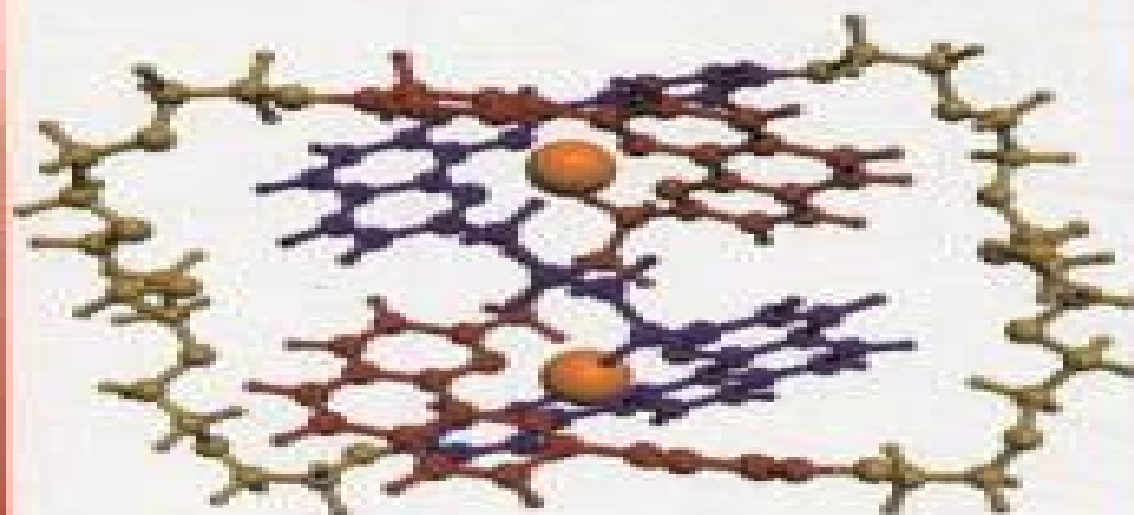


Molecular Catenanes, Rotaxanes and Knots

A Journey Through the World
of Molecular Topology

J.-P. Sauvage, C. Dietrich-Buchecker (Eds.)



Molecular Catenanes Rotaxanes And Knots

K Morrison

A decorative graphic element consisting of a light blue horizontal bar with a rounded right end, and a red circular shape partially visible behind it.

Molecular Catenanes Rotaxanes And Knots:

Molecular Catenanes, Rotaxanes and Knots Jean-Pierre Sauvage, Christiane Dietrich-Buchecker, 2008-07-11 This journey through the fascinating world of molecular topology focuses on catenanes rotaxanes and knots their synthesis properties and applications and the theory of interlocking and interpenetrating molecules Nearly one hundred years of progress have passed since Willsttter's speculative vision of a molecule consisting of two interlinked rings But even today the synthesis of such structures are a challenge to the creativity of synthetic chemists These molecules are not only of academic interest since they occur naturally In such molecules as DNA knots and related topological features play a key role in biochemical processes In addition extensive research on the properties of polyrotaxanes and polycatenanes show potential applications as molecular magnets wires or switches Twelve international leading experts in the field present the broad and impressive spectrum of the topology of these molecules from theoretical aspects and new pathways in synthesis to probing their properties All researchers working in this interdisciplinary area whether organic inorganic or polymer chemists as well as material scientists will welcome this comprehensive and up to date work as an inspiring source for creative research ideas

Catenanes, Rotaxanes, and Knots Gottfried Schill, 2013-10-22 Organic Chemistry Volume 22 Catenanes Rotaxanes and Knots provides information pertinent to the synthesis of catenanes and rotaxanes This book discusses the manner of interaction between the molecular subunits in catenanes in the solid liquid and gaseous states Organized into 19 chapters this volume begins with an overview of the idea of synthesizing molecules composed of separate entities that are mechanically connected to one another This text then examines the stereochemistry and the other physical and chemical properties related to the mechanical connections in these compounds Other chapters consider the determination of the absolute configuration of catenanes by extension of the Cahn Ingold Prelog rules This book discusses as well the bond that mechanically connects the catenated rings The final chapter deals with the model studies of the synthesis of knots double wound rotaxanes and higher linear catenanes This book is a valuable resource for chemists students and research workers

