

## Laser Ablation Accelerator Mass Spectrometry Of Actinides

This work is a comprehensive and much-needed tool for the teaching and practice of radioanalytical chemistry. It encompasses a concise theoretical background, laboratory work, and data interpretation. It also contains chapters on the most current and visible applications of radioanalytical techniques. Its emphasis on the practical aspects on laboratory setup and operation make it a valuable tool for training professionals and students alike.

Thoroughly updated to include exciting discoveries from spacecraft missions and laboratory analyses, as well as new teaching resources.

PRINCIPLES OF INSTRUMENTAL ANALYSIS is the standard for courses on the principles and applications of modern analytical instruments. In the 7th edition, authors Skoog, Holler, and Crouch infuse their popular text with updated techniques and several new Instrumental Analysis in Action case studies. Updated material enhances the book's proven approach, which places an emphasis on the fundamental principles of operation for each type of instrument, its optimal area of application, its sensitivity, its precision, and its limitations. The text also introduces students to elementary analog and digital electronics, computers, and the treatment of analytical data. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

The leading resource for anyone looking for an accessible and authoritative introduction to nuclear and radiochemistry In the newly revised Fourth Edition of Nuclear and Radiochemistry: Fundamentals and Applications, distinguished chemist Jens-Volker Kratz delivers a two-volume handbook that has become the gold standard in teaching and learning nuclear and radiochemistry. The books cover the theory and fundamentals of the subject before moving on the technical side of nuclear chemistry, with coverage of nuclear energy, nuclear reactors, and radionuclides in the life sciences. This latest edition discusses the details and impact of the Chernobyl and Fukushima nuclear disasters, as well as new research facilities, including FAIR and HIM. It also incorporates new methods for target preparation and new processes for nuclear fuel recycling, like EURO-GANEX. Finally, the volumes extensively cover environmental technological advances and the effects of radioactivity on the environment. Readers will also find: - An accessible and thorough introduction to the fundamental concepts of nuclear physics and chemistry, including atomic processes, classical mechanics, relativistic mechanics, and the Heisenberg Uncertainty Principle - Comprehensive explorations of radioactivity in nature, radioelements, radioisotopes and their atomic masses, and other physical properties of nuclei - Practical discussions of the nuclear force, nuclear structure, decay modes, radioactive decay kinetics, and nuclear radiation - In-depth examinations of the statistical considerations relevant to radioactivity measurements Written for practicing nuclear chemists and atomic physicists, Nuclear and Radiochemistry: Fundamentals and Applications is also an indispensable resource for nuclear physicians, power engineers, and professionals working in the nuclear industry.

Authoritative reference providing the principles, practical techniques, and procedures for the accurate measurement of radioactivity.

This book offers a balanced mixture of practice-oriented information and theoretical background as well as numerous references, clear illustrations, and useful data tables. Problems and solutions are accessible via a special website. This new edition has been completely revised and extended; it now includes three new chapters on tandem mass spectrometry, interfaces for sampling at atmospheric pressure, and inorganic mass spectrometry.

Stars are the main factories of element production in the universe through a suite of complex and intertwined physical processes. Such stellar alchemy is driven by multiple nuclear interactions that through eons have transformed the pristine, metal-poor ashes leftover by the Big Bang into a cosmos with 100 distinct chemical species. The products of

Providing an exhaustive review of this topic, Inorganic Mass Spectrometry: Principles and Applications provides details on all aspects of inorganic mass spectrometry, from a historical overview of the topic to the principles and functions of mass separation and ion detection systems. Offering a comprehensive treatment of inorganic mass spectrometry, topics covered include: Recent developments in instrumentation Developing analytical techniques for measurements of trace and ultratrace impurities in different materials This broad textbook in inorganic mass spectrometry, presents the most important mass spectrometric techniques used in all fields of analytical chemistry. By covering recent developments and advances in all fields of inorganic mass spectrometry, this text provides researchers and students with information to answer any questions on this topic as well as providing the basic fundamentals for understanding this potentially complex, but increasingly relevant subject.

