New Books

Aliphatic Chemistry, Vol. 4, A. McKillop (The Chemical Society, Burlington House, London, England, 1976, 226 pages, $49.50).

Volume 4 of the series "Specialist Periodical Reports" entitled *Aliphatic Chemistry* is similar in scope and format to the previous three volumes in the series and maintains the high standards established in the earlier volumes. The book presents an outstanding survey and interpretation of many important and new reactions of aliphatic compounds. The scope of Volume 4 is best described by giving the chapter titles: (Chapter 1) Acetylenes, Alkanes, Allenes, and Olefins, by D.W. Dunwell, J.C. Saunders, and B.P. Swann; (Chapter 2) Functional Groups Other than Alkanes, Acetylenes, Allenes, and Olefins, by E.W. Colvin; (Chapter 3) Naturally Occurring Polyolefinic and Polyacetylenic Compounds, by G. Pattenden; (Chapter 4) Chemistry of the Prostaglandins, by G. Pattenden.

As in previous cases, the Senior Reporter, A. McKillop, deserves our thanks for an outstanding book. Chapter 4, "Chemistry of the Prostaglandins," is most relevant to research workers interested in lipids. All of the other chapters, however, are also a gold mine of useful information that can be directly translated to useful applications in lipid chemistry. For example, some of the main subheadings in the chapters deal with olefins, carboxylic acids, lactones, carboxylic acid esters, carboxylic acid amides, alcohols, amines, and many others. A particularly useful feature of this literature survey is that reaction pathways are given in many instances so that one not only learns a great deal of chemistry in going through this book, but one gets an excellent overview of some of the newer interpretive viewpoints in modern organic chemistry. Many of the newer organic chemical reagents are discussed in this book, which this reviewer found extremely valuable not only as a review but also because it adds a great deal of new and valuable information to the scope and limitations of newer organic reagents.

All lipid chemists interested in organic synthetic and mechanistic pathways should own this book, even though the price seems a bit high for a book containing fewer than 300 pages. Certainly, every library should have a copy. The book is remarkably free of typographical errors, it is very clearly printed, and reactions are given adequate space for easy reading and interpretation.

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Chromatographic Analysis of the Environment, Edited by Robert L. Grob (Marcel Dekker, Inc., New York, NY, 1975, 734 pages, $49.50).

This book collects details of chromatography used to monitor earth, air, and water. Many of the 19 contributors mention pollutants under the four headings of air pollution, soil, water pollution, and waste analysis. But this book addresses itself not only to pesticides, phenols, and petroleum products, but also to amines, amino acids, organic acids, lipids, sterols, sulphur compounds, plant pigments, detergents, and others. However, only some of the 18 sections cover each of these subjects, so that only searching will reveal whether or not a "pollutant" such as glycols and glycerides in waste water (p. 442) is treated.

Each of the four classifications is subdivided into the four main chromatographic techniques: for the water and soil sections, a small section on ion exchange is also included, written by Harold Walton, one of the few names that will be generally familiar. Paper chromatography (PC) was considered important enough for small sections (except in soil chemistry, where it is the largest of all five sections). Liquid chromatography (LC) is longer in two classifications than gas (GC) and thin layer (TLC).

Because its intention is to provide access to a variety of journals, the references are of the highest importance in such a book. The coverage varies between 13 references for the 26-page water's PC section to 347 for that of soil GC's 48 pages. Of these, only 12% were more recent than 1969, 6% than 1971, using air pollution as an example. PC and TLC each carried but a single reference in 1970 and none beyond. The use of tables is also variable. Tabulation for water's LC section is excellent, and in waste's TLC section there are three useful summary tables. Some other authors have used no tables at all. The chromatograms in the TLC section on airborne particulates are especially interesting and accompany a wide variety of chromatographic systems.

