Organometallic Compounds Of Low Coordinate Si Ge Sn And Pb From Phantom Species To Stable Compounds

Specialist Periodical Reports provide systematic and detailed review coverage of progress in the major areas of chemical research. Written by experts in their specialist fields the series creates a unique service for the active research chemist, supplying regular critical in-depth accounts of progress in particular areas of chemistry. Organosilicon Compounds provides readers with the state-of-the-art status of organosilicon chemistry, including its theoretical, synthetic, physico-chemical and applied aspects. By including high quality content in a key strategic signing area, this work is a strong addition to chemistry offerings in organic, main group and organometallic research. Organosilicon chemistry deals with compounds containing carbon–silicon bonds, an essential part of organic and organometallic chemistry. This book presents the many milestone in the field that have been discovered during the last few years, also detailing its usage in commercial products, such as sealants, adhesives and coatings. Features valuable contributions from prominent experts who cover both fundamental (theoretical, synthetic, physico-chemical) and applied (material science, applications) aspects Covers important breakthroughs in the field, along with historically

significant achievements Includes applied information for a wide range of specialists, from junior and senior researchers (from both academia and industry) working in organometallic, organosilicon, main group element, transition metal, industrial silicon chemistry, and more

Organosilicon Compounds: Experiment (Physico-Chemical Studies) and Applications, volume 2, also contains two parts. In its first part, Experiment (Physico-Chemical Studies), the application of modern instrumental tools (such as X-ray crystallography, 29Si NMR spectroscopy, UV-Photoelectron Spectroscopy, and other methods) for assessing the structures of organosilicon compounds is described. The second part, Applications, reviews the current research in the field of material science, specifically the use of organosilicon compounds in synthetic chemistry directed towards the creation of new materials. Organosilicon Compounds: From Theory to Synthesis to Applications provides a comprehensive overview of this important area of organic and organometallic chemistry, dealing with compounds containing carbon-silicon bonds. This field, which includes compounds that are widely encountered in commercial products such as in the fabrication of sealants, adhesives, and coatings, has seen many milestone discoveries reported during the last two decades. Beginning with the theoretical aspects of organosilicon compounds' structure and bonding, the book then explores their synthetic aspects, including main group element organosilicon compounds, transition metal complexes, silicon cages and clusters, low-coordinate

organosilicon derivatives (cations, radicals, anions, multiple bonds to silicon, silaaromatics), and more. Next, readers will find valuable sections that explore physical and chemical properties of organosilicon compounds by means of X-ray crystallography, 29Si NMR spectroscopy, photoelectron spectroscopy, and other methods. Finally, the work delves into applications for industrial uses and in many related fields, such as polymers, material science, nanotechnology, bioorganics, and medicinal silicon chemistry. Features valuable contributions from prominent experts cover both fundamental (theoretical, synthetic, physico-chemical) and applied (material science, applications) aspects of modern organosilicon chemistry Covers important breakthroughs in the field as well as with the historically significant achievements of the past Includes applied information for a wide range of specialists from junior and senior researchers (from both academia and industry), working in organometallic, organosilicon, main group element, transition metal, and industrial silicon chemistry, as well as those from interdisciplinary fields such as polymer, material science, nanotechnology

This book is both a review of current research and an undergraduate textbook for inorganic chemistry at university level. In university undergraduate lectures, basic concepts are mainly explained and added examples of frontier research are optional. However, in many cases, frontier research is more interesting for students than basic studies. This book is aimed at undergraduates in inorganic chemistry. Each author

introduces or reviews "frontier research topics" of inorganic coordination chemistry. Additionally, "basic concepts," as found in textbooks on this subject, indicate application examples of "frontier research topics."

