

with Raney nickel to 2,4-methanoprotoadamantane (**3b**), which was identified by comparison of its ^{13}C NMR, ^1H NMR, IR, and mass spectra with spectral data reported for this hydrocarbon.¹³ This strongly confirms the structure established for **2**.

The central bond in **2** was readily cleaved by electron-transfer hydrogenation with lithium in an ethylamine-hexane mixture at -30°C .¹⁴ The only product was 2,4-methanoprotoadamantane (**3b**) (80%). Catalytic hydrogenolysis with Pd/C, however, gave a mixture of products. With oxygen, **2** reacted slowly producing a polymeric material, which was scarcely soluble in toluene- d_8 .

Glacial acetic acid reacted with **2** instantaneously and exothermally, yielding almost quantitatively (by ^{13}C NMR) a mixture of 4-*exo*-acetoxy-2-methyleneprotoadamantane (**6**), 2-(acetoxy-methyl)-2,4-didehydroadamantane (**7**), and 2-*anti*-acetoxy-4-methyleneadamantane (**8**) (Scheme II). Products **6**–**8** were identified by comparison of their ^{13}C NMR and ^1H NMR spectra with those of authentic samples.^{4h,9b} The major product^{4h} (**8**) was previously isolated by GC, while **6** and **7** were identified in product mixtures enriched with them. The mechanism presumably involves a proton attack on carbon 3 of the propellane central bond leading to bicyclobutonium protoadamantyl cation **4**. (If the proton attacked carbon 2, rather than 3, other products would be formed instead of **6**–**8**.) The exclusive formation of the *exo* epimer of homoallyl acetate **6**, along with the formation of cyclopropylcarbinyl acetate **7**, strongly suggests that this cation is bridged. The adamantyl acetate **8**, however, cannot be formed directly from **4**. It is probably formed from bicyclobutonium adamantyl cation

5 by the attack of an acetoxy anion on carbon 4 from the side unhindered by bridging. Cations **4** and **5** are in a fast equilibrium. Owing to its adamantane structure, the latter should be more stable. Cyclopropylcarbinyl acetate **7** can arise from either of the two bridged cations (**4** and/or **5**) by attack on carbon 11.

In conclusion, it should be noted that the proton attacks exclusively one (carbon 3) of the two unequivalent inverted carbon atoms in the starting propellane **2**. Neither of these two carbons appears to be substantially more sterically hindered than the other, and the resulting carbocation **4** should be more distorted from planarity (higher in energy) than a carbocation that would arise by the attack on carbon 2.¹⁵ This is consistent with our starting hypothesis of different electron densities near unequivalent inverted carbons in unsymmetrical propellanes such as **2**.¹⁶ The electron density outside carbon 3 should be higher than that outside carbon 2, while between these two carbons it is most probably lower than outside either of them.

Acknowledgment. This investigation was supported by a grant from the Research Council of the Republic of Croatia (SIZ II) and US-Yugoslav Cooperative Program PN-531 (NSF). We thank Dr. K. Mlinarić-Majerski for an authentic sample of 2-(hydroxymethyl)-2,4-didehydroadamantane.

Registry No. **1**, 107616-71-7; **2**, 107616-72-8; **3a**, 107616-73-9; **3b**, 55638-02-3; **6**, 107616-74-0; **7**, 87433-57-6; **8**, 87433-51-0; MeSSMe, 624-92-0.

(15) This was estimated by careful examinations of molecular models of **2** and the relevant carbocations.

(16) Electron densities near unequivalent inverted carbons in some other unsymmetrical propellane may, naturally, be less different or even equal.

(13) Sasaki, T.; Eguchi, S.; Hirako, Y. *J. Org. Chem.* **1977**, *42*, 2981–2985.
(14) Moore, W. R.; Hall, S. S.; Largman, C. *Tetrahedron Lett.* **1969**, 4353–4356.

Book Reviews*

Crystallographic Computing. Volume 3. Data Collection, Structure Determination, Proteins, and Databases. Edited by G. M. Sheldrick (University of Göttingen) and C. Krüger and R. Goddard (Max-Planck-Institute). Oxford University Press: New York, 1985. ix + 314 pp. \$35.00. ISBN 0-19-855211-4.