The Chemistry of the Actinide and Transactinide Elements is a contemporary and definitive compilation of chemical properties of all of the actinide elements, especially of the technologically important elements uranium and plutonium, as well as the transactinide elements. In addition to the comprehensive treatment of the chemical properties of each element, ion, and compound from atomic number 89 (actinium) through to 109 (meitnerium), this multi-volume work has specialized and definitive chapters on electronic theory, optical and laser fluorescence spectroscopy, X-ray absorption spectroscopy, organoactinide chemistry, thermodynamics, magnetic properties, the metals, coordination chemistry, separations, and trace analysis. Several chapters deal with environmental science, safe handling, and biological interactions of the actinide elements. The Editors invited teams of authors, who are active practitioners and recognized experts in their specialty, to write each chapter and have endeavoured to provide a balanced and insightful treatment of these fascinating elements at the frontier of the periodic table. Because the field has expanded with new spectroscopic techniques and environmental focus, the work encompasses five volumes, each of which groups chapters on related topics. All chapters represent the current state of research in the chemistry of these elements and related fields.

Edited by two very well-known and respected scientists in the field, this excellent practical guide is the first to cover the fundamentals and a wide range of applications, as well as showing readers how to efficiently use this increasingly important technique. From the contents: \* The Isotopic Composition of the Elements \* Single-Collector ICP-MS \* Multi-Collector ICP-MS \* Advances in Laser Ablation - Multi-Collector ICP-MS \* Correction for Instrumental Mass Discrimination in Isotope Ratio Determination with Multi-Collector ICP-MS \* Reference Materials in Isotopic Analysis \* Quality Control in Isotope Ratio Applications \* Determination of Trace Elements and Elemental Species Using Isotope Dilution ICP-MS \* Geochronological Dating \* Application of Multi-Collector ICP-MS to Isotopic Analysis in Cosmochemistry \* Establishing the Basis for Using Stable Isotope Ratios of Metals as Paleoredox Proxies \* Isotopes as Tracers of Elements Across the Geosphere-Biosphere Interface \* Archaeometric Applications \* Forensics Applications \* Nuclear Applications \* The Use of Stable Isotope Techniques for Studying Mineral and Trace Element Metabolism in Humans \* Isotopic Analysis via Multi-Collector ICP-MS in Elemental

Speciation A must-have for newcomers as well as established scientists seeking an overview of isotopic analysis via ICP-MS.

This book provides a comprehensive introduction to radiogenic and stable isotope geochemistry. Beginning with a brief overview of nuclear physics and nuclear origins, it then reviews radioactive decay schemes and their use in geochronology. A following chapter covers the closely related techniques such as fission-track and carbon-14 dating. Subsequent chapters cover nucleosynthetic anomalies in meteorites and early solar system chronology and the use of radiogenic isotopes in understanding the evolution of the Earth's mantle, crust, and oceans. Attention then turns to stable isotopes and after reviewing the basic principles involved, the book explores their use in topics as diverse as mantle evolution, archeology and paleontology, ore formation, and, particularly, paleoclimatology. A following chapter explores recent developments including unconventional stable isotopes, mass-independent fractionation, and isotopic 'clumping'. The final chapter reviews the isotopic variation in the noble gases, which result from both radioactive decay and chemical fractionations.

With usage of mass spectrometry continually expanding, an increasing number of scientists, technicians, students, and physicians are coming into contact with this valuable technique. Mass spectrometry has many uses, both qualitative and quantitative, from analyzing simple gases to environmental contaminants, pharmaceuticals, and complex biopolymers.

The fourth edition of "The Chemistry of the Actinide and Transactinide Elements" comprises all chapters in volumes 1 through 5 of the third edition (published in 2006) plus a new volume 6. To remain consistent with the plan of the first edition, "... to provide a comprehensive and uniform treatment of the chemistry of the actinide [and transactinide] elements for both the nuclear technologist and the inorganic and physical chemist," and to be consistent with the maturity of the field, the fourth edition is organized in three parts. The first group of chapters follows the format of the first and second editions with chapters on individual elements or groups of elements that describe and interpret their chemical properties. A chapter on the chemical properties of the transactinide elements follows. The second group, chapters 15-26, summarizes and correlates physical and chemical properties that are in general unique to the actinide elements, because most of these elements contain partially-filled shells of 5f electrons whether present as isolated atoms or ions, as metals, as compounds, or as ions in solution. The third group, chapters 27-39, focuses on specialized topics that encompass contemporary fields related to actinides in the environment, in the human body, and in storage or wastes. Two appendices at the end of volume 5 tabulate important nuclear properties of all actinide and transactinide isotopes. Volume 6 (Chapters 32 through 39) consists of new chapters that focus on actinide species in the environment, actinide waste forms, nuclear fuels, analytical chemistry of plutonium, actinide chalcogenide and hydrothermal synthesis of actinide compounds. The subject and author indices and list of contributors encompass all six volumes.

