The Geochemistry Of Natural Waters Surface And Groundwater Environments

KANE MAYRA

Osmium Geochemistry of Natural Waters Springer Science & Business Media

The difficult struggle to protect our valuable ground-water resources necessarily involves scientists and engineers from many disciplines. To prevail in this effort, these practitioners—including microbiologists, hydrogeologists, geoscientists, and environmental engineers—must have a common understanding of essential ground-water quality issues and problems. That includes a basic grasp of how microorganisms and microbial processes affect the chemistry of ground water in both pristine and chemically stressed aquifer systems. Ground-Water Microbiology and Geochemistry marks the first attempt to bridge the historical lack of communication among these disciplines by detailing—in language that cuts across specialties—the impact of microorganisms and microbial processes on ground-water systems. To bring these diverse practitioners together, the book has been organized in three parts, with each section addressing the information needs of specific disciplines. The first six chapters of Ground-Water Microbiology and Geochemistry provide an overview of microbiology that’s geared to geoscientists who may lack formal training in the field. Here, the book systematically covers the kinds of microorganisms found in subsurface environments, focusing on their growth, metabolism, genetics, and ecology. The second part of the book, which covers four chapters, speaks both to geoscientists and to microbiologists. It offers a hydrologic perspective on how microbial processes affect groundwater geochemistry in pristine systems—an important topic for geochemists since most ground-water reservoirs have not been chemically affected by human activities, and naturally occurring

microbial processes have major impacts on water quality. At the same time, Part Two introduces microbiologists to the different classes of ground-water systems, and gives an overview of techniques for sampling subsurface environments. In addition, microbiologists gain an understanding of biogeochemical cycling in ground-water systems—in coverage that's unique to this book—and of the classic geochemical modeling techniques that are used to study microbial processes. The final three chapters of Ground-Water Microbiology and Geochemistry focus in on microbial processes in contaminated ground-water systems—a topic of central concern to environmental scientists. In this concluding section, microbiologists see how degradation processes depend upon the hydrologic and geochemical environments within which they operate. Having achieved a basic knowledge of microbiological and biochemical concepts from the earlier chapters, geoscientists are fully prepared for this treatment of microbial acclimation and the biodegradation of petroleum hydrocarbons and halogenated compounds. Ground-Water Microbiology and Geochemistry is as graphically impressive as it is far reaching. High-quality, computer-generated illustrations, of particular appeal to visually oriented geoscientists, can be found throughout the book. Equally important is the book's unusually comprehensive bibliography, which, like the text itself, spans the relevant science and engineering disciplines. The importance of Ground-Water Microbiology and Geochemistry to geoscientists, hydrologists, and environmental scientists has been amply documented. The book should also be required reading for water planners and lawyers involved in environmental issues. It will also serve as a compelling text in upper undergraduate and graduate courses in ground-water chemistry.

Study and Interpretation of the Chemical Characteristics of Natural Water John Wiley & Sons

One of the basic concepts of ocean biogeochemistry is that of an ocean with extremely active boundary zones and separation boundaries of extensive biochemical interactions. The areas of these zones are characterized by a sharp decrease of element migration intensity and consequently the decrease in their concentrations gave the boundaries for the naming of the geochemical barriers (Perelman, 1972). For the purposes of biogeo chemistry the most important ones are the boundaries of separation between river-sea, ocean-atmosphere, and water-ground (Lisitzin, 1983). The most complicated of them is the river-sea boundary, where the biogeochemical processes are the most active and complicated (Monin and Romankevich, 1979, 1984). The necessity of studying organic matter in rivers, mouth regions and adjoining sea aquatories has been repeatedly pointed out by v.I. Vernadsky (1934, 1960) who noted both the importance of registration of solid and liquid run-off of rivers, coming into the sea, and "the quality and the character of those elements, which are washed-down into the sea", emphasizing that "wash-down of organic substances into the sea is of great value". The interest in studying organic matter in natural waters, including river and sea waters, has grown considerably over the last 30 years. During this period essential material was collected on the content and composition of organic matter in various types of river waters of the USSR, and this was published in papers by B.A Scopintzev, AD. Semenov, M.V.

