
Preface

Amino Acid Analysis (AAA) has been an integral part of analytical biochemistry for almost 60 years. AAA was originally developed by Moore and Stein and was at the very heart of their work on the mechanism of enzyme catalysis for which they were awarded a Nobel Prize in Chemistry in 1972. In a relatively short time since the previous AAA book in this series has been published (10 years), the variety of AAA methods changed dramatically with more methods shifting to the use of mass spectrometry (MS) as a detection method. At the same time, a number of old techniques acquired a new make-up, like combination of AccQ-Tag with UPLC and MS, instead of HPLC and fluorescence. Another new aspect is miniaturization. One of the chapters in this book describes an AAA in a single cell. However, the most important aspect is that AAA in this day and age should be viewed in the context of Metabolomics as a part of Systems Biology.

Historically, analysis of amino acids (AA) includes derivatization (pre, on-, or post-column) coupled with chromatographic separation. A wide variety of separation techniques were applied to separation of AA over the years. This list includes ion-exchange LC, reverse-phase HPLC, gas chromatography (GC), and capillary electrophoresis (CE). Recent advances in mass spectrometry (MS) led to the application of electrospray ionization coupled with LC or CE for AA detection which may also allow the analysis of underivatized AA. Two most recent technological advances in AAA include the application of MALDI TOF MS and TOF/TOF MS/MS and microfluidics. AAA techniques evolve and follow the bioanalytical technological advances.

Sample preparation for AAA plays a critical role in the successful implementation of AAA. Correspondingly, in this book a reader can find chapters describing general as well as specific approaches to the sample preparation. A number of chapters describe different applications of AAA. Some chapters describe specific applications of AAA in clinical chemistry as well as in food analysis, microbiology, and other biomedical fields. Separate chapters are devoted to the application of AAA for protein quantitation and chiral AAA.

Our goal was to present a spectrum of all available methods for readers to choose the method that most suits particular laboratory and needs. And, at the same time we attempted to present more than one method for each application or detection/separation approach so that again the readers can find the one that most suits their needs and available laboratory conditions.

What is unique about this book, and in essence about AAA itself, is that it is related and is of interest to anyone involved in biomedical research or, in general, in life sciences. One can find here techniques essential in medicine, or in drug metabolism, or cell biology, even in archeology, in meat industry, in marine biology, in agriculture, and the list goes on. All of the described techniques are multifaceted and in many cases can serve as a blueprint for the analysis of other chemically related classes of metabolites.

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