Preface

Man's widespread reliance upon petroleum as an energy source and chemical feedstock requires the production of vast quantities of crude oil and the subsequent transportation of crude oil and refined products through pipelines and by vessels. Despite continually improving safeguards and increasingly stringent regulations, accidental spills and intentional discharges of petroleum are frequent occurrences in water bodies around the world. Determining the source of "mystery" spills and the extent of impact of both "mystery" and known releases relies largely on environmental forensics — *def*., the systematic and scientific evaluation of physical, chemical, and historical information for the purpose of developing defensible scientific conclusions relevant to the liability for environmental contamination.

Chemical fingerprinting has played an important role in the rapidly advancing field of environmental forensics of waterborne oil spills. Significant advances in chemical fingerprinting, driven by both the application of petroleum exploration and production geochemistry principles and by advancements in analytical methods and instrumentation, have resulted in the use of fingerprinting in nearly all oil spill investigations worldwide.

The global problem of oil spills, and the global application of environmental forensics in oil spill investigations, warranted a global effort in conveying the state-of-the-science in this book. As such, we've assembled contributions from researchers from Brazil, Canada, Denmark, Egypt, Germany, Japan, Malaysia, Norway, Republic of Korea, The Netherlands, and the United States. These contributions cover both new and emerging chemical fingerprinting technologies and the application and refinement of proven technologies in sufficient detail so as to reasonably represent the current knowledge base of oil spill fingerprinting and source identification. The sequence of chapters spans from an introduction of the methods for and factors affecting chemical fingerprints of petroleum, to oil spill investigation sampling design, to specific chemical fingerprinting features (biomarkers, sulfur-bearing PAHs, and stable isotopes) and instrumentation (GC × GC), data analysis techniques (emerging CEN protocol, quantitative methods, and multivariate analysis), biodegradation affects on and biological uptake of petroleum, fuel chemistry, and non-chemical oil spill identification techniques (transport modeling and remote sensing), before concluding with various case studies. It is hoped that the individual chapters in this book will provide students and scientists with ready access to a comprehensive overview of oil spill fingerprinting and source identification and provide a suitable and up-to-date reference and source of citations for years to come.

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