

R Sarkar Inorganic Chemistry

Metal clusters are on the brink between molecules and nanoparticles in size. With molecular, nano-scale, metallic as well as non-metallic aspects, metal clusters are a growing, interdisciplinary field with numerous potential applications in chemistry, catalysis, materials and nanotechnology. This third volume in the series of hot topics from inorganic chemistry covers all recent developments in the field of metal clusters, with some 20 contributions providing an in-depth view. The result is a unique perspective, illustrating all facets of this interdisciplinary area: * Inter-electron Repulsion and Irregularities in the Chemistry of Transition Series * Stereochemical Activity of Lone Pairs in Heavier Main Group Element Compounds * How Close to Close Packing? * Forty-Five Years of Praseodymium Diiodide * Centered Zirconium Clusters * Titanium Niobium Oxychlorides * Trinuclear Molybdenum and Tungsten Cluster Chalcogenides * Current State of (B,C,N)-Compounds of Calcium and Lanthanum * Ternary Phases of Lithium with Main-Group and Late-Transition Metals * Polar Intermetallics and Zintl Phases along the Zintl Border * Rare Earth Zintl Phases * Structure-Property Relationships in Intermetallics * Ternary and Quaternary Niobium Arsenide Zintl Phases * The Building Block Approach to Understanding Main-Group-Metal Complex Structures * Cation-Deficient Quaternary Thiospinels * A New Class of Hybrid Materials via Salt Inclusion Synthesis * Layered Perrhenate and Vanadate Hybrid Solids * Hydrogen Bonding in Metal Halides * Syntheses and Catalytic Properties of Titanium Nitride Nanoparticles * Solventless Thermolysis * New Potential Scintillation Materials in Borophosphate Systems. With its didactical emphasis, this volume addresses a wide readership, such that both students and specialists will profit from the expert contributions.

The newest volume in the authoritative Inorganic Syntheses book series provides users of inorganic substances with detailed and foolproof procedures for the preparation of important and timely inorganic and organometallic compounds that can be used in reactions to develop new materials, drug targets, and bio-inspired chemical entities.

Comprehensive Coordination Chemistry II (CCC II) is the sequel to what has become a classic in the field, Comprehensive Coordination Chemistry, published in 1987. CCC II builds on the first and surveys new developments authoritatively in over 200 newly commissioned chapters, with an emphasis on current trends in biology, materials science and other areas of contemporary scientific interest.

This book provides state of the art description of various approaches, techniques and some basic fundamentals of bioremediation to manage a variety of organic and inorganic wastes and pollutants present in our environment. A comprehensive overview of recent advances and new development in the field of bioremediation research are provided within relevant theoretical framework to improve our understanding for the cleaning up of polluted water and contaminated land. The book is easy to read and language can be readily comprehended by aspiring newcomer, students, researchers and anyone else interested in this field. Renowned scientists around the world working on the above topics have contributed chapters. In this edited book, we have addressed the scope of the inexpensive and energy neutral bioremediation technologies. The scope of the book extends to environmental/agricultural scientists, students, consultants, site owners, industrial stakeholders, regulators and policy makers.

Informal, effective undergraduate-level text introduces vibrational and electronic spectroscopy, presenting applications of group theory to the interpretation of UV, visible, and infrared spectra without assuming a high level of background knowledge. 200 problems with solutions. Numerous illustrations. "A uniform and consistent treatment of the subject matter." — Journal of Chemical Education.

