


# **ELECTRON DEFICIENT BORON and CARBON CLUSTERS**

**Edited by**  
**George A. Olah**  
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# Electron Deficient Boron And Carbon Clusters

**K Payea**

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## **Electron Deficient Boron And Carbon Clusters:**

**Electron Deficient Boron and Carbon Clusters** George Andrew Olah, Kenneth Wade, Robert E. Williams, 1991-02-07 Compares and contrasts the structure and chemistry of boron clusters carbon clusters and carboranes and their derivatives Honors the pioneering works of William Lipscomb

**Molecular Clusters of the Main Group Elements** Matthias Driess, Heinrich Nöth, 2008-11-21 With more than 20 contributions from leading research groups this book provides essential information for chemists and materials scientists working with molecular clusters It treats both homonuclear and heteronuclear clusters including the theory and concepts in main group cluster chemistry novel boranes and heteroboranes silicon germanium tin clusters alkali metal suboxides clusters in alloys with mercury chalcogen clusters and numerous other compound classes The whole is illustrated by examples of the great potential for technical applications such as electron storage cancer therapy and in optoelectronic devices Its systematic coverage of all relevant main group elements makes this the prime reference source in the field

**Carboranes** Russell N. Grimes, 2016-08-09 Carboranes Third Edition by Russell Grimes is the definitive resource on the subject Completely updated with a wealth of research and review articles published in this active field since the previous volume was released in 2011 the book provides a readable and concise introduction to the basic principles underlying the synthesis structures and reactions of carboranes heterocarboranes and metallacarboranes Following the valuable foundational information the book explores the advances in practical applications for the many areas in which experts have discovered that carboranes afford new possibilities for solving problems and advancing the science These disciplines include polymer science catalysis biomedicine nanomaterials and others Winner of a 2017 Textbook Excellence Award Texty from the Textbook and Academic Authors Association Includes over 2 000 molecular structure drawings throughout the text Features expanded coverage on applications of carboranes particularly in biomedicine and nanomaterials given the growth of research in these areas Presents extended and updated tables listing thousands of compounds with key literature references provided online via the book s website Explores the advances in practical applications for the many areas in which experts have discovered that carboranes afford new possibilities for solving problems and advancing the science

*Structure and Properties of Clusters: from a few Atoms to Nanoparticles* George Maroulis, 2006-10-27 This volume on Clusters brings together contributions from a large number of specialists A central element for all contributions is the use of advanced computational methodologies and their application to various aspects of structure reactivity and properties of clusters The size of clusters varies from a few atoms to nanoparticles Special emphasis is given to bringing forth new insights on the structure and properties of these systems with an eye towards potential applications in Materials Science Overall the volume presents to the readers an amazing wealth of new results Particular subjects include water clusters Silicon Iron Nickel and Gold clusters carbon titanium microclusters and nanoparticles fullerenes carbon nanotubes chiral carbon nanotubes boron nanoclusters and more

**Graph Theoretical Approaches to**

**Chemical Reactivity** Danail D. Bonchev, O.G. Mekenyan, 2012-12-06 The progress in computer technology during the last 10 15 years has enabled the performance of ever more precise quantum mechanical calculations related to structure and interactions of chemical compounds However the qualitative models relating electronic structure to molecular geometry have not progressed at the same pace There is a continuing need in chemistry for simple concepts and qualitatively clear pictures that are also quantitatively comparable to ab initio quantum chemical calculations Topological methods and more specifically graph theory as a fixed point topology provide in principle a chance to fill this gap With its more than 100 years of applications to chemistry graph theory has proven to be of vital importance as the most natural language of chemistry The explosive development of chemical graph theory during the last 20 years has increasingly overlapped with quantum chemistry Besides contributing to the solution of various problems in theoretical chemistry this development indicates that topology is an underlying principle that explains the success of quantum mechanics and goes beyond it thus promising to bear more fruit in the future Atomic Clusters with Unusual Structure, Bonding and Reactivity Pratim Kumar

