Continuous-Flow Fast Atom Bombardment Mass Spectrometry

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First reported in 1981 by Barber and co-workers, fast atom bombardment (FAB) mass spectrometry (or liquid secondary ion mass spectrometry) has become one of the most widely used desorption ionization techniques. In 1985 and 1986, the initial reports of on-line coupling of fast atom bombardment mass spectrometry with a continuous-flow liquid introduction system and high-performance liquid chromatography (LC) were reported by Ito and co-workers and Caprioli and co-workers. The American Society for Mass Spectrometry sponsored a workshop on continuous-flow fast atom bombardment (CF-FAB) mass spectrometry in November 1989, which became the basis for this book.

This affordable and readable book contains eight chapters, each with its own bibliography, and a brief subject index. The first seven chapters are written by seven contributing authors from biomedical academic and government laboratories. Special applications, contained primarily in the final chapter, are written by 14 other researchers including those in biotechnology, agricultural, and pharmaceutical industries. As a result, the examples illustrating the use of CF-FAB mass spectrometry concern primarily biomedical applications such as analyses of peptides, other natural products, and xenobiotic metabolites.

The first three chapters concern the design and operation of the CF-FAB interface and its use for trace analysis and quantitative analysis. Later chapters discuss LC-MS and LC-MS-MS, capillary zone electrophoresis (CZE)-MS and CZE-MS-MS, and novel CF-FAB applications such as on-line reaction monitoring of enzymatic peptide hydrolysis and microdialysis for in vivo monitoring of plasma drug concentrations. The LC-MS applications include coupling microbore HPLC columns to CF-FAB with solvent splitting post-column, as well as the newer nanoscale HPLC columns that require no solvent split. Basic descriptions of the instrumental design (i.e., capillary plumbing, probe design, coaxial flow addition of matrix), and operating parameters (i.e., solvent flow rate and composition, ion source temperature) are provided for using CF-FAB with several different types and brands of mass spectrometers. Such experimental detail should assist the novice in rapidly learning CF-FAB procedures and the

pitfalls to avoid when carrying out CF-FAB on their own equipment. Sufficient breadth of CF-FAB applications is provided to show experienced practitioners at least some new uses of the technique.

Numerous advantages of CF-FAB over standard FAB are discussed in detail with specific illustrations and examples, and the operational disadvantages are mentioned briefly. No attempt was made to compare CF-FAB to other liquid introduction or LC-MS techniques. Although the use of other LC-MS interfaces such as electrospray and ion spray is increasing, CF-FAB should continue to enjoy widespread application in medicine, biochemistry, biotechnology, and other fields for many more years. Therefore, this book is a timely reference for investigators already using or considering the use of CF-FAB.

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Mass Spectrometry in the Biological Sciences: A Tutorial

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This volume is based on the NATO Advanced Study Institute on "Mass Spectrometry in the Molecular Sciences" held in Cetraro, Italy, in June 1990. Rather than merely a collection of short articles and reviews, it is intended to be a tutorial on the current status of biological mass spectrometry. Although it also aims to provide an introduction to mass spectrometry for newcomers to the field, many of the articles presuppose that the reader has some familiarity with the subject.

Part 1 consists of six chapters on mass analysers and a seventh on ion detection. The authors have taken widely different approaches to their subject matter. The chapter on hybrid tandem instruments and triple quadrupole instruments are strongest on applications, whereas the chapters on sector and time-of-flight instruments and ion detection are devoted entirely to the physical principles underlying these analysers. The eleven chapters that form Part 2 are largely concerned with different ionization and sample introduction methods employed in the study of high molecular weight compounds of biological importance, with par-