Book Review

2010, 72, 1235

Extraction Techniques in Analytical Sciences

by John R. Dean, Wiley, Chichester, UK, 2009, pp xxvi + 281, ISBN: 9780470772843. Price: EUR 46.00, GBP 39.95

Sample preparation is a key aspect of the total analytical process with a profound effect on the accuracy and precision of the final result. Unless a highly selective separation-plus-detection technique is used for final analyte determination, current sample treatment procedures commonly involve a number of steps for quantitative extraction of the target compounds from the matrix and subsequent isolation and enrichment from co-extracted material. These several treatments frequently result in tedious, time-consuming and highly manipulative protocols, and frequently sample preparation is still the bottleneck of the analytical process in many application areas.

This book is an updated version of *Extraction Methods for Environmental Analysis*, published in 1998 by the same author. This new text discusses the fundamentals of extraction techniques as applied to the recovery of organic compounds from different environmental matrices, and reviews current trends in their application through selected examples and an updated bibliography. The book consists of thirteen chapters. After a first introductory chapter in which key aspects concerning pre- and post-extraction issues (i.e., basic sampling and instrumental analysis techniques and considerations) are presented and briefly dis-

cussed, the text is divided in five sections covering topics like aqueous samples (88 pages), solid samples (84 pages), gaseous samples (12 pages), comparisons of extraction methods (20 pages) and resources (8 pages). Chapter 2 describes the theory and more relevant aspects regarding liquid-liquid extraction of organic compounds from aqueous samples, as well as the fundamentals of the purge-and-trap technique and its application to the analysis of volatiles in water. Solid phase extraction (SPE), one of the most widely used techniques for preconcentration and clean-up of analytes in liquid samples, is discussed in Chapter 3, where the different commercially available sorbents, retention mechanisms and SPE formats and configurations are illustrated through representative examples. The fundamentals of solid-phase microextraction and the different analytical strategies used to increase the application range of this extraction technique to the analysis of compounds of divergent volatility in both liquid and solid samples and its potential for automation are presented in Chapter 4. Chapter 5, probably the weakest chapter, provides a brief overview of selected emerging miniaturised techniques that, despite their novelty, have already demonstrated their feasibility for the analysis of trace organic compounds in a variety of matrices.

The most common extraction techniques applied to the treatment of solid samples are covered in the next five chapters. Classical approaches based on solid-liquid extraction (i.e., mechanical shaking, Soxhlet and Soxtec) and ultrasound-assisted procedures are discussed in Chapter 6. Methods based on matrix

solid-phase dispersion and enhanced fluid/solvent extraction techniques (i.e., pressurised fluid extraction, microwave-assisted extraction and supercritical fluid extraction) are separately reviewed in the next four chapters following a common pattern that includes a detailed discussion of the theoretical aspects of the corresponding approach, instrumentation description, and a range of applications that illustrate the potential of the technique for a variety of studies as well as the latest trends in its use.

The most common techniques in use to sample and preconcentrate VOCs in air samples are reviewed and briefly discussed in Chapter 11. Chapter 12 focuses on practical aspects to be considered for appropriate selection of an extraction technique for recovering organic compounds from solid, aqueous and air samples, and highlights the use of reference materials for method development and validation. The last chapter provides a useful and complete list of relevant information resources where the interested reader can find more specific information concerning method protocols and techniques used for the separation of organic analytes.

Written as a self-study guide, the book is an ideal text for undergraduate and postgraduate students, but also for newcomers in the field interested in obtaining a general but complete overview of modern extraction techniques in use for the analysis of organic compounds in complex environmental samples.

L. Ramos