An advanced-level textbook of inorganic chemistry for the graduate (B.Sc) and postgraduate (M.Sc) students of Indian and foreign universities. This book is a part of four volume series, entitled "A Textbook of Inorganic Chemistry – Volume I, II, III, IV". CONTENTS: Chapter 1. Stereochemistry and Bonding in Main Group Compounds: VSEPR theory, $d^2 - p^2$ bonds, Bent rule and energetic of hybridization. Chapter 2. Metal-Ligand Equilibria in Solution: Stepwise and overall formation constants and their interactions, Trends in stepwise constants, Factors affecting stability of metal complexes with reference to the nature of metal ion and ligand, Chelate effect and its thermodynamic origin, Determination of binary formation constants by pH-metry and spectrophotometry. Chapter 3. Reaction Mechanism of Transition Metal Complexes – I: Inert and labile complexes, Mechanisms for ligand replacement reactions, Formation of complexes from aquo ions, Ligand displacement reactions in octahedral complexes- acid hydrolysis, Base hydrolysis, Racemization of tris chelate complexes, Electrophilic attack on ligands. Chapter 4. Reaction Mechanism of Transition Metal Complexes – II: Mechanism of ligand displacement reactions in square planar complexes, The trans effect, Theories of trans effect, Mechanism of electron transfer reactions – types; Outer sphere electron transfer mechanism and inner sphere electron transfer mechanism, Electron exchange. Chapter 5. Isopoly and Heteropoly Acids and Salts: Isopoly and Heteropoly acids and salts of Mo and W: structures of isopoly and heteropoly anions. Chapter 6. Crystal Structures: Structures of some binary and ternary compounds such as fluorite, antiferite, rutile, antirutile, cristobalite, layer lattices- CdI_2 , BiI_3 ; ReO_3 , Mn_2O_3 , corundum, perovskite, Ilmenite and Calcite. Chapter 7. Metal-Ligand Bonding: Limitation of crystal field theory, Molecular orbital theory, octahedral, tetrahedral or square planar complexes, π -bonding and molecular orbital theory. Chapter 8. Electronic Spectra of Transition Metal Complexes: Spectroscopic ground states, Correlation and spin-orbit coupling in free ions for 1st series of transition metals, Orgel and Tanabe-Sugano diagrams for transition metal complexes ($d^1 - d^9$ states), Calculation of Dq , B and β parameters, Effect of distortion on the d-orbital energy levels, Structural evidence from electronic spectrum, John-Teller effect, Spectrochemical and nephelauxetic series, Charge transfer spectra, Electronic spectra of molecular addition compounds. Chapter 9. Magnetic Properties of Transition Metal Complexes: Elementary theory of magneto - chemistry, Guoy's method for determination of magnetic susceptibility, Calculation of magnetic moments, Magnetic properties of free ions, Orbital contribution, effect of ligand-field, Application of magneto-chemistry in structure determination, Magnetic exchange coupling and spin state cross over. Chapter 10.

Metal Clusters: Structure and bonding in higher boranes, Wade's rules, Carboranes, Metal Carbonyl Clusters - Low Nuclearity Carbonyl Clusters, Total Electron Count (TEC). Chapter 11. Metal-? Complexes: Metal carbonyls, structure and bonding, Vibrational spectra of metal carbonyls for bonding and structure elucidation, Important reactions of metal carbonyls; Preparation, bonding, structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes; Tertiary phosphine as ligand.

This book contains an overview of complex formation by macrocyclic ligand systems. The study of macrocyclic chemistry represents a major area of activity which impinges on a range of other areas in both chemistry and biochemistry. The field has characteristically yielded many interesting and unusual compounds. The text discusses the structures and properties of macrocyclic compounds; the synthesis of macrocycles; polyether crown and related systems; metal-ion and molecular recognition (host-guest chemistry); as well as kinetic, thermodynamic and electrochemical aspects of a range of macrocyclic systems. A discussion of the different categories of naturally occurring macrocycles is also included. Specialist and non-specialist alike will find this a useful text. Apart from serving as a convenient reference for established workers in the field, it should also prove useful to new graduate students as well as to researchers from other areas who seek a general introduction to the subject. The topics discussed also provide a suitable basis for a senior undergraduate or graduate course in macrocyclic chemistry and inorganic complexes.

There has been enormous progress in our understanding of molybdenum and tungsten enzymes and relevant inorganic complexes of molybdenum and tungsten over the past twenty years. This set of three books provides a timely and comprehensive overview of the field and documents the latest research. Building on the first and second volumes that focussed on biochemistry and bioinorganic chemistry aspects, the third volume focusses on spectroscopic and computational methods that have been applied to both enzymes and model compounds. A particular emphasis is placed on how these important studies have been used to reveal critical components of enzyme mechanisms. This text will be a valuable reference to workers both inside and outside the field, including graduate students and young investigators interested in developing new research programs in this area.

