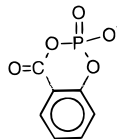


Additions and Corrections

Participation of Two Carboxyl Groups in Phosphodiester Hydrolysis. 1. Hydrolysis of Bis(2-carboxyphenyl) Phosphate [J. Am. Chem. Soc. 1995, 117, 12064–12069].

THOMAS C. BRUCE,* ANDREI BLASKÓ, AND MARK E. PETYAK

Page 12066, Scheme 1: 3 should be



3

JA9654037

Book Reviews

Characterization and Chemical Modification of the Silica Surface. By E. F. Vansant, P. Van Der Voort, and K. C. Vrancken (University of Antwerp, Belgium). Elsevier: The Netherlands. 1995. xv + 556. \$241.25. ISBN 0-444-81928-2.

Chemically modified oxide surfaces are widely used in science and commercial applications. Methods of surface modification and characterization of these materials are essential to expand understanding and applications. The authors state that the purpose of their book is "...to cover techniques and procedures characterizing and modifying the silica surface." The book is directed to those conducting graduate or other research or otherwise interested in the chemistry of silica and chemically modified oxide surfaces. The authors have done an excellent job of meeting their goal.

The book contains three parts, each with a number of chapters. Part I reviews the characterization of silica surfaces and various physical and chemical properties. Part II describes a variety of reactions with the silica surface. Part III discusses surface coating techniques. A set of appendixes provides a brief description of the fundamentals of FTIR/PAS, XPES, and solid-state NMR as applied to surface characterization. A fourth appendix lists very brief descriptions of a number of other surface characterization methods.

This book is an excellent introduction to the knowledge base in chemically modified silica surfaces. The authors are knowledgeable in the field and have presented key studies and results from the vast amount of literature on this subject. The reviewer has some knowledge in the field, yet found the organization and selection of topics to be excellent and provided a clear learning experience. Whether experienced or a novice in the subject, the book provides a reader with an excellent summary or introduction to the topic of modified silica surfaces.

The authors are to be complimented for the style and readability of the book. By-in-large, for a book with three authors, it is remarkably consistent. It is written in a somewhat European style of short and to the point paragraphs that are very easy to read. Figures and diagrams are used freely to illustrate their points. Abbreviations and acronyms are usually defined clearly. This reviewer had the opportunity to read the book during an extended airline flight and found it pleasant and captivating. Frequently, transition between sections was so intriguing that one hesitated to stop reading at that point.

One of the more attractive features of the book is that the authors do not debate the merit of results. They have selected the studies and results to discuss and do not concern themselves with defending some and critiquing others. By-in-large, their selections represent those investigations that address key and fundamental issues, important methods of study, and informative results. However, they do not shy

from controversy when different methods provide results that suggest different interpretations.

This is a well-written book based on carefully selected results and provides an excellent review or introduction to the topic. Kudos to V³ for an excellent job!

Donald E. Leyden, Philip Morris USA

JA9552470

Petroleum Products: Instability and Incompatibility. By George W. Mushrush (George Mason University) and James G. Speight (Western Research Institute). Taylor & Francis: Bristol, PA. 1995. x + 390 pp. \$69.95. ISBN 1-56032-297-7.

The stated goal of this book is to serve as a teaching text that will provide a broad overview of the chemical and physical concepts of instability and incompatibility. The anticipated readers are fuel science and engineering students and those already working with liquid fuels who need an overview of this vast topic. The book is organized into 14 chapters which reflect the authors' on-going research in these areas during the last 20 years. References are cited throughout the text and have allegedly been selected such that the reader might use the citations for more detail.

Chapter 1 defines the general terminology for instability and incompatibility in addition to terminology used to describe petroleum and various alternative fuel sources (coal and oil shale). Chapters 2–4 review the methods by which liquid fuels and other products are manufactured from both petroleum and alternative sources. The different liquid fuels and products that can be derived from petroleum are defined and characterized in Chapter 5. In Chapter 6, the chemical aspects of incompatibility are examined, while Chapter 7 addresses the relationship of fuel properties with instability and incompatibility. Chapters 8 and 9 deal with incompatibility in distillate fuels (gasoline, diesel fuel, and jet fuel). Chapters 10–12 discuss the incompatibility of nondistillate products (lubricating oil and wax, residual fuel oil, and asphalt). The focus of Chapter 13 is asphaltenes and incompatibility. The book concludes with Chapter 14, which addresses incompatibility in refining operations.

The up side of this book is that the authors have attempted to develop the chemistry involved in the conversion of crude material into finished products. This approach is beneficial since it focuses the readers' attention upon the types of molecules involved in fuel degradation. This naturally leads to a discussion of the authors' interpretations of the physical/chemical processes involved in instability and incompatibility. Such an approach should be very helpful to students and

workers in fuel science, since most books dealing with refining are written by and for engineers.

The down side of this book is that the coverage of certain topics is a bit anemic. For example, Chapter 8 claims to address the incompatibility of both gasoline and diesel fuel, while, in fact, this chapter spent little time addressing gasoline incompatibility. In addition, Chapter 8 references should have cited the review on diesel fuel instability by B. D. Batts and A. Z. Fathoni (*Energy Fuels* **1991**, 5, 2–21). The Chapter 9 references (jet fuel incompatibility) should have cited R. N. Hazlett's 1991 book (*Thermal Oxidative Stability of Aviation Turbine Fuels*, ASTM: Philadelphia, PA, ISBN 0-8031-1248-3). Even with these types of omissions, what the book lacks in depth, it makes up for in breadth.

Overall, I believe this is a useful book which does meet its intended objectives. This will be a good text for students of fuel science and will also serve as a useful reference source for both fuel scientists and engineers. I recommend this book highly.