Chattaraj, Sudip Pan, Gabriel Merino, 2022-10-06 Atomic Clusters with Unusual Structure Bonding and Reactivity Theoretical Approaches Computational Assessment and Applications reviews the latest computational tools and approaches available for accurately assessing the properties of a cluster while also highlighting how such clusters can be adapted and utilized for the development of novel materials and applications Sections provide an introduction to the computational methods used to obtain global minima for clusters and effectively analyze bonds outline experimental approaches to produce clusters discuss specific applications and explore cluster reactivity and usage across a number of fields Drawing on the knowledge of its expert editors and contributors this book provides a detailed guide to ascertaining the stability bonding and properties of atomic clusters Atomic clusters which exhibit unusual properties offer huge potential as building blocks for new materials and novel applications but understanding their properties stability and bonding is essential in order to accurately understand characterize and manipulate them for further use Searching for the most stable geometry of a given cluster is difficult and becomes even more so for clusters of medium and large sizes where the number of possible isomers sharply increase hence this book provides a unique and comprehensive approach to the topic and available techniques and applications Introduces readers to the vast structural and bonding diversity that clusters show and reflects on their potential for novel application and material development Highlights the latest computational methods and theoretical tools available for identification of the most stable isomers and accurate analysis of bonding in the clusters Focuses on clusters which violate the rules established in traditional chemistry and exhibit unusual structure bonding and reactivity Contemporary Boron Chemistry Matthew G Davidson, Ken Wade, T B Marder, Andrew K Hughes, 2007-10-31 The continued and evolving significance of boron chemistry to the wider chemical community is demonstrated by the international and interdisciplinary nature of the research reported in this book Contemporary Boron Chemistry encompasses inorganic and organic compounds as well as polymers solid state

materials medicinal aspects and theoretical studies Covering many areas of chemistry with boron at its centre topics include applications to polyolefin catalysis medicine materials and polymers boron cluster chemistry including carboranes and metal containing clusters organic and inorganic chemistry of species containing only 1 or 2 boron atoms and theoretical studies of boron containing compounds New materials with novel optical and electronic properties are also discussed Comprehensive and up to date graduates and researchers in a wide range of fields particularly those in organometallic and organic chemistry and materials science will welcome this book **Advances in Organometallic Chemistry**, 1994-04-22 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 now interface with organometallic chemistry the study of compounds containing carbon metal bonds Organometallic compounds range from species that are so reactive that they only have a transient existence at ambient temperatures to those that are thermally very stable They are used extensively in the synthesis of useful compounds on both small and large scales Industrial processes involving plastics polymers electronic materials and pharmaceuticals all depend on advances in organometallic chemistry In basic research organometallics have contributed inter alia to Metal cluster chemistry Surface chemistry The stabilization of highly reactive species by metal coordination Chiral synthesis The formulation of multiple bonds between carbon and the other elements and between the elements themselves Each volume of **Advances in Organometallic Chemistry** contains an index and each chapter includes references **Advanced Structural Inorganic Chemistry** Wai-Kee Li, Gong-Du Zhou, Thomas C. W.

Mak, 2008-03-27 A revised and updated English edition of a textbook based on teaching at the final year undergraduate and graduate level It presents structure and bonding generalizations of structural trends crystallographic data as well as highlights from the recent literature **Inorganic Two-dimensional Nanomaterials** Changzheng Wu, 2017-08-22

**Inorganic Two Dimensional Nanomaterials** provides an overview of the development on inorganic two dimensional nanomaterials from computational simulation and theoretical understanding to applications in energy conversion and storage

