Scheme I shows two possible structures for the surface resulting from the reaction of alkylating agents with the (111)B face of InP. The issue of which, if either, of the diagrams shown is an accurate representation of this surface is presently being investigated in this laboratory, along with studies of the scope of the reaction chemistry of InP [and other group III–V (group 13–15) semiconductors].[18]

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(18) In this paper the periodic group notation in parentheses is in accord with recent actions by IUPAC and ACS nomenclature committees. A and B notation is eliminated because of wide confusion. Groups IA and IIA become groups 1 and 2. The d-transition elements comprise grups 3 through 12, and the p-block elements comprise groups 13 through 18. (Note that the former Roman number designation is preserved in the last digit of the new numbering: e.g., III → 3 and 13.)

*Book Reviews**

Encyclopedia of Polymer Science and Engineering. Volume 2. Second Edition. Edited by Herman F. Mark, Norbert M. Bikales, Charles G. Overberger, and Georg Menges. John Wiley & Sons: New York. 1985. xxiv + 814 pp.

This volume, prepared under the direction of J. I. Kroschwitz, contains articles ranging from anionic polymerization to cationic polymerization and includes topics such as antioxidants, automotive applications, azo polymers, biopolymers, bleaching, block copolymers, calendering, and carbon fibers, to name a few. Abbreviations, SI units, conversion factors, and unit symbols are listed in the fore pages. Standard usage of nomenclature and terminology is carefully respected. Relevant IUPAC nomenclature is summarized when appropriate as, for example, in the article on block copolymers. Bibliography sections which are provided at the end of each chapter range from brief listings consisting mainly of references to books and review articles (see chapter on anionic polymerization by S. Bywater or chapter on antibodies and antigens—polymer bound by W. J. Dreyer and A. Rembaum, for example) to what appears to be a more comprehensive compilation of general literature (as in Block Copolymers by G. Riess, G. Hurtrez, and P. Bahadur; Carbon Fibers by J. P. Riggs; or Cationic Polymerization by A. Gandini and H. Cheradame, for example). References include patent liteature when appropriate and cross-referencing appears to be adequate. In the articles on antifoaming agents, antioxidants, antiozonants, antistatic agents, azo compounds, biocides, etc., lists of commonly available products are provided along with consideration of health and safety factors.

In short, contributions in this volume provide an authoritative source of information that can be used both as reference material and as a teaching tool. This book should soon find its rightful place on the reference shelves of science libraries, as did the sixteen volumes of the predecessor first edition of this monumental Encyclopedia.

Rita B. Blumstein, *University of Lowell*

Scale up of Chemical Processes. By Attilio Bisio (Exxon Research and Engineering Co.) and Robert L. Kabel (Pennsylvania State University). John Wiley & Sons: New York. 1985. XV + 699 pages. $69.95. ISBN 0-471-05747-9.

In the words of the authors, "This book is designed to serve students, faculty, researchers, and practitioners alike." To accomplish this design, the authors have called upon 15 contributors to write all or parts of 14 of the 18 chapters. In addition to the 4 chapters written by the authors, they have done a good job of producing a relatively coherent text by organizing the book in a parallel structure at three levels. At the beginning of each chapter is a rigorous outline. At the end of the chapter is a nomenclature section and an extensive list of references (alphabetized by author). The chapter topics include mathematical modeling, reaction kinetics, reaction systems, selection of reactor types, mixing, flow, mass transfer, separations, and environmental considerations.

As one could expect from the authors' backgrounds, the book is written from an engineering perspective and contains many mathematical equations and models. The text contains clear tables and graphs which are related to the text but are also sufficiently self-explanatory such that the chapters can generally be skimmed if one desires. Many of the examples from industry deal with continuous rather than batch processes. Probably the most general but informative chapter is Gaining Experience Through Pilot Plants and Demonstration Units which ties together many of the presented concepts and theories. This chapter looks at the total picture of scaling up including use of vendor tests and necessary considerations for predicting commercial performance.