The book appears well printed and reasonably accurate. Some of the statements in Chapter 1 are controversial. Monitoring ion exchange columns by UV or visible light "is of little value." Liquid chromatography is "able to easily and quickly concentrate very dilute solutions." Section III, B, 6 contains the statement (for liquid chromatography), "As indicated in Section III, B, 6, no separate injection part (sic) is used."

A book similar in its intent to provide access to separation literature is the third edition of Heftman's *Chromatography* (*JAOCS* 53:168A, 1976), a book of general interest and wider background on technique, which includes electrophoresis and gel chromatography. Both books appeared in 1975, and readers should decide on the basis of their interests which they prefer: the cost of buying both together is $97.

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1976 Energy Fact Book, Compiled under Commander Paul A. Petzrick (Tetra Tech, Inc., VA, 1975, 170 pages; $4.95 soft cover, $8.95 hard cover).

The books contents have been assembled in four major parts: I. Present Energy Situation (in the U.S.), II. Energy Research and Development in Other Countries, III. Energy Research and Development Legislation during the 93rd and 94th Congresses, IV. Federal Government Energy Research and Development. In addition, the Appendix is arranged in six parts and includes the latest facts and figures on world deposits and production of A-Petroluem, B-Natural Gas, C-Nuclear Power, D-Coal, E-Coal Gasification, F-Coal Liquefaction, G-Oil Shale, and H-Tar Sands.

The *1976 Energy Fact Book* is a compilation of the information available on the worldwide sources of fossil fuels, their availability, and their contribution to the total U.S. demand for energy.

The book was prepared by the Washington, DC, branch of Tetra Tech, Inc., an energy consulting firm, under the direction of Commander Paul A. Petrick, USN, for his

guidance in directing the U.S. Navy's Energy Research and Development program. Apparently, Commander Petrzrick felt that the data compiled should be made available to the nation's energy community, and this reviewer could not agree more. The book concentrates on the energy supply/demand situation for the U.S. but, in addition, presents an excellent summary of the reserves and resources of fossil fuels throughout the world.

The facts and data are well presented. Graphs, charts, and tables are well-labeled, concise, and easily understood. There is very little reading matter, which is confined mainly to acursory treatment of energy R&D in other countries and a summary of energy R&D legislation during the 93rd and 94th Congresses. This latter section lists the laws enacted by the two Congresses, as well as legislation vetoes, legislation in committee, and legislation proposed by the 94th Congress. A perusal of these 22 pages of legislative action dramatically shows the complexity of the entire energy problem that besets the U.S.

The Energy Reorganization Act of 1974 created the Energy R&D Administration. The section of the book that describes the ERDA's functions, programs, and budget is most informative. It includes a discussion of the programs and budgets of the Department of Interior, NASA, the National Science Foundation, the Federal Energy Administration, and the Environmental Protection Agency, which will supplement and directly affect ERDA's efforts. Organizational charts of the above-mentioned department and federal agencies, the names of the individuals in the key positions, and, in many cases, even their phone numbers are also included.

This *Energy Fact Book* can be considered an excellent addition to the literature aimed at providing the facts for an understanding of the energy situation—present and future—in the U.S. Its importance to those involved in or with the fossil fuel industry, and regular readers of the petroleum trade journals, may be minimal, since they are regularly exposed to similar data. But to have all the data assembled in a logical manner and in book form must be of great advantage to them. To all other technical individuals this book should be required reading. The supply of energy is no less fundamental to the future well-being of the U.S. than is the supply of food, and we, as technical people, should be aware of the facts concerning future energy availability as presented in the *Energy Fact Book*.

The facts in this book are presented matter-of-factly and without comment. Some facts startle, such as "Most of the 434 billion barrels of original-oil-in-place discovered in the U.S. is still in the ground." It is estimated that fully 68% of all the oil discovered in the U.S. is still there waiting to be recovered! Other facts are sobering, such as "There are 480 nuclear power plants worldwide that are in operation, under construction, or planned." Of these, 221 are in the U.S.