This report provides information about aluminum and the human health effects of exposure. This chemical has been found in many sites identified by the EPA for long-term Federal cleanup activities. The report includes a Public Health Statement which explains the toxicologic properties of aluminum in a nontechnical, Q&A format, and a review of the general health effects observed following exposure; a description of health effects; how the chemical can affect children; and information on its chemical and physical properties, production, use and disposal, potential for human exposure, analytical methods, and regulations and advisories.

Volume 10 in the series of the annual journal Reviews of Accelerator Science and Technology (RAST), will be its final volume. Its theme is 'The Future of Accelerators'. This volume, together with previous 9 volumes, gives readers a complete picture as well as detailed technical information about the accelerator field, and its many driving and fascinating aspects. This volume has 17 articles. The first 15 articles have a different approach from the previous volumes. They emphasize the more personal views, perspectives and advice from the frontier researchers rather than provide a review or survey of a specific subfield. This emphasis is more aligned with the theme of the current volume. The other two articles are dedicated respectively to Leon Lederman and Burton Richter, two prominent leaders of our community who left us last year.

"This edited volume provides researchers with an in-depth look at cutting-edge innovations in the art and science of taphonomy--the branch of paleontology that deals with the processes of fossilization--bringing them up to date on current knowledge and defining future directions for research"--

'The scientific techniques described encompass relevant examples of forgery detection and of authentication. The book deals, to name a few, with the Chagall, the Jackson Pollock and the Beltracchi affairs and discusses the Isleworth Mona Lisa as well as La Bella Principessa both thought to be a Leonardo creation. The authentication, amongst others, of two van Gogh paintings, of Vermeer's St Praxedis, of Leonardo's Lady with an Ermine and of Rembrandt's Old Man with a Beard are also described.' Over the last few decades there has been a disconcerting increase in the number of forged paintings. In retaliation, there has been a rise in the use, efficiency and ability of scientific techniques to detect these forgeries. The scientist has waged war on the forger. The Scientist and the Forger describes the cutting-edge and traditional weapons in this battle, showing how they have been applied to the most notorious cases. The book also provides fresh insights into the psychology of both the viewer and the forger, shedding light on why the discovery that a work of art is a forgery makes us view it so differently and providing a gripping analysis of the myriad motivations behind the most egregious incursions into deception. The book concludes by discussing the pressing problems faced by the art world today, stressing the importance of using appropriate tools for a valid verdict on authenticity. Written in an approachable and amenable style, the book will make fascinating reading for non-specialists, art historians, curators and scientists alike.

Accurate uranium analysis, and particularly for isotope measurements, is essential in many fields, including environmental studies, geology, hydrogeology, the nuclear industry, health physics, and homeland security. Nevertheless, only a few scientific books are dedicated to uranium in general and analytical chemistry aspects in particular. Analytical Chemistry of Uranium:

Environmental, Forensic, Nuclear, and Toxicological Applications covers the fascinating advances in the field of analytical chemistry of uranium. Exploring a broad range of topics, the book focuses on the analytical aspects of industrial processes that involve uranium, its presence in the environment, health and biological implications of exposure to uranium compounds, and nuclear forensics. Topics include: Examples of procedures used to characterize uranium in environmental samples of soil, sediments, vegetation, water, and air Analytical methods used to examine the rigorous specifications of uranium and its compounds deployed in the nuclear fuel cycle Health aspects of exposure to uranium and the bioassays used for exposure assessment Up-to-date analytical techniques used in nuclear forensics for safeguards in support of non-proliferation, including single particle characterization Each chapter includes an overview of the topic and several examples to demonstrate the analytical procedures. This is followed by sample preparation, separation and purification techniques where necessary. The book supplies readers with a solid understanding of the analytical chemistry approach used today for characterizing the different facets of uranium, providing a good starting point for further investigation into this important element.

