meso stilbene dibromide structure

Delving into the Intriguing World of Meso Stilbene Dibromide Structure

The world of organic chemistry often reveals molecules with fascinating structures and properties. One such molecule, meso stilbene dibromide, presents a captivating example of stereochemistry and its impact on physical and chemical behavior. While not widely known outside specialized chemical fields, understanding its unique structure unlocks a deeper appreciation for the intricacies of molecular configuration and its implications. This article will delve into the meso stilbene dibromide structure, exploring its characteristics, related concepts, and potential applications. We'll move beyond the basic molecular formula to uncover the subtleties that make this compound a fascinating subject of study.

Understanding the Structure: A Visual Exploration

Meso stilbene dibromide, chemically represented as $C_{14}H_{12}Br_2$, is a dibrominated derivative of stilbene. Stilbene itself is a simple hydrocarbon featuring a central ethylene bridge connecting two phenyl rings. The addition of two bromine atoms to the stilbene molecule introduces a crucial element: stereochemistry. The positioning of these bromine atoms determines the molecule's isomeric form. While stilbene dibromide can exist as different stereoisomers (including racemic and meso forms), this article focuses on the meso isomer. The key to understanding the meso stilbene dibromide structure lies in its symmetry. The molecule possesses a plane of symmetry – an imaginary plane that bisects the molecule, creating two mirror-image halves. This internal symmetry is the defining characteristic of a meso compound. Unlike chiral molecules that exist as enantiomers (non-superimposable mirror images), meso compounds are achiral, despite containing chiral centers. (Insert a clear, high-quality image of the meso stilbene dibromide structure here. Ideally, a 3D model would be beneficial. Consider using a software like ChemDraw or similar to create this image). The image should clearly show the two bromine atoms on opposite sides of the central double bond (now a single bond after dibromination), highlighting the plane of symmetry. The labelling of atoms and bonds will further enhance understanding.

Stereochemistry and Isomerism: A Deeper Dive

The existence of meso stilbene dibromide underscores the importance of stereochemistry in organic chemistry. Stereochemistry deals with the three-dimensional arrangement of atoms within a molecule. This arrangement can significantly affect a molecule's physical and chemical properties, including its reactivity, melting point, and optical activity. Isomerism refers to the existence of molecules with the same molecular formula but different structural arrangements. In the case of stilbene dibromide, we encounter diastereomers – stereoisomers that are not mirror images of each other. The meso form is a diastereomer of the racemic mixture (a 1:1 mixture of two enantiomers). The following table summarizes the key differences: | Isomer Type | Bromine Atom Positions | Plane of Symmetry | Optical Activity | |---|---|---|---| | Meso Stilbene Dibromide | Trans (opposite sides) | Present | Inactive | | Racemic Stilbene Dibromide | One molecule has both bromines on one side; the other has both on the other. | Absent in each individual molecule, present in the mixture as a whole | Inactive (net zero rotation) |

Synthesis and Applications of Meso Stilbene Dibromide

Meso stilbene dibromide is typically synthesized through the addition of bromine (Br_2) to trans-stilbene. This reaction proceeds via an electrophilic addition mechanism. The reaction conditions need to be carefully controlled to favor the formation of the meso isomer. Other isomers might also form depending on the reaction setup. While meso stilbene dibromide itself doesn't have widespread commercial applications, its synthesis and study serve as crucial learning tools in organic chemistry education and research. It provides a concrete example to illustrate fundamental concepts of stereochemistry and isomerism. Its role is primarily academic, offering a practical demonstration of theoretical principles. Furthermore, its synthesis and characterization contribute to refining techniques used in organic synthesis and analytical chemistry.

Related Compounds and Reactions: Expanding the Scope

The understanding of meso stilbene dibromide's structure is directly related to the study of other vicinal dibromides and their stereochemical implications. Similar reactions and concepts apply to other alkenes undergoing electrophilic addition.

Case Study: Analyzing Reaction Yields and Stereoselectivity

Let’s consider a hypothetical case study: a student conducts the bromination of trans-stilbene. The aim is to determine the yield and stereoselectivity of the reaction. By analyzing the resulting product mixture using techniques like NMR spectroscopy, the student can quantify the amount of meso stilbene dibromide formed compared to other possible isomers. A high yield of the meso isomer would indicate a highly stereoselective reaction. This type of analysis helps fine-tune reaction parameters for optimal product formation. (A table showing hypothetical NMR data and yield calculations could be included here to illustrate the point.)

Conclusion: A Foundation for Further Exploration

Meso stilbene dibromide, while not a commercially prominent compound, holds significant pedagogical value in organic chemistry. Its structure serves as a potent example for understanding the nuances of stereochemistry, isomerism, and reaction mechanisms. Its synthesis and analysis contribute to developing practical skills in organic chemistry laboratories and refining the theoretical understanding of molecular configuration. Further research into related compounds and their applications continues to expand our knowledge of this fascinating area of chemistry.

FAQs:

1. What is the difference between meso and racemic compounds? Meso compounds are achiral despite having chiral centers due to an internal plane of symmetry. Racemic mixtures are composed of equal amounts of two enantiomers and are optically inactive.