"Is there a Royal road to scale up?" the authors ask. The answer is no. However, to scale up one must understand the chemical and physical phenomena involved. This book reviews much of the art, theory, experience, and practices of scale up. And, in doing so, it adds yet more information for the process development scientist to use. This book contains something for everyone involved in scale up.

Roger N. Brummel, *Warner-Lambert Company*

The Chemistry of the Carbon–Metal Bond. Volume 3. Carbon–Carbon Bond Formation Using Organometallic Compounds. Edited by F. R. Hartley and S. Patai. John Wiley & Sons: New York. 1985. xiv + 489 pp. $160.00. ISBN 0471905577.

This volume will be welcomed by chemists interested in organic synthesis. In ten contributed chapters, the uses of tin and lead reagents (V. G. Kumar Das and C.-K. Chu), zinc, cadmium, and mercury reagents (L. Miginiac), η^3-allyl complexes of nickel, palladium, etc. (G. P. Chiusoli and G. Salerno), and transition-metal carbonyls (J. A. Davies and R. J. Shaver) are given a chapter each. There are also chapters on alkyne oligomerization (M. J. Winter), olefin oligomerization (O.-T. Onsager and J. E. Johansen), olefin and alcohol carbonylation (G. K. Anderson and J. A. Davies), olefin hydroformylation (J. A. Davies), olefin carbonylation (D. M. Fenton and E. L. Moorehead), and the Fischer-Tropsch Synthesis (G. Henrici-Olivé and S. Olivé). The several obviously missing topics, such as the use of alkali-metal and alkaline earth-metal reagents, are promised to be included in a companion volume now underway.

The chapters are supplemented by a 4-page list of abbreviations (a welcome feature), an author index, and a thorough subject index. The quality of production is up to the usual standards of the series. Structural formulas, for example, are uniform in style and very clear. The presence of running heads to the pages is admirable, but unfortunately, in the first two chapters they have been truncated to the point of uselessness and read simply "carbon–carbon bond formation". This is only a very minor detraction in such an excellent work.

Handbook of Reactive Chemical Hazards. Third Edition. By L. Bretherick. Butterworths: London, UK; and Stoneham, MA. 1985. xxvi + 1852 pp. $99.95. ISBN 0-408-01388-5.

Is it proper to think of a book about safety in the laboratory as expanding explosively? Fortunately, the price is not following suit. The author notes that since the previous edition, the work for which was completed in 1977, a very large amount of new information on chemical hazards has become available, at least partly as a result of a higher general level of concern.

This edition has been entirely reset and reorganized to include the new information. A section on specific chemicals (in formula-index order) is followed by one on classes, groups, and topics. Five appendices provide different ways for access to the information. No other work of this comprehensiveness appears to exist, and the importance of the information presented justifies having this work readily available (preferably in the laboratory rather than the library) where chemists are carrying out reactions. The prevention of one accident could save more than the price of the book, which, at less than 6¢ a page, is very reasonably priced.

*Unsigned book reviews are by the Book Review Editor.

Amino Acids and Peptides. Edited by J. S. Davies (University College of Swansea). Chapman and Hall: London and New York. 1985. ix + 430 pp. $69.95. ISBN 0-412-26950-3.

This is a reference work in which amino acids, peptides, and derivatives are listed in alphabetical order, roughly six to a page, with their structural formulas, source, physical properties, derivatives where appropriate, and key references. The information "is partially derived from the Fifth Edition of *Dictionary of Organic Compounds*", but "each individual entry has... been reviewed and... updated, and ... about 300 totally new entries have been added." Access to desired information is facilitated by an alternative name index and a formula index.

For those in this field, this is an affordable and convenient reference, and it should see a lot of use.