Geochemistry of oilfield waters Waveland Press

To understand hydrochemistry and to analyze natural as well as man-made impacts on aquatic systems, hydrogeochemical models have been used since the 1960's and more frequently in recent times. Numerical groundwater flow, transport, and geochemical models are important tools besides classical deterministic and analytical approaches. Solving complex linear or non-linear systems of equations, commonly with hundreds of unknown parameters, is a routine task for a PC. Modeling hydrogeochemical processes requires a detailed and accurate water analysis, as well as thermodynamic and kinetic data as input. Thermodynamic data, such as complex formation constants and solubility-products, are often provided as databases within the respective programs. However, the description of surface-controlled reactions (sorption, cation exchange, surface complexation) and kinetically controlled reactions requires additional input data. Unlike groundwater flow and transport models, thermodynamic models, in principal, do not need any calibration. However, considering surface-controlled or kinetically controlled reaction models might be subject to calibration. Typical problems for the application of geochemical models are: • speciation • determination of saturation indices • adjustment of equilibria/disequilibria for minerals or gases • mixing of different waters • modeling the effects of temperature • stoichiometric reactions (e.g. titration) • reactions with solids, fluids, and gaseous phases (in open and closed systems) • sorption (cation exchange, surface complexation) • inverse modeling • kinetically controlled reactions • reactive transport Hydrogeochemical models depend on the quality of the chemical analysis, the boundary conditions presumed by the program, theoretical concepts (e.g.

The Natural Geochemistry Of Our Environment Routledge

Environmental Geochemistry: Site Characterization, Data Analysis and Case Histories, Second Edition, reviews the role of geochemistry in the environment and details state-of-the-art applications of these principles in the field, specifically in pollution and remediation situations. Chapters cover both philosophy and procedures, as well as applications, in an array of issues in environmental geochemistry including health problems related to environment pollution, waste disposal and data base management. This updated edition also includes illustrations of specific case histories of site characterization and remediation of brownfield sites. Covers numerous global case studies allowing readers to see principles in action Explores the environmental impacts on soils, water and air in terms of both inorganic and organic geochemistry Written by a well-respected author team, with over 100 years of experience combined Includes updated content on: urban geochemical mapping, chemical speciation, characterizing a brownsfield site and the relationship between heavy metal distributions and cancer mortality

Principles of Environmental Geochemistry Wiley-Interscience

The Earth system consists of subsystems that include the atmosphere, hydrosphere (water), geosphere (rocks, minerals), biosphere, and humans. In order to understand these subsystems and their interactions, it is essential to clarify the mass transfer mechanism, geochemical cycle, and influence of human activity on the natural environment. This book presents fundamental theories (thermodynamics, kinetics, mass balance model, coupling models such as the kinetics-fluid flow model, the box model, and others) concerning mechanisms in weathering, formation of hydrothermal ore deposits, hydrothermal alteration, formation of groundwater quality, and the seawater system. The interaction between fluids (atmosphere, water) and solid phases (rocks, minerals) occurs both in low-temperature and also in high-temperature systems. This book considers the complex low-temperature cycle with the high-temperature cycle, a combination that has not been dealt with in previous books concerning Earth systems. Humanity is a small part of the biosphere; however, human activities greatly influence Earth's surface environments (atmosphere, hydrosphere, biosphere, soils, rocks). Thus, the influences of humans on other subsystems, particularly mass transfer in the deep underground

