Environmental Soil Chemistry Second Edition

Donald Sparks

University of Delaware, Newark, U.S.A.

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- Provides students with both sound contemporary training in the basics of soil chemistry and applications to real-world environmental concerns
- > Timely and comprehensive discussion of important concepts including: sorption/desorption, oxidation-reduction of metals and organics, and effects of acidic deposition and salinity on contaminant reacions
- > Boxed sections focus on sample problems and explanations of key terms and parameters
- > Extensive tables on elemental composition of soils, rocks and sediments, pesticide classes, inorganic minerals, and methods of decontaminating soils
- > Clearly written for all students and professionals in environmental science and environmental engineering as well as soil science

Environmental Soil Chemistry illustrates fundamental principles of soil chemistry with respect to environmental reactions between soils and other natural materials and heavy metals, pesticides, industrial contaminants, acid rain, and salts. Timely and comprehensive discussions of applications to real-world environmental concerns are a central focus of this established text.

In brief

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Environmental Soil Chemistry: An Overview: Evolution of Soil Chemistry. The Modern Environmental Movement. Contaminants in Waters and Soils. Case Study of Pollution of Soils and Waters. Soil Decontamination. **Inorganic Soil Components:** Pauling's Rules. Primary Soil Minerals. Secondary Soil Minerals. Specific Surface of Soil Minerals. Surface Charge of Soil Minerals. Identification of Minerals by X-Ray Diffraction Analyses. Use of Clay Minerals to Retain Organic Contaminants. Chemistry of Soil Organic Matter: Effects of Soil Formation Factors on SOM Contents. Composition of SOM. Fractionation of SOM. SOM Structure. Functional Groups and Charge Characteristics. Humic Substance–Metal Interactions. SOM-Clay Complexes. Retention of Pesticides and Other Organic Substances by Humic Substances. Soil Solution–Solid Phase Equilibria: Measurement of the Soil Solution. Speciation of the Soil Solution. Ion Activity and Activity Coefficients. **Dissolution and Solubility Processes.** Sorption Phenomena on Soils: Introduction and Terminology. Surface Functional Groups. Surface Complexes. Adsorption Isotherms. Equilibrium-Based Adsorption Models.

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Sorption of Anions.

Points of Zero Charge.

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Use of Spectroscopic and Microscopic Methods in Determining Mechanisms for Sorption–Desorption Phenomena.

Ion Exchange Processes:

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Effect of Temperature on Reaction Rates. Kinetics of Important Soil Chemical Processes. **Redox Chemistry of Soils:** Oxidation–Reduction Reactions and Potentials. Eh vs pH and pe vs pH Diagrams. Measurement and Use of Redox Potentials. Submerged Soils. Redox Reactions Involving Inorganic and Organic Pollutants. The Chemistry of Soil Acidity: Historical Perspective of Soil Activity. Solution Chemistry of Aluminum. Exchangeable and Nonexchangeable Aluminum. Soil Acidity. Liming Soils. The Chemistry of Saline and Sodic Soils: Causes of Soil Salinity. Sources of Soluble Salts. Important Salinity and Sodicity Parameters. Classification and Reclamation of Saline and Sodic Soils. Effects of Soil Salinity and Sodicity on Soil Structural Properties. Effects of Soil Salinity on Plant Growth. Appendix A. Appendix B. **Bibliography.** Chapter References. Subject Index.

Readership: Upper level undergraduate and graduate students, researchers and professionals, in environmental soil science, environmental and agricultural engineering, marine studies, and geochemistry.

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