in the presence of $Co(\alpha\text{-cqd})_2 \cdot H_2O$. The similar reaction in *trans*-1-phenyl-1-propene, however, gave only polymethylene. Bulky diazo compounds such as Ph_2CN_2 or 9-diazofluorene are not decomposed even above 60 °C. The reaction of dicyanodiazomethane with styrene proceeded at 35 °C to give 2-phenyl-1,1-dicyanocyclopropane in 20% yield. The enantioselectivity was only 4.6% and side reactions predominated. Diazoacetophenone and styrene also give a mixture of *cis*- and *trans*-2-phenyl-1-benzoylcyclopropane (cf. Table III). The trans isomer was obtained in an optical yield of 20%, which is considerably lower than the value obtained with diazoacetates. The optical rotation and configuration of the optically pure cis isomer are unknown.

Although most of the reactions have been performed in neat olefin, it is possible to dilute the reaction mixture with usual organic solvents, such as ethyl acetate, to an extent of ~3 M for the olefin concentration. Further dilution deactivates the catalyst and retards very much the reaction rate. The results in Table V show that the enantioselectivity does not decrease appreciably in most cases. Use of more strongly coordinating solvents such as pyridine or picolines decreases the activity and selectivity. Effects of these additives will be fully described separately.

Solvent Effects on Protomeric Equilibria: Quantitative Correlation with an Electrostatic Hydrogen-Bonding Model [*J. Am. Chem. Soc.*, **100**, 3961 (1978)]. By PETER BEAK* and JOHNNY B. COVINGTON, Roger Adams Laboratory, University of Illinois, Urbana, Illinois 61801.

Page 3961, lines 20 to 23 should read: 6-chloro-2-thiolpyridine (**6a**)-6-chloro-2-thiolpyridone (**6b**), 2-thiolpyridine (**5a**)-2-thiolpyridone (**5b**), and 4-thiolpyridine (**7b**)-4-thiolpyridone (**7d**).

Table I: the heading of last column should be **7c** and **7d**; the first column, line 12, *n*-butyl; line 14, *n*-propyl; line 16, methyl.

Page 3962, column 2, line 3: read **4c–4d** for **4a–4b**.

Book Reviews*

Pesticides. An Auto-Tutorial Approach. By GEORGE W. WARE (University of Arizona). W. H. Freeman and Co., San Francisco, Calif. 1975. xv + 191 pp. $5.95.

This paperbound book is based on the author's "programmed learning" lectures and is designed to give the layman "an appreciation for the fine state of this segment of chemical art and science." It might be a good book for chemists to recommend when acquaintances without professional chemical background ask about modern agricultural chemicals. It not only treats the many different types of pesticides from the standpoint of structure and function, but places the subject in perspective, with sections on legal aspects, toxicity, and safe handling.

Resinography. By T. G. ROCHOW and E. G. ROCHOW. Plenum Press, New York, N.Y. 1976. xiv + 187 pp. $25.00.

This book is subtitled "An Introduction to the Definition, Identification, and Recognition of Resins, Polymers, Plastics and Fibers." The authors point out that resinography is a comparison discipline to metallography and petrography and often uses the same instruments and investigative techniques. A course which they gave at the School of Textiles, North Carolina State University at Raleigh, provided the basis for this book, which may be the first on the subject. Their approach is more that of materials science than chemistry, but the subject is obviously one of importance to chemists concerned with plastics and their applications.

Compendium of Organic Synthetic Methods. Volume III. By L. S. HEGEDUS and L. G. WADE. John Wiley/Interscience, New York, N.Y. 1977. xv + 495 pp. $17.00.

This immensely useful work reaches its third volume with new authors, but is otherwise essentially unchanged. It presents in equation form, with clearly written structure, transformations of functional groups, and preparations of difunctional compounds, taken from the literature of 1974, 1975, and 1976. Access to specific information is actually fairly easy by scanning, but the organization of chapters by functional group prepared, and within each chapter, by kind of starting material, makes quick access possible. As in previous volumes, only yield and reference are given beside the equation itself.

Handbook of Nonprescription Drugs. Fifth Edition. Edited by R. P. PENNA and C. KLEINFELD. American Pharmaceutical Association, Washington, D.C. 1977. xiii + 387 pp. $12.50.

This book is intended to be a reference for practical information for use by pharmacists and others in related health care fields. It is composed of 32 contributed chapters, on such subjects as Laxative Products, Dental Products, etc., in which function and recommended use are given primary attention.