geologic environment composed of host rocks and groundwater, are discussed in relation to high-level nuclear waste geologic disposal and CO2 underground sequestration—topics that have not been included in other books on environmental science.
Geochemistry of natural waters of the Blue Grass region, Kentucky Edmonton, Alta. : Alberta Research Council
It is hoped that this book will be utilized by the many scientific and engineering disciplines which encounter water quality problems in their professional endeavors. The authors have attempted to provide the essential chemical bases that control the many dissolved constituents in natural waters. Also, a considerable quantity of "raw" water quality data is provided that may be helpful in the management of lakes, reservoirs, streams, rivers, etc., and in the design, perhaps, of a potable water treatment plant. The authors have researched the scientific literature as thoroughly as possible on a particular water quality subject.
Environmental Applications of Geochemical Modeling Butterworth-Heinemann
This book is written as a reference on organic substances in natural waters and as a supplementary text for graduate students in water chemistry. The chapters address five topics: amount, origin, nature, geochemistry, and characterization of organic carbon. Of these topics, the main themes are the amount and nature of dissolved organic carbon in natural waters (mainly fresh water, although seawater is briefly discussed). It is hoped that the reader is familiar with organic chemistry, but it is not necessary. The first part of the book is a general overview of the amount and general nature of dissolved organic carbon. Over the past 10 years there has been an exponential increase in knowledge on organic substances in water, which is the result of money directed toward the research of organic compounds, of new methods of analysis (such as gas chromatography and mass spectrometry), and most importantly, the result of more people working in this field. Because of this exponential increase in knowledge, there is a need to pull together and summarize the data that has accumulated from many disciplines over the last decade.
Environmental Geochemistry of Potentially Toxic Metals Springer Science & Business Media
Geochemistry of oilfield waters
Geochemistry for Hydrologists Springer
Many geochemists focus on natural systems with less emphasis on the human impact on those systems. Environmental chemists frequently approach their subject with less consideration of the historical record than geoscientists. The field of environmental geochemistry combines these approaches to address questions about the natural environment and anthropogenic effects on it. Eby provides students with a solid foundation in basic aqueous geochemistry before discussing the important role carbon compounds, isotopes, and minerals play in environmental issues. He then guides students through how these concepts apply to problems facing our atmosphere, continental lands, and oceans. Rather than broadly discussing a variety of environmental problems, the author focuses on principles throughout the text, leading students to understand processes and how knowledge of those processes can be applied to environmental problem solving. A wide variety of case studies and quantitative problems accompany each chapter, giving each instructor the flexibility to tailor the material to his/her course. Many problems have no single correct answer, illustrating the analytical nature of solving real-world environmental problems.
Chemistry of Natural Waters Taylor & Francis
There remains a lack of understanding of environmental isotopes and their use; students and practitioners typically find the concepts of isotope concentrations and partitioning to be more complicated than for geochemistry. However, this need not be so, if the basics are presented together with geochemistry, using case studies and examples to make the point. This new book presents the basics of environmental isotopes and geochemistry together, with case studies and simple examples that build a real understanding of their use in natural and contaminated groundwater.
The Environmental Geochemistry of Mineral Deposits Cambridge University Press
Essentials and Advances in Geochemistry of Natural Waters examine various aspects of geochemistry in context of natural waters with increased focus on Asia, America, Africa and Europe. It includes definitions of hydrogeochemical processes, equilibrium of ground water etc. Provides the reader with insights into the development of its history, so as to understand the necessities and innovations in geochemistry of natural waters. It is an overall comprehension of advancements in geochemistry of natural waters.
Environmental Geochemistry CRC Press
Groundwater Geochemistry: Fundamentals and Applications to Contamination examines the integral role geochemistry play s in groundwater monitoring and remediation programs, and presents it at a level understandable to a wide audience. Readers of all backgrounds can gain a better understanding of geochemical processes and how they apply to groundwater systems. The text begins with an explanation of fundamental geochemical processes, followed by a description of the methods and tools used to understand and simulate them. The book then explains how geochemistry applies to contaminant mobility, discusses remediation system design, sampling program development, and the modeling of geochemical interactions. This clearly written guide concludes with specific applications of geochemistry to contaminated sites. This is an ideal choice for readers who do not have an extensive technical background in aqueous chemistry, geochemistry, or geochemical modeling. The only prerequisite is a desire to better understand natural processes through groundwater geochemistry.
Environmental Geochemistry Princeton University Press
An in-depth discussion of the thermodynamics and kinetics of natural waters Divided into three major parts–structure of matter, chemical thermodynamics, and chemical kinetics– physical chemistry is concerned with the measurement, description, and prediction of the characteristics of chemical systems and their interaction with each other with respect to the transfer of mass and energy. Physical Chemistry of Natural Waters explores how the basic concepts of physical chemistry can be used to understand the chemistry of natural waters, with most of the text confined to chemical thermodynamics and kinetics. The extensive material in this book is the result of a course in marine physical chemistry that the author has taught over the past decade. Dr. Millero incorporates his own personal interest in solution physical chemistry and his approach to understanding the physical chemistry of seawater with the text’s vast coverage of the physical chemistry of liquid phases. In addition, detailed reviews of the basics of thermodynamics and kinetics provide a comprehensive overview for a clearer understanding of the topics covered. Environmental and physical chemists conducting research on water, seawater, rivers, lakes, and groundwater as well as graduate students studying environmental chemistry will find Physical Chemistry of Natural Waters a solid foundation on the subject of the physical chemistry of natural waters.
Geochemistry of natural waters of the Blue Grass region, Kentucky Elsevier
This book offers thorough, up-to-date coverage of controls on the

