. It covers biphasic reaction engineering, phase-transfer reactions, bio-organic synthesis engineering, electro-organic and sono chemical synthesis, microphases, membrane reactor engineering, multifunctional reactor engineering (e.g., reactive distillation or crystallisation), and miscellaneous topics (photochemistry, micelles, microwave chemistry, supercritical fluids, etc.). This latter section makes excellent reading, since it looks at subjects (with which a chemist may be familiar) from a new viewpoint and from any experienced engineer's approach.

The lack of organic chemistry knowledge of the author, however, does make for some alarming statements. For

example in the epoxidation of olefins by MCPBA we are told that the product (by-product?) *m*-chlorobenzoic acid (MCBA) reacts further with MCPBA in most organic solvents when it is clear that it is the epoxide reacting with MCBA that is the problem. On this page (801) there are three examples, all of which I am familiar with, and I disagree with the chemical interpretation of all of them. This is a serious drawback in a work of this nature. Minor criticisms are that chemical names are not always accurate and some schemes are incorrectly drawn, sometimes making them incomprehensible. The work could possibly have benefited from an organic chemist's input in the later stages (e.g., to remove equations such as $H_2O_2 \rightarrow H_2O + O$).

There is much to admire in this book—the range of topics covered is immense, and the number of references large (over 2000), many of these to important reviews and books which may not be in the average organic chemistry library. There are a large number of references to Indian authors and a large number of patents but none that I could find to anything in *Org. Process Res. Dev.*—what an omission!. The references are not always up to date, reflecting that the work was finished in early 1999 and probably took years to write (the author was also ill during that time).

I think the book is worth purchasing (even at £150) despite the faults mentioned. The publishers again give us a measly eight-page index for a 900-page work, far too small, making it difficult to retrieve information. It does not help when, in the index, piezoelectric comes between phase-transfer and photographic! Proof reading on the publishers part would also help to minimise mistakes (thus 250 pages have the heading "strategies for enhancing rate reactions" instead of reaction rates.

OP010036R

10.1021/op010036r

Quaternary Ammonium Salts, Their Use in Phase-Transfer Catalyzed Reactions. By R. A. Jones. Academic Press: New York. 2001. $159.95. 565 pp. ISBN 0-12-389171-X.

The book, *Quaternary Ammonium Salts, Their Use in Phase-Transfer Catalyzed Reactions*, by R. A. Jones is a very useful resource for organic chemists. The key benefit of this book is the unprecedented collection of approximately 650 actual procedures for performing a wide variety of nucleophilic substitutions, base-promoted reactions, oxidations, reductions, and other reactions in which phase-transfer catalysis (PTC) excels. The procedures were compiled from extensive nonoptimized literature reports, and they serve as a starting point for the screening program of a new project. When a candidate reaction needs to be performed, the reaction category should be sought in this book (well-organized table of contents and index), and if PTC is applicable to the reaction, there is a high probability that a procedure will be found in the book.

This book is differentiated from the other best-selling PTC books by its focus on reaction procedures. Neither the Starks/Liotta/Halpern book (Chapman and Hall, 1994) nor the Dehmlow/Dehmlow book (VCH, 1993) provides nearly as many experimental procedures. However, the Jones book provides very little discussion of the mechanistic aspects of PTC or insight into choosing reaction conditions (by design?). The Jones book is preferred over the three-volume *Phase-Transfer Reactions: Fluka-Compendium* by Walter E. Keller (George Thieme Verlag, 1986, 1987, 1992) because the Jones book provides procedures and some discussion, whereas the Compendium provides scant detail, references only, and is much more expensive. A comprehensive perspective on PTC can be gained by a combination of the procedures of the Jones book with the guidelines and thought processes for developing PTC systems provided in the Starks/Liotta/Halpern book.

Every book has idiosyncrasies. In the Jones book, the triple-numbered headings within each chapter refer to procedures only, and when there is a discussion of the procedures, they precede the headings. Discussions relating to double-numbered headings appear after the heading. This takes some getting used to but is still useful because you can always count on seeing a procedure just after a triple-numbered heading, which is usually very descriptive (e.g., "5.2.1. Monoalkylation of amides"). Most of the references in the book are prior to 1990, which may be expected, and thus they are mostly covered in the other earlier classic PTC books. Another minor difficulty is the use of the terms Aliquat (trademark of Cognis Corporation) and Adogen (trademark of Witco Corporation) without reference to their product numbers (except in the Abbreviation section). This is a problem since the manufacturers of these trade-named catalysts have multiple PTC products which are gaining popularity (e.g., Aliquat 175), and unless one seeks the abbreviation table, the reader may be confused as to which catalyst is being used. The trademarks are also not properly referenced, and the name for Aliquat 336 should be tricaprylylmethylammonium chloride (tricapryl is different than tricaprylyl).