The Nature of Seawater. Edited by EDWARD D. GOLDBERG. Dahlem Konferenzen, Delbrückstr. 4C, D-1000 Berlin 33, W. Germany. 1975. 719 pp. $?

This soft-bound volume is the proceedings of an international conference held in 1975. It consists of papers and group reports, largely of a review nature. They are well illustrated and documented, and include many tables. The scope of the conference was wide enough to include such important topics as biodegradation of petroleum hydrocarbons, and biogenesis of halogenated sesquiterpenes. An extensive index increases its reference value.

Chemical Process Industries. Fourth Edition. By R. N. SHREVE and J. A. BRINK, JR. McGraw-Hill Book Co., New York, N.Y. 1977. 814 pp. $23.75.

This is a book for chemical engineers and for those chemists and others who want to find out something about the major chemical manufacturing processes. The material is presented in 40 concise chapters, on such subjects as "electrothermal industries", pharmaceutical industries", etc. The book contains enormous amounts of data in tables and has many diagrams and illustrations, including one of an early type of uranium bomb. Although this edition is said to have been extensively rewritten, the chemistry presented does not show it. Along with quite correct structural formulas, there are whole sections that have been unchanged from the 1930's, showing benzene rings as cyclohexane rings. Proofreading of the chemistry appears to have been nonexistent, and such abominations as "$CH_2{\equiv}CCl{\equiv}CH{\equiv}CH_2$" for chloroprene are common. It is a pity that an otherwise good work is so marred.

Aromatic and Heteroaromatic Chemistry. Volume 5. Senior Reporters: C. W. BIRD and G. W. H. CHEESEMAN. The Chemical Society, London. 1977. xv + 566 pp. $70.00.

This volume reviews the literature published between July 1975 and June 1976. The well-known chemists in the list of 13 reporters have demonstrated by the substantial efforts they have contributed how important they consider this activity of The Chemical Society to be.

The chapter topics are imaginative and draw one's interest; in addition to the obvious topics, there are chapters on ring transformations,

* Unsigned book reviews are by the Book Review Editor.

ring cleavages, and "Ring Systems of Topical Interest", for example. Many of the structures appearing in the last must have been a real challenge to the illustrator or compositor, and it is thus especially gratifying to find the entire book so well illustrated with structural formulas and equations. Another expensive convenience is the placing of the references at the foot of each page. It is most helpful that references to reviews are given as well as those to original research.

The Senior Reporters inform us that they are retiring, turning the responsibility over to a new team. They have done well and deserve our gratitude.

Foams. Edited by R. J. AKERS. Academic Press, New York, N.Y. 1977. x + 299 pp. $23.50.

The eighteen papers and one plenary lecture in this volume constitute the proceedings of a symposium held at Brunel University in 1975, organized by the Colloid and Surface Chemistry Group of the Society of Chemical Industry. Many of the contributions reflect the concerns of the surfactant industry, and applications dominate theory for the most part. One fascinating paper on beer foam discloses that it is essentially a polypeptide foam, and is sensitive to metal ions. Another paper has the startling title "Food Foams—Static and Dynamic." Marshmallows are static foams, but bread and meringues are dynamic. It does not, unfortunately, tell how to decelerate a descending soufflé, but reports on such things as results from the use of the remarkably named Chopin Zymotachygraph. This paper was enhanced by the showing of a film of sponge batter being baked on a microscope slide, but the reader, of course, must miss this diversion.

Chemical Milling: The Technology of Cutting Materials by Etching. By WILLIAM T. HARRIS. Oxford University Press, New York, N.Y. 1977. x + 371 pp. $35.25.

Chemical milling, by which metal is removed by chemical reaction, is an old technique of medieval origin that has had a rebirth in modern times as an important manufacturing process. At first limited to etching, and later to printing (especially photogravure), the process is now used extensively in the aerospace and automotive industries. Although this book is engineering in emphasis, one chapter does deal specifically with the chemistry involved.

Imaging Systems: Mechanisms and Applications of Established and New Photosensitive Processes. By K. I. JACOBSON and R. E. JACOBSON. Wiley/Halsted, New York, N.Y. 1977. 391 pp. $27.50.