Almost all branches of chemistry and material science now interface with organometallic chemistry - the study of compounds containing carbon-metal bonds. This widely acclaimed serial contains authoritative reviews that address all aspects of organometallic chemistry, a field which has expanded enormously since the publication of Volume 1 in 1964. * Provides an authoritative, definitive review addressing all aspects of organometallic chemistry * Useful to researchers within this active field and is a must for every modern library of chemistry * High quality research book within this rapidly developing field

Organometallic Compounds of Low-Coordinate Si, Ge, Sn and PbFrom Phantom Species to Stable CompoundsJohn Wiley & Sons

A series of critical reviews and perspectives focussing on specific aspects of organometallic chemistry interfacing with other fields of study are provided. For this volume, the critical reviews cover topics such as the activation of "inert" carbon-hydrogen bonds, ligand design and organometallic radical species. For example, Charlie O'Hara discusses how mixed-metal compounds may perform the highly selective activation of C-H bonds and, in particular, how synergic relationships between various metals are crucial to this approach. The chemistry of a remarkable series of air-stable chiral primary phosphine ligands is discussed in some depth by Rachel Hiney, Arne Ficks, Helge M ller-Bunz, Declan Gilheany and Lee Higham. This article

focuses on the preparation of these ligands and also how they may be applied in various catalytic applications. Bas De Bruin reports on how ligand radical reactivity can be employed in synthetic organometallic chemistry and catalysis to achieve selectivity in radical-type transformations. As well as highlighting ligand-centered radical transformations in open-shell transition metals, an overview of the catalytic mechanism of Co(II)-catalysed olefin cyclopropanation is given, showing that enzyme-like cooperative metal-ligand-radical reactivity is no longer limited to real enzymes. Valuable and informative comprehensive reviews in the field of organometallic chemistry are also covered in this volume. For example, organolithium and organocuprate chemistry are reviewed by Joanna Haywood and Andrew Wheatley; aspects in Group 2 (Be-Ba) and Group 12 (Zn-Hg) compounds by Robert Less, Rebecca Melen and Dominic Wright; metal clusters by Mark Humphrey and Marie Cifuentes; and recent developments in the chemistry of the elements of Group 14 - focusing on low-coordination number compounds by Richard Layfield. This volume therefore covers many synthetic and applied aspects of modern organometallic chemistry which ought to be of interest to inorganic, organic and applied catalysis fields."

The series Structure and Bonding publishes critical reviews on topics of research concerned with chemical structure and bonding. The scope of the series spans the entire Periodic Table and addresses structure and bonding issues associated with all of the elements. It also focuses attention on new and developing areas of modern structural and theoretical chemistry such as nanostructures, molecular electronics, designed molecular solids, surfaces, metal clusters and supramolecular structures. Physical and spectroscopic techniques used to determine, examine and model structures fall within the purview of Structure and Bonding to

the extent that the focus is on the scientific results obtained and not on specialist information concerning the techniques themselves. Issues associated with the development of bonding models and generalizations that illuminate the reactivity pathways and rates of chemical processes are also relevant. The individual volumes in the series are thematic. The goal of each volume is to give the reader, whether at a university or in industry, a comprehensive overview of an area where new insights are emerging that are of interest to a larger scientific audience. Thus each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years should be presented using selected examples to illustrate the principles discussed. A description of the physical basis of the experimental techniques that have been used to provide the primary data may also be appropriate, if it has not been covered in detail elsewhere. The coverage need not be exhaustive in data, but should rather be conceptual, concentrating on the new principles being developed that will allow the reader, who is not a specialist in the area covered, to understand the data presented. Discussion of possible future research directions in the area is welcomed. Review articles for the individual volumes are invited by the volume editors. Readership: research scientists at universities or in industry, graduate students Special offer For all customers who have a standing order to the print version of Structure and Bonding, we offer free access to the electronic volumes of the Series published in the current year via SpringerLink.

The chemistry of silicon has always been a field of major concern due to its proximity to carbon on the periodic table. From the molecular chemist’s viewpoint, one of the most interesting differences between carbon and silicon is their divergent coordination behavior. In fact, silicon

is prone to form hyper-coordinate organosilicon complexes, and, as conveyed by reports in the literature, highly sophisticated ligand systems are required to furnish low-coordinate organosilicon complexes. Tremendous progress in experimental, as well as computational, techniques has granted synthetic access to a broad range of coordination numbers for silicon, and the scientific endeavor, which was ongoing for decades, was rewarded with landmark discoveries in the field of organosilicon chemistry. Molecular congeners of silicon(0), as well as silicon oxides, were unveiled, and the prominent group 14 metalloid proved its applicability in homogenous catalysis as a supportive ligand or even as a center of catalytic activity. This book focuses on the most recent advances in the coordination chemistry of silicon with transition metals as well as main group elements, including the stabilization of low-valent silicon species through the coordination of electron donor ligands. Therefore, this book is associated with the development of novel synthetic methodologies, structural elucidations, bonding analysis, and also possible applications in catalysis or chemical transformations using related organosilicon compounds.