chemical quality of surface and subsurface waters, both pristine and polluted, with an emphasis on problem-solving and practical applications. The text is appropriate for courses in aqueous geochemistry or aquatic chemistry. Desirable prerequisites are introductory courses or the equivalent in thermodynamics and solution chemistry, and in physical geology including mineralogy.
Groundwater Elsevier
The Treatise on Geochemistry is the first work providing a comprehensive, integrated summary of the present state of geochemistry. It deals with all the major subjects in the field, ranging from the chemistry of the solar system to environmental geochemistry. The Treatise on Geochemistry has drawn on the expertise of outstanding scientists throughout the world, creating the reference work in geochemistry for the next decade. Each volume consists of fifteen to twenty-five chapters written by recognized authorities in their fields, and chosen by the Volume Editors in consultation with the Executive Editors. Particular emphasis has been placed on integrating the subject matter of the individual chapters and volumes. Elsevier also offers the Treatise on Geochemistry in electronic format via the online platform ScienceDirect, the most comprehensive database of academic research on the Internet today, enhanced by a suite of sophisticated linking, searching and retrieval tools.
Environmental and Low-Temperature Geochemistry Springer Science & Business Media
Contamination of groundwater sources is a global phenomenon and it is becoming evident that unregulated human activity will lead to further deterioration of the resource in many countries of the world. There is therefore an increasing need for research and informed policies to strategically manage groundwater along with other natural resources. This book has been structured into ten chapters, including an introductory background and contextual material for its contributions, with case studies from US, Canada, Australia, Brazil, Serbia, India, Malaysia, Netherlands, and South Africa. Contributions in this book range from hydrogeochemical investigations and evaluation of groundwater usability for water supply as well as for agricultural purposes to groundwater quality descriptions and characterisation. Issues on groundwater overdevelopment and the consequent quality degradation; flow and recharge processes with management implications; groundwater dependent ecosystems and ecological implications are well covered in its content. A number of simulation variants from numerical modelling to characterise groundwater conditions and estimate groundwater resources potential in large basins are presented to support technical decisions and policy making. The prospects and problems of groundwater development are addressed in this book and novel bioremediation technology with more than 10 years of successful application in remediating groundwater contaminated with chlorinated aliphatic hydrocarbons (CAHs) concludes the content. This book will be useful to all within the groundwater community, researchers and policy makers alike.
The Geochemistry of Natural Waters Draining Hydrothermally Altered and Mineralized Terrains in the Upper Alamosa River Basin, Colorado Prentice Hall
Environmental and Low-Temperature Geochemistry presents conceptual and quantitative principles of geochemistry in order to foster understanding of natural processes at and near the earth’s surface, as well as anthropogenic impacts and remediation strategies. It provides the reader with principles that allow prediction of concentration, speciation, mobility and reactivity of elements and compounds in soils, waters, sediments and air, drawing attention to both thermodynamic and kinetic controls. The scope includes atmosphere, terrestrial waters, marine waters, soils, sediments and rocks in the shallow crust; the temporal scale is present to Precambrian, and the spatial scale is nanometers to local, regional and global. This second edition of Environmental and Low-Temperature Geochemistry provides the most up-to-date status of the carbon cycle and global warming, including carbon sources, sinks, fluxes and consequences, as well as emerging evidence for (and effects of) ocean acidification. Understanding environmental problems like this requires knowledge based in fundamental principles of equilibrium, kinetics, basic laws of chemistry and physics, empirical evidence, examples from the geological record, and identification of system fluxes and reservoirs that allow us to conceptualize and understand. This edition aims to do that with clear explanations of fundamental principles of geochemistry as well as information and approaches that provide the student or researcher with knowledge to address pressing questions in environmental and geological sciences. New content in this edition includes: Focus Boxes – one every two or three pages – providing case study examples (e.g. methyl isocyanate in Bhopal, origins and health effects of asbestiform minerals), concise explanations of fundamental concepts (e.g. balancing chemical equations, isotopic fractionation, using the Keq to predict reactivity), and useful information (e.g. units of concentration, titrating to determine alkalinity, measuring redox potential of natural waters); Sections on emerging contaminants for which knowledge is rapidly increasing (e.g. perfluorinated compounds, pharmaceuticals and other domestic and industrial chemicals); Greater attention to interrelationships of inorganic, organic and biotic phases and processes; Descriptions, theoretical frameworks and examples of emerging methodologies in geochemistry research, e.g. clumped C-O isotopes to assess seawater temperature over geological time, metal stable isotopes to assess source and transport processes, X-ray absorption spectroscopy to study oxidation state and valence configuration of atoms and molecules; Additional end-of-chapter problems, including more quantitatively based questions. Two detailed case studies that examine fate and transport of organic contaminants (VOCs, PFCs), with data and interpretations presented separately. These examples consider the chemical and mineralogical composition of rocks, soils and waters in the affected system; microbial influence on the decomposition of organic compounds; the effect of reduction-oxidation on transport of Fe, As and Mn; stable isotopes and synthetic compounds as tracers of flow; geological factors that influence flow; and implications for remediation. The interdisciplinary approach and range of topics – including environmental contamination of air, water and soil as well as the processes that affect both natural and anthropogenic systems – make it well-suited for environmental geochemistry courses at universities as well as liberal arts colleges.
Geochemistry of Organic Matter in River-Sea Systems Nova Science Publishers
Environmental and Low-Temperature Geochemistry presents conceptual and quantitative principles of geochemistry in order to foster understanding of natural processes at and near the earth’s surface, as well as anthropogenic impacts on the natural environment. It provides the reader with the essentials of concentration, speciation and reactivity of elements in soils, waters, sediments and air, drawing attention to both thermodynamic and kinetic controls. Specific features include: • An introductory chapter that reviews basic chemical principles applied to environmental and low-temperature geochemistry • Explanation and analysis of the importance of minerals in the environment • Principles of aqueous geochemistry • Organic compounds in the environment • The role of microbes in processes such as biomineralization, elemental speciation and reduction-oxidation reactions • Thorough coverage of the