Imaging is taken here to include all manner of technological means to produce an image, including conventional photography, thermography, diazo processes, xerography, and many less well-known methods. The approach is a nice blend of the applied and the scientific, and the chemistry of the processes is given full treatment, both descriptive and theoretical. There is even such unexpected information as a table of bond dissociation energies of organic halogen compounds. Any chemist curious about how a Xerox machine works, or what the chemistry behind the Polaroid SX-70 camera is, or the nature of Itek process, will find a satisfying exposition. There is a usefully detailed index.

Ceramic Microstructures '76. Edited by R. M. FULRATH and J. A. PASK. Westview Press, 1898 Flatiron Ct., Boulder, Colo. 1977. xvii + 907 pp. $46.50.

This book is the proceedings of the Sixth International Materials Symposium, held in 1976. It attempts to present "a comprehensive review of the advances in ceramic science and technology since the 1966 symposium . . .". It consists of a large number of contributed papers, most of which appear to be reports of original research, which deal with analytical chemistry, crystal chemistry, surface chemistry, mechanical and thermal properties, etc., of pure substances and ceramic formulations. The editors are to be commended for including a really substantial subject index (23 pp).

Polymerization of Heterocycles (Ring Opening). Edited by S. PENCZEK. Pergamon Press, New York, N.Y. 1977. 125 pp. $18.00.

This "book" is a reprinting of that portion of the journal "Pure and Applied Chemistry" containing the papers derived from the main lectures at the IUPAC symposium held in Poland in 1975. There are no preface and no index, and the pagination begins with p 247.

Colloid and Surface Science. Edited by E. WOLFRAM. Pergamon Press, New York, N.Y. 1977. 108 pp. $20.00.

This is another reprint of part of the journal *Pure and Applied Chemistry*. The papers are derived from the plenary and main lectures given at an international conference held in Budapest in 1975.

Chloramination Reactions. Edited by S. E. FRAZIER and H. H. SISLER. Wiley/Halsted, New York, N.Y. 1977. xiii + 229 pp. $28.00.

This is Volume 6 of Benchmark Papers in Inorganic Chemistry, published by Dowden, Hutchinson and Ross, and marketed by John Wiley & Sons. It is devoted to chloramine, from a 1907 paper of F. Raschig to a 1972 paper by Sisler and Kotia. The title is apt to be misleading, for the editors do not mean introduction of a chloramino group, but instead, any sort of reaction in which something is treated with chloramine. In fact, the reactions under consideration lead mostly to amination products as in the classical example of the Raschig synthesis of hydrazine from chloramine and ammonia.

It is an interesting group of 36 papers, which includes two complete reviews from *Chemical Reviews*. As customary in this series, the papers are reproduced exactly as they appeared in the original journals and are interspersed with commentary by the editors.

Rodd's Chemistry of Carbon Compounds. Second Edition. Volume IV. Part G. Edited by S. COFFEY. Elsevier Scientific Publishing Co., Amsterdam–New York. 1977. xviii + 506 pp. $79.75.

This volume is primarily devoted to fused-ring derivatives of pyridine, such as acridines, benzoquinolines, etc., and alkaloids containing the pyridine/piperidine ring skeleton. In addition, a chapter covers six-membered heterocycles containing a single phosphorus, arsenic, antimony, or bismuth atom. The alkaloid section, divided into six chapters, constitutes four-fifths of the book.

It is no surprise that this book continues the tradition of broad but selective treatment of the subjects, with much more information in tables, a vast bibliography, and a very generous proportion of structural formulas and equations. The subject index shows the usual thoroughness. No information is given about when the various contributors terminated their coverage of the literature, but casual examination suggests that this may have been some time ago. In fact, the chapter on heterocycles containing phosphorus, arsenic, antimony, and bismuth is inexcusably out of date, having no references later than 1972, and thus ignoring all the exciting advances of the last five years. It appears that the author may have relied on previous reviews of the subject and did not do the required literature searching. A shadow is thus cast over the timeliness of all the other chapters; some of them do, however, have more recent references.

Dictionary of Organic Compounds. Fourth Edition. Thirteenth Supplement. Oxford University Press, New York, N.Y. 1977. 270 pp.

This supplement is composed mostly of entries derived from papers published in 1976. In consists of new entries as well as supplements to previous ones and ranges from abrotanifolone to zingerone. It contains its own formula index.

Advances in Automated Analysis. Volumes 1 and 2. Edited by E. C. BARTON and eleven others. Mediad Inc., P.O. Box 417, Tarrytown, N.Y. 10591. 1977. Vol. 1: xvi + 490 pp.; Vol. 2: xi + 366 pp. No price stated.

