

Book reviews

Toxicants in the Aqueous Ecosystem

T. R. Compton

John Wiley & Sons, Chichester, 1997

xii + 382 pages. £75

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The author states that the purpose of the book is 'to review the current situation as regards the control of pollution from all sources and discuss the levels of pollutants at present occurring in the aqueous environment, including rivers, lakes, groundwaters, estuary and seawaters and potable water as well as considering the toxic effects of such pollutants and methods of analysis'. He seeks to achieve this goal in ten chapters dealing with toxicants in the aqueous ecosystem. The book is reviewed in the context of its stated aims.

Chapters 1 and 2 deal with toxicity evaluation in terms of LC₅₀ based on analysis of water and animal tissue respectively. Chapter 1 also highlights the manner in which various approaches can be used in assessing long-term water quality in terms of element concentration in the aqueous ecosystem, while Chapter 2 discusses factors affecting bioaccumulation of elements in tissue. Chapter 3 deals with EU and UK legislation for control of pollutants in aqueous ecosystems and Chapter 4 reviews some of the information available on the toxicity of metallic, organometallic and organic pollutants towards fish and other species. Chapter 5 deals with the effects on creatures of dissolved metals in freshwater and oceans; Chapter 6 deals with the effects on creatures of organic and organometallic compounds in water. Chapter 7 is mainly concerned with methods for the determination of pollutants in sediments and contains data on the levels present in a variety of sources. Chapter 8 reviews the levels of metals, organometallics and organics found in tissues and organs of various plants and animal species from around the world. Chapter 9 summarizes concentrations of pollutants found in potable water samples taken throughout the world, while Chapter 10 deals with the occurrence of radionuclides in natural water systems.

The book contains five appendices, which give general information on (i) the range of elemental concentrations found in environmental waters, (ii) references to the occurrence of radioactive elements in the environment, (iii) data on toxicant concentrations in sedimentary matter, (iv) levels of elements in sea organisms and phytoplankton and (v) results obtained for the determination of elements and organics in potable waters from various parts of the world.

This book is therefore a useful starting point for anyone with an interest in pollutants in the aqueous ecosystem. However, it has serious limitations. Although

it is relatively well referenced with over 2070 references, only 160 are more recent than 1989. Chapters 1, 2, 3, 4, 9 and 10 and the appendices contain references no more recent than 1989. This implies that Chapter 3, which deals with EU legislation, is not up to date. I am personally aware of a considerable body of post-1990 information on radioactivity in the Irish Sea. A further example of the rather dated references is found on p. 75 where the 'recently renewed interest' in lead speciation is discussed. However, the three references cited date from 1977, 1978 and 1980! Virtually all of the post-1989 references in the book are from *Analytical Chemistry*. Worthwhile work has been published in other journals. In addition, some of the Figures in Chapters 1 and 2 are not referenced—I would have liked to have looked up the original work. References to legislation such as the US Safe Water Drinking Act (p. 222) should include the year.

Chemists will be unhappy with the fact that elements such as arsenic, phosphorus, selenium and antimony are classed as metals throughout the book. In many instances, the word 'elements' should have been used instead of 'metals'. In other instances, the nature of the oxidation state of the metal is not provided. This is particularly important for an element such as chromium that can exist in solution in oxidation states III and VI. In the former state it is an essential element in man and relatively non-toxic, but in the latter state it is highly toxic. For example, on p. 5 no reference is made to its oxidation state when discussing the effect of pH on the toxicity of chromium.

While the author claims merit in the fact that Chapters 5–8 discuss appropriate analytical methods for a range of elements and compounds, I found a considerable amount of repetition and feel that this feature could have been much better organized.

Some of the most serious incidents of pollution in recent times have arisen from oil spills. Examples include the Gulf War, when some 6–8 million barrels of oil were released into the marine environment, while closer to home the oil tanker *Braer* ran aground at Garth's Ness in the southern Shetland Isles in January 1993, releasing some 85 000 tons of crude oil and 500 tons of heavy fuel oil into the surrounding seas. There is little discussion of the effects of oil in the aqueous ecosystem in the book.

Typographical errors are relatively few although how 'ether capture detector' (p. 207) escaped unscathed through the editing process mystifies me. Surprisingly, the index contains no reference to Seveso or Minimata.