Macrocyclic Chemistry K. Gloe, 2005-12-05 Macrocyclic Chemistry Current Trends and Future Perspectives illustrates essential concepts in this expanding research field covering both basic and applied studies Written by well known experts from around the world the topics of the chapters range from new macrocyclic architectures with different functions and self assembly processes through to the modeling and dynamics of such systems The content also reflects on application possibilities in analytical chemistry separation processes material preparation and medicine Thus this book serves as a creative source of research strategies and methodic tools Providing an excellent overview of the field this book will be a valuable resource for researchers in industry and academic institutions as well as for teachers of science and graduate students This book is devoted to the long standing tradition of the International Symposia on Macrocyclic Chemistry ISMC and published to coincide with the 30th meeting Dresden Germany

Encyclopedia of Supramolecular Chemistry J. L.

Atwood, Jonathan W. Steed, 2004 Covers the fundamentals of supramolecular chemistry supramolecular advancements and methods in the areas of chemistry biochemistry biology environmental and materials science and engineering physics computer science and applied mathematics Encyclopedia of Supramolecular Chemistry - Two-Volume Set (Print) Jerry L.

Atwood, Jonathan W. Steed, 2013-10-09 The two volume Encyclopedia of Supramolecular Chemistry offers authoritative centralized information on a rapidly expanding interdisciplinary field User friendly and high quality articles parse the latest supramolecular advancements and methods in the areas of chemistry biochemistry biology environmental and materials science and engineering physics computer science and applied mathematics Designed for specialists and students alike the set covers the fundamentals of supramolecular chemistry and sets the standard for relevant future research **Core**

Concepts in Supramolecular Chemistry and Nanochemistry Jonathan W. Steed, David R. Turner, Karl

Wallace, 2007-04-30 Supramolecular chemistry and nanochemistry are two strongly interrelated cutting edge frontiers in research in the chemical sciences The results of recent work in the area are now an increasing part of modern degree courses and hugely important to researchers Core Concepts in Supramolecular Chemistry and Nanochemistry clearly outlines the fundamentals that underlie supramolecular chemistry and nanochemistry and takes an umbrella view of the whole area This concise textbook traces the fascinating modern practice of the chemistry of the non covalent bond from its fundamental origins through to its expression in the emergence of nanochemistry Fusing synthetic materials and supramolecular chemistry with crystal engineering and the emerging principles of nanotechnology the book is an ideal introduction to current chemical thought for researchers and a superb resource for students entering these exciting areas for the first time The book builds from first principles rather than adopting a review style and includes key references to guide the reader through influential work supplementary website featuring powerpoint slides of the figures in the book further references in each chapter builds from first principles rather than adopting a review style includes chapter on nanochemistry clear diagrams to highlight basic principles Macrocyclic and Supramolecular Chemistry Reed M. Izatt, 2016-05-31 This

book commemorates the 25th anniversary of the International Izatt Christensen Award in Macrocyclic and Supramolecular Chemistry The award one of the most prestigious of small awards in chemistry recognizes excellence in the developing field of macrocyclic and supramolecular chemistry Macrocyclic and Supramolecular Chemistry How Izatt Christensen Award Winners Shaped the Field features chapters written by the award recipients who provide unique perspectives on the spectacular growth in these expanding and vibrant fields of chemistry over the past half century and on the role of these awardees in shaping this growth During this time there has been an upsurge of interest in the design synthesis and characterization of increasingly more complex macrocyclic ligands and in the application of this knowledge to understanding molecular recognition processes in host guest chemistry in ways that were scarcely envisioned decades earlier In October 2016 Professor Jean Pierre Sauvage and Sir J Fraser Stoddart author for chapter 22 Contractile and Extensile Molecular

Systems Towards Molecular Muscles by Jean Pierre Sauvage Vincent Duplan and Fr d ric Niess and 20 Serendipity by Paul R McGonigal and J Fraser Stoddart respectively were awarded the Nobel Prize in Chemistry alongside fellow Wiley author Bernard Feringa for the design and synthesis of molecular machines