A complete reference to the cutting edge procedures used to test today's materials and details measuring techniques for the long term durability of new types of concrete and concrete technologies, with contributions by 24 leading scientists and chapters that cover chemical and thermal analysis.

While existing books related to DOE are focused either on process or mixture factors or analyze specific tools from DOE science, this text is structured both horizontally and vertically, covering the three most common objectives of any experimental research: * screening designs * mathematical modeling, and * optimization. Written in a simple and lively manner and backed by current chemical product studies from all around the world, the book elucidates basic concepts of statistical methods, experiment design and optimization techniques as applied to chemistry and chemical engineering. Throughout, the focus is on unifying the theory and methodology of optimization with well-known statistical and experimental methods. The author draws on his own experience in research and development, resulting in a work that will assist students, scientists and engineers in using the concepts covered here in seeking optimum conditions for a chemical system or process. With 441 tables, 250 diagrams, as well as 200 examples drawn from current chemical product studies, this is an invaluable and convenient source of information for all those involved in process optimization.

A series of critical reviews and perspectives focussing on specific aspects of organometallic chemistry interfacing with other fields of study are provided.

General & Inorganic Chemistry Vol 1 New Central Book Agency General & Inorganic Chemistry Vol 2 New Central Book Agency A Textbook of Inorganic Chemistry – Volume 1 Dalal Institute

"This book has succeeded in covering the basic chemistry essentials required by the pharmaceutical science student...the undergraduate reader, be they chemist, biologist or pharmacist will find this an interesting and valuable read."—Journal of Chemical Biology, May 2009
Chemistry for Pharmacy Students is a student-friendly introduction to the key areas of chemistry required by all pharmacy and pharmaceutical science students. The book provides a comprehensive overview of the various areas of general, organic and natural products chemistry (in relation to drug molecules). Clearly structured to enhance student understanding, the book is divided into six clear sections. The book opens with an overview of general aspects of chemistry and their importance to modern life, with particular emphasis on medicinal applications. The text then moves on to a discussion of the concepts of atomic structure and bonding and the fundamentals of stereochemistry and their significance to pharmacy- in relation to drug action and toxicity. Various aspects of aliphatic, aromatic and heterocyclic chemistry and their pharmaceutical importance are then covered with final chapters looking at organic reactions and their applications to drug discovery and development and natural products chemistry. accessible introduction to the key areas of chemistry required for all pharmacy degree courses student-friendly and written at a level suitable for non-chemistry students includes learning objectives at the beginning of each chapter focuses on the physical properties and actions of drug molecules

Now in its fifth edition, Housecroft & Sharpe's Inorganic Chemistry, continues to provide an engaging, clear and comprehensive introduction to core physical-inorganic principles. This widely respected and internationally renowned textbook introduces the descriptive chemistry of the elements and the role played by inorganic chemistry in our everyday lives. The stunning full-colour design has been further enhanced for this edition with an abundance of three-dimensional molecular and protein structures and photographs, bringing to life the world of inorganic chemistry. Updated with the latest research, this edition also includes coverage relating to the extended periodic table and new approaches to estimating lattice energies and to bonding classifications of organometallic compounds. A carefully developed pedagogical approach guides the reader through this fascinating subject with features designed to encourage thought and to help students consolidate their understanding and learn how to apply their understanding of key concepts within the real world. Features include: · Thematic boxed sections with a focus on areas of Biology and Medicine, the Environment, Applications, and Theory engage students and ensure they gain a deep, practical and topical understanding · A wide range of in-text self-study exercises including worked examples, reflective questions and end of chapter problems aid independent study · Definition panels and end-of-chapter checklists provide students with excellent revision aids · Striking visuals throughout the book have been carefully crafted to illustrate molecular and protein structures and to entice students further into the world of inorganic chemistry Inorganic Chemistry 5th edition is also accompanied by an extensive companion website, available at www.pearsoned.co.uk/housecroft . This features multiple choice questions and rotatable 3D molecular structures.

