BOOK REVIEW

Daniel S. Isenschmid,[1] *Ph.D.*

Review of: *Handbook of Analytical Separations, Volume 2, Forensic Science*

REFERENCE: Smith RM, series editor, Bogusz MJ, editor. Handbook of analytical separations, Volume 2, forensic science. Elsevier, Amsterdam, Netherlands, 2000, 742 pp.

This is the second volume of *Handbook of Analytical Separations* and is entitled *Forensic Science*. While several topics in forensic science are included, the first part of the book, Forensic toxicology, make up the bulk of this volume (597 pp.). This part of the book is divided into three sections: illicit drugs, therapeutic drugs, and other topics of toxicological relevance. A review of the analytical toxicology of many major drug classes are considered in the individual chapters that make up the first two sections of this part of the book. Chapter topics include opiate agonists, cocaine and metabolites, amphetamines, hallucinogens, cannabinoids, sedatives and hypnotics, antidepressants and antipsychotics, non-opioid analgesics, and a catch-all chapter that includes cardiac glycosides, oral antidiabetics, and muscle relaxants. Each chapter first reviews methods used to isolate drugs from biological matrices (and plant material where applicable). Included are traditional liquid-liquid and solid-phase extraction procedures as well as newer isolation techniques such as supercritical fluid extraction. Separation methods discussed in most chapters include thin layer chromatography, liquid and gas chromatography and in some cases, capillary electrophoresis. Derivatization methods, if applicable, are either presented in a distinct section of a chapter or incorporated into the discussion of detection techniques. Methods of detection are usually integrated into the discussion of each separation technique. In addition to mass spectrometric detection, I was glad to see that most authors also reviewed other detection techniques including nitrogen-phosphorus, diode-array, electron-capture, and fluorescence. Notably absent from most chapters, except the chapter on cannabinoids, was any discussion of immunoassays. This is unfortunate as important issues such as cross-reactivity to various compounds, interferences, and comparisons between different types of commercially available immunoassays are not presented to the user of this volume. Most authors considered the analysis of drugs in various matrices, although the manner in which this data were presented varied considerably. Some authors chose to include this in their discussion of isolation techniques while others chose to dedicate sections of their chapter to each type of matrix. A separate chapter on alternative matrices also occurs later in the book. The authors of the chapter on the analysis of cocaine analytes included a table that lists the analytes detected, specimen type, internal standards, column type, instrumentation details, performance characteristics, and reference. I found this to be extremely useful for method comparison and wish that each chapter would have included a table similar to this. In addition to analytical methods, many chapters also contain additional topics of forensic significance for the analytes discussed, e.g., morphine (poppy seeds), cocaine (stability), amphetamines (source differentiation), etc. In general, the chapters on illicit drugs were more thorough than the chapters on therapeutic drugs. However, many more analytes had to be considered in the latter section. The chapter on antidepressants and antipsychotics, in particular, was too brief. In addition, this chapter discussed tricyclic antidepressants, serotonin reuptake inhibitors, neuroleptics, and antipsychotics as a group. It would have been much more useful to have this information subdivided by drug class with greater emphasis on a review of the published methods, rather than methods used in the authors' laboratory. The chapter on sedatives and hypnotics did break down the drugs by class, but was also too brief in its review of this important group of drugs, especially the benzodiazepines. Unlike the chapters in the section on illicit drugs, the chapters on therapeutic drugs did not include other relevant issues to the analytes discussed (e.g., postmortem redistribution).

The third section of the forensic toxicology part of this volume: other topics of toxicological relevance include a variety of chapters of interest to the forensic toxicologist. Some of these will inevitably be referred to more often than others. The first of these chapters covers enantioselective liquid chromatographic analysis of drugs in forensic science. Although this topic may seem to be a bit of pedantic esoterica to many, it is an interesting primer to an emerging area. The next chapter, environmental poisons, is divided into four parts. There is a short section on mushroom toxins, followed by a lengthy section on the toxins of freshwater blue-green algae. Following this is a short section on pesticides, and finally, a timely review of the analysis of chemicals related to the chemical weapons convention. These four topics were selected because the substances discussed possess a high degree of acute toxicity. The next chapter, drugs and driving, may, at first glance, seem out of place in this volume, but is an excellent review of this topic. The bulk of this chapter reviews analytical methods for screening and confirmation of drugs in drugs and driving cases including sections on alternative matrices, quality assurance, and interpretation. A brief review of legal issues, discussion of the prevalence of drugs in drivers, a few unusual case reports,

[1] Chief toxicologist, Wayne County Medical Examiner's Office, Detroit, MI.

and a short section on performance testing are also included. Additional chapters in this section include a chapter on unconventional samples and alternative matrices, aspects of quality assurance in forensic toxicology, doping substances in human and animal sport, and analysis of the general unknown. All of these chapters provide useful, brief reviews of these topics. The chapter on the general unknown contains an unusual discussion on the mathematical approach to the identification process.

The final two parts of this book, forensic chemistry and forensic identification of individuals and biological traces, are covered too briefly for those scientists interested in a review of these topics, and are probably of limited interest to forensic toxicologists to whom more the bulk of this volume seems to be directed. It would have been more useful to expand the section on therapeutic drugs and address these other topics in future volumes. The forensic chemistry section consists of three chapters: explosives, chemical analysis of fire debris for potential accelerants, and analysis of writing media and documents. The last part of the book, forensic identification of individuals and biological traces, is basically one chapter divided into three sections: forensic genetics–from classical serological genetic markers to DNA polymorphisms analyzed by microarray technology, mitochondrial DNA in forensic genetics, and the human y-chromosome: male specific polymorphisms and forensic genetics.

Overall, this book is a useful addition to the library of the forensic toxicologist. There are some formatting issues to this book that are less than ideal. Abbreviations are used extensively throughout the text. Some chapters include a list of abbreviations at the end, but not all do. This can be a bit frustrating, particularly for less common terms. References at the end of each chapter include only the author and abbreviated journal name. For a book comprised of review articles designed to send the reader to the original source material, leaving out the titles of the articles in the reference section is most unfortunate.