Book Reviews*

Heterosiloxanes Volume 1: Derivatives of Non-Biogenic Elements. Soviet Scientific Reviews Supplement Series, Section B: Chemistry, Volume 2. By M. G. Voronkov et al. (Institute of Organic Chemistry, Siberian Division of the USSR Academy of Sciences). Translated from the Russian by Kurt Gingold. Harwood Academic: Chur and New York. 1988. xiii + 469 pp. $298.00. ISBN 3-7186-4811-3.

This book provides a description of the synthesis and properties of compounds containing the Si-O-M grouping where M is an atom of a metal or nonmetal other than H, C, Si, N, P, O, S, or the inert gases. The authors cover the elements systematically beginning with Group I and concluding with Group VIII. Each chapter includes sections on preparative methods, chemical and physical properties, thermal and hydrolytic stability, analysis (with several X-ray structures included), and uses. In the area of applications, the emphasis is on polymers and waterproofing, although occasional mention of biological properties is included. There are 1376 references, mostly from the Russian literature, covering the period 1968–1982. There is a brief subject index.

This book could well serve as an introduction to the Russian literature for those interested in silicones. While it may serve as a reference work to those in the silicone area, this reviewer feels it is too highly specialized for reading by the average silicon chemist. For someone relatively unfamiliar with silicone polymers, I found it difficult to determine which compounds and results were important. Although potential uses are mentioned frequently, it was unclear whether the class of materials under discussion had actually found industrial application. Each area is considered in relative isolation, often making it difficult to elucidate trends of reactivity. Frequently the research which was summarized seemed to lack a sense of purpose.

On the more positive side, some of the compounds and results were surprising and enlightening. The preparation and use of several very highly functional organosilicon monomers are reported. The chemistry of monomeric silanols and their metallic derivatives has been unfairly neglected in most modern silicon texts.

In summary the book is a collection of results obtained over a 15-year period. While some of the results are interesting and potentially important, no attempt is made to place them in context. While the book could potentially serve as a catalyst for those interested in functionalized silicon compounds, the style is somewhat dry and too specialized for the average chemist.

John D. Buynak, *Southern Methodist University*

Ultrasound: Its Chemical, Physical and Biological Effects. Edited by K. S. Suslick (University of Illinois). VCH: New York and Weinheim. 1988. xiii + 336 pp. $65.00. ISBN 0895-73328-5.

The editor has compiled a collection of eight chapters written by qualified experts to introduce the reader to the principles of ultrasound and outline for him or her some of the various known responses of material systems to compressional stimulation at ultrasonic frequencies. Many practical uses for such stimulation are described, often with specific examples. These uses cover a broad range of topics from familiar cleaning operations to less familiar ones such as acoustical holographic imaging. Every scientist is sure to find something of interest in this book. For the chemist it may well be the chapters on homogeneous and heterogeneous sonochemistry and on sonoluminescence.

Most phenomena of interest produced by ultrasonic excitation have their origin in the important process of cavitation. This phenomenon is discussed at length in the opening chapter which, together with the second chapter on other nonlinear acoustic phenomena, sets the stage quite nicely for understanding the other topics subsequently presented. The physics of ultrasonic excitation effects is presented with sufficient mathematical detail to afford the reader an appreciation of its origins and permit him or her to make quantitative predictions. The original sources are abundantly referenced for those who might want to use them.

The chapter on industrial applications of ultrasound documents the highly developed and heavily employed uses such as plastic welding and cleaning and discusses many others which are presently less well established. The variety and novelty of some of these is quite fascinating and reveals the good imaginations of those who look beyond the science toward solutions of practical problems. I recommend that experimentalists in particular read this chapter for possible useful ideas. This reviewer is presently setting up to use in his research laboratory an ultrasonic technique first fully appreciated as a consequence of reading this book.

