Analytical Chemistry of the Actinide Elements

Analytical Chemistry, Volume 24: The Analytical Chemistry of the Noble Metals describes the procedures for the separation, extraction, and analysis of noble metals. This book is composed of seven chapters, and begins with a survey on the influence of metallurgical factors on the susceptibility of platinum and gold metals to various corrosive agents. The succeeding chapter provides the methods of isolation of osmium and ruthenium from associated platinum metals and from base metals. A chapter examines the application of gravimetric methods for the separation of seven noble metals, including ruthenium, osmium, rhodium, iridium, palladium, platinum, and gold. Other chapters consider the procedures for volumetric, spectrophotometric, and spectrochemical analysis of noble metals. The concluding chapter describes the features and attributes of the equipment for noble metal analysis. This book is of value to analytical chemists and workers and researchers in metallurgy.

Design and Application of TIMS-Based Thorium Measurement Methods in the Actinide Analytical Chemistry Group at Los Alamos National Laboratory

Process Analytical Chemistry Applied to Actinide Waste Streams

Analytical Chemistry of Organic Halogen Compounds

Principles of Field Ionization and Field Desorption Mass Spectrometry

Lanthanide and Actinide Chemistry

The Chemistry of the Actinide and Transactinide Elements (Set Vol.1-6)

Analytical Chemistry for Technicians

Computational Methods in Lanthanide and Actinide Chemistry

The Analytical Chemistry of the Noble Metals

The Chemistry of the Actinide and Transactinide Elements (3rd ed., Volumes 1-5)

Structural Chemistry of Inorganic Actinide Compounds

Treatise on Analytical Chemistry - Part 2, Volume 9

Analytical Chemistry of the Elements Uranium, The Transuranium - Actinide Elements

Treatise on Analytical Chemistry

Soviet Research on the Lanthanide and Actinide Elements

Soviet Research on the Lanthanide and Actinide Elements 1949-1957

Nuclear Forensics at Los Alamos National Laboratory

Analytical Chemistry in Space

Capabilities and Challenges in Actinide Analytical Chemistry at Los Alamos National Laboratory

Analytical Applications of EDTA and Related Compounds

Analytical Chemistry of the Actinide Elements

Analytical Chemistry of Molybdenum and Tungsten

Analytical Chemistry of Organic Halogen Compounds

Principles of Field Ionization and Field Desorption Mass Spectrometry

Lanthanide and Actinide Chemistry

Design and Application of TIMS-Based Thorium Measurement Methods in the Actinide Analytical Chemistry Group at Los Alamos National Laboratory

Process Analytical Chemistry Applied to Actinide Waste Streams

Analytical Chemistry Capabilities - Los Alamos National Laboratory

Synthesis of Lanthanide and Actinide Compounds

The Chemistry of the Actinide and Transactinide Elements (3rd ed., Volumes 1-5)
The Chemistry of the Actinide Elements

The first edition of this work appeared almost thirty years ago, when, as we can see in retrospect, the study of the actinide elements was in its first bloom. Although the broad features of the chemistry of the actinide elements were by then quite well delineated, the treatment of the subject in the first edition was of necessity largely descriptive in nature. A detailed understanding of the chemical consequences of the characteristic presence of 5f electrons in most of the members of the actinide series was still for the future, and many of the systematic features of the actinide elements were only dimly apprehended. In the past thirty years all this has changed. The application of new spectroscopic techniques, which came into general use during this period, and new theoretical insights, which came from a better understanding of chemical bonding, inorganic chemistry, and solid state phenomena, were among the important factors that led to a great expansion and maturation in actinide element research and a large number of new and important findings. The first edition consisted of a serial description of the individual actinide elements, with a single chapter devoted to the six heaviest elements (lawrencium, the heaviest actinide, was yet to be discovered). Less than 15% of the text was devoted to a consideration of the systematics of the actinide elements.
Structural Chemistry of Inorganic Actinide Compounds is a collection of 13 reviews on structural and coordination chemistry of actinide compounds. Within the last decade, these compounds have attracted considerable attention because of their importance for radioactive waste management, catalysis, ion-exchange and absorption applications, etc. Synthetic and natural actinide compounds are also of great environmental concern as they form as a result of alteration of spent nuclear fuel and radioactive waste under Earth surface conditions, during burn-up of nuclear fuel in reactors, represent oxidation products of uranium miles and mine tailings, etc. The actinide compounds are also of considerable interest to material scientists due to the unique electronic properties of actinides that give rise to interesting physical properties controlled by the structural architecture of respective compounds. The book provides both general overview and review of recent developments in the field, including such emergent topics as nanomaterials and nanoparticles and their relevance to the transfer of actinides under environmental conditions.