1. How is meso stilbene dibromide identified? Techniques like NMR spectroscopy and X-ray crystallography can be used to confirm its structure and distinguish it from other isomers.

1. What are the potential hazards associated with meso stilbene dibromide and its synthesis? Bromine is a corrosive and toxic substance. Appropriate safety precautions and handling procedures should be followed during synthesis and handling.

1. Are there any industrial applications for similar compounds? Vicinal dihalides, while not exactly meso stilbene dibromide, are used as intermediates in various organic syntheses and in some specialized applications.

1. How does the stereochemistry of the starting material (trans-stilbene) affect the outcome of the bromination reaction? The trans configuration of the starting material is crucial for the formation of the meso isomer; the cis isomer would produce a different stereochemical outcome.

meso stilbene dibromide structure: Microscale Organic Laboratory Dana W. Mayo, Ronald M. Pike, David C. Forbes, 2010-01-12 This is a laboratory text for the mainstream organic chemistry course taught at both two and four year schools, featuring both microscale experiments and options for scaling up appropriate experiments for use in the macroscale lab. It provides complete coverage of organic laboratory experiments and techniques with a strong emphasis on modern laboratory instrumentation, a sharp focus on safety in the lab, excellent pre- and post-lab exercises, and multi-step experiments. Notable enhancements to this new edition include inquiry-driven experimentation, validation of the purification process, and the implementation of greener processes (including microwave use) to perform traditional experimentation. **meso stilbene dibromide structure: Advanced Organic Chemistry** Francis A. Carey, Richard J. Sundberg, 2007-06-13 The two-part, fifth edition of Advanced Organic Chemistry has been substantially revised and reorganized for greater clarity. The material has been updated to reflect advances in the field since the previous edition, especially in computational chemistry. Part A covers fundamental structural topics and basic mechanistic types. It can stand-alone; together, with Part B: Reaction and Synthesis, the two volumes provide a comprehensive foundation for the study in organic chemistry. Companion websites provide digital models for study of structure, reaction and selectivity for students and exercise solutions for instructors. **meso stilbene dibromide structure:** Perspectives on Structure and Mechanism in Organic Chemistry Felix A. Carroll, 2023-05-09 PERSPECTIVES ON STRUCTURE AND MECHANISM IN ORGANIC CHEMISTRY “Beyond the basics” physical organic chemistry textbook, written for advanced undergraduates and beginning graduate students Based on the author’s first-hand classroom experience, Perspectives on Structure and Mechanism in Organic Chemistry uses complementary conceptual models to give new perspectives on the structures and reactions of organic compounds, with the overarching goal of helping students think beyond the simple models of introductory organic chemistry courses. Through this approach, the text better prepares readers to develop new ideas in the future. In the 3rd Edition, the author thoroughly updates the topics covered and reorders the contents to introduce computational chemistry earlier and to provide a more natural flow of topics, proceeding from substitution, to elimination, to addition. About 20% of the 438 problems have been either replaced or updated, with answers available in the companion solutions manual. To remind students of the human aspect of science, the text uses the names of investigators throughout the text and references material to original (or accessible secondary or tertiary) literature as a guide for students interested in further reading. Sample topics covered in Perspectives on Structure and Mechanism in Organic Chemistry include: Fundamental concepts of organic chemistry, covering atoms and molecules, heats of formation and reaction, bonding models, and double bonds Density functional theory, quantum theory of atoms in molecules, Marcus Theory, and molecular simulations Asymmetric induction in nucleophilic additions to carbonyl compounds and dynamic effects on reaction pathways Reactive intermediates, covering reaction coordinate diagrams, radicals, carbenes, carbocations, and carbanions Methods of studying organic reactions, including applications of kinetics in studying reaction mechanisms and Arrhenius theory and transition state theory A comprehensive yet accessible reference on the subject, Perspectives on Structure and Mechanism in Organic Chemistry is an excellent learning resource for students of organic chemistry, medicine, and biochemistry. The text is ideal as a primary text for courses entitled Advanced Organic Chemistry at the upper undergraduate and graduate levels. **meso stilbene dibromide structure:** *Experimental Organic Chemistry* John C. Gilbert, Stephen F. Martin, 2006 This proven and well-tested laboratory manual for organic chemistry students contains procedures for both miniscale (also known as small scale) and microscale users. This lab manual gives students all the necessary background to enter the laboratory with the knowledge to perform the experiments with confidence. For the microscale labs, experiments were chosen to provide tangible quantities of material, which can then be analyzed. Chapters 1-2 introduce students to the equipment, record keeping, and safety of the laboratory. Chapters 3-6, and 8 are designed to introduce students to laboratory techniques needed to perform all experiments. In Chapters 7 and 9 through 20, students are required to use the techniques to synthesize compounds and analyze their properties. In Chapter 21, students are introduced to multi-step syntheses of organic compounds, a practice well known in chemical industry. In Chapter 23, students are asked to solve structures of unknown compounds. The new chapter 24 introduces a meaningful experiment into the textbook that reflects the increasing emphasis on bioorganic chemistry in the sophomore-level organic lecture course. This experiment not only gives students the opportunity to accomplish a mechanistically interesting and synthetically important coupling of two a-amino acids to produce a dipeptide but also provides valuable experience regarding the role of protecting groups in effecting synthetic transformations with multiple functionalized molecules. **meso stilbene dibromide structure: Structure Reports** , 1956 **meso stilbene dibromide structure:** *Structure Reports for ...