Overall, the Jones PTC book is useful as a resource and does not need to be read from cover-to-cover to be valuable. On a personal note, my first introduction to PTC was reading Jones' Aldrichimica Acta PTC article in 1976, and I have been a die-hard PTC chemist ever since!

Marc E. Halpern

PTC Organics, Inc., Mt. Laurel, New Jersey, U.S.A.

OP010035Z

10.1021/op010035z

Solid-Phase Synthesis: A Practical Guide. Edited by S. A. Kates and F. Albericio. Marcel Dekker: New York. 2000. 826 pp. $250. ISBN 0-8247-0359-6.

Kates and Albericio have done an excellent job of compiling this book, which is certain to prove useful to anyone who is involved in any aspect of solid-phase synthesis. In doing this, they undertook a significant challenge, because of the relatively explosive growth of the field during the almost 40 years since Merrifield first reported the solid-phase synthesis method for peptides. Obviously,

because of the history of the field, the majority of experience has been with solid-phase peptide synthesis, and the book certainly reflects this, with the first half being devoted to peptides. However, the second half of the book covers all of the many other important applications, including pseudopeptides and peptide mimics, oligonucleotides, oligonucleotide−peptide conjugates, peptide nucleic acids, oligosaccharides, and organic molecules, such as heterocyclic compounds. The book also contains several chapters, which are of general interest to all of the disciplines covered, including two particularly useful chapters on solid supports, one on instrumentation, and two on analytical methods for peptides and combinatorial arrays.

While there have been a number of excellent reviews in the individual fields, such as those by Merrifield, and also by Atherton and Sheppard, on solid-phase synthesis of peptides, to this reviewer's knowledge, this is the first book which attempts to provide an in-depth overview of all major applications of the solid-phase method, not only to peptides but also to other important fields, as noted above. Therefore, the publication of this book is particularly timely, both because of the need for such a broad overview and also because of the increasing diversity of applications of solid-phase synthesis, which, at the same time, overlap considerably with each other, especially in terms of the chemistry used. Each of the individual chapters is generally comprehensive and of a high standard. Furthermore, as the title suggests, in most cases, each of the authors of the individual chapters has not only provided a review of their particular topic, but also has given useful, practical examples of procedures, as well as a comprehensive bibliography for the topic. Therefore, the book will be a useful reference text, both to those who are new to any of the areas covered as well as to those who are experienced.

In summary, *Solid-Phase Synthesis: A Practical Guide* is the type of book that belongs in the library of everyone who is interested in this field. Not only does it provide informative, high-quality reviews of a wide variety of topics, with a total of over 2000 literature references, but it also supplements the reviews with useful working examples. The book more than lives up to the promise of its title—I highly recommend it.

Michael Verlander

PolyPeptide Laboratories, Inc., 365 Maple Avenue, Torrance, California 90503

OP000121J

10.1021/op000121j

The Nitro Group in Organic Synthesis. N. Ono. Wiley-VCH: Weinheim. 2001. 372 pp. DM 315. ISBN 0-471-31611-3.

This is the latest volume in the Wiley Organic Nitro Chemistry Series. The use of nitro compounds in organic synthesis has proliferated, and the book fulfils the need to cover latest developments—the author focuses attention on discoveries of the last 10−15 years, with references in year 2000 included. The arrangement of the chapters is the logical one for a synthetic chemist. After a brief introduction, the synthesis of nitro compounds is covered, with emphasis on environmentally friendly methods (although scale up or large-scale synthesis is not discussed). The Henry reaction is covered in great detail as deserves such an important reaction, and the latest asymmetric versions are discussed. Michael additions to nitro olefins, and by nitro alkyl compounds to Michael acceptors, are covered in chapter 4. Many further transformations of these products, for example to heterocycles, which are valuable synthetic methodologies, are discussed. Other chapters include alkylation, acylation, halogenation of nitro compounds, and other displacemen-treactions of NO_2 (including S_NAr). Cycloaddition reactions (70 pages) is the longest chapter, and inevitably much heterocyclic chemistry is covered. The final chapter discusses heterocyclic synthesis—especially pyrrole and indoles—using nitro compounds.

Nitro compounds are excellent for C−C bond formation, and any synthetic chemist, from reading or even skimming this work, will find lots of ideas for preparation of a variety of compounds. The author has covered the literature admirably, and the style is such that information is easy to assimilate. The work is highly recommended for all chemists; it should be in every library as the definitive book on modern nitro chemistry (particularly the Henry and Nef reactions).

A minor criticism is that the safety precautions in handling nitro compounds, particularly under basic conditions, could have been brought out, to emphasis the potential dangers with larger-scale work. The work is well referenced, but the patent literature has not been covered.

