

Book Reviews *

The Chemistry of Organic Germanium, Tin and Lead Compounds. Edited by Saul Patai (The Hebrew University). Wiley: New York. 1995. xv + 997 pp. \$625. ISBN 0-471-94207-3.

The general preface to the series *The chemistry of functional groups* states that the emphasis of each volume is on the preparation, properties, and reactions of the functional group, and on its effects on the rest of the molecule. Readily available material from other secondary sources is to be excluded. The forward to the present volume notes the absence of chapters on MS, NMR, and Mössbauer spectroscopy, the use of organo-Ge, -Sn, and -Pb compounds as synthons, free radicals and carbene analogs, and rearrangements. Not mentioned is a rather general lack of materials on the *reactions* of organo-Ge, -Sn, and -Pb compounds, although several chapters cover aspects of reactivity.

There is a genuine need for a single-volume reference work on this area of main-group organometallic chemistry. As K. M. Mackay points out in his chapter on structural aspects of compounds containing C-Ge, C-Sn, and C-Pb bonds, there is "a rich chemistry of each individual element, a subtly varying relationship between them, and sufficient unexpected and at present unique behavior to indicate further development will be exciting and complex". There is no single book that the present work replaces. The nearest to it are the chapters on germanium, tin, and lead in *Comprehensive Organometallic Chemistry*, Wilkinson, Stone, and Abel, Eds., 1982, with a supplement containing 1982-1994 material. Given the considerable current activity in this field, and the ca. 3300 references contained in the 18 chapters of the present volume, this reviewer approached his task with pleasure and eagerness.

The first chapter by H. Basch and T. Hoz on the nature of the C-Ge, C-Sn, and C-Pb bonds employs *ab initio* calculations including electron correlation to predict the geometries, bond energies, dipole moments, atomic charges, and other molecular properties of XH_3Y molecules (X = Si, Ge, Sn, Pb; Y = 53 different monatomic and polyatomic substituents). The results are conveniently tabulated. The goal is to find trends in molecular properties and their causes.

Mackay's chapter employs structural data from only X-ray crystallographic and other "absolute" methods to go beyond classical explanations of differences between the compounds of carbon and those of the heavier group 14 elements.

In an excellent chapter J. A. Marshall and J. A. Jablonowski succinctly summarize what is known about the stereochemistry and conformations of organo-Ge, -Sn, and -Pb compounds, their synthesis, the stereochemical consequences of their reactions, and their use in mechanistic studies.

The chapter by J. A. Martino Simões, J. F. Liebman, and S. W. Slayden on the thermochemistry of organo-Ge, -Sn, and -Pb compounds was read with great interest because it speaks to a genuine need for reliable information. Unfortunately the authors are forced to note that key values are either missing or require experimental confirmation, and that discussion of the thermochemical data is "hindered by the probable inaccuracies and uncertainties that affect those values". Little progress was recorded in the last decade, in contrast to the rescue of organosilicon thermochemistry from a similar degree of chaos by R. Walsh and others in the 1980s and 1990s.

The spectroscopy of organo-Ge, -Sn, and -Pb compounds is represented by J. Iley's chapter on ESR and that by C. Cauletti and S. Stranges on photoelectron spectroscopy. It is concluded that PES indicates negligible participation by d-orbitals in bonding.

A chapter each, all by J. Zabicky and S. Grinberg, is devoted to the analytical chemistry of organic compounds of Ge, Sn, and Pb. Environmental and safety considerations are treated in four chapters: The environmental metallation of Ge, Sn and Pb by P. J. Craig and J. T. van Elteren, Toxicity of organo-Ge compounds by E. Lukevics and L. M. Ignatovich, Organo-Sn toxicology by L. R. Sherman, and Safety and environmental effects by S. Maeda.

A key chapter should have been the one on the synthesis of organo-Ge, -Sn, and -Pb compounds by J. M. Tsangaris, R. Willem, and M. Gielen. Unfortunately their contribution is poorly organized, and there are no tables. For systematic coverage one must return to chapters in the 1982 treatise (brought up to 1994) mentioned above, or to the even earlier monographs of Satgé and co-workers on the organic compounds

of germanium (1971), W. P. Neumann on the organic chemistry of tin (1970), and H. Shapiro and F. W. Frey on the organic compounds of lead (1968).

Substituent effects are covered in a chapter by M. Charton, and some of the chemistry of organo-Ge, -Sn, and -Pb compounds is described in the chapter on acidity, complexing, basicity, and H-bonding by A. Schulz and T. A. Klapötke. The latter contains a systematic treatment of the synthesis of complexes of Ge, Sn, and Pb. M. Michman's chapter on the electrochemistry of alkyl derivatives of Ge, Sn, and Pb and the chapter by C. M. Gordon and C. Long on the photochemistry of their organometallic compounds cover considerable reaction chemistry, but the photochemistry chapter contains errors and only a few recent references.

The chapter by K. Westaway and H. Joly on the synthesis and uses of isotopically labeled organo-Ge, -Sn, and -Pb compounds is excellent, including tables of compounds prepared, spectroscopic information, and an interesting account of the applications of these labeled compounds in mechanistic studies.

Given the prestige of the Patai-Rappoport series and the \$625 price tag (I expected a bookmark made of gold-pressed latinum), a more serious effort should have been made to produce a reference work with more information, organized for more convenient use. Individual libraries will have to decide whether this book offers enough material that is not already on their shelves in the earlier works cited above to justify the expenditure.

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Organosilicon Chemistry II: From Molecules to Materials.

Edited by Norbert Auner (Humboldt Universität zu Berlin) and Johann Weis (Wacker-Chemie GmbH). VCH: Weinheim. 1995. xxiii + 852 pp. DM188.00. ISBN 3-527-29254-3.

This volume provides in-depth coverage of the latest developments in organosilicon chemistry, a rapidly advancing field. Topics covered include Electivity and reactivity of organosilicon compounds, New synthetic applications, Structure and bonding, and Applications in materials and polymer science. There are 405 figures and 71 tables.

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Bioinformatics: From Nucleic Acids and Proteins to Cell Metabolism (GBF Monographs, Volume 18).

Edited by Dietmar Schomburg and Uta Lessel (Institute for Biotechnology Research). VCH: New York. 1995. viii + 195 pp. \$95.00. ISBN 3-527-30072-4.

The word "bioinformatics" has two distinct meanings. It may describe information handling in living organisms or, as in this volume, the application of computer science to biological problems. Bioinformatics has become an indispensable part of any research in the biosciences. Rapid developments in gene sequencing and structure determination, as well as rational protein engineering and design, have made it necessary for biologists, chemists, and computer scientists to channel their expertise into large-scale collaborative projects. This volume gives a general overview of the latest activities in bioinformatics such as the use and development of biological data bases for research in protein science and molecular biology, research currently being conducted on the noncoding regions of DNA and RNA, and the alignment of protein sequences and structures with low homology.

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