Theilheimer's Synthetic Methods of Organic Chemistry. Volume 39. Edited by A. F. Finch. S. Karger AG: Postfach, 4009-Basel, Switzerland. 1985. xxiv + 548 pp. $243.75. ISBN 3-8055-3987-8.

Papers published in 1983 and the first half of 1984 have been searched to provide the content of this latest volume of highly condensed and thoroughly organized data on reactions of preparative significance. Although experienced organic chemists will be quite familiar with this reliable aid to recent awareness and information retrieval, new chemists are always entering the field; to help them, the publishers now offer a free booklet entitled "Getting the Most Out of Theilheimer's Synthetic Methods of Organic Chemistry".

Although the content of the Theilheimer's series is now compiled by the Chemical Reactions Documentation Service of Derwent Publications Ltd. (London), the scope and style remain the same. A 5-page essay on Trends in Synthetic Organic Chemistry, itself very informative, based on publications in 1984 and 1985, precedes the bulk of the work. The essay introduces a mysterious new term in organic chemistry, "acoxylation" (ET, where are you?), but otherwise the work is remarkably free of errors. It is hard to open the book without being fascinated by the reactions reported, even though the information is very much condensed. Textual material is essentially confined to experimental detail. Apart from the logical order of the lay-out, there are the usual, exceptionally thorough, subject and formula indexes.

The Pyrimidines, Supplement II. By D. J. Brown (Australian National University), with a Chapter by R. F. Evans (University of Queensland) and Essays by W. B. Cowden and M. D. Fenn (Australian National University). John Wiley & Sons: New York. 1985. xxv + 916 pp. $195.00. ISBN 0471-02745-6.

This hefty Supplement reviews the subject for the period 1968–1983 and does not include any of the material in the earlier two volumes (which are out of print, but can be obtained as reprints from Krieger Publishing Co., P.O. Box 9542, Melbourne, FL). A helpful feature has been borrowed from *Beilstein*; all section headings and tables include the corresponding page numbers from the earlier volumes, preceded by *H* (for Hauptwerk) or *E* (for Ergänzungswerk). The appendix tables of simple pyrimidines have been combined into one gigantic table in alphabetical order. Even more gigantic is the list of references, which grinds to a halt at number 7120; they are numbered in sequence from the original work, and 2791 of them are new with this volume. With such a mass of information to deal with, the authors can easily be forgiven for omitting the patent literature! Considering the fecundity of pyrimidine chemists raises the fear of a future world awash in pyrimidines (or in papers describing them). Is it too soon to think about pyrimidine birth control measures?

This book is produced with the care that characterizes the series and is set in type and contains numerous well-drawn structural formulas. The index itself, 98 pp, must have required mighty labors. One hesitates to criticize such a massive effort for the welfare of organic chemistry, but the omission of authors' initials in the citations cannot be overlooked. How are we to know which of the papers attributed to "Brown" are the work of the senior author of this monograph?

Synthetic Reagents. Volume 6. Edited by J. S. Pizey. Ellis Horwood, Ltd.: London. John Wiley & Sons: New York. 1985. 438 pp. $89.95. ISBN 0-470-20152-5.

Three contributed chapters comprise this volume: Chloramine T, by D. H. Bremmer; Hydrogen Peroxide, by K. Pandiarajan; and Polyphosphoric Acid, by D. A. Rowlands. The three reagents were obviously chosen for their general usefulness. Each chapter in this series includes a word about preparation, but in the present case, the reagents are cheap commercial products. Description of the properties and general characteristics of the reagents follow. The bulk of each chapter, however, consists of a review of the reactions of the reagent, arranged according to the kind of substrate and plentifully adorned with equations and structural formulas. Unlike "Organic Reactions", this series does not have long tables of examples with yields, etc. References are abundant, and those for the third chapter are well over the thousand mark. The index of 24 pp is a big help in locating information but is well supplemented by detailed tables of content for each chapter and by sensibly chosen running heads. Altogether, this promises to become a well-used component of the organic chemist's arsenal of information sources.

