

Book reviews

The Chemistry of Organic Compounds of Arsenic, Antimony and Bismuth

S. Patai (Ed.)

John Wiley & Sons, Chichester, 1994

962 pages: £485

ISBN 0-471-93044-X

This book is devoted to a comprehensive presentation of the chemistry of organometallic compounds of arsenic, antimony and bismuth based on a literature search up to the end of 1991 or to the beginning of 1992.

The book consists of 21 chapters covering not only the preparation and properties of organometallic compounds of Group 15 elements, but also structural as well as biochemical and biological aspects. All the contributing authors are top specialists in this research field.

After a short first chapter (24 pages) devoted to general and theoretical aspects including those related to multiple-bonded compounds and hypervalent compounds, the second chapter (64 pages) presents a systematic overview of the structural chemistry of organic compounds of arsenic, antimony and bismuth, based mainly on solid-state X-ray diffractometry studies. The structures are classified by taking into account the central metal atom, its oxidation state and the type of metal-element bonds. Chapter 8 (52 pages) is also devoted to structural chemistry, but the presentation follows other criteria, i.e. the presence of hydrogen bonding or at least one dative covalently bound ligand.

Comprehensive accounts of the methods of preparation for organoarsenic compounds, and organoantimony and organobismuth derivatives, are excellently presented in Chapters 21 (69 pages) and 20 (52 pages), respectively. The preparation of optically active arsines, and their uses in asymmetric synthesis or as stereochemical probes, are overviewed in Chapter 3 (64 pages). Chapter 15 (77 pages) is devoted to the syntheses and uses of isotopically labelled compounds of arsenic, antimony and bismuth. Other shorter chapters deal with radical intermediates (di-, tri-, tetra-, penta- and hexa-coordinated species, as well as ligand-centred radicals and inorganic radicals) in the radiation chemistry of arsenic, antimony and bismuth (Chapter 12, 15 pages), organoarsenic and organoantimony homocycles (preparation, properties and reactions) (Chapter 14, 15 pages), and arsonium, stibonium and bismuthonium ylides and imines (synthesis, stability and reactions, structure) (Chapter 16, 37 pages). The substituent effects of arsenic, antimony and bismuth groups are described in Chapter 9 (73 pages).

Chapter 4 (16 pages) presents some thermochemical aspects, i.e. enthalpies of formation for alkyl and phenyl derivatives of Group 15 elements. Chapter 13 (36 pages) is devoted to the thermolysis of organopnictogens, with emphasis on the use of thermal decomposition for

preparative purposes, e.g. semiconductor or superconductor materials. The electrochemistry of organoarsenic, organoantimony and organobismuth compounds is reviewed in Chapter 11 (53 pages), which is organized in sections according to the type of the electrochemical process and the oxidation state of the metal atom.

An overview of the thermochromism of organometallic compounds of Group 15 elements which contain metal-metal bonds, i.e. colour changes on melting or dissolution in organic solvents, is presented in Chapter 10 (16 pages). The mass spectra and photoelectron spectra of organic derivatives of arsenic, antimony and bismuth are reviewed in Chapters 6 (27 pages) and 7 (49 pages).

Chapter 5 (67 pages) is devoted to a comprehensive presentation, covering the literature up to 1991, of the methods used in the detection, identification and determination of organometallic derivatives of arsenic, antimony and bismuth.

Finally, three chapters deal with biological aspects related to organoarsenic, organoantimony and organobismuth compounds, i.e. biochemistry (Chapter 17, 19 pages), pharmacology and toxicology (Chapter 18, 9 pages), and safety and environmental effects (Chapter 19, 35 pages).

All the chapters are well illustrated and contain a rich reference section.

The book is warmly recommended to chemists and biochemists who are interested in the synthesis and structure as well as the biological implications of organometallic compounds of arsenic, antimony and bismuth. No library of any institute or laboratory involved in organometallic chemistry should exist without this book!

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Hydrocarbon Chemistry

G. A. Olah and A. Molnar

Wiley, Chichester, 1995

632 pages. £55.00 (hardback)

ISBN 0471 11359 X

This book provides a wealth of information about the chemistry of hydrocarbons. There are 12 chapters which comprehensively cover the chemistry of alkanes, cycloalkanes, alkenes, dienes, alkynes and aromatics. Although there is heavy emphasis on laboratory and industrial processes, there is plenty of information for undergraduate, postgraduate and research chemists. They can all benefit from the wide coverage of reduction, oxidation, addition, carbonylation, hetero-substitution, oligomerization and polymerization reactions. Each chapter has been constructed around well-chosen examples and

informative tables. A minor blemish is the rather poor state of some of the structural formulae and the incorrect directions of curved arrows in some reaction schemes.

The selection and range of references is the major strength of the book. Placing the references at the end of every chapter, rather than at the end of the book, makes them more accessible.

Overall, this formidable book represents a considerable advance in hydrocarbon chemistry knowledge. It is also reasonably priced by comparison with texts written in other specialist areas.

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Quality Assurance for Environmental Analysis
Ph Quevauviller, E A Maier and B Griepink (eds)
Elsevier, Amsterdam, 1995
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ISBN 0-444-89955-3

This book is an authoritative survey of an area of work that is of increasing importance today, i.e. the underlying quality assurance work without which analytical results for compounds at low levels in the environment would be, essentially, meaningless. The book looks at three different aspects of quality assurance, viz. establishment of the state-of-the-art for speciation analysis, critical evaluation of the present analytical techniques and examination of existing quality assurance (QA). Clearly some form of QA background is either essential, or at the very least reassuring, if one is to have confidence in analytical results from materials at very low concentrations in complex biological or other matrices—the more so because legislation may be based on these analytical

results. There is no doubt then that the book is of great potential importance in a growing field and that it amply fills a previously empty niche. It is also reassuring that the contributing authors are very experienced in the field of analytical QA and work with the preparation of Certified Reference Materials (CRMs). In fact the background experience of many of the authors is via interlaboratory comparative work and meetings with the Measurements and Testing Programmes of the European Union (Bureau of Community Reference).

There are 24 chapters: the first two summarize QA matters, including the use of CRMs. The next four chapters review the various techniques used in environmental analysis (viz. using conventional abbreviations, ICPMS, AAS, NAA). Two further chapters cover work with sensors (flow-through and fibre optics). Eleven chapters then cover speciation (chemical and/or oxidation-state) analysis for a series of elements of environmental interest (i.e. chromium, aluminium, selenium, antimony, arsenic, mercury, organolead and organotin). Two chapters then cover techniques and extraction schemes for metals and metalloids in the environment. The final four chapters cover the analysis of organic compounds (chlorinated biphenyl, carbamates, polycyclic aromatic compounds and dioxins). The coverage is therefore comprehensive as well as authoritative, being written, as the editor notes, by experienced practitioners.

In essence, the book is a required piece of the laboratory furniture for any establishment dealing with low-level analysis, analysis from complex matrices and regulatory work. Do not let your laboratory be without it! The index is comprehensive (nine pages) and the refereeing is thorough. It is expensive and it will not be on many private shelves, but the corporate group must possess it.

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