Molecular Machines and Motors Alberto Credi, Serena Silvi, Margherita Venturi, 2014-09-02 The cutting edge advances in this research field are nicely pictured in the chapters of this volume They come from world s leading laboratories engaged in the development of molecular machines and are authored by some of the most respected scientists in the field This volume shows on the one hand the level of ingenuity and technical capability reached in the construction of artificial nanomachines roughly two decades after their inception On the other hand it conveys the excitement about the enormous opportunities as well as the challenges this research area presents as the interest of researchers is shifting from ensemble to single molecule measurements and from homogeneous to heterogeneous environments Indeed as Feynman said when we have some control of the arrangement of things on a molecular scale we will get an enormously greater range of possible properties that substances can have Although the answer to the when question is not easy to find there is no doubt that artificial molecular machines and motors will lead to a wide variety of applications which we cannot even envisage today The Nobel Prize in Chemistry 2016 was awarded jointly to Jean Pierre Sauvage Sir J Fraser Stoddart and Bernard L Feringa for the design and synthesis of molecular machines Both Jean Pierre Sauvage and Bernard L Feringa contributed to this volume The goal of each thematic volume in this series is to give the non specialist reader whether in academia or industry a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience 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 are presented using selected examples to illustrate the principles discussed The coverage is not intended to be an exhaustive summary of the field or include large quantities of data but should rather be conceptual concentrating on the methodological thinking that will allow the non specialist reader to understand the information presented Contributions also offer an outlook on potential future developments in the field Review articles for the individual volumes are invited by the volume editors Readership research chemists at universities or in industry graduate students

Supramolecular Polymer Chemistry Akira Harada, 2012-01-10 Presenting the work of pioneering experts in this exciting field of supramolecular polymer chemistry this monograph covers an extensive range of applications including drug delivery and catalysis It focuses on new structures and phenomena of cyclodextrin based supramolecular polymers and many other compound classes While providing a deeper insight in macromolecular recognition and the mechanisms of living systems this book also introduces fascinating novel phenomena beyond natural systems

Transition Metals in Supramolecular Chemistry Jean-Pierre Sauvage, 2008-04-30 Perspectives in Supramolecular Chemistry will relate recent developments and new exciting approaches in supramolecular chemistry In supramolecular chemistry our aim is to understand molecular chemistry beyond the covalent

bond the series will concentrate on goal orientated supramolecular chemistry Perspectives in Supramolecular Chemistry will reflect research which develops supramolecular structures with specific new properties such as recognition transport and simulation of biosystems or new materials The series will cover all areas from theoretical and modelling aspects through organic and inorganic chemistry and biochemistry to materials solid state and polymer sciences reflecting the many and varied applications of supramolecular structures in modern chemistry Transition Metals in Supramolecular Chemistry Edited by Jean Pierre Sauvage Universit Louis Pasteur Strasbourg France The chemistry of weak forces and non covalent interactions as pioneered by Pedersen Lehn and Cram is considered to be the origin of modern supramolecular chemistry 30 years ago transition metals and their complexes were not regarded as important to this science Transition Metals in Supramolecular Chemistry clearly demonstrates that today transition metal complexes are routinely used to build large multicomponent architectures which display new and exciting applications including molecular switches liquid crystals and molecular magnets Contents Ligand and Metal Control of Self Assembly in Supramolecular Chemistry Bistability in Iron II Spin Crossover Systems A Supramolecular Function Luminescent Sensors with and for Transition Metals The Chirality of Polynuclear Transition Metal Complexes Design and Serendipity in the Synthesis of Polynuclear Compounds of the 3d metals Rotaxanes From Random to Transition Metal Templated Threading of Rings at the Molecular Level Metallomesogens Supramolecular Organisation of Metal Complexes in Fluid Phases Self Assembly of Interlocked Structures with Cucurbituril Metal Ions and Metal Complexes Reflecting contemporary science Transition Metals in Supramolecular Chemistry will inspire scientists and students interested in coordination chemistry magnetochemistry molecular sensors and switches liquid crystals and artificial systems