In summary, the volume is a must-buy for libraries and should be read by all involved in synthesis, whether in academia or industry.

OP010046S

10.1021/op010046s

Fundamentals of Process Safety. By Vic Marshall and S. Ruhemann. Institution of Chemical Engineers (IChemE): Rugby, Warwickshire, UK. 2001. ISBN 0-85295-431-X.

This is the course we all should have been required to take in school whether one is a practicing process development chemist or chemical engineer. Many would have enjoyed it. All, whether they realized it at the time or not, would have found it informative, ultimately valuable, and useful. *Fundamentals of Process Safety* provides a "one-stop shopping" treatise of a broad subject many of us in the process research and development arena take for granted. In particular the approach does an excellent job tying together the source of process hazards, separating the realization of the hazard with the impending consequence, and finally, offering comment and strategy for control to avoid all of the former. There is particular effort on the hazard consequence presentation and discussion that will entice the process development chemist and engineer to think beyond their immediate world of quality, yield, cost, and cycle time to consider the real-world possibilities presented by a scale-up gone bad. Subjects such as blast damage, BLEVEs,

chimney plumes, detonations versus deflagrations, emergency barriers, failure modes and rates, harm from emissions of thermal or pressure energy or toxics, hazards versus risk versus probability, spill on a lake versus spill on a canal or river are just a few of the consequences addressed. To reinforce the emphasis on consequences, the book offers 27 case histories efficiently summarized yet with pertinent references for those wanting more detail. In the very least, the book will demonstrate to the process development chemist and engineer why many of those other people in the corporation (environmental, process safety management, corporate loss prevention, etc.) have jobs. The desired outcome, of course, is a proactive process safety inoculation that is injected into the development sequence as early as possible.

Donald J. Knoechel

Pharmacia Corporation, Global Supply API, Process Safety Lab, Kalamazoo, Michigan

OP0100347

10.1021/op0100347

March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure, 5th ed. by M. B. Smith and J. March. Wiley Interscience: New York. 2001. 2112 pp. $69.95. ISBN 0-471-58589-0.

I was delighted to read that Jerry March's book was to come out in a new edition. I have always used it as a good reference source and for its mechanistic content. It was sad to hear, however, of March's death. Michael Smith of the University of Connecticut has undertaken a mammoth task to update the 4th edition (1994) and has added 41 new sections and 2800 new references, making 20 000 references in all.

Even in 2000 pages it is impossible to cover subjects in too great a depth, and inevitably, a lot has had to be left out. The value of the book is in its organisation by type of reaction, its excellent indexes, its large number of references, and its comprehensive nature.

If I have one quibble with the new editor, it is that he does not give enough focus to asymmetric synthesis—particularly to catalysis and to organometallic chemistry, which is now a standard part of synthesis. Thus, topics such as directed metalation, lanthanide reagents, and asymmetric reduction are only briefly mentioned. As such, it maintains an old-fashioned approach.

The updating has been well done, but in places, recent references to reviews could have been supplied. Thus, in the section on phase-transfer catalysis, the two books published in the 1990s on the subject do not appear in the references which only mention 1980 publications. Similarly, recent books on catalytic hydrogenations are not referred to.

Consequently, it seems that the updating of references is patchy. For the reader it is the references to key up-to-date reviews and monographs which are needed most, and these are not uniformly given.

Nevertheless, the book remains tremendous value for money—more pages per dollar than most other texts—so that it will remain a firm favourite as a general organic text and an easy-to-use one-volume reference. The 240-page author index and the 150-page subject index are an example to other books on how to provide easy access to a complete text.

The book will undoubtedly appear in all organic chemistry libraries and probably on many chemists' personal bookshelves too. No doubt the 6th edition is already being planned.

OP010074A

10.1021/op010074a

Solid-Phase Organic Syntheses, Vol. 1. Edited by Anthony Czarnik. Wiley Interscience: New York. 2001. 164 pp. £50.50. ISBN 0-471-31484-6.

Practicing organic chemists have come to rely on the series *Organic Synthesis* (OS) as a compendium of tried and tested methods for making organic compounds. The new field of solid-phase organic synthesis has now reached the point where it needs a similar reference work, partly because much of the work in this area has been carried out in industry and much remains unpublished. *Solid-Phase Organic Syntheses* was created to fill this need.

The editor has taken the view that the focus should be on a single type of synthetic transformation accomplished on a solid support. The volume contains procedures on functionalising resins/supports as well as a variety of procedures for synthesising a range of heterocycles, Mannich reactions, Mitsunobu reactions, and so forth, and so forth. There are 14 procedures in all, some giving more detail (up to 18 pages) than others (4 pages). The book is a little pricey for the length, so that only libraries will purchase a copy, unless, as with OS, a paperback edition is widely circulated to a segment of the ACS membership. No doubt the series will—as with OS—run and run.

