

## Foreword

HPLC has become the analytical method against which all others are measured and compared. It is perhaps the most widely employed method of analysis of all those instrumental approaches that have ever been or are now in vogue. Having been involved with HPLC for perhaps the past 35 years, since the early 1970s, I have seen the technique and field grow and prosper, academically and commercially. It has become an incredible commercial success, and the cornerstone of many academic careers in analytical and other fields of chemistry. Annual, dedicated meetings, as well as major parts of ACS, ASMS, AAPS and AAAS meetings, are routinely devoted to talks and discussions on or involving HPLC. Though it has not quite displaced GC or flat-bed electrophoresis, it has surely been highly competitive for volatiles and biological macromolecules, respectively. Indeed, one could argue that it is the very first technique that most analysts, biologists or biochemists would consider investigating and applying for virtually any class of analytes, regardless of molecular weight, size, volatility, ionic charges, polarity, hydrophobicity, or other physical or chemical properties. HPLC has become a technique that can be applied to virtually any analyte or class of analytes, almost without regard to the properties thereof. There are very few other analytical methods for which this can be claimed. HPLC has truly become the “800 pound gorilla”, and it may be virtually impossible for any other technique to displace it from this niche in the analytical world, not even CEC or 2DE or multidimensional CE.

Why then another book dealing with this same topic? I have read some other texts by *Stavros Kromidas*, and was thus eager to preview this current one. This text is really an edited book, though *Stavros Kromidas* has contributed several excellent chapters of his own. The other contributions come from an international group of invited authors, mainly from the US, Canada, and Western Europe. Virtually all of these individuals are well known in the HPLC community, such as *Uwe Neue*, *Michael McBrien*, *Lloyd Snyder*, *John Dolan*, *Klaus Unger*, and so forth. Most, if not all, have been heavily involved in HPLC matters for decades, and have, in their own right, become well-regarded and recognized experts in their various fields. The book is heavily practice and practicality oriented, in that it aims to help the readers become more knowledgeable and better adept at using various forms of and approaches in HPLC. However, it is not a “Methods”-type text, such as those published by Humana Press; it is not just a compilation of practice-oriented HPLC methods for various analytes.

*HPLC Made to Measure: A Practical Handbook for Optimization*. Edited by Stavros Kromidas  
Copyright © 2006 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim  
ISBN: 3-527-31377-X

Rather, the text is quite detailed, with scientific discussions and theory, lots of equations and principles, reference to a variety of practical software, and with an emphasis on understanding the fundamentals in each and every chapter. This is not an introductory text; it is not meant as a text for a graduate Analytical Separations type course. Rather, it is quite an advanced text, dealing with many recent and contemporary aspects of HPLC. It deals with approaches for method optimization, currently available software and practices, chemometrics, principal component analysis, the selection of ideal stationary phases, and tools for column characterization and method optimization. Of course, it deals extensively with reversed-phase HPLC, but it also covers many other areas, including GPC/SEC, affinity chromatography, chiral separations, microLC, nanoLC, and even microchip-based LC instrumentation and techniques. It also deals with immunochromatographic methods, two-dimensional HPLC (MDLC), LC-MS, LC-NMR, and even how magic-angle spinning NMR spectroscopy can be used to better understand the selectivity of stationary phases in HPLC. All in all, there are over two-dozen individual chapters, some authored by the same author(s), but most not. It is to the Editor's credit that he has not written most or even close to 50% of the total chapters, but rather that he has invited the most highly regarded and best-known authors, young and old, to contribute in areas of their unique expertise. He has made an exceptionally good selection of such authors, each of whom has done an admirable job in their final writings and efforts.

This is not a book that you will pick up and read in a single sitting; that would appear impossible, even for those of us who have already devoted a major portion of our careers to researching and developing HPLC areas. It is not an easy read; it is not a trivial text. Rather, it is clearly an advanced, involved, and detailed text. It is a book to be read slowly and carefully, because it contains an incredible amount of useful and important practical knowledge. It also covers the very latest developments in HPLC, not just the fundamentals, but where the field stands today, and where it is going tomorrow. It is a practical handbook for the optimization of HPLC and its ultimate application, but it is far from being just a handbook or "how to do it" text. It is really more of a summary of where HPLC stands today, what can be done with its various techniques and instrumentation, and what is important to know about its future developments and applications. It is an incredibly useful and practical tome, collated by experts pooling their expertise, and it will make better chromatographers out of those of us who take up the book, study it carefully, and then apply its lessons to our own future needs. It is not a simplistic methods development type book, though it does aim to help us optimize and improve our methods development approaches. It is far more than "just" a Practical Handbook for Optimization, though the subtitle might make that suggestion.

It is my hope that those of you thinking of purchasing this particular, newer text on HPLC, and those who have already made this wise decision and are about to pursue the text itself, will benefit from these choices. They were and are wise choices; now it is up to you to make the most of the book, which means not just reading the text and studying the figures and tables, but making every effort

possible to really understand what the authors are trying to impart to the readers. This may require re-reading of the same chapter more than once; I did – actually several times, as these are not easy chapters or contributions. However, in the long run, the time will be well spent and such efforts will be rewarded, for the book is truly a wealth of useful and practical information. Obviously, I highly recommend the book to those contemplating purchase and study, for it is really one of the better texts to have come along in many years dealing with this, one of our very favorite subjects, HPLC.

January 2006

*Ira S. Krull*  
Associate Professor  
Department of Chemistry and Chemical Biology  
Northeastern University  
Boston, MA, USA



## Preface

The optimizing of practices and processes constitutes an essential prerequisite for long-term success. The objective and the motives may be very different: self-preservation among living things, “saving lives” among volunteers in Africa, maximizing profits among marketing strategists, new discoveries among scientists. This principle is of course also valid in chemistry and in analytics.

This book deals exclusively with the subject of optimization in HPLC. The aim is to examine this important aspect of HPLC from diverse perspectives. First, we have set out the fundamental aspects, encompassing the principal considerations and background information. At the same time, we have endeavored to present and discuss as many practical examples, ideas, and suggestions as possible for the everyday application of HPLC. The implementation of concepts for rapid optimization should equally aid and support the planning of effective method development strategies as in daily practice at the laboratory bench. The aim of the book is to contribute to purposeful, affordable, forward-looking method development and optimization in HPLC.

To this end, internationally renowned experts have offered their knowledge and experience. I extend my sincere thanks to these colleagues. I also thank Wiley-VCH, in particular Steffen Pauly, for their valued collaboration and good cooperation.

Saarbrücken, January 2006

*Stavros Kromidas*