**Symmetry through the Eyes of a Chemist** Istvan Hargittai, Magdolna Hargittai, 2007-08-29 We have been gratified by the warm reception of our book by reviewers colleagues and students alike Our interest in the subject matter of this book has not decreased since its first appearance on the contrary The first and second editions envelop eight other symmetry related books in the creation of which we have participated I Hargittai ed **Symmetry Unifying Human Understanding** Pergamon Press New York 1986 I Hargittai and B K Vainshtein eds **Crystal Symmetries Shubnikov Centennial Papers** Pergamon Press Oxford 1988 M Hargittai and I Hargittai **Fedezsikfal a szimmetriát Discover Sym try in Hungarian Tankönyvkiadó Budapest 1989** I Hargittai ed **Symmetry 2 Unifying Human Understanding** Pergamon Press Oxford 1989 I Hargittai ed **Quasicrystals Networks and Molecules of Fivefold Sym try** VCH New York 1990 I Hargittai ed **Fivefold Symmetry** World Scientific Singapore 1992 I Hargittai and C A Pickover eds **Spiral Symmetry** World Scientific Singapore 1992 I Hargittai and M

Hargittai Symmetry A Unifying Concept Shelter Publications Bolinas California 1994 We have also pursued our molecular structure research and some books have appeared related to these activities vi Preface to the Second Edition I Hargittai and M Hargittai eds Stereochemical Applications of Gas Phase Electron Diffraction Parts A and B VCH New York 1988 R Gillespie and I Hargittai VSEPR Model of Molecular Geometry Allyn and Bacon Boston 1991 A Domenicano and I Hargittai eds Accurate Molecular Structures Oxford University Press Oxford 1992 **Atomic Clusters: Theory & Experiments** Ambrish Kumar Srivastava,Iwona Anusiewicz,Neeraj Misra,Suzana Velickovic,Wei-Ming Sun,2022-01-03 **50th Anniversary of Electron Counting Paradigms for Polyhedral Molecules** D. Michael P. Mingos,2022-01-01 The 50 Year Anniversary of the development of electron counting paradigms for polyhedral molecules is celebrated in two volumes of Structure and Bonding Volume 1 covers the historical development theoretical models and applications to boranes and metalloboranes

*Organometallic Chemistry* M Green,2007-10-31 Organometallic chemistry is an interdisciplinary science which continues to grow at a rapid pace Although there is continued interest in synthetic and structural studies the last decade has seen a growing interest in the potential of organometallic chemistry to provide answers to problems in catalysis synthetic organic chemistry and also in the development of new materials This Specialist Periodical Report aims to reflect these current interests reviewing progress in theoretical organometallic chemistry main group chemistry the lanthanides and all aspects of transition metal chemistry *Hypercarbon Chemistry* George A. Olah,G. K. Surya Prakash,Robert E. Williams,Kenneth Wade,Árpád Molnár,2011-08-04 The essential new edition of the book that put hypercarbon chemistry on the map A comprehensive and contemporary treatment of the chemistry of hydrocarbons alkanes alkenes alkynes and aromatics towards electrophiles Hypercarbon Chemistry Second Edition deals with all major aspects of such chemistry involved in hydrocarbon transformations and of the structural and reaction chemistry of carboranes mixed hydrides in which both carbon and boron atoms participate in the polyhedral molecular frameworks Despite the firmly established tetravalency carbon can bond simultaneously to five or more other atoms Hypercarbon bonding permeates much organic inorganic and organometallic chemistry and the book serves as the compendium for this phenomenon Copious diagrams illustrate the rich variety of hypercarbon structures now known and patterns therein Individual chapters deal with specific categories of compound e g organometallics carboranes carbocations or transformations that proceed through transient hypercarbon species detailing fundamental chemistry including reactivity selectivity stereochemistry mechanistic factors and more