This book containing 33 papers from an international summer school in Germany in 1984 is aimed at specialists. The descriptions of crystallographic databases and some suggestions for speeding up electronic computations may also have interest for some who are not crystallographers. A discussion of least-squares methods by D. Watkin clarifies important points relevant to any type of experiment which involves a large data set and a complicated model. Most of the rest concerns highly specialized practical details of experiment and analysis in crystal structure research or descriptions of particular software systems and computer hardware. It is rich in useful hints for better technique and warnings of errors and pitfalls. The authors are experts. This volume is highly recommended to others who are, and to those who aspire to become, experts in structure analysis.

David H. Templeton, *University of California, Berkeley*

Volumes of Proceedings

Development of Drugs and Modern Medicines: A Conference To Honour Professor Arnold H. Beckett. Edited by J. W. Gorrod, G. G. Gibson, and J. Mitchard. VCH Publishers: New York, 1986. x + 669 pp. \$163.00. ISBN 0-89573-557-1

This "Festschrift" contains 63 papers delivered at a 1985 conference held in Chelsea, U.K. The subjects range from design to evaluation, metabolism, toxicity, delivery, and pharmacokinetics. Indexed.

Stereochemistry of Organic and Bioorganic Transformations. Edited by Wilhelm Bartmann and K. Barry Sharpless. VCH Publishers: New York, 1987. xii + 330 pp. \$54.00. ISBN 0-89573-607-1

The Editor's preface begins with these statements: "The gathering, distribution, and cataloging of the ever increasing scientific information can be solved with the instruments of the computer age. However, the

selection and classification of those results which determine the frontiers of scientific progress must remain the privilege of a few." These thoughts were presumably the guiding spirit in the selection of an outstanding group of chemists, who have contributed 18 papers, drawn from a conference held in Schloss Reisenburg in 1986. They are reproduced from typescript and are accompanied by a good index.

Surface and Interface Analysis. Volume 9. John Wiley & Sons: New York, 1986. iv + 522 pp. \$160.00. ISBN 0471-91160-7

Proceedings of a European Conference on applications of the title subject, held in The Netherlands in 1985, consisting of a large number of papers and short abstracts, under the general headings Techniques, Quantification, Metallurgy, Catalysis, Electronics, Semiconductors and Thin Films, Corrosion, Polymers, Adhesion, Ceramics, and Tribology and Environmental. The papers are nicely set in type, and there are many photographic illustrations. There is an index only of contributors.

Organic Pollutants in Water: Sampling, Analysis, and Toxicity Testing. Edited by I. H. (Mel) Suffet and Murugan Malaiyandi. American Chemical Society: Washington, DC, 1987. xvi + 797 pp. \$94.95. ISBN 0-8412-0951-0

The symposium from which this book was developed took place in Philadelphia in 1984. It contains 36 papers and the transcript of a panel discussion, all of which have gone through more than the usual editorial attention, and are, appropriately, set in type. The subject headings are the following: Protocols; Reverse Osmosis to Isolate Organic Pollutants from Water; Synthetic Polymers for Concentrating Organic Chemicals from Water; Novel Methods to Isolate and Fractionate Organic Chemicals in Water Samples; Comparison of Isolation Methods; Case Histories; Biological Testing; and Toxicological Testing-Analysis Interface. The overall picture drawn of what we drink is unsettling but fascinating. The index is uncommonly thorough.

Bioactive Analytes, Including CNS Drugs, Peptides, and Enantiomers. Edited by Eric Reid, Bryan Scales, and Ian D. Wilson. Plenum Press: New York, 1986. xiv + 422 pp. \$69.50. ISBN 0-306-42400-2

*Unsigned book reviews are by the Book Review Editor.

The 6th International Bioanalytical Forum, held in Guildford, U.K., in 1985, is the source of the 26 papers included in this book. After each group of related papers, a section of extensive, formal Notes and Comments follows, most of which are contributions in their own right. There are two indexes: Analyte and General.

Agricultural Uses of Antibiotics. Edited by William A. Moats. American Chemical Society: Washington, DC. 1986. x + 189 pp. \$39.95. ISBN 0-8412-0996-0

The 15 typescript papers in this book derive from a symposium held in Chicago in 1985. They are divided among the headings Uses, Risks and Benefits, and Residues. Indexed.