New Frontiers in Polymer Synthesis Shiro Kobayashi, 2008-09-26 It is generally accepted that a new material is often developed by finding a new synthesis method of reaction or a new reaction catalyst Historically a typical example may be referred to as a Ziegler Natta catalyst which has allowed large scale production of petroleum based polyolefins since the middle of the 20th century New polymer synthesis therefore will hopefully lead to creation of new polymer materials in the 21st century This special issue contributed by three groups focuses on recent advances in polymer synthesis methods which handle the cutting edge aspects of the advanced technology The first article by Yokozawa and coworkers contains an overview of the action control in various condensation polymerizations polycondensations Advanced technologies enabled the control of stereochemistry regiochemical and enantio selections chemoselectivity chain topology and stoichiometry of monomers giving a high molecular weight polymer It has been recognized for a long time however that polycondensation is a difficult process in controlling the reaction pathway because the reaction is of step growth and the reactivity of monomers oligomers and polymers are almost the same during the reaction and hence the molecular weight of polymers and its distribution M_w/M_n are impossible to regulate The authors group developed with a new reaction system chain growth condensation polymerization changing the nature of polycondensation from step growth to chain growth namely the

propagating chain end is active allowing for control of the product molecular weight as well as the distribution

The Nature of the Mechanical Bond Carson J. Bruns, J. Fraser Stoddart, 2016-11-07 The story is told by THE inventor pioneer master in the field and is accompanied by amazing illustrations it will become an absolute reference and a best seller in chemistry Alberto Credi the great opus on the mechanical bond A most impressive undertaking Jean Marie Lehn Congratulations to co author J Fraser Stoddart a 2016 Nobel Laureate in Chemistry In molecules the mechanical bond is not shared between atoms it is a bond that arises when molecular entities become entangled in space Just as supermolecules are held together by supramolecular interactions mechanomolecules such as catenanes and rotaxanes are maintained by mechanical bonds This emergent bond endows mechanomolecules with a whole suite of novel properties relating to both form and function They hold unlimited promise for countless applications ranging from their presence in molecular devices and electronics to their involvement in remarkably advanced functional materials The Nature of the Mechanical Bond is a comprehensive review of much of the contemporary literature on the mechanical bond accessible to newcomers and veterans alike Topics covered include Supramolecular covalent and statistical approaches to the formation of entanglements that underpin mechanical bonds in molecules and macromolecules Kinetically and thermodynamically controlled strategies for synthesizing mechanomolecules Chemical topology molecular architectures polymers crystals and materials with mechanical bonds The stereochemistry of the mechanical bond mechanostereochemistry including the novel types of dynamic and static isomerism and chirality that emerge in mechanomolecules Artificial molecular switches and machines based on the large amplitude translational and rotational motions expressed by suitably designed catenanes and rotaxanes This contemporary and highly interdisciplinary field is summarized in a visually appealing image driven format with more than 800 illustrations covering both fundamental and applied research The Nature of the Mechanical Bond is a must read for everyone from students to experienced researchers with an interest in chemistry's latest and most non canonical bond

Emergent Computation Matthew Simon, 2005-01-07 Emergent Computation is concerned with recent applications of Mathematical Linguistics or Automata Theory This subject has a primary focus upon Bioinformatics the Genome and arising interest in the Proteome but the closing chapter also examines applications in Biology Medicine Anthropology etc The book is composed of an organized examination of DNA RNA and the assembly of amino acids into proteins Rather than examine these areas from a purely mathematical viewpoint that excludes much of the biochemical reality the author uses scientific papers written mostly by biochemists based upon their laboratory observations Thus while DNA may exist in its double stranded form triple stranded forms are not excluded Similarly while bases exist in Watson Crick complements mismatched bases and abasic pairs are not excluded nor are Hoogsteen bonds Just as there are four bases naturally found in DNA the existence of additional bases is not ignored nor amino acids in addition to the usual complement of 20 Can there be more than 64 possible codons RNA is examined from the point of view of Nussinov plots All information is presented from the point of view of regular

