

**A C<sub>11</sub>H<sub>11</sub> Cation of Unusual Structure** [*J. Am. Chem. Soc.* 1973, 95, 935]. M. J. GOLDSTEIN\* and STANLEY A. KLINE, Department of Chemistry, Cornell University, Ithaca, New York 14853.

Redetermination of the cation <sup>13</sup>C NMR spectrum, by J. P. Dinnocenzo in this laboratory, has uncovered errors of numerical

Table I. Estimated and Observed NMR Chemical Shifts of 3<sup>a</sup>

nucleus	assigned location	model estimates		mean		obsd <sup>b</sup>
		5-ring	6-ring	5-ring	6-ring	
<sup>1</sup> H	A <sub>1</sub>	11.26 <sup>c,g</sup>	10.25			
	A <sub>2</sub>	5.65	6.00	7.62	7.20	8.09
	A <sub>3</sub>	2.31 <sup>d</sup>	2.31 <sup>d</sup>			
	B <sub>1</sub>	8.65 <sup>c,g</sup>	8.32 <sup>c</sup>	7.47	7.31	7.59
	B <sub>2</sub>	6.29 <sup>d</sup>	6.29 <sup>d</sup>			
	C <sub>1</sub>	2.70 <sup>d</sup>	2.70 <sup>d</sup>			
	C <sub>2</sub>	4.23 <sup>c,g</sup>	3.81 <sup>c</sup>	3.01	2.84	2.69
	C <sub>3</sub>	1.95 <sup>d</sup>	1.95 <sup>d</sup>			
	<sup>13</sup> C	A <sub>1</sub>	217 <sup>c</sup>	238 <sup>c</sup>		
A <sub>2</sub>		130 <sup>e</sup>	126 <sup>e</sup>	143	153	161
A <sub>3</sub>		9 <sup>f</sup>	9 <sup>f</sup>			
B <sub>1</sub>		136 <sup>c</sup>	145 <sup>c</sup>	133	136	139
B <sub>2</sub>		130 <sup>e</sup>	126 <sup>e</sup>			
C <sub>1</sub>		28 <sup>f</sup>	28 <sup>f</sup>			
C <sub>2</sub>		48 <sup>c</sup>	33 <sup>c</sup>	28	22	52
C <sub>3</sub>		9 <sup>f</sup>	9 <sup>f</sup>			

<sup>a</sup> δ<sub>TMS</sub> (ppm). <sup>b</sup> Internal reference CH<sub>2</sub>Cl<sub>2</sub>; <sup>1</sup>H NMR δ = 5.30 ppm, <sup>13</sup>C NMR δ = 52.9 ppm. <sup>c</sup> Cyclopentenyl and cyclohexenyl cations relative to external Me<sub>4</sub>Si; G. A. Olah, G. Liang, and Y. K. Mo, *J. Am. Chem. Soc.* 94, 3544 (1972). <sup>d</sup> Ketone 4, Table II. <sup>e</sup> Cyclopentene and cyclohexenes: D. E. Dorman, M. J. Jautelet, and J. D. Roberts, *J. Org. Chem.*, 36, 2757 (1971). <sup>f</sup> Nortricyclane: G. A. Olah and A. M. White, *J. Am. Chem. Soc.*, 91, 3955 (1969). <sup>g</sup> Unimportant differences in the 5-ring means (7.49, 7.38, 2.98) result from the cyclopentenyl δ values of M. Saunders and R. Berger, *J. Am. Chem. Soc.*, 94, 4049 (1972).

transcription that arose when the original data were transferred into Table I. Most notably, δ<sub>CS<sub>2</sub></sub> (CH<sub>2</sub>Cl<sub>2</sub>, internal) = 139 ppm, not 103 ppm as cited in the original footnote *b*. We take this opportunity also to replace the previously used <sup>1</sup>H NMR (τ) and <sup>13</sup>C NMR (δ<sub>CS<sub>2</sub></sub>) conventions by δ<sub>TMS</sub>. In the interest of historical accuracy, both the original experimental data and the original models are retained in the revised Table I (below); redetermined values differ insignificantly from the original ones.

