

Foreword

I feel honored by Hans-Joachim Hübschmann asking me to write this Foreword to his newest book, *Automated Sample Preparation: Methods for GC-MS and LC-MS*. I have read the near-final draft with pleasure, and I am impressed in all respects with the work, which was a great deal of work indeed! Hans-Joachim's choices of topic, title, chapters, sections, and their organization were splendid, and he presented the right amount of detailed yet concise information with much consideration and care.

Many books are written to follow trends that cover the same information as other books already available, but Hans-Joachim found a perfect niche by focusing on automation of sample preparation for instrumental chromatographic analysis. It is a topic that has rarely been published before, not even in journals due to the profitable advantages gained by laboratories that successfully implement automated methods.

Hans-Joachim and I met for the first time in 2016 at a food science conference in Singapore. We had an immediate connection in our work involving automated mini-cartridge solid-phase extraction, which has expanded to a larger connection after many conversations and email exchanges since then. I am grateful to Hans-Joachim for his valuable knowledge and input when I have requested it, and I am pleased to gain the perspective from the author of this work, as well as an 880-page 3rd Edition opus, *Handbook of GC-MS: Fundamentals and Applications*.

In my opinion, the three most important trends in sample preparation are streamlining, miniaturization, and automation. The fundamental chemistry of dissolution, precipitation, vaporization, partitioning, adsorption, hydration, chelation, and other phenomena that form the basis of all old and new sample preparation techniques have been known for centuries. However, the technical art of analytical chemistry requires the skill to manipulate those chemical properties in the most efficient way possible to still achieve accurate results for the purpose of the analysis.

Michelangelo Anastassiades and I did not invent any new chemistry when we developed the “quick, easy, cheap, rugged, and safe” (QuEChERS) approach for sample preparation in 2002, but we streamlined and miniaturized existing tools in an elegant solution at the right time when commercial GC-MS and LC-MS instruments were sensitive and universally selective enough to allow analysis of a wide scope of analytes. In this book, Hans-Joachim describes the next step for QuEChERS, which entails automation, and I've been calling it QuEChERSER (more than QuEChERS is also “elegant and robust”).

Devising and implementing automated methods takes “brains,” which constitutes the fourth important trend in sample preparation. Unlike the other trends that continually entail “more more more,” required intelligence among laboratory workers is trending in both directions the same time. The growth in sheer knowledge and the complexity of problems, tools, and technology has required more brains to solve modern problems, but less brains are needed to perform routine operations, especially when using automated methods. For decades now, laboratories have saved money by hiring less educated, less talented, and less skilled technicians (thereby less expensive) to perform chemical analyses. In fact, many laboratory owners consider it a “no brainer” to fully automate as much of their operations as possible so they can hire as few staff as possible.

Despite what CSI and other fictional depictions of analytical chemistry may show, in which perfectly accurate results are beautifully displayed on colorful viewscreens in a matter of seconds, real-world analyses are not that fast and easy! Real-world analysts are not as smart as Abby Sciuto from NCIS either, and nobody is writing the plots and scripts for them leading to high certainty results that neatly solve the critical problem of the hour. With respect to reliability and data quality, brainless robots can outperform even Abby (without the personality quirks, need for sleep, or salary demands). The real-life Abby is a smart and savvy technical operator who writes the script and maintains the automated instruments.

Analytical chemists tend to be responsible, hard-working people who are motivated by laziness, which is a perfect combination to traits needed to implement laboratory automation. If it was easy, laboratory automation would have been implemented ages ago. Unfortunately, reliable, inexpensive, and user-friendly automated tools have not been commercially available until very recently, and the lack of technical know-how and abilities of laboratory staff remains the greatest obstacle.

This is how Hans-Joachim Hübschmann’s book about the *Automated Sample Preparation: Methods for GC-MS and LC-MS* comes in handy. The smartest (and the dumbest) brains do not have to work hard to solve problems at all if the owners of these brains have knowledge that the same or similar problems have already been solved by others! Hans-Joachim and this book can help both the brainy and not so brainy analysts of the world, and their bosses, make the fictional world of CSI and NCIS become a step closer to reality.

Disclaimer

The opinions expressed in this foreword are the author’s own and do not reflect the view of the USDA.

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