This volume is a comprehensive and up-to-date compendium of worldwide experimental programs dedicated to the pursuit of atomic mass measurements. A tutorial section includes the various fields of physics in which atomic masses play an important role: nuclear physics, quantum electrodynamics, stellar nucleosynthesis, and weak interaction studies. There is a section devoted to theoretical approaches for both atomic and nuclear interactions, as well as a host of new projects for further advancing the field. This volume presents both an introduction and review of the current state of the art concerning mass measurements, evaluation, and prediction, and is suitable for graduate students and researchers in the field. No other volume is so devoted to the question of the atomic mass.

Chemical Imaging Analysis covers the advancements made over the last 50 years in chemical imaging analysis, including different analytical techniques and the ways they were developed and refined to link the composition and structure of manmade and natural materials at the nano/micro scale to the functional behavior at the macroscopic scale. In a development process that started in the early 1960s, a variety of specialized analytical techniques was developed – or adapted from existing techniques – and these techniques have matured into versatile and powerful tools for visualizing structural and compositional heterogeneity. This text explores that journey, providing a general overview of imaging techniques in diverse fields, including mass spectrometry, optical spectrometry including X-rays, electron microscopy, and beam techniques. Provides comprehensive coverage of analytical techniques used in chemical imaging analysis Explores a variety of specialized techniques Provides a general overview of imaging techniques in diverse fields

Nuclear chemistry represents a vital field of basic and applied research. Modern applications cover, for example, fundamental aspects of energetics and high-sensitive, high-selective and non-destructive analytical technologies. Nuclear chemistry and radiopharmaceutical chemistry are increasingly used to bridge pharmaceutical and medical research with state-of-the-art non-invasive molecular diagnosis as well as with patient-individual treatment. While volume I on Introduction to Nuclear Chemistry describes the origin of unstable atoms and their pathways to stabilize, this volume II illustrates the spectrum of modern applications of nuclear and radiochemistry. In various chapters, leading scientists address -the measurement of radiation, -the dosimetric action of radioactive radiation and radiation safety -nuclear dating -elemental analysis by neutron activation, -radiation mass spectroscopy and chemicals speciation, -radiochemical separations, -applications of radiochemistry to life sciences, -the chemistry of radioelements: Tc and At, actinides and the transactinides -fundamentals of modern nuclear energy.

Radioactivity in the Environment, Second Edition, presents the facts on the presence of both natural and manmade radionuclides in the environment. Sources of ionizing radiation that can lead to human exposure are discussed, including natural sources, nuclear explosions, nuclear power generation, the use of radiation in medical, industrial and research purposes, and radiation-emitting consumer products. In this thoroughly updated edition, users will find new sections on developments in radioactive nuclides in nature and technologically modified exposure to natural radiation, new threats by terrorist individuals, groups and countries, changes to the status of nuclear power in the world, and more. Additional new sections cover radioisotopes in geo-prospecting and the oil industry, the use of radiation in environmental protection, detector types and detectors used for personal dosimetry, the "Dirty Bomb", the Fukushima accident, and North Korea testing sites and nuclear capabilities. Includes details of analytical laboratory procedures for radioactivity measurement in different samples Features a new chapter on decontamination after radiation exposure Expands the discussion on nuclear fusion to cover ITER and other installations

Key features: Serves as the first single-source reference with in-depth coverage of techniques appropriate for the laboratory and field study of sharks, skates, and rays Contains chapters on a broad range of methods such as Imaging Technologies, Satellite Tracking, Stationary Underwater Video, and Population Genetic Approaches and Genomics among others Presents technologies that can be used to study other aquatic fish and marine mammals and reptiles Includes chapter authors who were pioneers in developing some of the technologies discussed in the book Concludes with a unique section on Citizen Science and its Application to Studies of Shark Biology Over the last decade, the study of shark biology has benefited from the development, refinement, and rapid expansion of novel techniques and advances in technology. These have given new insight into the fields of shark genetics, feeding, foraging, bioenergetics, imaging, age and growth, movement, migration, habitat preference, and habitat use. This pioneering book, written by experts in shark biology, examines technologies such as autonomous vehicle tracking, underwater video approaches, molecular genetics techniques, and accelerometry, among many others. Each detailed chapter offers new insights and promises for future studies of elasmobranch biology, provides an overview of appropriate uses of each technique, and can be readily extended to other aquatic fish and marine mammals and reptiles. In the last few years, the problems of authenticity in paintings have reached untenable proportions in tandem with a lack of understanding from connoisseurs and collectors of the insights that modern scientific investigation can offer. In some cases, because of this lack of knowledge, the results of scientific analysis are treated with suspicion. The art world has gradually come to realize the need to develop educational programs that aim at improving the technical know-how of collectors, connoisseurs, and young students who seek work as art scientists. As an introductory textbook, Technical Art History is an essential contributor to addressing this need. Traditional and innovative scientific techniques are introduced and explained through separate case studies, using the analysis of paintings and their authentication as a vehicle. This book will equip the reader with the ability to discern the most appropriate techniques in an authenticity endeavor and to have an increased appreciation of the value of an integrated approach in the evaluation of an artwork.