In conclusion, the book can be recommended as a good starting point for those interested in toxicants in the aqueous ecosystem. It should prove very useful for teachers preparing courses in this area and would save

considerable effort in accumulating the basics. However, these would have to be supplemented by additional more recent, up-to-date data. As an up-to-date reference, it has serious limitations as outlined above.

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Organosilicon Chemistry III — from Molecules to Materials

Norbert Auner and Johann Weis (eds)

Wiley-VCH, Weinheim, 1998

xxv + 716 pages. £70

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This hard-back volume contains a summary of lectures and poster contributions to the *III. Munchner Silicontage* in April 1996. The volume is attractively produced with all papers in the same standard format, with good-quality graphics, clear well-produced reaction schemes and useful tables of physical and spectroscopic data. Literature citations are included at the end of each paper.

The contributions are organized in two sections: Part I, 'Fascinating organosilicon compounds' (466 pages) and a shorter Part II, 'Silicon based materials' (270 pages); full titles of all contributions are listed in the Contents section. The details from 76 contributions are described in Part I prefaced by a beautifully written brief account (16 pages) introducing the main current research areas of molecular organosilicon chemistry, including some key literature sources listed under appropriate headings for each of these areas. Germany has a reputation for excellent research in this area and most of the German household names of main-group chemistry, along with several from other countries, are to be found here pushing back the frontiers of silicon chemistry. Some of the topics covered in these contributions are as follows. Silylene species feature in many of the contributions, either as reactive intermediates or stable entities, and an extensive range of addition reactions are described, including the fascinating reaction chemistry from decamethylsilicocene and heterocumulenes. The chemistry of compounds with multiple bonds between two silicon centres or silicon and other elements is tackled by several groups and synthetic routes to iminosilanes and metastable silylidene-phosphanes and -arsanes are elaborated, along with addition and cycloaddition products of reactions with organic and inorganic reagents including elemental phosphorus, sulphur and tellurium. A considerable degree of interest is directed towards

compounds with silicon-to-metal single bonds, including examples where the steric properties of the bulky hypersilyl group, $(\text{Me}_3\text{Si})_3\text{Si}$, and supersilyl groups, $(\text{Me}_3\text{C})_3\text{Si}$, are exploited for the stabilization of unusual oxidation states or low coordination at metal centres.

Several papers deal with metal oligosilane complexes, including reactions leading to corresponding chlorosilane and silanol derivatives. Several groups report on the chemistry of silanols and associated metallasiloxanes. Novel aspects of the chemistry of oligosilanes and polysilanes are described, including catalytic routes to polychloro-oligosilanes and stepwise synthesis of dendritic polysilanes. Hypervalent silicon compounds continue to fascinate and some particularly interesting reaction chemistry of the pentacoordinated silicon compound $(2-\text{Me}_2\text{NCH}_2\text{C}_6\text{H}_4)(\text{CH}_2=\text{CH})\text{Si}(\text{H})_2$ is described, including formation of carbosilane and siloxane polymers and the replacement of the $\text{Si}(\text{H})_2$ fragment with $\text{Si}=\text{S}$ or $\text{Si}=\text{Cr}(\text{CO})_5$.

The introduction to Part II of the volume gives a brief survey of the technologies based on organosilicon and inorganic silicon chemistry and concludes with the observation that much more effort is required on the materials science and technology front, particularly related to the growth area of silicon-based sol-gel materials. An interesting discussion on environmental issues relating to silicon products is included here. The 28 other papers in this section of the volume touch on a broad range of the topics of current interest in silicon-based materials chemistry. A substantial article on the chemistry and applications of liquid-crystalline cyclic siloxanes is included. Studies of photoconductivity in polysilylenes, fluorescence and luminescence behaviour of modified siloxanes as well as electrical and electronic applications of silicone elastomers are presented. The syntheses of novel preceramic polymers, poly(diorganysilylene-co-ethynylene)s, polycarbosilanes and poly-organoborosilazanes are featured. Several papers deal with applications of alkylalkoxysilanes as reagents for surface modification, as consolidants for natural stone or as precursors for the synthesis of novel organic-inorganic hybrid materials by sol-gel processing. There are several other contributions dealing variously with cationic reagents as photoinitiators and photocrosslinking agents, the role of some structure-directing agents in the synthesis of zeotype materials, aspects of chemical modification of silica surfaces and the synthesis and properties of nitrido silicates.

This volume provides an excellent and valuable summary of much recent work in organosilicon and inorganic silicon chemistry. It is very good value at £70.

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