Advanced Inorganic Chemistry - Volume II is a concise book on basic concepts of inorganic chemistry. Beginning with Coordination Chemistry, it presents a systematic treatment of all Transition and Inner-Transition chemical elements and their compounds according to the periodic table. Special topics such as Pollution and its adverse effects, chromatography, use of metal ions in biological systems, to name a few, are discussed to provide additional relevant information to the students. It primarily caters to the undergraduate courses (Pass and Honours) offered in Indian universities.

This volume is for environmental researchers and government policy makers who are required to monitor environmental quality for their environmental investigators and remediation plans. It uses concepts and applications to aid in the exchange of scientific information across all the environmental science disciplines ranging from geochemistry to hydrogeology and ecology to biotechnology. Focusing on issues such as metals, organics and nutrient contamination of water and soils, and interactions between soil-water-plants-chemicals, the book synthesizes

the latest findings in this rapidly-developing, multi-disciplinary field. Cutting-edge environmental analytical methods are also presented, making this a must-have for professionals tasked with monitoring environmental quality. These concepts and applications help in decision making and problem solving in a single resource. *Integrative approach promotes the exchange of scientific information among different disciplines *New concepts and case studies make the text unique among existing resources *Tremendous practical value in environmental quality and remediation with an emphasis on human health and ecological risk assessment

This part of the book deals mainly with chemistry of the elements meant for 3rd year degree students.

Volume 19, entitled Essential Metals in Medicine: Therapeutic Use and Toxicity of Metal Ions in the Clinic of the series Metal Ions in Life Sciences centers on the role of metal ions in clinical medicine. Metal ions are tightly regulated in human health: while essential to life, they can be toxic as well. Following an introductory chapter briefly discussing several important metal-related drugs and diseases and a chapter about drug development, the focus is first on iron: its essentiality for pathogens and humans as well as its toxicity. Chelation therapy is addressed in the context of thalassemia, its relationship to neurodegenerative diseases and also the risks connected with iron administration are pointed out. A subject of intense debate is the essentiality of chromium and vanadium. For example, chromium(III) compounds are taken as a nutritional supplement by athletes and bodybuilders; in contrast, chromate, Cr(VI), is toxic and a carcinogen for humans. The beneficial and toxic effects of manganese, cobalt, and copper on humans are discussed. The need for antiparasitic agents is emphasized as well as the clinical aspects of metal-containing antidotes for cyanide poisoning. In addition to the essential and possibly essential ones, also other metal ions play important roles in human health, causing harm (like the metalloid arsenic, lead or cadmium) or being used in diagnosis or treatment of human diseases, like gadolinium, gallium, lithium, gold, silver or platinum. The impact of this vibrant research area on metals in the clinic is provided in 14 stimulating chapters, written by internationally recognized experts from the Americas, Europe and China, and is manifested by approximately 2000 references, and about 90 illustrations and tables. Essential Metals in Medicine: Therapeutic Use and Toxicity of Metal Ions in the Clinic is an essential resource for scientists working in the wide range from pharmacology, enzymology, material sciences, analytical, organic, and inorganic biochemistry all the way through to medicine ... not forgetting that it also provides excellent information for teaching.

Porphyrins play a vital role in many biological functions including oxygen transport, electron transfer and catalyzing the incorporation of oxygen into other molecules. This current survey discusses the use of modern physical techniques to probe porphyrin structure and function. The authors review the data available through a particular technique and show what can be learned therefrom about the (electronic) structure and function of biologically important porphyrins. The techniques include magnetic circular dichroism, X-ray absorption fine structure (EXAFS) and Mössbauer spectroscopies. All contributors are well known in their respective fields, enjoying world-wide reputation.

With this handbook, the distinguished team of editors has combined the expertise of leading nanomaterials scientists to provide the latest overview of this field. They cover the whole spectrum of nanomaterials, ranging from theory, synthesis, properties, characterization to application, including such new developments as quantum dots, nanoparticles, nanoporous materials, nanowires, nanotubes, and nanostructured polymers. The result is recommended reading for everybody working in nanoscience: Newcomers to the field can acquaint themselves with this exciting subject, while specialists will find answers to all their questions as well as helpful suggestions for further research.

