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Book review

Organobismuth Chemistry
Edited by H. Suzuki, Y. Matano, Elsevier, Amsterdam, The Netherlands, 2001. ISBN 0-444-20528-4, 636 pp.; US $147, Euro 131.60

Bismuth, located at the bottom of Group 15 of the Periodic Table, is the stable element of highest atomic weight found in Nature. Bismuth has been known for a long time and research on it has been conducted for dozens of years. At present it is widely used in fields such as electronics, ceramics, plastics, cosmetics, and pigments, as well as pharmaceuticals, superconductors, ferroelectrics, and heterogeneous catalysts.

It was only 20 years ago that organobismuth chemistry was born. The first step was when Professor D.H.R. Barton and his associates started a systematic study of organobismuth compounds. This laid the basis of its subsequent development. Over the past 20 years a lot of organobismuth compounds have been synthesized and their properties have been elucidated. Concurrently a variety of new methodologies for synthesizing various organobismuth compounds have also been developed.

This book, 'Organobismuth chemistry', was written by a group of distinguished Japanese authors to provide a source of information for researchers interested in organobismuth chemistry or organobismuth compounds. It covers literature published up to early 2000, and deals with compounds containing Bi–C bonds, generally omitting inorganic compounds, minerals, metal alloys, and non-stoichiometric materials. It consists of six chapters in all, as follows: Chapter 1, Introduction; Chapter 2, Organobismuth(III) compounds; Chapter 3, Organobismuth(V) compounds; Chapter 4, Bismuth-containing heterocycles; Chapter 5, Bismuth compounds in organic transformations; and Chapter 6, Structural chemistry of organobismuth compounds.

Chapter 1 introduces the basic facts concerning bismuth, including elemental bismuth, the production of bismuth, its physical and chemical properties, applications, commercially available bismuth compounds, and the toxicity. Chapters 2–4 classify organobismuth compounds according to type, and describe each compound group in detail. There are experimental sections concerning key compounds, which are useful for synthetic research. Chapter 5 focuses on bismuth compounds used for organic transformations, such as oxidization, reduction, and the formation of C–C and C–heteroatom bonds. The last Chapter is a collection of X-ray data for the organobismuth-(III) and -(V) compounds, which are of interest fundamentally or structurally. The question of the Bi–Bi double bond issue, notable among the more recent topics of research, is discussed in Chapter 2.

This book has been designed to contain as much data as possible, to impart to the reader a thorough understanding of organobismuth chemistry. In particular, synthetic methods, molecular structures, reactivity, and physical properties are described in minutest detail. Furthermore, the compounds and their derivatives discussed in each Chapter are presented in tables, one for each compound group. The tables detail synthetic methods, yields, melting/boiling points, spectral data (IR, MS, NMR, UV) and X-ray data, and appropriate literature references so that reader can easily find the original material.

As mentioned above, this book has many special features and is clearly constructed. It should attract the attention of not only researchers who need information on organobismuth chemistry, but also a lot of researchers organometallic chemistry in general. Although this is my particular interest, it is significant that the bond angles of organobismuth compounds are approximately 90°, since there is no hybridization of orbitals, something that is not observed in any other organometallic compounds. This phenomenon should be assumed to occur for considerations of molecular geometry in connection with molecular construction or shape.

It is my great hope that this book will serve successfully as the foundation for a much greater development of organobismuth chemistry.

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