Ecology and Metabolism of Plant Lipids. Edited by Glenn Fuller and W. David Nes. American Chemical Society: Washington, DC. 1986. viii + 374 pp. \$69.95. ISBN 0-8412-1006-3

The 22 typescript papers in this book are concerned with interactions between plants and other plants, insects, nematodes, and microbes. Thoroughly indexed.

Mass Spectrometry in the Analysis of Large Molecules. Edited by C. J. McNeal. John Wiley & Sons: New York. 1986. x + 221 pp. \$44.95. ISBN 0471-91262-X

The 13 typescript papers in this volume were presented at a symposium with an international selection of contributors, held at Texas A&M University in 1986. There is a 2-page epilogue and a substantial subject index.

Radon and Its Decay Products: Occurrence, Properties, and Health Effects. Edited by Philip K. Hopke. American Chemical Society: Washington, DC. 1987. xii + 609 pp. \$89.95. ISBN 0-8412-1015-2

The typescripts of 41 papers, derived from an ACS Symposium held in New York in 1986, make up this volume. They are grouped under the headings Occurrence, Measurement Methods, Properties, Health Effects, Mitigation Methods, and A Layman's Guide. This is a timely appearance, considering the growing public concern over pollution of indoor atmospheres. Indexed.

Laser Surface Treatment of Metals. Edited by Clifton W. Draper and Paolo Mazzoldi. Martinus Nijhoff Publishers: Dordrecht and Boston. 1986. xx + 680 pp. \$134.00. ISBN 90-247-3405-3

A large number of papers, grouped into "chapters", make up this volume, which collects the proceedings of a NATO Advanced Study Institute, held in Italy in 1985. Edited questions are included, and there is a short subject index.

Chemical Events in the Atmosphere and Their Impact on the Environment. Edited by G. B. Marini-Bettolo (Pontifical Academy of Sciences). Elsevier Scientific Publishers: Amsterdam and New York. 1986. xii + 702 pp. \$164.75. ISBN 0-444-99513-7

Refreshingly different, this volume derives from a "study week" rather than a conference, symposium, or workshop. The event took place in 1983 at the Pontifical Academy of Sciences, and it gave rise to 23 papers, which are accompanied by transcripts of the discussions, all nicely set in type. There is no subject index, but only an index of the contributors. In the review copy, the binding is inverted with respect to the pages.

New Trends in Natural Products Chemistry 1986. Edited by Atta-Ur-Rahman and Philip W. Le Quesne. Elsevier Science Publishers: Amsterdam and New York. 1986. xiv + 674 pp. \$148.00. ISBN 0-444-42691-4

An international symposium combined with a Pakistan-U.S. Workshop on Natural Products Chemistry was held in Karachi in January 1985. Forty-four typescript papers from the occasion are collected in this volume; they all appear to be reports of original research. There is an index of contributors, but unfortunately there is no subject index.

Polymeric Materials for Corrosion Control. Edited by Ray A. Dickie and F. Louis Floyd. American Chemical Society: Washington, DC. 1986. x + 374 pp. \$69.95. ISBN 0-8412-0998-7

This volume of 31 typescript chapters is concerned with polymeric coatings. The papers originated in a symposium held in Chicago in 1985 and are divided into three categories: Evaluation of Material Performance; Adhesion and Interfacial Aspects of Corrosion Protection; and Materials for Corrosion Protection. An extensive subject index is included.

New Synthetic Methodology and Functionally Interesting Compounds. Edited by Zen-ichi Yoshida. Elsevier Science Publishers: Amsterdam and New York. 1986. xiv + 442 pp. \$158.00. ISBN 0-444-98996-X

The 24 typescript papers in this volume come from the 3rd International Kyoto Conference on New Aspects of Organic Chemistry, held in

1985. The editor was evidently hard put to find a title for a disparate collection of papers, the topics of which range from "organic metals" to pharmacological studies on tumor promotion, including some that are not concerned with synthesis. Seven of the papers are on methodology, nine are on "biologically interesting compounds", seven are on "photochemically, electrically, or magnetically interesting compounds", and one falls alone in the category "biomimetic systems". Indexed.