As a result of these corrections, the observed <sup>13</sup>C NMR peaks still appear at lower field than do the estimated ones, but the discrepancies are much less.

**Electronic Control of Stereoselectivity. 4. Effects of Neighboring Fused Bicyclic Frameworks on the Stereochemical Outcome of Diels-Alder Cycloadditions to Cyclopentadiene Rings** [*J. Am. Chem. Soc.*, 102, 7218 (1980)]. MICHAEL C. BOHM, RICHARD V. C. CARR, ROLF GLEITER,\* and LEO A. PAQUETTE,\* Evans Chemical Laboratories, The Ohio State University, Columbus, Ohio 43210, Institut für Organische Chemie der Technischen Hochschule Darmstadt, D-6100 Darmstadt, West Germany, and Institut für Organische Chemie der Universität, D-6900 Heidelberg, West Germany

Page 7220, second column: The following sequence was omitted after line 15: A lesser amount (ca. 10%) of adduct 4 was also isolated.

Page 7226, second column, line 56: The <sup>13</sup>C NMR spectral data given are for compound 20. The corresponding data for 19 are: (CDCl<sub>3</sub>) 180.04, 154.14, 50.66, 48.11, 47.00, 46.58, 42.77, and 25.46 ppm.

Page 7226, second column, line 61: The <sup>13</sup>C NMR spectral data given are for adduct 4, but with an additional peak at 52.82. The correct data for 20 are given above on line 56.

## Book Reviews\*

**Industrial Organic Chemicals In Perspective. Parts I and II.** By Harold A. Wittcoff (Koor Chemicals Ltd., Beer-Sheeva, Israel) and Bryan G. Reuben (Polytechnic of the South Bank, London). John Wiley and Sons, New York, Chichester, Brisbane, Toronto. 1980. Part I: 298 pp, \$27.50. Part II: 502 pp, \$45.00.

This two-volume set is intended to bridge the gap between academic organic chemistry and finished products resulting from this chemistry and to show the place of the chemical industry in our modern economy. It is organized as a text for chemists and engineers who are planning to work in industrial chemistry. However, it also provides a very valuable general reference for those who are already in industry.

Part I presents an overview of the chemical industry and its place in the national economy including a description of the large volume organic chemicals and the major chemical companies. Following are detailed discussions of the prime sources of chemical raw materials for various industries. Chapter 2 discusses chemicals from natural gas and petroleum. Chapter 3 describes other raw material sources such as coal, fats and oils, carbohydrates, and fermentation. Chapter 4 presents detail on polymer synthesis, properties, and uses, followed by a chapter on industrial catalysts. The final chapter is a thought-provoking discussion of the future of the chemical industry.

Part II starts with a presentation as to who uses various chemicals, and is followed by more detailed chapters on plastics, fibers, elastomers, surface coatings, adhesives, surface active agents, pharmaceuticals, solvents, lubricating oils, plasticizers, agrochemicals, food chemicals, and dyes and pigments.

Both volumes are very readable and put together provide a concise as well as a detailed look into the total chemical industry. Each chapter contains an excellent annotated bibliography where the reader can find more information on the various subjects from both general and more detailed sources.

\* Unsigned book reviews are by the Book Review Editor

These books do provide the basis for the much needed communication between academic and industrial chemistry and will be useful as textbooks for both undergraduate and graduate courses in colleges and universities. Because of the clarity of presentation and the economic and descriptive discussions, as well as detailed examples of chemistry involved, these books will also provide a good reference for industrial training courses for middle managers and a refresher for practicing technical people in the various fields. Industrial chemists and engineers can profit by seeing the interrelationships between raw material availability and the technology necessary to create successful products. As a general reference, this will be a valuable addition to any technical library.

Donald R. Baer, *E. I. du Pont de Nemours & Co.*

**Residue Reviews. Volume 74.** Edited by F. A. Gunther and J. D. Gunther. Springer-Verlag, New York. 1980. viii + 138 pp. \$26.80.