context free and context sensitive languages as well as Turing machines and Sequential Machines and their corresponding semi groups Relationships to other subjects of mathematics such as Complex numbers Quaternions Algebraic Topology and Knot Theory are also mentioned An examination is made of Splicing Systems as well as Dominoes Shortcomings illustrating the dangers of mathematical abstractions that ignore biochemistry are pointed out The papers examine the subjects of interest from the point of view of applying language theory to search for new results but also as biological automatons implementations or machines to do calculations This book will be of value to those studying Bioinformatics Biochemistry Computer Science Mathematical Linguistics and Biology as well as Pharmacology with the possible promise of medically active artificial DNA RNA and proteins Laboratory results to demonstrate the usefulness of the topics discussed are demonstrated both in vitro and in vivo

Handbook Of Carbon Nano Materials - Volume 1: Synthesis And Supramolecular Systems; Volume 2: Electron Transfer And Applications Karl M Kadish, Francis D'souza, 2011-01-31 A hands on reference guide for scientists working in the fields of chemistry physics materials science polymer science solid state physics devices nanotechnology or supramolecular science of carbon nanomaterials In depth and comprehensive coverage of topics combined with the perspectives for future research by the contributing authors An invaluable reference source essential for both beginning and advanced researchers in the field

Supramolecular Science Rocco Ungaro, Enrico Dalcanele, 2012-12-06 A summary of all the most important aspects of supramolecular science from molecular recognition in chemical and biological systems to supramolecular devices materials and catalysis The 17 chapters cover calixarenes catenanes cavitands cholephanes dendrimers membranes and self assembly systems molecular modelling molecular level devices organic materials peptides and protein surfaces recognition of carbohydrates rotaxanes supramolecular catalysis A forward looking chapter written by J M Lehn indicated the future prospects for the entire field Audience Ph D students and young researchers in chemistry physics and biology

Tomorrow's Chemistry Today Bruno Pignataro, 2009-09-22 Providing a glimpse into the future the young scientists contributing here were considered to be the most important for tomorrow s chemistry and materials science They present the state of the art in their particular fields of research with topics ranging from new synthetic pathways and nanotechnology to green chemistry Of major interest to organic chemists materials scientists and biochemists

Organic Nanostructures Jerry L. Atwood, Jonathan W. Steed, 2008-09-08 Filling the need for a volume on the organic side of nanotechnology this comprehensive overview covers all major nanostructured materials in one handy volume Alongside metal organic frameworks this monograph also treats other modern aspects such as rotaxanes catenanes nanoporosity and catalysis Detailed attention is paid to the chemistry physics and materials science throughout making this a definite must for all chemists

Supramolecular Coordination Complexes Sankarasekaran Shanmugaraju, 2022-09-30 Supramolecular Coordination Complexes Design Synthesis and Applications discusses the growth of the field and explores the advantages opportunities and latest applications of supramolecular complexes Beginning with an introduction to design

principles synthetic methods and post synthetic functionalization of supramolecular complexes the book goes on to compile the different analytical and computational modeling methods used to understand the structure and functional properties of supramolecular structures Applications of supramolecular complexes in biomedicine sensing catalysis and materials are then explored in detail Drawing on the knowledge of a global team of experts this book provides a wealth of interesting information for students and researchers working in the design synthesis or application of such complexes Discusses cutting edge approaches for the investigation of supramolecular coordination chemistry Summarizes a varied range of supramolecular coordination complex designs and applications Highlights the interdisciplinary connections between supramolecular chemistry and the fields of biology and materials science