Insect Neurochemistry and Neurophysiology 1986. Edited by A. B. Bořkovec and Dale B. Gelman. Humana Press: Clifton, NJ. 1986. xii + 484 pp. \$69.50. ISBN 0-896030119-5

The Second International Conference on the title subject was held at the University of Maryland in 1986. It consisted of seven reviews (over 20 pages each) and a large number of reports of recent research, all of which are presented in typescript form. The reviews, which deal with neuropeptides, neurohormones, the chemistry of nerve transmission, amine receptors, etc., are largely chemical in nature. Indexed.

Progress in Colloid & Polymer Science. Volume 72. Polymers as Colloid Systems. Edited by H.-G. Kilian and A. Weiss. Steinkopff Verlag: Darmstadt, and Springer-Verlag: New York. 1985. vi + 134 pp. \$52.50. ISBN 0-387-91288-6

The proceedings of the 32nd meeting of the Kolloid-Gesellschaft, held in Berlin in 1985, consisting of 16 papers, set in type, accompanied by a subject index.

Supercomputer Simulations in Chemistry. Edited by M. Dupuis. Springer-Verlag: Berlin and New York. 1986. vi + 312 pp. \$35.60. ISBN 0-387-17178-9

Proceedings of a symposium held in Montreal in 1985, consisting of 15 papers set in type, but not provided with an index.

Photovoltaic Materials and Devices. Edited by B. K. Das and S. N. Singh. John Wiley & Sons: New York. 1985. xii + 448 pp. \$39.95. ISBN 0-470-20224-6

A symposium held in New Delhi in 1984 produced the many papers in this volume, which is set in type. The five "Chapters" are the following: Photovoltaic Systems and Applications; Silicon and Silicon Solar Cells; Amorphous Silicon Solar Cells; MIS and Thin Film Heteroconjugation Solar Cells; and Photoelectrochemical Solar Cells. Indexed.

Cancer Prevention: Strategies in the Workplace. Edited by Charles E. Becker and Molly Joel Coye. Hemisphere Publishing Co.: New York. 1986. xii + 155 pp. \$39.95. ISBN 0-89116-441-3

The Second Annual Occupational Cancer Conference, held in San Francisco in 1984, was responsible for the 15 typescript papers in this volume. Many of them deal with carcinogenic chemical substances. Indexed.

Current Issues in Clinical Psychology. Volume 4. Edited by Gill Edwards. Plenum Press: New York. 1986. viii + 247 pp. \$37.50. ISBN 0-306-42152-6

A 1984 conference held in Chester gave rise to the papers in this volume, which will be of interest to chemists primarily because of the intriguing titles, such as "Dialectical Drinking and the Problem of Balance", and "Forensic Assessment and the Killing of Partners".

Photochemistry of Environmental Aquatic Systems. Edited by Rod G. Zika and William J. Cooper. American Chemical Society: Washington, DC. 1986. viii + 288 pp. \$54.95. ISBN 0-8412-1008-X

The 20 papers in this volume derive from a symposium sponsored by the ACS Divisions of Geochemistry and Environmental Chemistry in Miami Beach in 1985. The subjects are the following: Transformation of Xenobiotic Compounds; Inorganic Photooxidants; Photosensitization in Natural Waters; Heterogeneous Reactions; and Modeling and Actinometry. Indexed.

Electrophoresis '86. Edited by M. J. Dunn. VCH Publishers: New York. 1986. xviii + 765 pp. \$99.50. ISBN 0-89573-583-0

The International Electrophoresis Society met in London in 1985; most of the invited and contributed papers and poster presentations are included in typescript form in this volume. A number of papers are included in a curiously titled section, "Stop Press Contributions". Indexed.

Electrochemistry and Reactivity of Systems Containing π Electrons. Edited by William H. Watson. VCH Publishers: New York. 1986. xiv + 439 pp. \$44.90. ISBN 0-89573-117-7

A symposium that was held in 1982 "in recognition of Professor Paul Bartlett's many years of leadership in physical organic chemistry" gave rise to the 12 typescript papers in this volume. The subjects range from theoretical treatment to synthesis, with much attention to reactivity, selectivity, and structure. Indexed.

