



## Bioseparations Engineering: Principles, Practice, and Economics

**Michael R. Ladisch**  
**John Wiley & Sons, Inc., New York, NY**  
**760 pp., \$105, 2001**

Dr. Ladisch, with his experience in teaching and research, expands the principles of bioseparations that are applied to bioproducts at every scale of production. The thought process is complemented with examples of industrial practice that simplify the comprehension of the material.

The book starts with a compelling introduction to bioseparations. Due to heat and pH sensitivity of biological molecules, bioseparation emerged as a necessity to recover, purify and concentrate biological products without the use of the traditional unit operations of the chemical industry. The author discusses the bioseparation methods in the text in the order of their use during product recovery and purification. Chapters 2 through 4 emphasize primary and secondary stages of product recovery. Sedimentation, centrifugation and filtration are introduced as solid/liquid separations that occur at a macroscopic level. The use of membranes



allows separations at a macromolecular or molecular level, while solids obtained through precipitation, coagulations or crystallization require a solid/liquid separation prior to purification. The rest of the text emphasizes chromatography (Chapters 5 through 9). After a detailed review of the principles of liquid chromatography, its scale-up from bench scale to process scale is discussed assuming that the governing mechanisms remain unaffected. A detailed discussion of the purification of biological products using ion exchange, size exclusion (gel permeation), reversed phase, hydrophobic interaction and affinity chromatography is presented in Chapter 8. The final chapter discusses how affinity chromatography applies molecular biology and combinatorial methods to separations science.

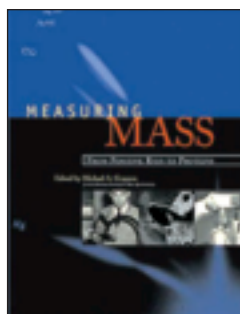
The text, with its unique context and detailed structure, is a good first resource for both industrial and academic readers. As a textbook, it integrates practical examples and study problems that allow students to apply basic principles to industrial examples. As a reference, it addresses a wide range of applications and scale-up problems.

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## Measuring Mass: From Positive Rays to Proteins

**Michael A. Grayson, editor**  
**Chemical Heritage Foundation**  
**Philadelphia, PA**  
**160 pp., \$35, 2002**

The American Society for Mass Spectrometry celebrated the 50<sup>th</sup> anniversary of its Conference on Mass



Spectrometry and Allied Topics by supporting the publication of the book “Measuring Mass: From Positive Rays to Proteins.” This well-written tome describes the history and applications of mass spectrometry. In mass spectrometry, instruments convert molecules in a sample into ions and separate them according to their mass. The resulting “finger-

print” can be used to determine the identity and concentration of a chemical compound.

The book begins by discussing the origins of mass spectrometry, starting with John Dalton’s proposal of atomic theory in 1803, Eugen Goldstein’s discovery of positively-charged “canal rays” (the “positive rays” of the book’s title) in 1886, and J. J. Thomson’s discovery of the electron in 1897. Subsequent chapters discuss applications of the technology, including tracer use in metabolism studies, development of vaccines and drugs, terrestrial and extraterrestrial atmospheric analysis, and analysis of environmental pollutants. The final chapter presents the history of and a promotion for the society. Along the bottom of each page are two parallel timelines — one of important milestones in the history of mass spectrometry, and the other of general world history that places the milestones in context. Side boxes contain information of a more technical nature. Photos of key people and of the equipment are liberally sprinkled throughout.

Although by its nature a specialized book, it should be readable by anyone with an education in general chemistry and physics. If you are looking for an operational reference, this book is not for you. But, if you want to know the history of this fascinating and versatile instrument and a very basic overview of how the equipment works, then I recommend it.

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