There are three contributed chapters in this book: Molybdenum in the Environment; Fate of Polychlorinated Biphenyls in Soil-Plant Systems, and Fungicides for Gray-Mold Control. The first one reviews natural occurrences of molybdenum, discusses the role of molybdenum in animal and plant nutrition (it is an essential element), and then reviews the sources of environmental molybdenum enrichment (coal, sewage sludges, smelters). Although "the potential for Mo toxicity to human beings and nonruminant animals appears to be quite low", there is a potential hazard for ruminants, and control of the release of molybdenum from geological storage is needed. The second reviews contamination of the environment with chlorinated biphenyls, with particular emphasis on their potential for degradation. The many members of this group vary considerably in stability, and much important information remains to be learned, but it appears that degradation by soil microorganisms is the most promising means for their removal. The third chapter reviews the wide variety of substances that are used to treat fruit crops in order to

prevent molding. The emphasis is on analytical methods for their detection.

**Zeolite Technology and Applications.** Edited by J. Scott. Noyes Data Corp., Park Ridge, N.J. 1980. xiv + 381 pp. \$64.00.

In this book one finds the useful descriptive information in U.S. Patents "since January, 1977" collected, sifted, and organized. Natural and synthetic zeolites are considered. The bulk of the patents are concerned with the use of zeolites in petroleum cracking, reforming, aromatization, and oxidation of hydrocarbons, conversion of synthesis gas, etc. Another major area is in pollution control, especially of water, by sorptive or catalytic action.

**Synergetics Far From Equilibrium.** Edited by A. Pacault and C. Vidal. Springer-Verlag, New York. 1979. x + 175 pp. \$32.50.

In the preface to this volume of Proceedings, the editors note that "Laser emission, chemical reactions, fluid motions exhibit very particular phenomena when, under appropriate external action, they occur far from equilibrium". The papers included, some in French, some in English, were given at a meeting held in France in 1978 and include descriptions of experimental phenomena and theoretical attempts to rationalize them. The areas to which they relate are chemistry, biochemistry, physics, and engineering. This volume includes 25 papers plus a concluding address, which looks very mathematical. There is no index, but a list of contributors appears at the front.

**Solubility Data Series. Volume 11. Alkali Metal, Alkaline-Earth Metal and Ammonium Halides, Amide Solvents.** Edited by A. G. Kertes, B. Scrosati, and C. A. Vincent. Pergamon Press, New York and Oxford. 1980. xx + 354 pp. \$100.00.

This compilation of critically evaluated data on solubilities reaches a particularly important area with this volume, for the solutes considered are widely encountered, and the solvents include dimethylformamide and dimethylacetamide, which have assumed a prominent position as highly polar but aprotic media for reactions of inorganic and organic materials. The solutes in this volume actually include the corresponding pseudohalides (cyanides, thiocyanates, etc.) as well. As is customary in this series, the critical evaluation of the published data leads to "recommended values" where the data allow. The information in this volume is clearly of great value; the layout, however, makes inefficient use of space (there are large unprinted areas on every page, sometimes amounting to more than half the page) and causes one to wonder if the considerable cost of this series could be reduced. This volume has its own index.

**Nitrogen Fixation. Volumes I and II.** Edited by W. S. Newton and W. H. Orme-Johnson. University Park Press, Baltimore, MD. 1980. Vol. I: xii + 394 pp. Vol. II, xii + 325 pp. \$39.50 (for both).

An international symposium held in Madison, Wisconsin, in 1978, generated these Proceedings. Both reviews and accounts of original research are included. The papers are typeset and have tables, figures, and references. They are grouped under various headings, which give an idea of the scope of the symposium: Global Nitrogen and Carbon Economy; Genetics and Physiology; Nitrogenase and Cofactors; Chemical Models; Leguminous Associations; Nonleguminous Associations, and Cyanobacteria and Their Associations. From these one can see that industrial processes (Haber; Birkeland-Eyde) were not the concern of the symposium, which addressed itself chiefly to biological fixation. The two volumes are separately indexed.

**Fuels and Fuel Technology. Second (SI) Edition.** By W. Francis and M. C. Peters. Pergamon Press, New York and Oxford. 1980. xv + 716 pp. \$34.50 softbound; \$95.00 hardbound.