Mass Spectrometry of Non-Covalent Complexes Christoph A. Schalley, Andreas Springer, 2009-09-08 Details the many benefits of applying mass spectrometry to supramolecular chemistry Except as a method for the most basic measurements mass spectrometry MS has long been considered incompatible with supramolecular chemistry Yet with today's methods the disconnect between these two fields is not warranted Mass Spectrometry and Gas Phase Chemistry of Non Covalent Complexes provides a convincing look at how modern MS techniques offer supramolecular chemists a powerful investigatory toolset Bringing the two fields together in an interdisciplinary manner this reference details the many different topics associated with the study of non covalent complexes in the gas phase The text begins with brief introductions to supramolecular chemistry and such relevant mass spectrometric methods as ionization techniques analyzers and tandem MS experiments The coverage continues with How the analyte's transition into the gas phase changes covalent bonding How limitations and pitfalls in analytical methods may produce data misinterpretations Artificial supramolecular aggregates and their examination Biomolecules their complexes and their examination After the general remarks making up the first section of the book the following sections describe specific experimental procedures and are illustrated with numerous examples and short tutorials Detailed citations end each chapter Mass spectrometrists supramolecular chemists students in these fields and interested readers from other disciplines involving the study of non covalent bonds will all value Mass Spectrometry and Gas Phase Chemistry of Non Covalent Complexes as an innovative and practical resource

Stimulating Concepts in Chemistry Fritz Vögtle, J. Fraser Stoddart, Masakatsu Shibasaki, 2000 Fresh ideas have always been a necessary ingredient for progress in chemistry Without a continuous supply of stimulating ideas from creative researchers there would be no new insights into the subject But what are some of the ideas that pervade modern chemistry The answer to this question is to be found in Stimulating Concepts in Chemistry In a collection of 24 essays a group of leading researchers provides an overview of the most recent developments in their fields Readers can find out about modern concepts in chemistry such as self assembly nanochemistry and molecular machines Moreover many spectacular advances have been achieved from the fusion of chemistry with life and materials science a development which is illustrated by contributions on enzyme mimics molecular wires and chemical sensors Further

the essayists write about new nanomaterials efficient methods in synthesis and big biomolecules indeed many of the topics that have dominated some of the recent discussions in chemistry This outstanding text makes use of a special layout to reflect the editors aim of presenting concepts in the form of essays Thus the book is not merely another source of knowledge but is intended to stimulate readers to develop their own ideas and concepts This format should help to make the book interesting to a wide range of scientists Students of chemistry will benefit from the different style of presentation of their subject while researchers in industry and academia will welcome the exciting way in which some of the most challenging concepts in modern chemistry are presented

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Table of Contents Molecular Catenanes Rotaxanes And Knots

1. Understanding the eBook Molecular Catenanes Rotaxanes And Knots
 - The Rise of Digital Reading Molecular Catenanes Rotaxanes And Knots
 - Advantages of eBooks Over Traditional Books
2. Identifying Molecular Catenanes Rotaxanes And Knots
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Molecular Catenanes Rotaxanes And Knots
 - User-Friendly Interface
4. Exploring eBook Recommendations from Molecular Catenanes Rotaxanes And Knots
 - Personalized Recommendations
 - Molecular Catenanes Rotaxanes And Knots User Reviews and Ratings
 - Molecular Catenanes Rotaxanes And Knots and Bestseller Lists
5. Accessing Molecular Catenanes Rotaxanes And Knots Free and Paid eBooks
 - Molecular Catenanes Rotaxanes And Knots Public Domain eBooks
 - Molecular Catenanes Rotaxanes And Knots eBook Subscription Services
 - Molecular Catenanes Rotaxanes And Knots Budget-Friendly Options

6. Navigating Molecular Catenanes Rotaxanes And Knots eBook Formats
 - ePub, PDF, MOBI, and More
 - Molecular Catenanes Rotaxanes And Knots Compatibility with Devices
 - Molecular Catenanes Rotaxanes And Knots Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Molecular Catenanes Rotaxanes And Knots
 - Highlighting and Note-Taking Molecular Catenanes Rotaxanes And Knots
 - Interactive Elements Molecular Catenanes Rotaxanes And Knots
8. Staying Engaged with Molecular Catenanes Rotaxanes And Knots
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Molecular Catenanes Rotaxanes And Knots
9. Balancing eBooks and Physical Books Molecular Catenanes Rotaxanes And Knots
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Molecular Catenanes Rotaxanes And Knots
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Molecular Catenanes Rotaxanes And Knots
 - Setting Reading Goals Molecular Catenanes Rotaxanes And Knots
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Molecular Catenanes Rotaxanes And Knots
 - Fact-Checking eBook Content of Molecular Catenanes Rotaxanes And Knots
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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