Until recently the low-coordinate compounds of the heavier elements of group 14 were known only as transient, unstable species which were difficult to isolate. However recent developments have led to the stabilisation of these compounds and today heavier group 14 element cations, radicals, anions, carbene analogues, alkene and alkyne analogues and aromatics have all been prepared as highly reactive, stable, fully characterizable and readily available organometallic reagents. Organometallic Compounds of Low-Coordinate Si, Ge, Sn and Pb describes the chemistry of this exciting new class of organometallics, with an emphasis on their major similarities and differences with the analogous species in organic chemistry.

Topics covered include include the synthesis, structure, reactions and synthetic applications of : Si-, Ge-, Sn and Pb-centered cations, radicals and anions heavy analogues of carbenes: silylenes, germylenes, stannylenes and plumbylenes heavy analogues of alkenes: disilenes, digermenes, distannenes, diplumbenes heavy analogues of alkynes: disilynes, digermynes, distannynes, diplumbynes, and their valence isomers heteronuclear derivatives: silenes, germenes, stannenes, silagermenes, silastannenes, germastannenes heavy analogues of alkenes of the type: >E14=E13-, >E14=E15-, >E14=E16 [where E13, E14, E15 and E16 are elements of the groups 13, 14, 15 and 16] cyclic compounds (three-, four-, five-, and six-membered rings) heavy analogues of 1,3-dienes, allenes and other cumulenes heavy analogues of aromatic compounds; including a comparison between organometallic and organic aromaticity Organometallic Compounds of Low-Coordinate Si, Ge, Sn and Pb is an essential guide to this emerging class of organometallic reagents for researchers and students in main group, organometallic, synthetic and silicon chemistry

The series Structure and Bonding publishes critical reviews on topics of research concerned with chemical structure and bonding. The scope of the series spans the entire Periodic Table and addresses structure and bonding issues associated with all of the elements. It also focuses attention on new and developing areas of modern structural and theoretical chemistry such as nanostructures, molecular electronics, designed molecular solids, surfaces, metal clusters and supramolecular structures. Physical and spectroscopic techniques used to determine, examine and model structures fall within the purview of Structure and Bonding to the extent that the focus is on the scientific results obtained and not on specialist information concerning the techniques themselves. Issues associated with the development of bonding

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The most comprehensive guide to infrared and Raman spectra of inorganic and coordination compounds-now fully revised and updated This book has served as the definitive guide to infrared and Raman spectroscopy of inorganic and coordination compounds from the time of its first publication in 1963. The Fifth Edition consists of two self-contained volumes: Part A describes basic theories of normal vibrations and their applications to relatively simple

inorganic compounds, while Part B extends them to larger and more complex systems-coordination compounds, organometallic compounds, and bioinorganic compounds. Part B shows how one can deduce structural and bonding information from vibrational spectra. For this purpose, the compounds have been classified into each structural type, their vibrational frequencies and band assignments listed, and typical infrared/Raman spectra illustrated. Special emphasis has been placed on metal-ligand vibrations that appear in the low-frequency region. This new edition * Incorporates new topics, including complexes of carbon dioxide and dihydrogen and metal complex-DNA interactions * Offers many references to the latest research in the field * Reviews all important new results obtained on the subject * Provides many infrared and Raman spectral charts of typical compounds * Features 156 illustrations This is the best reference book for researchers and graduate students in this field today. Also Available: Infrared and Raman Spectra of Inorganic and Coordination Compounds, 5th Edition, Part A: Theory and Applications in Inorganic Chemistry, 1997 0-471-16394-5

The principal idea of this volume is to offer a Capita Selecta of unconventional and thought-provoking topics in organometallic chemistry, presented by experts in each field. As intended, this approach leads either to reviews covering a specific uncommon class of organometallic compounds or to overviews which relate uncommon physical properties with various classes of organometallic compounds. The contributions are streamlined thus onto two main axes - unusual properties reflecting structures and bonding situations, on the one hand, and uncommon structural features or structure-reactivity relationships, on the other. Extensive cross-referencing of useful information is provided, making this volume accessible for people working in rather different areas of organometallic chemistry. The synthesis of molecules with