The subject of 'Molluscs in Archaeology' has not been dealt with collectively for several decades. This new volume in Oxbow's 'Studying Scientific Archaeology' series addresses many aspects of molluscs in archaeology. It will give the reader an overview of the whole topic; methods of analysis and approaches to interpretation. It aims to be a broad based text book giving readers an insight of how to apply analysis to different present and past landscapes and how to interpret those landscapes.

Thermochronology - the use of temperature-sensitive radiometric dating methods to reconstruct the thermal histories of rocks - has proved to be an important means of constraining a wide variety of geological processes. Fission track and (U-Th)/He analyses of apatites, zircons and titanites are the best-established methods for reconstructing such histories over time scales of millions to hundreds of millions of years. The papers published in this volume are divided into two sections. The first section on 'New approaches in thermochronology', presents the most recent advances of existing thermochronological methods and demonstrates the progress in the development of alternative thermochronometers and modelling techniques. The second section, 'Applied thermochronology', comprises original papers about denudation, long-term landscape evolution and detrital sources from the European Alps, northwestern Spain, the Ardennes, the Bohemian Massif, Fenno-scandia and Corsica. It also includes case studies from the Siberian Altai, Mozambique, South Africa and Dronning Maud Land (East Antarctica) and reports an ancient thermal anomaly within a regional fault in Japan.

This book is an updated, completely revised version of a previous volume in this series entitled: ENVIRONMENTAL ANALYSIS -- Techniques, applications and quality assurance. The book treats different aspects of environmental analysis such as sample handling and analytical techniques, the applications to trace analysis of pollutants (mainly organic compounds), and quality assurance aspects, including the use of certified reference materials for the quality control of the whole analytical process. New analytical techniques are presented that have been developed significantly over the last 6 years, like solid phase microextraction, microwave-assisted extraction, liquid chromatography-mass spectrometric methods, immunoassays, and biosensors. The book is divided into four sections. The first describes field sampling techniques and sample preparation in environmental matrices: water, soil, sediment and biota. The second section covers the application areas which are either based on techniques, like the use of gas chromatography-atomic emission detection, immunoassays, or coupled-column liquid chromatography, or on specific application areas, like chlorinated compounds, pesticides, phenols, mycotoxins, phytotoxins, radionuclides, industrial effluents and wastes, including mine waste. Validation and quality assurance are described in the third section, together with the interpretation of environmental data using advanced chemometric techniques. The final section reports the use of somewhat advanced analytical methods, usually more expensive, less routinely used or less developed, for the determination of pollutants.

This third edition of the Encyclopedia of Spectroscopy and Spectrometry provides authoritative and comprehensive coverage of all aspects of spectroscopy and closely related subjects that use the same fundamental principles, including mass spectrometry, imaging techniques and applications. It includes the history, theoretical background, details of instrumentation and technology, and current applications of the key areas of spectroscopy. The new edition will include over 80 new articles across the field. These will complement those from the previous edition, which have been brought up-to-date to reflect the latest trends in the field. Coverage in the third edition includes: Atomic spectroscopy Electronic spectroscopy Fundamentals in spectroscopy High-Energy spectroscopy Magnetic resonance Mass spectrometry Spatially-resolved spectroscopic analysis Vibrational, rotational and Raman spectroscopies The new edition is aimed at professional scientists seeking to familiarize themselves with particular topics quickly and easily. This major reference work continues to be clear and accessible and focus on the fundamental principles, techniques and applications of spectroscopy and spectrometry. Incorporates more than 150 color figures, 5,000 references, and 300 articles for a thorough examination of the field Highlights new research and promotes innovation in applied areas ranging from food science and forensics to biomedicine and health Presents a one-stop resource for quick access to answers and an in-depth examination of topics in the spectroscopy and spectrometry arenas