Bruce Beaver, *Duquesne University*

JA955318J

Environmental Chemistry of the Heavy Elements: Hydrido and Organo Compounds. By John S. Thayer (University of Cincinnati). VCH Publishers Inc.: New York. 1995. xi + 145 pp. \$65.00. ISBN 1-56081-540-X.

This is a very slim volume: 118 pages of text and references, together with an author index (12 pages), a chemical structure index (6 pages), a species index (2 pages), and a subject index (5 pages). The species index lists the references to particular biological species ranging from mussels to methanogens, although the reader is given only the Latin names. The "heavy elements" as defined by Thayer, have atomic numbers greater than 10, and the book chapters are organized as follows: (1) Introduction (8 pages); (2) Selected physical and chemical properties (11 pages); (3) Hydrides: sources in the environment (8 pages); (4) Alkyls: Sources in the environment (12 pages); (5) Mechanisms: I. Biohydridization and biomethylation (14 pages); (6) Mechanisms: II. Bioalkylation, biotransformation, and biodealkylation (18 pages); (7) Hydrides and alkyls: their roles in geochemical cycles (20 pages); (8) Hydrides and alkyls: their roles in biogeochemical cycles (10 pages); (9) Potential applications and possible future developments (8 pages).

Thayer states that the book was written to provide a generalized picture of the subject, but it is difficult to decide for whom the book was written. We are really dealing with an overblown review that points out some of the directions that the field has taken in recent years. No topic is covered in any depth, and even such a fundamental concept as the "Challenger mechanism" for biomethylation is only hinted at, although there are two chapters devoted to "mechanisms". On the positive side, this reviewer was pleased to note the coverage of phosphorus compounds, especially phosphine.

It is difficult to write about this subject without mentioning the associated analytical methodology. Unfortunately, Thayer chooses to ignore this aspect. In fact, it is probably a very bad time to bring out a book such as this because of the rapid advances that are currently being made; for example, the presence of arsenobetaine in terrestrial plants has recently been established by using HPLC/ICP/MS. Previously this arsenal was believed to be confined to the marine environment.

There are major problems with the figures in the book: many are poorly drawn, misleading, and even confusing. There are also a number of problems with the writing; for example, the oxidation state of cobalt in methyl-B₁₂ is surely +3 (p 52), the bioreduction of As(V) species to As(III) may involve thiols (p 49), and the text (p 65) seems to imply that it has been established that cleavage of the ribose ring of arsenosugars affords arsenocholine. There is much confusion about the manganese compound used as a fuel additive.

In conclusion, this book is very expensive for what is essentially a reasonable well-referenced review that is not directed to a particular audience. I cannot recommend its purchase.

W. R. Cullen, *University of British Columbia*

JA955306Y

Structure and Chemistry of the Apatites and Other Calcium Orthophosphates. By J. C. Elliot (The London Hospital Medical College). Elsevier: Amsterdam. 1994. xii + 389 pp. ISBN 0-444-81582-1.

Structure and Chemistry of the Apatites and Other Calcium Orthophosphates summarizes the large volume of work undertaken on compounds with the apatite atomic arrangement and its precursors and structural derivatives. Few compounds are of such multidisciplinary interest as apatite, and this volume includes summaries of research in the biological, medical, geological, chemical, and material science communities.

The book, number 18 in the *Studies in Inorganic Chemistry* series, is organized into four chapters. Chapter 1 (62 pages), General Chemistry of the Calcium Orthophosphates, provides an overview of the apatite atomic arrangement, its structural derivatives, and related compounds including brushite, monetite, whitlockite, and mono-, octa-, and tetracalcium phosphates. The chapter effectively summarizes the structures and illustrates the importance of the phases in various organic and inorganic systems. Chapter 2 (41 pages), Fluorapatite and Chlorapatite, deals with the those apatite structures with monovalent anions in the apatite anion column, and details of structure, substitutions, synthesis, and spectroscopy are presented. Chapter 3 (75 pages), Hydroxyapatite and Nonstoichiometric Apatites, proffers the results of numerous studies on this phase of biological importance. Finally, Chapter 4 (114 pages) is devoted entirely to Mineral, Synthetic, and Biological Carbonate Apatites and summarizes the current state of our understanding of these enigmatic compounds. The book also offers the calculated diffraction patterns of several calcium orthophosphates, a useful addition for routine identification only, as they are presented not as tables of *d*-*I* but as reproductions of diffractograms. Finally, the book lists 1059 references cited throughout the text.

The volume serves as a useful reference for any worker in the field of apatite structure and chemistry. Because of the perhaps unique interdisciplinary nature of apatite research, it is difficult for workers in any one field to keep up to date with research in all fields, and this book adequately summarizes the main body of the pre-1990 research. The broad scope of the research, however, precludes in-depth coverage of the most recent research in all fields. From my own mineralogical perspective, recent studies of anion interactions in the apatite anion columns are not discussed. The treatments of fission-track dating of apatite and the annealing of fission tracks as a function of time, temperature, and composition ignore the extensive post-1990 research. Finally, the insightful description of the apatite structure as an example of *cation* closest packing is not elucidated.

On the whole, the book provides an exhaustive summary of a compound of profound interest and importance in numerous disciplines. Because the author was a member of the research team that provided many of the insights into the details of this complex structure type, he has unique knowledge of the apatite atomic arrangement. The book should be considered a "must-read" for any researcher moving into the apatite arena. Although its broad scope may make the literature citations in any one discipline slightly dated, the overall comprehensive treatment of a complex subject is commendable; the book certainly belongs on the shelf of researchers in any aspect of the structure and chemistry of apatite compounds.

John M. Hughes, *Miami University*

JA945007T