This fat volume is a revised and enlarged version of the original edition of 1965, which was written by Francis without collaboration. The authors state that their primary purpose was to convert the book into SI units, while bringing the technology up to date and adding a section on alternative energy sources. The last includes water, wind, wave, solar, and geothermal power and energy from biomass.

The character of the original edition is retained: the book is a set of lecture notes (called Data Sheets), packed with specific information in the form of tables, graphs, figures, definitions, and equations, with an occasional leading reference, held together with succinct narrative. These sections are designed for use by engineering students in British universities, and the emphasis is accordingly somewhat British, although remaining acceptably international. There is rather little chemistry as such included, although there is much material of use to chemists as background material. The breadth of the coverage, involving as it does sources, properties, processing, handling, combustion, sampling, energy balances, applications, etc., necessarily leads to limited depth, and readers

with special interests may consider the treatment of their fields somewhat superficial. It is nevertheless a most useful general reference, although its function would have been greatly improved by the addition of an index.

**Thermodynamic and Transport Properties of Organic Salts.** Edited by P. Franzosini and M. Sanesi. Pergamon Press, Oxford and New York. 1980. x + 370 pp. \$95.00.

This is a volume in the IUPAC Chemical Data Series; it emanates from the Commission on Thermodynamics. The intent is to give the best values of thermodynamic quantities, as determined by experts in the field. The content, which largely consists of tables, was prepared by 13 contributors, including the editors. The first part deals with pure salts, and covers PVT relationships, thermal properties, melting mechanism, and transport properties of molten salts. The second part covers salt mixtures, and includes phase diagrams. The third part is devoted to solutions, and includes consideration of micelle formation and liquid crystals. Two appendixes give data on aspects of the structure of pure solid organic salts and electrochemical studies in molten organic salts. Illustrations and diagrams are included, but there is no index.

**Chemical Diagnosis of Disease.** Edited by S. S. Brown, F. L. Mitchell, and D. S. Young. Elsevier-North Holland Biomedical Press, Amsterdam and New York. 1980. xviii + 1374 pp. \$74.75.

Books on clinical chemistry generally have the authors' attention focussed on the analytical methods, and the other side of the subject, interpreting the results, has been neglected. The editors of the present book have attempted to restore the balance by presenting a comprehensive treatise on the meaning of clinical chemical tests. It is composed of 25 chapters contributed by specialists from the English-speaking world, who present their subject more or less critically, relating interpretation to the methods of analysis. Everything is documented, and the references are cited with complete titles. There is an extensive index.

Because of the substantial effects of method and handling on the significance of test results, clinical chemists will find this book a valuable guide for improving their interaction with physicians. Biochemists will also find it useful to the extent that they are concerned with human biochemistry. It appears to be the sort of book that will see heavy use as a reference work.

**Werkstoff-tabelle. Dritte Bearbeitung, 7<sup>e</sup> Ergänzungslieferung (Acid Halides).** By G. Eisner. DEHEMA (Deutsche Gesellschaft für Chemisches Apparatuswesen), Frankfurt, West Germany, 1979. 35 pp. Loose-leaf binder (price not stated).

This is a compendium of information of the susceptibility or resistance to corrosion on the part of materials of commerce. It begins with a table of materials in which each is indicated as being stable, mostly usable, rarely usable, or unusable for use in contact with acid chlorides. There then follows a section of text primarily on the dangers and problems in handling specific acid halides, but including a brief review of properties, uses, and preparation and specific recommendations of materials that can be or are used for handling the acid chloride and for transporting it. The reverse aspect is given in another section, where the particular properties of individual materials, such as aluminum, nickel-chromium alloys, fluorocarbon resins, wood, etc., are taken up, with references to original reports of their behavior toward various acid halides. This work should be especially useful to chemical engineers, but it is not without relevance to the work of the general research chemist.

**Gas Tables: Thermodynamic Properties of Air, Products of Combustion and Component Gases; Compressible Flow Functions. Second Edition.** By J. H. Keenan, J. Chao, and J. Kaye. John Wiley & Sons, New York. 1980. xiv + 217 pp. \$22.50.