As one of the most dynamic fields in contemporary science, bioinorganic chemistry lies at a natural juncture between chemistry, biology, and medicine. This rapidly expanding field probes fascinating questions about the uses of metal ions in nature. Respiration, metabolism, photosynthesis, gene regulation, and nerve impulse transmission are a few of the many natural processes that require metal ions, and new systems are continually being discovered. The use of unnatural metals - which have been introduced into human biology as diagnostic probes and drugs - is another active area of tremendous medical significance. This introductory text, written by two pioneering researchers, is destined to become a landmark in the field of bioinorganic chemistry through its organized unification of key topics. Accessible to undergraduates, the book provides necessary background information on coordination chemistry, biochemistry, and physical methods before delving into topics that are central to the field: What metals are chosen and how are they taken up by cells? How are the concentrations of metals controlled and utilized in cells? How do metals bind to and fold biomolecules? What principles govern electron transfer and substrate binding and activation reactions? How do proteins fine-tune the properties of metals for specific functions? For each topic discussed, fundamentals are identified and then clarified through selected examples. An extraordinarily readable writing style combines with chapter-opening principles, study problems, and beautifully rendered two-color illustrations to make this book an ideal choice for instructors, students, and researchers in the chemical, biological, and medical communities.

This collection of thirty articles on research projects in all areas of peroxide chemistry, i. e. analytical, biochemical, inorganic, organic, organometallic, physical, spectroscopic, and theoretical facets, are the result of a multidisciplinary research program funded by the Deutsche Forschungsgemeinschaft (DFG). The emphasis was to lie on the development of environmentally acceptable, selective (chemo-, regio-, diastereo- and enantioselectivity) oxidations. One chapter focuses on industrial applications which have to meet both economical and ecological demands to remain competitive in the future. Latest results on the consequences of lipid peroxidation in age-dependent diseases, which range from Alzheimer and Parkinson disorders to diabetes, rheumatic arthritis, atherosclerosis and cardiovascular diseases are also presented.

This book reviews the current diagnostic and therapeutic uses of metal-containing compounds in medicine, as well as the role of metals in disease.

Part A.: Overviews of biological inorganic chemistry : 1. Bioinorganic chemistry and the biogeochemical cycles -- 2. Metal ions and proteins: binding, stability, and folding -- 3. Special cofactors and metal clusters -- 4. Transport and storage of metal ions in biology -- 5. Biominerals and biomineralization -- 6. Metals in medicine. -- Part B.: Metal ion containing biological systems : 1. Metal ion transport and storage -- 2. Hydrolytic chemistry -- 3. Electron transfer, respiration, and photosynthesis -- 4. Oxygen metabolism -- 5. Hydrogen, carbon, and sulfur metabolism -- 6. Metalloenzymes with radical intermediates -- 7. Metal ion receptors and signaling. -- Cell biology, biochemistry, and evolution: Tutorial I. -- Fundamentals of coordination chemistry: Tutorial II.

Of all the different areas in computational chemistry, density functional theory (DFT) enjoys the most rapid development. Even at the level of the local density approximation (LDA), which is computationally less demanding, DFT can usually provide better answers than Hartree-Fock formalism for large systems such as clusters and solids. For atoms and molecules, the results from DFT often rival those obtained by ab initio quantum chemistry, partly because larger basis sets can be used. Such encouraging results have in turn stimulated workers to further investigate the formal theory as well as the computational methodology of DFT. This Part II expands on the methodology and applications of DFT. Some of the chapters report on the latest developments (since the publication of Part I in 1995), while others extend the applications to wider range of molecules and their environments. Together, this and other recent review volumes on DFT show that DFT provides an efficient and accurate alternative to traditional quantum chemical methods. Such demonstration should hopefully stimulate fruitful developments in formal theory, better exchange-correlation functionals, and linear scaling methodology.