Allelochemicals: Role in Agriculture and Forestry. Edited by George R. Waller. American Chemical Society: Washington, DC. 1987. xviii + 606 pp. \$94.95. ISBN 0-8412-0992-8

Allelochemicals are substances produced by a plant that are inimical to other plants or to plant pests. Their study grows in importance as the need to increase crop yields and reduce residues of pesticides increases, and the symposium of which this volume is the proceedings is timely. It was held in Chicago in 1985 and gave rise to the 51 papers included. They fall into the categories Overview of Allelochemicals from Around the World, Plant-Plant and Plant-Soil-Plant Interactions, Plant-Insect Interactions, and Plant-Microbial and Plant-Animal Interactions. Indexed.

Bio-Organic Heterocycles 1986: Synthesis, Mechanisms and Bioactivity. Edited by H. C. van der Plas, M. Simonyi, F. C. Alderweireldt, and J. A. Lepoivre. Elsevier Science Publishers: Amsterdam and New York. 1986. xii + 325 pp. \$94.00. ISBN 0-444-42711-2

The 4th FECHM conference on Heterocycles in Bio-Organic Chemistry, held in Belgium in 1986, produced the 35 typescript papers in this volume. Seven of them are plenary lectures, and the others are poster presentations. Indexed.

Third SCI-REC Medicinal Chemistry Symposium. Edited by R. W. Lambert. The Royal Society of Chemistry: London. Available from the American Chemical Society: Washington, DC. 1986. xiv + 384 pp. £35.00. ISBN 0-85186-616-6

A symposium held at Cambridge in 1985 produced the 19 typescript papers in this volume. They are distributed among the following areas: Modulation of Serotonin and Dopamine Receptors; Enzyme Inhibitors in the Control of Disease; and Drugs for the Control of the Endocrine System. Not indexed.

Acidification and Its Policy Implications. Edited by T. Schneider. Elsevier Science Publishers: Amsterdam and New York. 1986. xii + 514 pp. \$110.00. ISBN 0-444-42725-2

The proceedings of an international conference held in Amsterdam in 1986 constitute this vaguely titled volume. The participants were actually concerned only with acidification of the environment; even acidification of paper is not taken up, for example. In addition to the effect of acidic wastes on animals, plants, water, soil, and objects (bridges, monuments, etc.), strategies for abatement and research programs are considered. Indexed.

Chemistry for Protection of the Environment 1985. Edited by L. Pawlowski, G. Alaerts, and W. J. Lacy. Elsevier Science Publishers: Amsterdam and New York. 1986. xii + 796 pp. \$180.00. ISBN 0-444-42715-5

The 58 papers in this volume constitute the proceedings of an international conference held in Leuven, Belgium, in 1985. Both plenary lectures and papers on original research are included.

Nuclei Off the Line of Stability. Edited by Richard A. Meyer and Daeg S. Brenner. American Chemical Society: Washington, DC. 1986. xvi + 532 pp. \$94.95. ISBN 0-8412-1005-5

An ACS symposium sponsored by the Division of Nuclear Chemistry and Technology, held in Chicago in 1985, generated the 76 typescript papers in this volume. They are divided according to four sections: Progress in Theory; Experimental Exploration of Current Issues; New Facilities and Techniques; and Survey of Current Research. Indexed.

Porphyrins. Excited States and Dynamics. Edited by M. Gouterman, P. M. Rentzepis, and K. D. Straub. American Chemical Society: Washington, DC. 1986. x + 371 pp. \$64.95. ISBN 0-8412-0997-9

This volume has been developed from the International Conference on Excited States and Dynamics of Porphyrins (Little Rock, Arkansas, November 16-19, 1985). The 23 contributions span the areas of theoretical studies, steady-state spectroscopy, time-resolved spectroscopy, resonance Raman studies, and photochemistry. The contributions represent a summary of the current state of the art in studies of porphyrin excited states, as told by an international collection of experts.

Equations of State: Theories and Applications. ACS Symposium Series 300. Edited by K. C. Chao (Purdue University) and R. L. Robinson, Jr. (Oklahoma State University). American Chemical Society: Washington, DC. 1986. ix + 597 pp. \$94.95. ISBN 0-8412-0958-8

This volume of proceedings is based on the 1985 equation-of-state symposia. The twenty-eight papers included present and evaluate numerous mathematical formulations describing volumetric behavior and phase equilibria in a variety of nonpolar and polar, single- and multi-component fluid systems. Equation design, mixing parameters and theoretical modeling are emphasized.