- Covers over 2,000 actinide compounds including materials, minerals and coordination polymers
- Summarizes recent achievements in the field
- Some chapters reveal (secret) advances made by the Soviet Union during the 'Cold war'

Experimental and Theoretical Approaches to Actinide Chemistry

International Series of Monographs in Analytical Chemistry, Volume 54: Organic Reagents in Metal Analysis focuses on the factors determining the analytical selectivity of complexation reactions. This book consists of three chapters. Chapter 1 deals with the effects of stability and electronic structure of complexes and formation of mixed ligand complexes on analytical selectivity. The analytical procedures for the accomplishment of many metal analytical tasks are reviewed in Chapter 2. The last chapter provides a tabulated data that facilitates experimental work in the field of metal analysis. This volume is useful to practical analysts and researchers engaged with developments in the field of analytical chemistry and routine metal analyses.

Process Analytical Chemistry Applied to Actinide Waste Streams

Actinide Analytical Chemistry Capabilities - Los Alamos National Laboratory

The hazards connected with the handling of actinide elements are surveyed. Emphasis is placed on Thorium, Uranium, Neptunium, and Plutonium. It is pointed out that the chemical toxicity of the actinides is usually minor when compared with radiochemical toxicity. Inhalation and ingestion are the important routes of entry but direct injection into the bloodstream through wounds also requires consideration. Special enclosures, such as glove boxes, function primarily to minimize the risk of inhalation and aid in confinement. The external hazard from actinide elements, primarily due to gamma and fast neutron emission, varies considerably with the element and its source. Irradiated actinides, such as Thorium and Plutonium, usually show an increase in the external hazard from gamma radiation with extent of irradiation.

Synthesis of Lanthanide and Actinide Compounds

This report discusses LANL's actinide analytical chemistry capabilities.

The Chemistry of the Actinide and Transactinide Elements (3rd ed., Volumes 1-5)

Radiation Problems Associated with the Handling of the Actinide Elements

Nuclear Techniques in Analytical Chemistry discusses highly sensitive nuclear techniques that determine the micro- and macro-amounts or trace elements of materials. With the increasingly frequent demand for the chemical determination of trace amounts of elements in materials, the analytical chemist had to search for more sensitive methods of analysis. This book accustoms analytical chemists with nuclear techniques that possess the desired sensitivity and applicability at trace levels. The topics covered include safe handling of radioactivity; measurement of natural radioactivity; and neutron activation analysis. The positive ion and gamma ray activation analysis; isotope dilution and tracer investigations of analytical techniques;...
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 activation to the analysis of certain samples of geological interest. This monograph will be a useful resource for analytical chemists and space scientists.

Analytical Chemistry in Space presents an analysis of the chemical constitution of space, particularly the particles in the solar wind, of the planetary atmospheres, and the surfaces of the moon and planets. Topics range from space engineering considerations to solar system atmospheres and recovered extraterrestrial materials. Mass spectroscopy in space exploration is also discussed, along with lunar and planetary surface analysis using neutron inelastic scattering. This book is comprised of seven chapters and opens with a discussion on the possibilities for exploration of the solar system by mass spectroscopy, with particular reference to analysis of compositional data on solar system objects such as the Earth and meteorites, asteroids, comets, and interplanetary dust. The reader is then introduced to the project administration, instrument design, and spacecraft integration problems that must be solved to successfully fly a space experiment. The following chapters focus on the atmospheres of the sun and planets; the use of mass spectroscopy in solar system exploration and of neutron inelastic scattering in space experiment. The final chapter is devoted to the advantages and applications of thermal neutron lunar and planetary surface analysis; and extraterrestrial in situ 14 MeV neutron activation analysis. The overview of this presentation is: (1) Introduction to nonproliferation efforts; (2) Scope of activities at Los Alamos National Laboratory; (3) Facilities for radioanalytical work at LANL; (4) Radiochemical characterization capabilities; and (5) Bulk chemical and materials analysis capabilities. Some conclusions are: (1) Analytical chemistry measurements on plutonium and uranium matrices are critical to numerous defense and non-defense programs including safeguards accountancy verification measurements; (2) Los Alamos National Laboratory operates capable actinide analytical chemistry and material science laboratories suitable for nuclear material forensic characterization; (3) Actinide analytical chemistry uses numerous means to validate and independently verify that measurement data quality objectives are met; and (4) Numerous LANL nuclear facilities support the nuclear material handling, preparation, and verification activities necessary to evaluate samples containing nearly any mass of an actinide (attogram to kilogram levels).

Chemical Analysis of Additives in Plastics intending to acquire knowledge on nuclear techniques and analytical methods in chemistry. and geo- and cosmochronology and miscellaneous nuclear techniques are also elaborated in this text. This publication is intended for analytical chemists, but is also valuable to students and researchers in the fields of chemistry, materials science, and nuclear engineering. The book is organized into three main sections: (1) Introduction to Nuclear Techniques and Analytical Methods, (2) Chemical Analysis of Additives in Plastics, and (3) Applications of Nuclear Techniques in Chemical Analysis. The first section provides an overview of the basic principles of nuclear techniques and analytical methods, with a focus on the use of gamma-ray spectrometry, neutron activation analysis, and neutron inelastic scattering. The second section examines the chemical analysis of additives in plastics, including polymers and plasticizers, with a focus on the use of nuclear techniques to determine the presence and concentration of these additives. The third section discusses the applications of nuclear techniques in chemical analysis, with examples drawn from a variety of industries and fields. Throughout the book, a wide range of case studies and examples are presented to illustrate the practical use of nuclear techniques in chemical analysis.
The only introduction into the exciting chemistry of Lanthanides and Actinides. The book is based on a number of courses on "f elements". The author has a long experience in teaching this field of chemistry. Lanthanides have become very common elements in research and technology applications; this book offers the basic knowledge. The book offers insights into a vast range of applications, from lasers to synthesis.

