BOOK REVIEW

Organic Mass Spectrometry in Art and Archaeology

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This book is a welcome addition to the current collection of archaeometric books, as it is focused on the monitoring of organic compounds by using mass spectrometric techniques, while the majority of existing literature deals with elemental, qualitative, quantitative, and/or isotopic analysis instead. The editors, who have also written several chapters in the current book, are well-known in the community for their extensive work in this area of research, carried out at the University of Pisa (Italy), and have worked with the cooperation of many experts in the techniques and samples covered in the book.

The book has been very nicely edited. It can be divided into five main parts, each of them with a different number of chapters. The first part (Part I) is introductory and comprises two chapters, one devoted to the organic materials that are expected to be present in archaeological samples, their properties, and their significance, and a second chapter that overviews the basic operating principles of organic mass spectrometric techniques. Parts II to V are devoted to different analytical techniques. Part II covers direct mass spectrometric analysis. Part III deals with gas chromatography coupled to mass spectrometry (GC/MS), and it is actually the most extensive section comprised of six chapters. Part IV is very short and is devoted to liquid chromatography coupled to mass spectrometry. Finally, Part V is devoted to other MS-based techniques that are relatively more recent; examples are time-of-flight secondary ionization mass spectrometry (TOF-SIMS) and accelerator mass spectrometry (AMS), the latter used for carbon dating. Given that these techniques are a bit different from those discussed throughout the work, their fundamentals are also discussed in these last chapters.

The book is, therefore, focused on the existing organic mass spectrometric techniques and their potential. This analytical

focus is balanced by the fact that every chapter is devoted to the application of a technique for investigation of a particular type of material. For example, Chapter 4 belongs to Part II and is, thus, devoted to the use of direct mass spectrometry, in this case for the characterization of wax and lipids, whereas Chapter 8 belongs to Part III and is consequently devoted to the use of GC/MS, in this case for the characterization of resinous materials. Every one of these applied chapters contains an introduction, a detailed description of the analytical procedure typically used, a discussion of all steps necessary from sampling to data processing (which is often not a trivial step in structural analysis), and some examples (case studies) from the recent literature. The book contains a very significant number of figures (including some in color) and tables. Every chapter, which is typically about 30 pages long, includes its own references and stands on its own (can be read separately). There is a very good index at the end that facilitates finding particular pieces of information.

It is always difficult to keep an adequate degree of cohesion and avoid excessive repetitions in this kind of book in which every chapter is written by different authors. Indeed, there are some repetitions in this book, but this is not necessarily a problem because it is intended to be used as a reference for readers searching for specific pieces of information, instead of being read from the beginning to the end. Moreover, the authors have made an effort to include adequate remarks directing the readers' attention to those other chapters where a topic may be discussed in more detail. Keeping an analytical focus also results in some scattering of information for those authors interested in some materials only. For instance, a reader interested in characterization of binders will find this information in chapters 5, 9, and 11, all of them based on different analytical techniques. However, this is again not a significant problem because the exact location of all the information is sufficiently clear (e.g., based on the chapter titles and on the index).

Overall, I can recommend this book to those who wish to learn how organic mass spectrometric techniques can help unravel very old but also very interesting and relevant mysteries. In particular, I think all archaeometry researchers who are unfamiliar with these techniques will be pleasantly surprised by the current opportunities offered by MS (e.g., TOF-SIMS can provide direct imaging information from a solid sample), and they may discover new ways to enhance or complement their current research.