Now in its second edition, Nuclear Forensic Analysis provides a multidisciplinary reference for forensic scientists, analytical and nuclear chemists, and nuclear physicists in one convenient source. The authors focus particularly on the chemical, physical, and nuclear aspects associated with the production or interrogation of a radioactive sample. They consolidate fundamental principles of nuclear forensic analysis, all pertinent protocols and procedures, computer modeling development, interpretational insights, and attribution considerations. The principles and techniques detailed are then demonstrated and discussed in their applications to real-world investigations and casework conducted over the past several years. Highlights of the Second Edition include: A new section on sample analysis considerations and interpretation following a post-detonation nuclear forensic collection New case studies, including the most wide-ranging and multidisciplinary nuclear forensic investigation conducted by Lawrence Livermore National Laboratory to date Expanded treatments of radiologic dispersal devices (RDDs) and statistical analysis methodologies The material is presented with minimal mathematical formality, using consistent terminology with limited jargon, making it a reliable, accessible reference. The broad-based coverage provides important insight into the multifaceted changes facing this recently developed science.

The use of chemistry in archaeology can help archaeologists answer questions about the nature and origin of the many organic and inorganic finds recovered through excavation, providing valuable information about the social history of humankind. This textbook tackles the fundamental issues in chemical studies of archaeological materials. Examining the most widely used analytical techniques in archaeology, the third edition of this comprehensive textbook features a new chapter on proteomics, capturing significant developments in protein recognition for dating and characterisation. The textbook has been updated to encompass the latest developments in the field. The textbook explores

several archaeological investigations in which chemistry has been employed in tracing the origins of or in studying artefacts, and includes chapters on obsidian, ceramics, glass, metals and resins. It is an essential companion to students in archaeological science and chemistry, as well as to archaeologists, and those involved in conserving human artefacts.

A new section of short reviews called 'Frontiers' was introduced within the Elsevier journal Earth and Planetary Science Letters (EPSL) in 2002 under the Editorship of Alex Halliday from ETH Zurich, Switzerland. These high profile Frontiers articles are written by leading experts and published as the opening pages to regular issues of EPSL. The reason for this development is that the Editors of EPSL believe there is an important niche to be filled with fast communications that bring the scientific community up-to-speed on interesting new areas of science. Frontiers articles are therefore specifically intended for the non-specialist earth and planetary science readership. In order to reach a broader readership, those without subscriptions to the journal, Frontiers articles will now also be published in a new book series, the EPSL Frontiers series. Volume 1 will contain all 2002 and 2003 Frontiers articles. Future volumes will contain one year of articles each.

Modern mass spectrometry - the instrumentation and applications in diverse fields Mass spectrometry has played a pivotal role in a variety of scientific disciplines. Today it is an integral part of proteomics and drug discovery process. Fundamentals of Contemporary Mass Spectrometry gives readers a concise and authoritative overview of modern mass spectrometry instrumentation, techniques, and applications, including the latest developments. After an introduction to the history of mass spectrometry and the basic underlying concepts, it covers: Instrumentation, including modes of ionization, condensed phase ionization techniques, mass analysis and ion detection, tandem mass spectrometry, and hyphenated separation techniques Organic and inorganic mass spectrometry Biological mass spectrometry, including the analysis of proteins and peptides, oligosaccharides, lipids, oligonucleotides, and other biological materials Applications to quantitative analysis Based on proven teaching principles, each chapter is complete with a concise overview, highlighted key points, practice exercises, and references to additional resources. Hints and solutions to the exercises are provided in an appendix. To facilitate learning and improve problem-solving skills, several worked-out examples are included. This is a great textbook for graduate students in chemistry, and a robust, practical resource for researchers and scientists, professors, laboratory managers, technicians, and others. It gives scientists in diverse disciplines a practical foundation in modern mass spectrometry.