This work consists of the proceedings of the 1976 Technicon International Congress; Vol. 1 is subtitled "Clinical and Hospital Management Symposia", and Vol. 2 is subtitled "Industrial Symposia". Volume 1 contains a large number of contributed papers, a large proportion of which deal with aspects of clinical analysis, from chemistry to instrumentation. Volume 2 is much concerned with monitoring of industrial waste and environmental quality, with chemical quality control in such areas as agriculture and pharmaceuticals, and new instrumental applications. The texts of some keynote addresses are also included.

These volumes will obviously be of value to chemists concerned with applied analysis of a sustained or repetitive situation. The papers are well illustrated and contain good bibliographies, but the subject indexes (separate for each volume) are quite inadequate and are little more than an alphabetized table of contents.

Chemicals for Crop Protection and Pest Control. By M. B. GREEN, G. S. HARTLEY, and T. F. WEST. Pergamon Press, New York, N.Y. 1977. xii + 291 pp. $9.50 softbound, $14.50 hardbound.

This book is a revised edition of "Chemicals for Pest Control", published in 1939. It approaches the subject from the standpoint of what is manufactured and is intended for the student of chemistry rather than agriculture or biology. In 23 chapters with such titles as "Synthetic Insecticides: Organophosphorus Compounds and Carbamates," Fumigants", etc., it gives structures, mode of action, use, and in some cases method of synthesis. It provides useful orientation for the chemist about to enter this important area of applied chemistry. It is pleasingly and thoughtfully written and includes such peripheral topics as "Responsibility of Manufacturers and Farmers to the Public".

The Chemistry of Pyrroles. By R. ALAN JONES (University of East Anglia) and GERRIT P. BEAN (Western Illinois University). Academic Press, London and New York. 1977. ix + 525 pp. $41.00.

This book is volume 34 of Organic Chemistry, a series of monographs under the general editorship of A. T. Blomquist and H. H. Wasserman.

The authors have aimed at a comprehensive survey that is selective and interpretive. Such a treatment of pyrrole chemistry is certainly needed, for, on the one hand, the subject is bewildering in its enormity, and, on the other hand, its importance in relation to naturally occurring substances is hard to overestimate. The eleven chapters include ones on structure and reactivity and physico-organic properties, as well as those of a more descriptive type. Such an interesting and controversial subject as aromaticity of the pyrrole ring is treated extensively and critically from both an experimental and theoretical standpoint. Tables of data are numerous. Reactions are treated mechanistically as well as descriptively. References, which are numbered in the thousands, appear to reach into 1975. Lastly, there is a good index.

From Neuron to Brain. By S. W. KUFFLER (Harvard University) and J. G. NICHOLLS (Stanford University). Sinaur Associates, Inc., Publishers, Sunderland, Mass. 1976. xiii + 487 pp. $18.00.

The continuing enormous proliferation of information concerning mechanisms of brain function provides a monumental task for authors attempting to summarize and synthesize this research into a comprehensive up-to-date text. Dr. Kuffler and Dr. Nicholls have avoided many of the inherent problems by admittedly relying heavily upon examples of concepts and research with which they are or have been actively involved, or for which they have considerable interest and enthusiasm. In addition to having focused their attention on a limited number of topics, the authors have made exclusive use of data and theories provided by specific outstanding research laboratories. A major strength of the text is the section on mechanisms for neural signaling. This section provides an in-depth analysis of the ionic basis of neural communication with special reference to methods used to obtain the results. Though the chapters in the section are detailed, the authors' obvious in-depth understanding and appreciation of the topic makes the section very readable and informative.

This text is not recommended for a survey course in neurobiology, but would provide excellent reading for advanced undergraduate seminars, graduate seminars, and for knowledgeable laymen and scientists who desire a better understanding of the excitement being generated in the neurosciences.

Fred H. Gage III, *Texas Christian University*

Elements of Organic Photochemistry. By DWAINE O. COWAN (the Johns Hopkins University) and RONALD L. DRISKO (Essex Community College). Plenum Press, New York, N.Y. 1976. ix + 586 pp. $27.50.

Organic photochemists have witnessed a recent surge of texts and monographs in their field. This text by Cowan and Drisko is written at an introductory level, readable by advanced undergraduate or beginning graduate students. It contains a rather broad survey of organic photochemical reactions, all of current interest to the field.