The facts are useful to the engineer. Every company is involved with new construction, plant expansions, and plant replacements, and the decision on the source of energy to be used must be based on the future availability of this source. This *Energy Fact Book* shows, for example, that the population in the U.S. is projected to increase in 25 years by 30%, while a perusal of the natural gas supply shows a 50% decline in domestic production at current trends. An optimistic view shows that the 1975 levels of natural gas production can be *maintained* for 25 years if the price of the gas is more than *doubled*. On the other hand, using reasonable assumptions of increased drilling rates and finding rates, U.S. petroleum production may actually increase in the next 25 years. Thus, the data in the Fact Book could well be used in the decision process as to the energy source chosen.

Finally, and more importantly, all technical people, as citizens, should peruse this book and acquaint themselves with the latest facts concerning the energy situation in the U.S. and the inexorable drift into more dependence on imported fossil fuels. The facts, charts, and tables in this book show clearly that the U.S. has the resources and the potential to become energy independent if only it will act and provide the climate and incentive to develop those resources. In spite of the dramatic oil embargo of 1973, a critical balance of payments deficit, and the increasing cost of crude oil, our elected officials appear unable to act and pass the necessary legislation to reverse this dangerous situation. Only an informed citizenry, it seems, will be able to force our legislators into action.

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Lipid Chromatographic Analysis, Vol. 1 (2nd edition in 3 volumes), Edited by Guido V. Marinetti (Marcel Dekker, Inc., New York, NY, 1976, 337 pages, camera-ready copy, $29.50).

The first volume in this second edition, described as revised and expanded, contains six chapters: 1. Thin-layer Chromatography of Phospholipids and Glycolipids, by O. Renkonen and A. Luukkonen; 2. Chromatography of Phospholipids and Glycolipids on Whatman SG-81 Silica Gel-Loaded Paper, by R.E. Wuthier; 3. Chromatographic Analysis of Alkyl and Alk-1-enyl Ether Lipids and Their Derivatives, by F. Snyder; 4. Analysis of Phosphatides and Glycolipids by Chromatography of Their Partial Hydrolysis or Alcoholysis Products, by R.M.C. Dawson; 5. Column Chromatography of Neutral Glycerides and Fatty Acids, by K.K. Carroll; and 6. Gas Chromatography of Neutral Acylglycerols, by A. Kuksis.

A multi-volume work of this type with each chapter written by separate authors requires close and effective cooperation between authors, editor, and publisher to plan and adhere to a meaningful and timely production schedule. This was certainly not achieved in the case of Volume 1. The references cited clearly indicate that Chapters 1 and 3 were prepared in early 1973, with 22-25% of the literature cited published between 1971-1973, and both added exactly one 1975 reference at some later date. Chapters 2 and 4 contain two references each, postdating the publication of the previous volume in 1967, and have 98% and 100%, respectively, of the literature cited published in 1970 or earlier. Chapters 5 and 6 were clearly compiled at later dates than Chapters 1-4 and therefore contain most (84%) of the 1973, all of the 1974, and all but two of the 1975 citations present in this volume.

Good, sound methodology has a lasting value and tends to be cited much longer than the average report of research data. Most prospective purchasers, however, would be well advised to seek out some other similar volume which had at least considered for inclusion new methods or developments which had become available within 3-6 years of the date of publication.

The book has been published from typewritten camera-ready copy, and therefore the content is much less than would be contained in the same number of pages set in hard type. Promotional literature from the publisher describes Volume 1 as containing 384 pages when in fact the copy received contained 337 pages.

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Lipid Chromatographic Analysis, Vol. 2 (2nd edition in 3 volumes), Edited by Guido V. Marinetti (Marcel Dekker,

Inc., New York, NY, 1976, 373 pages, camera-ready copy, $34.50).

