The Handbook of Trace Elements


The worldwide awareness about environmental pollution has generated an intense interest in trace elements. In addition, deficient and toxic concentrations of some of the trace elements in biological systems have been of concern for years. This book deals with 41 elements found in the environment at concentrations <0.1%. The objective in dealing with these elements was to assemble factual information and data on trace elements so that the book could be used as an easy reference. The book is divided into six chapters. The introduction abounds with trace element concentration data presented in tables for situations dealing with the lithosphere, nonpolluted soils, sewage sludge, sewage sludge applied to soil, sensitive crops, ocean and fresh waters, and drinking waters. Biological classification and functionality in plants of many trace elements are briefly discussed. Concentrations of various trace elements in plants as well as a description of toxicity symptoms are provided. A short discussion on how plants adapt to excessive concentrations of trace elements is presented. Trace element concentration data are given for levels that are removed from the soil by plants, in urine, scalp hair, and other human tissues and fluids. Recommended safe and adequate dietary intake for human adults is provided. In addition, data in tabular form are given for maximum tolerable levels of dietary minerals for domestic animals.

Detailed information by element is given in Chapter 2. The information includes atomic number, atomic weight, abundance in lithosphere, common valence state, common mineral forms, total content in soils, soluble content in soils, contents in various waters, and content in humans, animals, and plants and essentiality to living organisms.

A general discussion about the rare earth elements and their relationship with plants, animals, and humans is provided in Chapter 3. Chapter 4 deals with the association of micronutrients in soils and plants. Normal and maximum concentrations of trace elements in different crops are provided in tabular form for easy reading. Information on testing the soil for their micronutrient levels and the analytical procedures tremendously in making comparisons. Also, tables are located close to where they are referred in the text, making for easy reading. However, very little is written about the analytical methods by which the data were obtained. The reader should be cautioned against making comparisons across some tables, since the methods used in obtaining data may not be the same.

The book is an excellent single source for a large amount of descriptive information on trace elements, as well as a very useful handbook on this subject.—Michael Sheppard Environmental, Pinawa, Manitoba, Canada ROE 1L0 (sheppard@granite.mb.ca).

Humic Substances and Organic Matter in Water Environments: Characterization, Transformations and Interactions


While recognized as one of the most important components of soil, research on organic matter has historically been at best. Technological progress has enabled researchers in characterizing this extremely complex and diverse subset of soil. The International Humic Substances Society has taken the lead in developing methods for extracting and analyzing naturally occurring humic substances, defining standard substances, developing a repository of reference materials, and hosting conferences. This book is a collection of papers presented at the 7th International Conference of the International Humic Substances Society held on the campus of the University of the West Indies at St. Augustine, Trinidad, during 3 to 8 July 1994. The book is divided into seven sections, and each section is prefaced with a two-page summary of the history and development of the study of humic substances. A brief description of the papers contained within each section follows.

Section 1 begins with papers describing conventional methods of extraction and characterization of humic substances from soil and water. Papers discussing isolation and fractionating these substances using electric focusing, use of resins, and gel filtration are included. Characterization descriptions include UV, visible, IR, Raman spectroscopy, 13C-NMR spectroscopy, viscometry, analytical pyrolysis, gas chromatography, and liquid chromatography techniques. Section 2 discusses the isolation of various plant residues to humic substances. Methods employed in this section include UV, visible spectroscopy, visible, IR, Raman spectroscopy, viscometry, analytical pyrolysis, gas chromatography, and liquid chromatography techniques. Section 2 discusses the isolation of various plant residues to humic substances. Methods employed in this section include UV, visible spectroscopy, visible, IR, Raman spectroscopy, viscometry, analytical pyrolysis, gas chromatography, and liquid chromatography techniques. Section 3 is a collection of papers discussing the effects of land management on the composition and properties of humic substances. The source soils and management practices range from forest to urban. The environmental effects range from acid rain to pollution in transportation of hazardous materials and emergency response. It may also be a good index system or starting place for researchers and regulatory personnel beginning to seek information on new compounds.—S.C. (STEVE) SHEPPARD, Sheppard Environmental, Pinawa, Manitoba, Canada ROE 1L0 (sheppard@granite.mb.ca).