Finally those individuals intrigued with the newly evolving science of chaos will be pleased to read about the behavior of a gas bubble in a fluid under sonication, whereby the excitation pressure produces pulsations in the bubble's size. Under appropriate conditions these pulsations respond to increasing acoustic pressure by exhibiting patterns which repeat first at the driving frequency then at one-half, one-fourth, etc. of that frequency until the bubble exhibits chaotic behavior. The corresponding Feigenbaum tree, however, shows that the resultant "chaotic" behavior still has some underlying deterministic nature.

On the whole I find this to be a well-conceived and well-written book which will prove to be of value to a large and diverse group of readers. It affords an excellent means for the interested reader to come quickly up to speed on concepts and techniques which doubtlessly will assume positions of even more significance in science and technology.

Sam O. Colgate, *University of Florida*

Volumes of Proceedings

Inverse Gas Chromatography. Characterization of Polymers and Other Materials. ACS Symposium Series 391. Edited by Douglas R. Lloyd (University of Texas) et al. American Chemical Society: Washington, DC. 1989. xii + 321 pp. $69.95. ISBN 0-8412-1610-X.

Twenty-two typescript papers, arranged under the headings Methodology and Instrumentation, Sorption and Diffusion in Polymers, Polymer Blend Characterization, Surface and Interface Characterization, Analytical Applications, and Special Applications make up this volume, which opens with an Overview of Inverse Gas Chromatography by Schreiber and Lloyd. An excellent subject index concludes the work.

Lignin. Properties and Materials. ACS Symposium Series 397. Edited by Wolfgang G. Glasser (Virginia Polytechnic Institute and State University) and Simo Sarkanen (University of Minnesota). American Chemical Society: Washington, DC. 1989. xiv + 545 pp. $99.95. ISBN 0-8412-1631-2.

Lignin, a major polymeric component of wood, has been and remains a structural enigma, but the understanding of it has advanced greatly in the 23 years since the previous ACS Symposium volume devoted to it. The present volume derives from a symposium held in Toronto in 1988. The 41 papers are arranged in six groups: Macromolecular Structure and Properties; General Materials; Water-Soluble Polymers; Phenolic Compounds; Polyols, Polyurethanes, Polyblends, and Grafts; and Epoxies and Acrylics. They include two keynote papers: The Lignin Paradigm (D. A. I. Goring) and Speciality Polymers from Lignin (Lindberg, Kussela, and Levon). There is a thorough index.

Functional Polymers. Edited by David E. Bergbreiter and Charles R. Martin (Texas A&M University). Plenum: New York and London. 1989. viii + 216 pp. $59.50. ISBN 0-306-43203-X.

The typescript papers and poster abstracts that make up this volume originated in the sixth annual Industry-University Cooperative Chemistry Program held at Texas A&M University in 1988. They are mostly reports of original research. Indexed.

Quantum Chemistry: Basic Aspects, Actual Trends. Studies in Physical and Theoretical Chemistry Volume 62. Edited by R. Carbó (Universitari de Girona). Elsevier: Amsterdam and New York. 1989. xiii + 622 pp. $192.00. ISBN 0-444-87494-1.

Forty typescript papers from an "international workshop" on quantum chemistry, held in Spain in 1988, make up this volume. There is no index.

Characterization and Catalyst Development. An Interactive Approach. ACS Symposium Series 411. Edited by Steven A. Bradley (UOP Research Center) et al. American Chemical Society: Washington, DC. 1989. xiv + 451 pp. $99.95. ISBN 0-8412-1684-3.

A 1988 symposium, held as part of the National Meeting of the ACS in Los Angeles, was the source of the typescript papers that comprise this book. They are grouped under five headings: Catalyst Development Through Characterization, Performance Testing for Catalyst Characterization, Vibrational Characterization of Catalysts for Understanding Catalyst Sites, New Perspective in Characterization by X-ray Scattering and Electron Microscopy, and Bulk Property Analysis. Author, affiliation, and subject indexes are included; the latter is substantial.

*Unsigned book reviews are by the Book Review Editor.