The contents of this volume are: Chapter 7—Thin-layer Chromatography of Sterols and Steroids, by B.L. Lisboa; Chapter 8—Gas Chromatography of Bile Acids, by Arnis Kuksis; Chapter 9—Chromatography of Prostaglandins, by E.G. Daniels; Chapter 10—Gas Chromatographic Analysis of Carbohydrates in Glycolipids, by Glyn Dawson; and Chapter 11—Gas Chromatography of Long-chain Bases Derived from Lipids, by Benjamin Weiss.

This volume, prominently labeled revised and expanded, comes slightly closer to fulfilling this claim than did Volume 1. On the basis of the references cited, the chapters were written in early 1973, with perhaps a total of one-half dozen more recent references and citations of other chapters within the present work added at a later date.

An unfortunate impression is created by the otherwise excellent first chapter (Chapter 7), which was "written" with scissors and paste pot. A page-by-page comparison through the first 50-60 pages suggests a complete verbatim retention of the text, tables, and references published in 1969. Newer data (approximately one-third new citations) are neatly packaged and inserted where appropriate. Chapter 10 has been completely rewritten by a new author, but the illusion of timeliness is shattered by the closing paragraph. Eight 1973 references are cited (but not otherwise reviewed) as illustrating new knowledge gained by use of the techniques described in the past two years (since the chapter was written?).

The chapters are extensive descriptions of areas by knowledgeable experts. In particular, Daniels has done a comprehensive job in updating the chapter on prostaglandins, with more than half of the material described having appeared since the previous edition in 1969. The analytical methods described by Weiss for long-chain bases differ markedly from the methods emphasized in the first edition. It was the impression of this reviewer that, aside from saving money, the object of camera-ready copy was to reduce production time and bring up-to-date information to the reader rapidly. A potential purchaser would be well advised to look elsewhere for a book that is not three years out of date when published. Incidentally, the publisher's literature describes this volume as containing 400 pages, whereas the reviewer's copy had only 373 pages.

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Organic Sulphur Chemistry: Structure, Mechanism and Synthesis, Edited by C.J.M. Stirling (Butterworths, London and Boston, 1975, 495 pages, $34.50).

As a record of the proceedings of the VI International Conference on Organic Sulphur Chemistry held in July 1974, this book does not have as wide a scope as its title implies. However, the full texts of the plenary lectures, which constitute 60% of the book, do provide in-depth discussions of important recent research.

Stereochemical topics are prominent. Among them are steric effects on the nucleophilic reactivity of the thiocarbonyl group, rotational isomerism in substituted thiophene and thiazole radicals, and sterol-selective electrophilic substitution at carbon induced by an α-sulfinyl group.

Discussions of structure and bonding in sulfur compounds include that in 6a-thiathiophthenes, the inductive and resonance interactions of the sulfonyl group with an α,β-double bond, and the influence of S-N bond character on properties of *N*-sulfinyl amines, sulfur diimides, and sulfilimines.

Among the synthetic topics covered are the preparation of thiabenzenes, of alkenes from sulfoximines, and of very hindered alkenes from hindered thiones and the synthetic utility of thienyl lithium derivatives, sulfonium cyclopropylides, and allylides, and α-(alkylthio)carbonyl compounds. Also described are novel ways to use the special properties of sulfur to control reactions in syntheses of natural products.

The mechanisms of sulfonimidoyl chloride substitution reactions, thiono-thiolo rearrangements in hydroxylamine derivatives, and lithiation of substituted thiophenes are described.

The remainder of the book contains abstracts of the 151 papers submitted for presentation at the Conference, an index of contributing authors, and a limited subject index.

This book will be useful as a reference for those interested in current research in organic sulfur chemistry, especially since some of the work has not been published elsewhere.

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Principles of Food Science (Part II): Physical Principles of Food Preservation, Marcus Karel, Owen R. Fennema, and Daryl B. Lund, Edited by Owen R. Fennema (Marcel Dekker, Inc., New York and Basel, 1975, 474 pages, $39.50).