The Inorganic Chemistry: A Textbook series reflects the pivotal role of modern inorganic and physical chemistry in a whole range of emerging areas, such as materials chemistry, green chemistry and bioinorganic chemistry, as well as providing a solid grounding in established areas such as solid state chemistry, coordination chemistry, main group chemistry and physical inorganic chemistry. Lanthanide and Actinide Chemistry is a one-volume account of the Lanthanides (including scandium and yttrium), the Actinides and the Transactinide elements, intended as an introductory treatment for undergraduate and postgraduate students. The principal features of these elements are set out in detail, enabling clear comparison and contrast with the Transition Elements and Main Group metals. The book covers the extraction of the elements from their ores and their purification, as well as the synthesis of the man-made elements; the properties of the elements and principal binary compounds; detailed accounts of their coordination chemistry and organometallic chemistry, from both preparative and structural viewpoints, with a clear explanation of the factors responsible for the adoption of particular coordination numbers; spectroscopy and magnetism, especially for the lanthanides, with case studies and accounts of applications in areas like magnetic resonance imaging, lasers and luminescence; nuclear separations and problems in waste disposal for the radioactive elements, particularly in the context of plutonium. Latest developments are covered in areas like the synthesis of the latest man-made elements, whilst there is a whole chapter on the application of lanthanide compounds in synthetic organic chemistry. End-of-chapter questions suitable for tutorial discussions are provided, whilst there is a very comprehensive bibliography providing ready access to further reading on all topics.

The Chemistry of the Actinide and Transactinide Elements (3rd ed., Volumes 1-5)

Structural Chemistry of Inorganic Actinide Compounds

Treatise on Analytical Chemistry - Part 2, Volume 9 Analytical Chemistry of the Elements Uranium, The Transuranium - Actinide Elements

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.

Treatise on Analytical Chemistry

Surpassing its bestselling predecessors, this thoroughly updated third edition is designed to be a powerful training tool for entry-level chemistry technicians. Analytical Chemistry for Technicians, Third Edition explains analytical chemistry and instrumental analysis principles and how to apply them in the real world. A unique feature of this edition is that it brings the workplace of the chemical technician into the classroom. With over 50 workplace scene sidebars, it offers stories and photographs of technicians and chemists working with the equipment or performing the techniques discussed in the text. It includes a supplemental CD that enhances training activities. The author incorporates knowledge gained from a number of American Chemical Society and PITTCON short courses and from personal visits to several laboratories at major chemical plants, where he determined firsthand what is important in the modern laboratory.
Analytical Chemistry of the Actinide Elements

International Series of Monographs on Analytical Chemistry

Alfred J. Moses

This book provides an introduction to the discovery, electronic configuration, and oxidation states of the elements 89-103. It includes information on the handling of radioactive materials and techniques for analyzing trace concentrations of actinides. The book also covers nuclear instrumentation and methods, such as emission spectroscopy and mass spectrometry, for analyzing these elements.

Soviet Research on the Lanthanide and Actinide Elements

The Chemistry of the Actinides contains chapters from the Comprehensive Inorganic Chemistry to provide an overview of the 14 elements after actinium in the Periodic Table. The book discusses the occurrence, separation, chemical properties, chemical structures, and preparation of the metals. It also includes a comparison of the radioactive properties of the actinides and lanthanides.

Nuclear Forensics at Los Alamos National Laboratory

Analytical Chemistry of the Actinide Elements presents techniques for analyzing actinides and provides information on handling radioactive materials. The book covers the preliminary treatment of samples, separations, and spectroscopic methods for analyzing trace concentrations of actinides.

Analytical Chemistry in Space

The Chemistry of the Actinide Elements

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.

Analytical Chemistry of the Elements. (Section A: Systematic Analytical Chemistry of the Elements)
International Series of Monographs in Analytical Chemistry, Volume 47: Analytical Chemistry of Molybdenum and Tungsten describes the chemical and instrumental methods of analysis of molybdenum and tungsten. This book is composed of 15 chapters that particularly consider detailed methods for determining these metals in typical samples and their alloys by both classical and modern techniques. The opening chapters discuss the history, occurrence, physico-chemical properties, and applications of molybdenum and tungsten. The succeeding chapters deal with the metals' sampling, decomposition, separation, and qualitative detection. Considerable chapters are devoted to various chemical and instrumental methods for their analysis, including gravimetry, titrimetry, colorimetry, polarography, amperometry, coulometry, emission and atomic absorption spectroscopy, X-ray spectrophotometry, mass spectrometry, and radiochemical methods. The concluding chapter examines the determination of impurities and alloying elements. This book will prove useful to analytical and inorganic chemists, as well as analytical and inorganic chemistry students.