fundamentals of important geochemical cycles (C, N, P, S) • Atmospheric chemistry • Soil geochemistry • The roles of stable isotopes in environmental analysis • Radioactive and radiogenic isotopes as environmental tracers and environmental contaminants • Principles and examples of instrumental analysis in environmental geochemistry The text concludes with a case study of surface water and groundwater contamination that includes interactions and reactions of naturally-derived inorganic substances and introduced organic compounds (fuels and solvents), and illustrates the importance of interdisciplinary analysis in environmental geochemistry. Readership: Advanced undergraduate and graduate students studying environmental/low T geochemistry as part of an earth science, environmental science or related program. Additional resources for this book can be found at: www.wiley.com/go/ryan/geochemistry.

Program and Abstracts for the International Symposium on the Geochemistry of Natural Waters Arcler Press

Geochemical Techniques for Identifying Sources of Ground-Water Salinization offers a comprehensive look at the threat to the United States' freshwater resources due to salinization and outlines techniques that can be used to study the problem. The book reviews the seven major salt-water sources that commonly mix and deteriorate our fresh ground water (natural saline ground water, halite solution, sea-water intrusion, oil- and gas-field brines, agriculture effluents, saline seep, and road salting). Other topics covered are the characteristics of saltwater sources, geochemical parameters, and basic graphical and statistical methods that are frequently used in saltwater studies. The book also provides geographical charts showing the distribution of the major salt-water sources, illustrating which ones are potential sources in any given area in the United States.Geochemical Techniques for Identifying Sources of Ground-Water Salinization describes the individual geochemical parameters used in identifying salinization and the information on how and where to obtain them. This is an informative book for anyone interested in the present and future quality of our fresh-water supply.

Groundwater Geochemistry Elsevier

The Natural Geochemistry of Our Environment shows that the Earth is a water world, whose water is transformed readily from the solid to the liquid to the gaseous state. This book, is an outgrowth of a report prepared in 1979 by Drs. Speidel and Agnew for the U.S. Science, Research, and Technology Subcommittee, provides just such a background to enables one to comprehend the natural system and the way that human activities affect that environment.

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