This extensive undertaking, Accelerator Mass Spectrometry, conducts an elaborate and comprehensive summary of one of the foremost catalysts of progress in scientific research. Accelerator mass spectrometry (AMS), an innovative analytical technique, measures rare atoms at unprecedented levels of sensitivity, revolutionizing the science of radiocarbon dating and accessing new natural radioisotopes as environmental tracers and chronometers. This book demonstrates how AMS is applied in the studies of extraterrestrial materials, the earth sciences, the future of the global environment, and the history of mankind. This compendium also highlights the significant impact of AMS on several fields of scientific investigation, spurring remarkable studies in global climate change, ancient artifacts, pollution, nuclear safeguards, geochronology, and materials characterization. The myriad of sample types and variety of applications in this examination include: Meteorites from Mars Ancient air trapped in Antarctic ice The Shroud of Turin The dating of human bones The colonization of the Americas and Australia Ancient rock art The crown of Charlemagne Cancerogenic effects of cooked meat The consequences of the Chernobyl accident The role of aluminum in Alzheimer's Disease This unique edition has compiled the diverse set of scientific literature into a single volume, suitable as a text or resource on the major AMS-related outcomes, issues, and methods.

Due to its enormous sensitivity and ease of use, mass spectrometry has grown into the analytical tool of choice in most industries and areas of research. This unique reference provides an extensive library of methods used in mass spectrometry, covering applications of mass spectrometry in fields as diverse as drug discovery, environmental science, forensic science, clinical analysis, polymers, oil composition, doping, cellular research, semiconductor, ceramics, metals and alloys, and homeland security. The book provides the reader with a protocol for the technique described (including sampling methods) and explains why to use a particular method and not others. Essential for MS specialists working in industrial, environmental, and clinical fields.

The purpose of this book is to present a state of art summary of current knowledge of methods of assessment of radionuclides in the terrestrial and marine environments. It covers the traditional methods of radioactivity measurements such as radiometrics techniques, but also recent developments in the mass spectrometry sector. The book starts with a short preface introducing the subject of the book, summarising content and philosophy of the book, as well as the most important historical achievements. The scientific topics are introduced by description of sampling methods, optimisation of sampling sites and sampling frequency. The recent developments in radiochemical separation methods using chromatography resins for the treatment of actinides, transuranics and other groups of radioelements are also described. No other book is available covering all aspects of environmental radioactivity measurements, although remarkable progress has been made in detection techniques over the last ten years. At present the new methods enable to carry out investigations which were not possible before, either because of lack of sensitivity or because of the fact that they required too large samples.

Stable isotope ratio variation in natural systems reflects the dynamics of Earth systems processes and imparts isotope labels to Earth materials. Carbon isotope ratios of atmospheric CO<sub>2</sub> record exchange of carbon between the biosphere and the atmosphere; the incredible journeys of migrating monarchs is documented by hydrogen isotopes in their wings; and water carries an isotopic record of its source and history as it traverses the atmosphere and land surface. Through these and many other examples, improved

understanding of spatio-temporal isotopic variation in Earth systems is leading to innovative new approaches to scientific problem-solving. This volume provides a comprehensive overview of the theory, methods, and applications that are enabling new disciplinary and cross-disciplinary advances through the study of "isoscapes": isotopic landscapes. "This impressive new volume shows scientists deciphering and using the natural isotope landscapes that subtly adorn our spaceship Earth.", Brian Fry, Coastal Ecology Institute, Louisiana State University, USA "An excellent timely must read and must-have reference book for anybody interested or engaged in applying stable isotope signatures to questions in e.g. Anthropology, Biogeochemistry, Ecology, or Forensic Science regarding chronological and spatial movement, changes, or distribution relating to animals, humans, plants, or water.", Wolfram Meier-Augenstein, Centre for Anatomy & Human Identification, University of Dundee, UK "Natural resources are being affected by global change, but exactly where, how, and at what pace? Isoscapes provide new and remarkably precise answers.", John Hayes, Woods Hole Oceanographic Institution, USA "This exciting volume is shaping a new landscape in environmental sciences that is utilizing the remarkable advances in isotope research to enhance and extend the capabilities of the field.", Dan Yakir, Weizmann Institute of Science, Israel

"This volume covers many of the important advances in the geological sciences from 1963 to 2013. These advances include understanding plate tectonics, exploration of the Moon and Mars, development of new computing and analytical technologies, understanding of the role of microbiology in geologic processes, and many others"--Provided by publisher.

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