'extreme' properties is a challenge for all those working in organometallic chemistry, irrelevant of theoretical/computational, synthetic or application interests. This book presents case studies at the interface of these overlapping interests. Unusual Structures and Physical Properties in Organometallic Chemistry: * Provides test cases for computational and theoretical models * Presents a challenge for synthetic chemists * Provides ideal show cases for analytical techniques This volume will be an invaluable reference for researchers in organometallic chemistry, computational and theoretical chemistry, NMR and other spectroscopic methods.
The significance of organometallic chemistry has constantly increased during the second half of this century. The Gmelin Institute recognizes this fact in publishing an entire series on organometallic compounds, listed in the Complete Catalog. Within this series the description of the organogermanium compounds has started, of which already two volumes have been published. The present third volume in the organogermanium series describes the remainder of GeR3R' compounds, all other types of tetraorganogermanium compounds, from GeR2R'2 to GeRR'R"R"', germacyclic compounds of various ring sizes, including spiro compounds, and compounds with low-coordinate germanium atoms such as GeR3 radicals, germylenes, and germanocenes. The volume concludes with an empirical formula index.
Organometallic Chemistry of Five-Membered Heterocycles is a comprehensive source of information on the synthesis, coordination modes and reactivity of coordinated five-membered monoheterocycles and the organometallic complexes of their numerous derivatives, including chelating ligands, oligomers and macrocycles. Applications in modern materials chemistry are examined, including optical materials, catalysts, fuels, and more. An ideal reference for researchers working in organometallic, heterocyclic, materials chemistry, organic chemistry

and catalysis, readers will find this book a comprehensive overview on the modern synthetic methods, possible coordination situations, trends in reactivity of the coordinated heteroaromatic ligands, and methods for construction of modern materials. Includes synthesis, structural features and coordination modes of five-membered heterocycles Features a comparative analysis of reactivity of uncoordinated and coordinated ligands Offers coverage of derivatives of fundamental ligands and examines trends in materials applications

In Organometallics and Catalysis, author Manfred Bochmann distills the extensive knowledge of the field that has been amassed in recent years into a succinct review of the essential concepts. It is enriched throughout by examples that demonstrate how our understanding of organometallic chemistry has led to new applications in research and industry--not least in relation to catalysis--and an extensive art program clarifies the concepts being explained. Striking just the right balance between breadth and depth, Organometallics and Catalysis is the perfect introduction for students who need a thorough grounding in the subject.

Organosilicon Compounds: Theory and Experiment (Synthesis), volume 1, comprises two parts. The first part, Theory, covers state-of-the-art computational treatments of unusual nonstandard organosilicon compounds that classical bonding theory fails to describe adequately. The second part, Experiment (Synthesis), describes recent synthetic advances in the preparation of a variety of organosilicon compounds with different coordination numbers of the central silicon: from tetracoordinate to low-coordinate to hypercoordinate derivatives.

Organosilicon Compounds: From Theory to Synthesis to Applications provides a comprehensive overview of this important area of organic and organometallic chemistry, dealing with compounds containing carbon-silicon bonds. This field, which includes

compounds that are widely encountered in commercial products such as in the fabrication of sealants, adhesives, and coatings, has seen many milestone discoveries reported during the last two decades. Beginning with the theoretical aspects of organosilicon compounds' structure and bonding, the book then explores their synthetic aspects, including main group element organosilicon compounds, transition metal complexes, silicon cages and clusters, low-coordinate organosilicon derivatives (cations, radicals, anions, multiple bonds to silicon, silaaromatics), and more. Next, readers will find valuable sections that explore physical and chemical properties of organosilicon compounds by means of X-ray crystallography, 29Si NMR spectroscopy, photoelectron spectroscopy, and other methods. Finally, the work delves into applications for industrial uses and in many related fields, such as polymers, material science, nanotechnology, bioorganics, and medicinal silicon chemistry. Features valuable contributions from prominent experts that cover both fundamental (theoretical, synthetic, physico-chemical) and applied (material science, applications) aspects of modern organosilicon chemistry Covers important breakthroughs in the field, along with the historically significant achievements of the past Includes applied information for a wide range of specialists, from junior and senior researchers (from both academia and industry) Ideal reference for those working in organometallic, organosilicon, main group element, transition metal, and industrial silicon chemistry, as well as those from interdisciplinary fields, such as polymer, material science, and nanotechnology