The Group 13 Metals Aluminium, Gallium, Indium and Thallium Simon Aldridge,Anthony J. Downs,2011-04-11 The last two decades have seen a renaissance in interest in the chemistry of the main group elements In particular research on the metals of group 13 aluminium gallium indium and thallium has led to the synthesis and isolation of some very novel and unusual molecules with implications for organometallic synthesis new materials development and with biological medical and environmental relevance The Group 13 Metals Aluminium Gallium Indium and Thallium aims to cover new facts

developments and applications in the context of more general patterns of physical and chemical behaviour Particular attention is paid to the main growth areas including the chemistry of lower formal oxidation states cluster chemistry the investigation of solid oxides and hydroxides advances in the formation of III V and related compounds the biological significance of Group 13 metal complexes and the growing importance of the metals and their compounds in the mediation of organic reactions Chapters cover general features of the group 13 elements group 13 metals in the 3 oxidation state simple inorganic compounds formal oxidation state 3 organometallic chemistry formal oxidation state 2 metal metal bonded vs mononuclear derivatives group 13 metals in the 1 oxidation state mixed or intermediate valence group 13 metal compounds aluminium and gallium clusters metalloid clusters and their relation to the bulk phases to naked clusters and to nanoscaled materials simple and mixed metal oxides and hydroxides solids with extended structures of different dimensionalities and porosities coordination and solution chemistry of the metals biological medical and environmental relevance III V and related semiconductor materials group 13 metal mediated organic reactions The Group 13 Metals Aluminium Gallium Indium and Thallium provides a detailed wide ranging and up to date review of the chemistry of this important group of metals It will find a place on the bookshelves of practitioners researchers and students working in inorganic organometallic and materials chemistry

**Structure and Dynamics of Non-Rigid Molecular Systems** Y.G. Smeyers, 2012-12-06 This volume contains a selection of scientific papers related to the structure and dynamics of non rigid molecules This frontline topic was born a few decades ago when Longuet Higgins proposed his famous theory of Molecular Symmetry Groups Mol Phys 6 1962 457 Unfortunately since this early paper very few publications have been devoted to the study of non rigid molecules Let us mention some books which dedicate some chapters to them Induced Representations in Crystals and Molecules by S L Altmann Academic Publishers 1977 Molecular Symmetry and Spectroscopy by P R Bunker Academic Publishers 1979 and finally Large Amplitude Motion in Molecules Vols I and II by several authors Springer Verlag 1979 More recently an International Symposium on Non Rigid Molecules was held in Paris France from 1 7 July 1982 the proceedings of which were published in the volume entitled Symmetries and Properties of Non Rigid Molecules A Comprehensive Survey edited by J Maruani et al Elsevier 1983 Finally we should mention the very specialized work The Permutational Approach to Dynamic Stereochemistry by J Brocas et al McGraw Hill 1983 The purpose of this book is to fill in this information on the structure and dynamics of non rigid systems To this aim we have gathered a collection of recent papers written by the most qualified specialists in the world covering a large field from van der Waals molecules to inorganic complexes and organic polyrotor molecules as well as considering statistical and dynamic aspects

**Superhalogens & Superalkalis: Exploration of Structure, Properties and Applications** Ambrish Kumar Srivastava, Iwona Anusiewicz, Suzana Velickovic, Wei-Ming Sun, Gennady L. Gutsev, 2022-12-07 *Molecular Modeling Theory* Mr. Rohit Manglik, 2024-07-03 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources

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E.W. Abel, G. Wilkinson, F.G.A. Stone, 1995-10-13  
Covers the literature in depth from 1982-1994 thus building on the original nine volumes. 14 volume set, 8750 pages approx. Volumes 1-9 provide a detailed account of the organic chemistry of both main group and transition elements. Volume 10 deals with compounds containing heteronuclear metal-metal bonds. Volume 11 describes the use of main group organometallic compounds in organic synthesis. Volume 12 is devoted to the use of transition metal organometallic compounds in organic synthesis. Volume 13 consists of a comprehensive index of all organometallic structures studied by diffraction methods. Volume 14 contains subject and formula indexes covering Volumes 1-12.



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