This book is one of a three-part series written primarily for upper level undergraduates and graduate students studying in the field of food science. As such, a solid background in chemistry, microbiology, and mathematics is needed for full understanding of the book. The authors' multidisciplinary approach, use of related materials and examples, and readable style of writing, however, make it possible for people with various degrees of training to benefit from the book.

The first chapter defines the world food problem in terms of distribution, dietary inadequacy, and limitations in productive capacity. Possible solutions are then discussed, with emphasis upon decreased food wastage by proper preservation techniques. Since food production and preservation requires energy from various sources, the energy aspect is discussed here and reemphasized throughout the book.

The section on preservation through energy input includes basic heat transfer mechanisms and theory; the use of heat energy to preserve food and its effect on color, texture, flavor nutritive value, and microorganisms; the radiation preservation of foods, including the physical and chemical effects of ionizing irradiation on food components and microorganisms as well as the safety of foods preserved in this manner.

The section on preservation by storage at chilling or freezer temperatures covers the physiological changes (both good and bad) that occur in fruits, vegetables, animal tissues, etc., on chilling and freezing. The effects of atmospheric control in chilling preservation are discussed, including the optimal balance of gases such as oxygen and carbon dioxide, relative humidity control, and the use of chemicals to control fruit diseases, promote ripening, etc. Freezing and thawing technology is well covered, ranging from cellular aspects to descriptions of the various chemical methods available to the food processor.

The section on preservation through water removal is a comprehensive review of the technology and chemical changes involved in various types of drying, including the use of evaporators, freeze dryers, freeze concentrators, spray driers, drum driers, osmotic driers, fluid bed driers, and the like. The thermodynamic and physical chemical

discussions of the principles involved in the various processes will be helpful to food chemists, microbiologists, and engineers alike in approaching problems where flavor, nutritive value, and microbiological safety factors must be balanced against production costs. The chapter on water activity in foods provides a basic introduction to this relatively new and important means of studying the chemical and enzymatic changes inherent in low and intermediate moisture foods.

The final section of the book covers protective packaging of foods. The major types of materials used in packaging are examined in terms of liquid and gas permeability and the effects of such factors as mechanical damage, temperature, and biological agents on container and food integrity.

The book as a whole is well illustrated, with useful examples of the principles being described. Pertinent literature references can be found throughout the book which will be helpful for those who wish to pursue the topics in more detail.

This book was written primarily for those who may be directly involved with the different aspects of food preservation. However, the wealth of general information presented makes it a good survey book for anyone who is interested in the food industry and some of the most important processes utilized in the industry.

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New Publications

Part 31 of the *1976 Annual Book of ASTM Standards on Water,* ASTM, 1916 Race St., Philadelphia, PA 19103, 976 pages, 1976, $31.00.

Les Aspects Lipochimiques De L'Industrie Des Revetements (Lipochemical Aspects of the Coatings Industry), J.P. Helme, L. Petit, and G. Bosshard, Editions Techniques Des Indistries De Corps Gras, 5 Bd de Latour Maubourg 75007, Paris, France, 1976, 175 French francs + postage and handling.

Aeros Information, Booklet of Nationwide Air Pollution Data System, Air Pollution Technical Information Center (APTIC), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

Computers and Chemistry (a new international journal), Edited by De Los F. DeTar, Pergamon Press, Oxford, England, 1976, $60.00 annual subscription.

Biomedical Sciences Instrumentation, Vol. 12, Instrument Society of America, 400 Stanwix St., Pittsburgh, PA 15222, 1976, 140 pages, $15.00, softbound.

Model Handbook, American Engineering Model Society, PO Box 2066, Aiken, SC 29801, 290 pages, 1976, $17.50 + 10% for mailing.

French-English Science and Technology Dictionary, 4th Edition, Louis DeVries and Stanley Hochman, McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, NY 10020, 684 pages, 1976, $13.50. ■