There has been enormous progress in our understanding of molybdenum and tungsten enzymes and relevant inorganic complexes of molybdenum and tungsten over the past twenty years. This set of three books provides a timely and comprehensive overview of the field and documents the latest research. Building on the first volume that focussed on biochemistry aspects, the second volume in the set focusses on the inorganic complexes that model the structures and reactivity of the active sites of each major group of molybdenum and tungsten enzymes. Special attention is given to synthetic strategies, reaction mechanism and chemical kinetics of these systems. The introductory chapter provides a useful overview and places the topic of the book into a wider context. This text will be a valuable reference to workers both inside and outside the field, including graduate students and young investigators interested in developing new research programs in this area.

Nanocarbon and Its Composites: Preparation, Properties and Applications provides a detailed and comprehensive review of all major innovations in the field of nanocarbons and their composites, including preparation, properties and applications. Coverage is broad and quite extensive, encouraging future research in carbon-based materials, which are in high demand due to the need to develop more sustainable, recyclable and eco-friendly methods for materials. Chapters are written by eminent scholars and leading experts from around the globe who discuss the properties and applications of carbon-based materials, such as nanotubes (buckytubes), fullerenes, cones, horns, rods, foams, nanodiamonds and carbon black, and much more. Chapters provide cutting-edge, up-to-date research findings on the use of carbon-based materials in different application fields and illustrate how to achieve significant enhancements in physical, chemical, mechanical and thermal properties. Demonstrates systematic approaches and investigations from design, synthesis, characterization and applications of nanocarbon based composites Aims to compile information on the various aspects of synthesis, properties and applications of nano-carbon based materials Presents a useful reference and technical guide for university academics and postgraduate students (Masters and Ph.D.)

The book has been written in a systematic way and explains vividly the subject in the light of modern structural theories.

The first IUPAC Manual of Symbols and Terminology for Physicochemical Quantities and Units (the Green Book) of which this is the direct successor, was published in 1969, with the object of 'securing clarity and precision, and wider agreement in the use of symbols, by chemists in different countries, among physicists, chemists and engineers, and by editors of scientific journals'. Subsequent revisions have taken account of many developments in the field, culminating in the major extension and revision represented by the 1988 edition under the simplified title Quantities, Units and Symbols in Physical Chemistry. This 2007, Third Edition, is a further revision of the material which reflects the experience of the contributors with the previous editions. The book has been systematically brought up to date and new sections have been added. It strives to improve the exchange of scientific information among the readers in different disciplines and across different nations. In a rapidly expanding volume of scientific literature where each discipline has a tendency to retreat into its own jargon this book attempts to provide a readable compilation of widely used terms and symbols from many sources together with brief understandable definitions. This is the definitive guide for scientists and organizations working across a multitude of disciplines requiring internationally approved nomenclature.

Comprehensive Coordination Chemistry III describes the fundamentals of metal-ligand interactions, provides an overview of the systematic chemistry of this class of compounds, and details their importance in life processes, medicine, industry and materials science. This new edition spans across 9 volumes, 185 entries and 6600 printed pages. Comprehensive Coordination Chemistry III is not just an update of the second edition, it includes a significant amount of new content. In the descriptive sections 3-6, emphasis is placed upon material that has appeared in primary and secondary review literature since the previous edition published. The material in other sections is newly written, with an emphasis on modern aspects of coordination chemistry and the latest developments. The metal-ligand interaction is the link between the award of the 1913 Nobel Prize in Chemistry to Alfred Werner, the father of Coordination Chemistry, the 1987 prize for supramolecular chemistry and the 2016 award for molecular machines. The key role of coordination chemistry in the assembly of hierarchical nano- and micro-dimensioned structures lies at the core of these applications and so this Major Reference Work bridges several sub-disciplines of chemistry, thus targeting a truly interdisciplinary audience. Provides the go-to foundational resource on coordination chemistry research, providing insights into future directions of the field Written and edited by renowned academics and practitioners from various fields and regions this authoritative and interdisciplinary work is of interest to a large audience, including coordination, supramolecular and molecular chemists Presents content that is clearly structured, organized and cross-referenced to allow students, researchers and professionals to find relevant information quickly and easily

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