Book Reviews

Studies in Natural Products Chemistry: Vol. 16, Stereoselective Synthesis (Part J). Edited by A.-u.-Raman (University of Karachi, Pakistan). Elsevier: The Netherlands. 1995. xiv + 757 pp. $435.25. ISBN 0-444082264-X.

This volume is the latest in a long-standing series edited by Professor Atta-ur-Raman devoted to matters related to natural products synthesis. As in previous installations, a typical chapter will describe the author's efforts toward the synthesis of a class of natural products, including related matters of previous synthetic efforts, the development of relevant synthetic methodology, and the occasional discussion of biological context. A thumbnail view of the book reveals contributions by a nice mix of well-chosen authors and topics: Weinreb (actinobolin/bactobolin), Clive et al. (fredericamycin), Nishimura (sistatin B and analogs), Money and Wong (a wide-ranging review on monoterpenes as starting materials in synthesis), Isoe (iridoids), Back (brassinosteroids), Larock (organopalladium approaches to prostaglandins), Stephenson (transition metal complexes in amino acid synthesis), Bäckvall and Tanner (palladium-mediated approaches to alkaloids), Angle and Breitenbucher (piperidine and indolizidine alkaloids), Hoshino (aporphine alkaloids), Engler (benzoquinone/styrene reactions and syntheses of pterocarpans and neolignans), Endo (photolysis of 4-substituted phenols), Raczko and Jurczak (furan as an educt in natural product synthesis), Koch and Chamberlain (γ-butyrolactones in natural product synthesis), and Welch and Kawecki (fluoro-β-lactams).

The chapters are without exception well-written, readable, and browser-friendly. Although the book was produced from camera-ready manuscripts, each contribution has been attractively presented and the overall quality is very high. Given the usual delays associated with producing a book of this type, the references are reasonably up-to-date and complete. This book will strongly appeal to authors directly involved in some of these research areas, to graduate students interested in learning more about the evolution of a research program than is generally evident from the original literature, or to aficionados of complex synthesis. Such persons should find this book an engaging and convenient resource. Ultimately, however, this book's price will keep it out of the personal collections of most chemists who are not tycoons or book reviewers. And, given the current climate of budget-cutting and journal cancellations in institutional libraries combined with the fact that most of this chemistry has been previously published, many librarians will find it difficult to justify its purchase.

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Flow Injection Atomic Absorption Spectrometry. By Zhaolun Fang (Institute of Applied Ecology, Chinese Academy of Sciences). Wiley: New York. 1996. xiii + 306 pp. $89.95. ISBN 0-444-87394-5.

The monograph *Flow-injection Atomic Spectrometry* by J. L. Burguera appeared in 1989. The literature in this area has since grown from about 130 references to nearly 600 at the end of 1994, when Fang's book was completed. Much of the newer literature is devoted to electrothermal atomic absorption spectrometry. Fang's excellent book bridges the gap from 1989 and is complementary to the earlier book that helped establish flow injection absorption (FIA) as an important technique for atomic spectroscopists. The literature is current through 1994.

Flow injection (FI) is sufficiently mature that the principles are dealt with only briefly in Chapter 1. Chapter 2 describes the fundamental instrumentation for flow injection, including propulsion devices, injection values, transport conduits and connectors, mixing reactors, and on-line separation devices. Chapter 3 then gets into the important aspects of FI sample introduction in flame atomic absorption spectrometry (AAS). Particular attention is paid to dispersion contributed by system components and different manifold designs for introducing samples and reagents. The introduction of high dissolved solid samples and slurry samples is treated. Chapter 4 describes various sample dilution systems, to extend the limited dynamic range of AAS, and these include dispersion, microsampling, mixing chambers, flow manipulation, gradient dilution, and on-line dialysis. General systems are drawn from the literature that should be applicable to AAS. A short Chapter 5 discusses ways to enhance the sensitivity in flame AAS, such as improving nebulization efficiency and use of organic solvents, and their combined synergistic effects in a FI-AAS system.

Chapter 6 describes FI vapor generation techniques, including hydride generation and mercury cold vapor generation. These vapor generation methods provide 3 orders of magnitude or more increase in sensitivity for hydride-forming elements such as arsenic, selenium, bismuth, and antimony, and FI methods decrease sample and reagent consumption by over 90%, as well as increase sample throughput. Also, interferences from transition elements are often reduced by orders of magnitude over those of batch methods.

The indirect determination of anions and organic species has been made more convenient by using FI methods. Chapter 7 describes analyte conversion methods using precipitation, ion-exchange, solid-phase reactions, and solvent extraction. These techniques and others are useful also for preconcentration of analytes, as discussed in Chapter 8. Definitions of the enrichment and enhancement factors, concentration efficiency, consumptive index, and phase transfer factor are provided with formulas for the characterization of these systems. Fang's 1993 book, *Flow Injection Separations and Preconcentration*, is a useful companion reference for this chapter.

A separate chapter deals with FI techniques for electrothermal AAS. This is an area where much of the growth in the FI-AAS literature has occurred in recent years and is a welcome addition to this book. On-line preconcentration systems provide truly impressive detection limits when combined with ETAAS, with parts per trillion and lower measurements possible. The closed system operation and automation afforded by flow injection minimizes contamination difficulties and makes these types of measurements nearly routine. Chapter 9 treats FI preconcentration manifolds and techniques for sample deposition in the graphite tube. Sorption, solvent extraction, coprecipitation, and electrochemical preconcentration methods are covered.

Various calibration methods for FI-AAS are described in Chapter 10, including serial dilution, continuous dilution, gradient dilution and ratio methods, standard addition methods, and calibration by peak width evaluation. On-line and off-line digestions of samples are critically discussed in Chapter 11, as means to automate and speed sample throughput. On-line microwave-assisted digestions, stopped-flow digestion systems, UV irradiation, and tandem digestion systems are described.

Finally, example applications of FI-AAS for the analysis of environmental, agricultural, clinical, geological, and metallurgical samples are given in Chapter 12.

Zhaolun Fang is a pioneer in developing flow injection for atomic absorption spectrometry, starting in the laboratories of Ruzicka and Hansen in Denmark and Welz in Germany and has presented a detailed perspective on essentially all methodologies and applications. The book is of high quality. I detected very few errors, for example, the omission of detection limit units in Table 9.3. Titles are given to nearly all the referenced papers, which is very helpful to the reader and entails a great deal of work. A few (I counted 33 out of some 680) do not have titles and are distinguished as references rather than bibliography, without explanation.

The literature of flow injection in inductively coupled plasma emission and mass spectrometry is not covered, although many of the techniques listed in this book are applicable to these systems. Fang has done a superb job of describing and tying together the various flow injection schemes reported in the literature. It would have been helpful for the reader to have more of his critical evaluation or recommendations of different approaches based on his years of experience and expertise. For example, which dilution schemes are to be preferred? Microsampling and mixing chamber methods might have been compared with manifold manipulation schemes.

This book will further establish flow injection as the method of choice for sample introduction in atomic spectrometry and is a must read for all AAS practitioners.

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