Nine tenths of this book is devoted to tables (62 of them) giving the information indicated by the title, in English units. A table of Physical Constants is a thoughtful new addition, but the data in it, curiously, are given in metric units and are therefore not compatible with the data in all the other tables, which utilize foot-pounds, BTU, and the Rankine temperature scale. The book concludes with a short section of text on sources of data, calculation methods, and examples.

**Annual Reports in Organic Synthesis—1979.** By L. G. Wade, Jr., and M. J. O'Donnell. Academic Press, New York. 1980. xiii + 461 pp. \$23.50.

Organic chemists have come to expect the annual appearance of this helpful and inexpensive means of keeping abreast with recent developments, and it is reassuring to read between the lines in the Preface that the compilers have not lost their energy and intend to keep on with future volumes. Most organic chemists will not need to be reminded that this series is largely composed of equations showing reactions by structural

formula, with only enough words, if any, needed to clarify a point. The references are mostly to 1979, with a few holdovers from 1978, and cover a range of 46 primary journals.

The design of this book is for quick visual identification of the desired information, a feature that extends to the organization of the material. The Table of Contents, set out in much detail on four pages, is the key, and it makes an index unnecessary (there is an author index, however). Three chapters are organized according to type of reaction, another deals with syntheses of heterocyclic systems, the fifth is devoted to protecting groups, and the last gives unclassifiable but useful transformations. A glossary of abbreviations has been included for the first time; it could be a help with earlier volumes as well.

**Drying. 1980. Volume 2.** Edited by A. S. Mujumdar. Hemisphere Publishing Corp., New York. 1980. ix + 532 pp. \$58.00.

This volume is the Proceedings of the Second International Symposium on Drying, held at McGill University in July, 1980. It contains the text of about sixty selected papers, reproduced directly from the authors' typescripts. They are grouped under several headings: Drying Theory and Fundamentals; Simulation Studies; Drying of Granular Materials; Drying of Foodstuffs and Grains; Drying of Pulp and Paper; Energy Aspects; Spray Drying; Drying of Coal; Solar Drying; Nonthermal Methods; and General Topics. The last group includes a fascinating paper on the cultural importance of drying, titled Drying Since the Millenniums, which traces the technology back 750 000 years.

**Encyclopedia of Chemical Technology (Kirk-Othmer). Third Edition. Volume 12.** Executive editor M. Grayson. John Wiley & Sons, New York. 1980. xxvi + 1037 pp. \$145.00.

Readers of reviews of earlier volumes will know that they consist of authoritative reviews packed with specific information. This volume contains 30 of them, ranging from Gravity Concentration through Hafnium, Hair Preparations, Herbicides, Histamine, Holography, Hydrazine, Hydroboration, Hydrocarbons, and Hydrogen to Hydrogen Energy. The contributors are easily recognized as outstanding experts in the subjects. Although "Technology" is prominent in the title, it does not suppress the chemistry in the content, which is full of equations and structural formulas (reliably correct). The result is a work that is not only of paramount reference value, but is also profitable and enjoyable for the ordinary chemist to browse in.

**A-Z of Clinical Chemistry.** By W. Hood. John Wiley & Sons, New York. 1980. vii + 386 pp. \$19.95.

This is a sort of dictionary or miniature encyclopedia, with one to five entries on a page. The entries are real paragraphs rather than definitions, and succinctly relate the terms to clinical chemistry. Chemical formulas are almost entirely absent, and entries under names of chemical substances are mostly confined to a succinct description of their physiological effects. As a quick source of such information, this book could be very convenient; there is no padding, and it gets quickly to the point.

**Masters Theses in the Pure and Applied Sciences. Volume 23.** Edited by W. H. Shafer. Plenum Press, New York. 1979. xv + 292 pp. \$75.00.

This is a compilation of Master Theses submitted in 1978, arranged by title according to discipline and university. They are drawn from universities in the USA and Canada. A total of 10 432 titles are reported, down slightly from the maximum resolved in the previous volume.

**Analytical Profiles of Drug Substances. Volume 9.** Edited by K. Florey. Academic Press, New York. 1980. ix + 618 pp. \$34.00.