Rodd's Chemistry of Carbon Compounds. 2nd Edition. Supplement to Volume IV. Part B. Five Membered Mono-Heterocyclic Compounds: Alkaloids, Dyes, Pigments. Edited by M. F. Ansell. Elsevier Science Publishers: Amsterdam and New York. 1985. xviii + 320 pp. $98.25. ISBN 0-444-42485-7.

This volume contains supplements to seven of the chapters of Volume IVB of the main work. Chapters 7 through 11, contributed by D. J. Robins (7 and 8), K. S. J. Stapleford (9), M. Sainsbury (10), and J. G. Woolley (11), cover alkaloids having five-membered rings. Chapters 12 and 13, which are planned to cover pyrrole pigments and porphyrins, have been omitted but are promised for a forthcoming supplement. In Chapter 14, M. Sainsbury reviews the indigo group of compounds, and D. J. Fry reviews cyanine dyes in Chapter 15. Unfortunately, neither the introduction nor the individual chapters specify the termination date(s) of the literature coverage.

These chapters are so written that they can stand alone, although they would best be used in conjunction with the original work. For economy in presenting a large amount of information, the style of writing is necessarily somewhat turgid, but that should not bother the enthusiast. Structural formulas are plentiful and are drawn in professional styles; the plural is required here, because the styles vary markedly among the chapters, and in some, the size of a benzene ring, for example, is only half that in others. This is actually a help, because the persistent lack of running heads on the pages makes it difficult to tell which chapter or section one has opened to, until one remembers to look at the structures and the typefaces. An index of 20 pp includes not only compounds but also reactions, techniques, and natural sources. Uncommon care has been paid to it, as shown by the presence of a 2-p guide to its use.

Computational Methods for the Determination of Formation Constants. Edited by D. J. Leggett (Dow Chemical USA). Plenum Press: New York. 1985. xvi + 478 pp. $75.00. ISBN 0-306-41957-2.

This volume is the most welcome compilation of computational methods to have appeared in years for those engaged in the study of equilibria in solution. Its nine chapters represent a thorough treatment of computational procedures for handling potentiometric and spectrophotometric data. Four programs are presented for the former, two for the latter, and one for both types of data.

Several of the early programs for the computation of formation constants, LETAGROP (1962), GAUSS (1963), and SCOGS (1968), have developed to SCOGS2 and the MINIQUAD series. The latest updated versions of each of the programs are provided. The programs have been tested by individual authors and also on a Honeywell 66/60 and on a VAX 11/780, under the FORTRAN 66 compiler. Input experimental data have also been supplied by each author. An interesting test would have been to run the various programs for a given set of experimental results.

An interesting chapter (Chapter 3) is concerned with the calibration of a glass electrode. A Fortran program named MAGEC (Multiple Analysis of titration data for Glass Electrode Calibration) is presented. The calibration problem can be solved for titrations even when protonation constants of a ligand are not known a priori. Also, small variations in liquid junction parameters cease to be a problem.

Stability quotients from absorbance data are handled by SQUAD which dates back to an early twist matrix algorithm of Sillen. Its very broad application is shown in the application to many systems with UV and visible spectral data. The program PSEQUAD is shown for the evaluation of potentiometric and/or spectrophotometric equilibrium data using analytical derivatives. The advantages of analytical derivatives are higher speed of calculation and better conveyance.

The final chapter, on STBLTY, describes nine major FORTRAN programs for the construction and refinement of equilibrium models. First is the computer generation of potentiometric data and distribution of species, then data reduction and Bjerrum analysis, free ion concentrations in solution, average composition of species in solution, and finally a series of linear and nonlinear least-squares refinements of constants. For those who have toiled long over these tedious calculations, this book is the most welcome sight since Hazel and Francis Rossotti's book a quarter century ago. It is a pleasure to see this active research field brought up to date by this volume.

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