OP0100753

10.1021/op0100753

Handbook of Heterogeneous Catalytic Hydrogenation for Organic Synthesis. By S. Nishimura. Wiley-VCH: New York. 2001. 700 pp. $175.00. ISBN 0-471-39698-2.

In the preface to the book, the author states that the "book is intended primarily to provide experimental guidelines for organic synthesis". I would disagree on the use of the words experimental guidelines, since there are no typical experimental procedures, no safety and handling information, and there is little practical detail on how to conduct a heterogeneous hydrogenation. Reactors are covered in one and a half pages—mostly a list of references to other sources—and scale-up issues are hardly mentioned, even in the section on nitro reductions.

Nevertheless, this is a very useful book, since it covers the topic from an organic chemist's viewpoint (rather than a catalysis expert's view). The chapters are arranged logically by type of reaction (reduction of alkenes, alkynes, carbonyls, nitriles, imines, nitros, acids and esters, aromatics, heterocycles as well as reductive alkylation, and hydrogenolysis. With over 700 pages the coverage is fairly comprehensive,

and anyone doing a catalytic hydrogenation should consult the relevant chapter for reference—the detail is excellent and should allow the chemist to choose how to carry out the process—I suspect this is what the author intends by the words "experimental guidelines".

Of course, a major disadvantage of any work on heterogeneous hydrogenation is that synthetic chemists in the lab just want a good synthetic method—they are not so concerned about whether it is heterogeneous or homogeneous. In fact they would like to compare the two types of hydrogenation. Perhaps the author will now produce a second volume on homogeneous hydrogenation.

A further disadvantage is that the book's references tend to be towards the older literature, with only a few to the 1990s literature—most of these are referenced to books derived from conference proceedings or to the author's own work.

Despite these criticisms, chemists will find this a useful guide, and it should be in all organic chemistry libraries. The volume will inevitably be compared to Augustine's *Heterogeneous Catalysis for the Synthetic Chemist* (Marcel Dekker, 1995) which has much more fundamental information about catalysis, catalytic mechanisms, and kinetics. The books are complementary—you should buy both!

OP0100798

10.1021/op0100798

Handbook of Analytical Techniques, Vols. I and II. Edited by H. Gunzler and A. Williams. Wiley−VCH: Weinheim. 2001. £285. 1196 pp. ISBN 3-527-30165-8.

The handbook comprises 30 chapters, each devoted to a different analytical technique and written by specialists in the field. The chapters were originally written for the 5th edition of *Ullmann's Encyclopedia of Industrial Chemistry* and have either been updated or completely rewritten. The aim is to provide a convenient source of analytical methodology data to those who do not have access to "Ullmann".

The introductory chapters cover general procedures such as sampling, chemometrics, quality assurance, and so forth. Industrial chemists will be surprised that sampling receives only six pages (and is treated rather superficially with little of practical value in terms of techniques), whereas, for example "Sample Preparation for Trace Analysis" receives 28 pages.

The rest of volume I is devoted to Trace Analysis, Radionucleotides in Analytical Chemistry, Enzyme and Immunoassays, four chapters on chromatography (Basic Principles, GC, LC, and TLC), Electrophoresis, Diffraction, and three chapters on spectroscopy (UV−visible, IR, and Raman, and NMR and ESR).

The chapters on chromatography are full of practical advice and make excellent reading in their 175 pages. The three spectroscopy chapters in volume I each have 40−50 pages, but one wonders whether this is sufficient. For example, in the NMR chapter, only one and a half pages are devoted to NMR of solids and its use in polymorphism gets a brief mention with no references (e.g., to S. Byrn's book *Solid State Chemistry of Drugs*, SSCI, 1999 which has an excellent section on solid-state NMR).

Volume II continues with more chapters on Spectroscopy (Mossbauer, MS, atomic, laser analytical, X-ray, fluorescence) and finishes with sections on Activation Analysis, Voltametry and Polarography, Thermal Analysis, and Calorimetry, Surface Analysis, Microscopy and Techniques for DNA Analysis.

The chapter on calorimetry devotes only three pages to the industrially important topic of reaction calorimetry, showing a figure describing the operating principle of the Contalab, no longer available, whilst failing to mention newer calorimeters. The accelerated rate calorimeter (ARC) is briefly mentioned, but further references are not given.

In summary, the two-volume set covers a vast amount of material in its 1200 pages, with a good index. Industrial chemists may find that many of the chapters are too theoretically orientated with not enough emphasis on practical applications with examples—surprising, given the origins from Ullmann. Chemists trying to build a personal library may be better advised to purchase individual monographs on the techniques of interest rather this compendium, which is rather expensive.

OP010084B

10.1021/op010084b