A group of 21 contributed chapters, each devoted to a drug, ranging from bacitracin to trifluoperazine hydrochloride, makes up this volume. Each is an extensive review, covering general descriptive properties, synthesis or source, stability, and some pharmacological aspects, in addition to analytical chemistry. Reaction methods, chromatography, spectroscopy, and microbiological assay are considered, and many spectra are reproduced in sufficient size to be useful. The bibliographies are substantial, in one instance exceeding 400 references. A cumulative index to Volumes 1-9 is included.

**Cement and Mortar Technology and Additives. Developments Since 1977.** Edited by M. H. Gutcho. Noyes Data Corp., Park Ridge, N.J. 1980. xvi + 540 pp. \$54.00.

This book is part of the continuing series in which information buried in the United States patent literature is retrieved, digested, and presented in an orderly form. As is customary in the series, the significant technical disclosures are given in full detail, free of legal jargon and other smoke screens. A table of contents nearly ten pages long provides easy access to specific topics, which include aspects of manufacture, waste disposal, and utilization. There is a surprisingly large amount of chemistry involved, as suggested by two topics out of many: Matrix of Yttrium Oxide and Selected Aqueous Salts; Synergistic Effect of Sodium Citrate and Pentasodium Tripolyphosphate Additive on Calcium Aluminate.

**Vapor-Liquid Equilibrium Data Bibliography. Supplement II.** By I. Wichterle, J. Linek, and E. Hála. Elsevier Scientific Publishing Co., Amsterdam and New York. 1979. viii + 286 pp. \$61.00.

This supplement covers the data reported in the primary literature for the years 1976, 1977, and 1978, with some material overlooked in the two earlier volumes. It is a bibliography only; the data themselves must be sought in the original literature. The information is set out in computer print-out form organized in formula-index fashion. No less than 816 references are given.

**Topics in Antibiotic Chemistry. Volume 4. The Chemistry and Antimicrobial Activity of New Synthetic  $\beta$ -Lactam Antibiotics.** Edited by P. Sammes. John Wiley and Sons (Halsted Press), New York. 1980. 278 pp. \$75.00.

The last three volumes of this series have already attracted the attention of many organic and medicinal chemists. This volume which is devoted entirely to new synthetic  $\beta$ -lactam antibiotics is bound to appeal to a very wide circle of readers.

Edited by Professor Sammes and authored by Drs. Jung, Pilgrim, Poyser, and Siret of ICI Pharma S. A., Reims, France, all of whom have been engaged in research on  $\beta$ -lactams, this is an authoritative volume written by experts for the use of experts. Literature citations mostly from the late 1970's, including a few from 1979, number 575. The material is divided into three chapters: Total Synthesis, New Structures Obtained by Semisynthesis, and Modifications at Various Sites in Penicillins and Cephalosporins. For convenience the information in each chapter is arranged by sections and subsections. This is helpful since the subject index is of modest size and there is no author index.

The emphasis in this book is on synthetic chemistry but each chapter carries a number of tables describing the antibiotic activity of various  $\beta$ -lactams. Many readers will be appreciative of this body of biological information which is not readily available from other sources.

The coverage of the field is thorough but terse. The numerous reaction schemes greatly aid the reader in following the chemistry which is described quite briefly of necessity since the book has less than 300 pages. The reviewer made a few spot checks for accuracy and was able to find only one misplaced reference.

New entrants to the field of  $\beta$ -lactams and those with only casual acquaintance with the chemistry of penicillins and cephalosporins will find the book difficult at first reading. At the end of the book there is a list of abbreviations with corresponding structures shown in detail which is a help to neophytes in making sense out of acronyms that have to be used in the interest of brevity. It is unfortunate that the numbering system used for penam and cepham structures is not on display anywhere in the book. The practicing  $\beta$ -lactam chemist, however, will use this book for the valuable aid it can give in locating methods developed prior to 1979.

Such is the momentum of progress in the field of  $\beta$ -lactams, that in less than two years since the manuscript of the book was finished, there is new material that could add another whole chapter to this book. For those who have to keep up-to-date with the field of  $\beta$ -lactam antibiotics access to this book is essential. But for the high price of the book, many an organic chemist and medicinal chemist would have liked to have a copy for their personal library.

Ajay K. Bose, Stevens Institute of Technology