Organometallic compounds are utilized as reagents in the preparation and processing of advanced nanostructured materials, as catalysts in the production of a wide variety of specialty chemicals and polymers, and as drugs. Supercritical fluid science and technology has a wide

variety of applications ranging from extraction of pharmaceutically active compounds to the synthesis of advanced materials. The combination of organometallic chemistry and supercritical fluids has significant potential. This book covers the fundamental aspects and related applications in this rapidly growing area. Covers the preparation of nanostructured composite materials using supercritical fluids Focuses on the intersection of organometallic chemistry and supercritical fluids Addresses the behavior of organometallic compounds in supercritical fluid environments

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.

The know-how about reactivity, reaction mechanisms, thermodynamics and other basics in physical organic chemistry is the key for successful organic reactions. This textbook presents comprehensively this knowledge to the student and to the researcher, too. Includes Q&As.

This Specialist Periodical Report aims to reflect the growing interest in the potential of organometallic chemistry.

This widely-acclaimed serial contains authoritative reviews that address all aspects of organometallic chemistry, a field which has expanded enormously since the publication of Volume 1 in 1964. Almost all branches of chemistry and material science now interface with organometallic chemistry--the study of compounds containing carbon-metal bonds. Organometallic compounds range

from species which are so reactive that they only have a transient existence at ambient temperatures to species which are thermally very stable.
Organometallics are used extensively in the synthesis of useful compounds on both large and small scales. Industrial processes involving plastics, polymers, electronic materials, and pharmaceuticals all depend on advancements in organometallic chemistry.
With the increase in volume, velocity and variety of information, researchers can find it difficult to keep up to date with the literature in their field. This interdisciplinary field has the potential to provide answers to problems and challenges faced in catalysis, synthetic organic chemistry and the development of therapeutic agents and new materials. Providing an invaluable volume, Organometallic Chemistry Volume 41 contains analysed, evaluated and distilled information on the latest in organometallic chemistry research including developments and applications of Lewis acidic boron reagents, masked low-coordinate main group species in synthesis and the diiron centre.
Organosilicon Compounds: Experiment (Physico-Chemical Studies) and Applications, volume 2, also contains two parts. In its first part, Experiment (Physico-Chemical Studies), the application of modern instrumental tools (such as X-ray crystallography, 29Si NMR spectroscopy, UV-Photoelectron

Spectroscopy, and other methods) for assessing the structures of organosilicon compounds is described. The second part, Applications, reviews the current research in the field of material science, specifically the use of organosilicon compounds in synthetic chemistry directed towards the creation of new materials. Organosilicon Compounds: From Theory to Synthesis to Applications provides a comprehensive overview of this important area of organic and organometallic chemistry, dealing with compounds containing carbon–silicon bonds. This field, which includes compounds that are widely encountered in commercial products such as in the fabrication of sealants, adhesives, and coatings, has seen many milestone discoveries reported during the last two decades. Beginning with the theoretical aspects of organosilicon compounds' structure and bonding, the book then explores their synthetic aspects, including main group element organosilicon compounds, transition metal complexes, silicon cages and clusters, low-coordinate organosilicon derivatives (cations, radicals, anions, multiple bonds to silicon, silaaromatics), and more. Next, readers will find valuable sections that explore physical and chemical properties of organosilicon compounds by means of X-ray crystallography, 29Si NMR spectroscopy, photoelectron spectroscopy, and other methods. Finally, the work delves into applications for industrial uses and in many related fields, such as polymers, material science, nanotechnology,

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The dissertation focuses on the synthesis, characterization and reactivity studies of low-coordinate terphenyl complexes of cobalt, iron, manganese and chromium. It also includes the discussion of preparation of low-valent heavier group 14 element terphenyl complexes. Single crystal X-ray crystallography was applied to establish the formulation and solid state structures of all new compounds. Due to the paramagnetic nature of most of these species, superconducting quantum interference device (SQUID) and Evans' method were essential to study the magnetic properties in the solid and solution phase, respectively, which help elucidate the electronic structures of these new organometallic complexes. For

diamagnetic samples, multi-nuclear NMR were employed. Furthermore, these new compounds were also characterized by UV-visible and infrared spectroscopy. In some cases, DFT calculation methods were also used to investigate the electronic structures and bonding schemes of these new complexes.

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