Analytical Chemistry Applied to Emerging Pollutants

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Preface

The presence of emerging pollutants (EPs)—pharmaceuticals, personal care products, industrial and household products, surfactants, industrial additives, and solvents, etc.—and their fate in the environment are especially worrisome because they cannot be completely degraded by conventional treatment technologies. The necessity of a book addressed to professional audience (e.g., environmental scientists, chemists, and engineers) to provide advice in real situations is paramount to mitigating the effects of EPs.

EPs' determination is relatively recent when compared to conventional pollutants (toxic metals, pesticides, oil derivatives, etc.), probably because EPs as pharmaceuticals and personal care products are consumed in large quantities and without concern for the environment. Then, analytical chemistry is paramount to understand EPs' presence, fate, and effects. From this development, the trend is to expand EPs' determination and their number and species in few years.

Technological advances in analytical techniques related to miniaturization and automatization are at the frontiers of knowledge in order to reduce costs and time, as probes and sensors.

Aquatic environment is the most impacted medium due to EPs' use and their discards, and legislation is incipient to regulate their presence and management in the environment. However, the generated knowledge supports the increasing of the regulation.

This book deals with the understanding of EPs and their sources and fate in the environment (Chap. 1), the fundamentals of analytical chemistry for analyses of EPs (Chap. 2), the main analytical technologies to be applied (Chap. 3), the description of most representative environmental matrices (air, soil, and water), and the most adequate analytical methods for those matrices (Chap. 4), the degradation processes and treatments of EPs (Chap. 5), and the general remarks and conclusions (Chap. 6). Furthermore, aspects of toxicology, chemometrics, QA&QC, sample preparation, and green analytical chemistry, among others, are considered in the text. In this way, the reader can have a broad vision of the analytical approaches to be used for the monitoring and control of EPs in the environment.

From these observations, the analysis of EPs in environmental matrices is a topic that generates opportunities for analytical services, research, technology, and improvement of environment and health conditions.

Good lecture!

Brasília, Brazil Sílvio Vaz Jr.

Contents

About the Author

Sílvio Vaz Jr. is currently a research scientist at the Brazilian Agricultural Research Corporation (Embrapa) working on the development of renewable chemicals from biomass, the application of analytical chemistry to bioenergy, and environmental chemistry.

He holds a DSc in analytical chemistry from the University of São Paulo and a PhD in chemistry from the University of Coimbra.