
Environmental science has grown rapidly in the last few decades and is now a major research and educational focus at universities around the world. Because of the multidisciplinary nature of environmental science, one cannot be expected to be an expert in all topics encompassing this extensive field. It is therefore important to have a textbook that deals with specific environmental science topics. Soil and Water Chemistry: An Integrated Approach fills the niche that encompasses the chemistry of soils and its accompanying solution (e.g., the soil solution). The book was written to address the science and quantitative applications associated with soil and water chemistry. The author has developed a textbook and reference resource that is one of the best available for both teaching soil chemistry and for individuals seeking information in this specific area of environmental science. While there were minor formatting, spelling, and editing problems in the first printing of the book, most of these were corrected in the second printing.

Soil and Water Chemistry: An Integrated Approach is divided into 11 chapters. The first chapter is an overview of soil phases and chemical processes, elements, units, and soil chemical heterogeneity. The last topic is extremely important to the application of chemical principles and processes at the landscape scale, which is often overlooked in earth and environmental textbooks. Chapter 2 is an extensive discussion of soil minerals, with the normal inclusion of minerals in the silicate, clay mineral, and metal oxide groups. This chapter also provides information on X-ray diffraction analysis and characterization. Chapter 3 emphasizes chemical weathering and includes balancing of equations, mineral stability, and weathering of the phyllosilicates. Although Chapter 3 deals with the area of chemical weathering of the soil solid phase, I prefer to discuss soil organic matter, which is Chapter 4, before emphasizing soil and water processes. Chapter 4 includes an extensive review of organic compounds in soils and a discussion of the analytical determination of soil carbon.

Chapters 5 and 6 are concerned with soil solution chemistry and soil–water interactions, which underscore the importance of mineral solubility. A noteworthy aspect of Chapter 5 is its sections on soil water sampling and methods of chemical analysis. Chapter 6 covers mineral solubility principles, stabilities, and solution composition. Extensive coverage of surface chemistry, sorption reactions, and their quantitative characterization is presented in Chapter 7. Qualitative and quantitative approaches to understanding cation exchange, along with methods for evaluating cation exchange capacities are included in Chapter 8.

The last three chapters, redox chemistry, acidity, and salinity and sodicity, include material that is essential to the understanding of soil and water chemistry. As with most, if not all, earth and environmental textbooks, oxidation–reduction chemistry is relegated to being one of the last topics covered. This is unfortunate because the master variables (e.g., pH, redox and ionic strength) are important concepts that should be introduced early in soil chemistry discussions. However, I cannot think of a textbook that presents master variables from more than a cursory perspective. Chapters 10 and 11 discuss the importance of acid- and salt-affected environments. Case studies are presented in these chapters that highlight the generation and management of these problematic ecosystems.

I am a firm believer in relating soil chemistry to landscapes and descriptive soil environments. If students can determine the position in the landscape that drives geochemical processes, then they can relate the subject matter to the real world. If a student appreciates the difference between a Histosol, Ultisol, Mollisol, Spodosol, etc., then they will also be able to appreciate how soil and water chemistry works at the landscape scale. Soil and Water Chemistry: An Integrated Approach has gone well beyond previous soil chemistry textbooks in relating the science to real world environments. This book will be of interest to not only students in our traditional fields of soil science, plant science, and agronomy, but also in natural resources, environmental sciences, engineering, geology, botany, geography, landscape ecology, and others.

Numerous figures, tables, and equations provide examples and clarify the material discussed throughout the book. Each chapter contains a reference section with additional sources for further reading. I especially liked the author’s inclusion of methodologies, exercises (with solutions), and topics related to a broad distribution of environments. There are numerous example problems throughout the book, and my students found these exercises particularly useful for preparing them for the end of the chapter questions and tests. The low cost of the book will undoubtedly be appreciated by students.

I congratulate the author on producing an outstanding up-to-date book that sets a higher standard for future environmental science textbooks. I would highly recommend anyone who is interested in the area of soil and water chemistry to purchase this book. As an instructor and research scientist, I have found this book to be especially beneficial for my “Chemistry of the Soil Environment” course and as a reference source. The cost is similar to most textbooks, and the book is extremely readable for the novice as well as for those with knowledge of soil and water chemistry.

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