The introductory chapters are devoted to photophysical and photochemical concepts (Chapter 1), photochemical techniques (Chapter 2 and 3), the properties of triplet states (Chapter 5), and electronic energy transfer (Chapter 6). Included in these chapters is a review of the photochemistry of ketones (Chapter 4, type I and type II reactions, oxetane formation, etc.) and the photodimerization of anthracenes. The remaining chapters use a mechanistic approach and deal with "Dienone and Enone Photochemistry" (Chapter 7), "The Di-π-methane Photorearrangement" (Chapter 8), "Photochemical Cis-Trans and Valence Isomerization of Olefins" (Chapter 9), "Photodimerization and Photocycloaddition" (Chapter 10), and "Photoelimination, Photoaddition, and Photosubstitution" (Chapter 11). The last chapter (12) is "An Introduction to Photobiology".

While it is true that more detailed discussions of the individual topics are available in other, more specialized treatises, a favorable impact is achieved by bringing together all of the topics integrated with synthetic and mechanistic techniques in a single, descriptive text. As noted in the Preface, the subjects discussed in depth are those most familiar to the authors. These include excellent descriptions of techniques and experimental results from flash photolysis studies, of heavy-atom effects on cycloaddition reactions, and of the cis-trans photoisomerization of olefins. Other subjects are treated with less detail (photofragmentation reactions like photoextrusion of N_2, CO, CO_2, or SO_2, the theory and applications of CIDNP and the photochemistry of β,γ-unsaturated ketones) or not at all (singlet oxygen reactions and the photo-Fries rearrangement).

Perhaps the most serious criticism of this text is the lack of a glossary of the terms used in photochemistry. This along with a rather sketchy index adds difficulty to the task of looking up specific subjects. In spite of this, the text should find a good market among those teaching a specialty course in organic photochemistry.

Richard S. Givens, *The University of Kansas*

Stochastic Processes in Chemical Physics: The Master Equation. By I. OPPENHEIM (Massachusetts Institute of Technology), K. E. SHULER (University of California, San Diego), and G. H. WEISS (National Institutes of Health). The MIT Press, Cambridge, Mass. 1977. viii + 561 pp. $19.95.

"The Master Equation", which is the subtitle of this large volume, might well have been the main title since that is what the book is about. In general terms the master equation is an integro-differential equation for the singlet probability densities, $p(x)$, viz.

$$\partial p(x)/\partial t = \int dy\, a(x,y,t)p(y)$$

where $a(x,y,t)$ is the transition probability density. Although equations of this form are not appropriate for all physical processes (the Boltzmann equation, for example, is nonlinear), the master equation does provide a method for treating the statistical aspects of a diverse class of physical-chemical problems. As such, it is a good topic on which to "cut one's teeth" in stochastic theory.

This book is intended to provide an introduction to the use of the master equation in chemical physics, and it should be useful to graduate students studying theory and others with adequate training in mathematics. The book consists of two long chapters which introduce the reader to stochastic processes, in general (including cumulants, Markov processes, and Gaussian processes), and the master equation, in particular (derivation, properties, and methods of solution). These chapters should make easy reading for someone with a feeling for physical applications of stochastic processes, although the lack of examples may deter the uninitiated.

The remainder of the volume is taken up by reprints of 27 papers dealing almost exclusively with the master equation. As the authors mention in the introduction, their selection of papers was somewhat arbitrary and motivated by pedagogy. The papers clearly reflect the interests and personal contributions of the authors and their associates over the past 15 years. Because Oppenheim, Shuler, and Weiss are important contributors to the field, the collection of reprints is both broad and interesting. My chief disappointment is that they did not include the beautiful papers of L. Onsager and S. Machlup, "Fluctuations and Irreversible Processes", *Phys. Rev.*, **91,** 1505, 1512 (1953), which are classics and not reprinted elsewhere. Also with the exception of T. Kurtz's important paper on the thermodynamic limit of birth and death processes, none of the recent developments on nonlinear dynamics far from equilibrium are represented. Nonetheless, much of the important work of the 1950s and '60s is reprinted here, and the volume will serve as a good source for these papers. Indeed it complements nicely the reprint collection edited by N. Wax "Selected Papers on Noise and Stochastic Processes" (Dover Publications, New York, N.Y., 1954), the two volumes covering an important 40-year period of stochastic theory in chemical physics.

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