* , 1956 **meso stilbene dibromide structure:** Advances in Organobromine Chemistry II J.-R. Desmurs, M.J. Goldstein, B. Gérard, 1995-01-13 The organic molecules that are used, particularly in the areas of pharmacy and agrochemicals, are becoming more and more complex both in their chemical nature and spacial configuration. A complex molecular structure is inevitably fragile; it cannot be produced under severe conditions (in particular high pressure and temperature). In addition there is a problem of the scale-up of a product from the laboratory to the industrial scale. The control of the reactivity, selectivity, and yield and the use of sufficiently mild industrial conditions are all factors that must be taken into account by industrial chemists. Amongst the tools giving controllable reactivity, selectivity, and relatively mild reaction conditions is bromine. The organic chemistry of bromine sometimes gives surprising selectivities compared to those of chlorine.This volume which is based on Orgabrom '93, brings together the main contributions presented at this event. **meso stilbene dibromide structure:** Monthly Abstract Bulletin from the Kodak Research Laboratories Eastman Kodak Company. Research Laboratories, 1946 **meso stilbene dibromide structure: Science Abstracts** , 1946 **meso stilbene dibromide structure: Experiments in Organic Chemistry** Louis Frederick Fieser, 1957 **meso stilbene dibromide structure: Structure and Reactivity in Organic Chemistry** Mark G. Moloney, 2008-04-28 The jump from an understanding of organic chemistry at lower undergraduate level to that required at postgraduate level or in industry can be difficult. Many advanced textbooks contain a level of detail which can obscure the essential mechanistic framework that unites the huge range of facts of organic chemistry. Understanding this underlying order is essential in any advanced study or application of organic chemistry. Structure and Reactivity in Organic Chemistry aims to bridge that gap. The text opens with a short overview of the way chemists understand chemical structure, and how that understanding is essential in developing a good knowledge of chemical reactivity and mechanism. The remainder of the text presents a mechanistic classification of modern organic chemistry, developed in the context of synthetic organic chemistry and exemplified by reference to stereoselective synthesis and protecting group chemistry. This approach is intended to illustrate the importance and value of a good grasp of organic reaction mechanisms, which is a prerequisite for a broader understanding of organic chemistry. Written by an expert educator with a sound understanding of the needs of different audiences, the subject is presented with clarity and precision, and in a highly practical manner. It is relevant to undergraduates, postgraduates and industrial organic chemists. **meso stilbene dibromide structure:** Annual Reports on the Progress of Chemistry Chemical Society (Great Britain), 1940 **meso stilbene dibromide structure:** *Macroscale and Microscale Organic Experiments* Kenneth L. Williamson, 1994 This flexible, accurate manual includes both macroscale and microscale procedures for each experiment. The level and writing style of the text, which emphasizes biochemical and biomedical applications, make it ideally suited for the mainstream organic chemistry laboratory. A student CD-ROM includes videos and photos related to the material in the text. Videos feature the exact glassware required for each experiment and demonstrate techniques for how to conduct experiments successfully and safely. Photos show lab equipment set-ups. In this Experiment is a new feature that appears before every microscale experiment. It presents the objective of the experiment and keeps students from getting bogged down in the minute details of experimental procedures. An instructor web site provides a forum where instructors can communicate directly with the text author about specific experiments and the implementation of microscale techniques. The site also includes PDF files from the Instructor's Resource Manual. **meso stilbene dibromide structure:** Introduction to Organic Chemistry Francis E. Condon, Herbert Meislich, 1960 **meso stilbene dibromide structure:** Dissertation Abstracts International , 1975 **meso stilbene dibromide structure: Structure Reports** W.B. Pearson, 2013-06-29 This Cumulative Index of Structure Reports is for the years 1961 to 1970 (Vols. 26 to 35). The Subject Index is arranged in strict alphabetical succession regardless of the construction of words, although in the listing of organic compounds certain prefIxes such as mono, 0-, m-, p-, D and L are disregarded. Nevertheless, some inconsistencies in the rendering of these prefIXes and others such as trans, cyclo and iso remain, and where a name is sought which contains these, it should be searched for both with and without regard for the prefIx. The Formula Index which lists Metals and Inorganic substances, is arranged in alphabetical order of chemical symbols. Organic compounds are listed in the Index of Carbon Compounds, which is indexed fIrst by C, then H with other elements following in alphabetical order of chemical symbols. A carbon compound not appearing in this Index should also be sought in the Formula Index. The scheme usually employed for the transliteration of Russian is given below. w. B. PEARSON Waterloo 20 October 1982 TRANSLITERATION OF RUSSIAN a a H p r III 1 b H j 6 C S !~ ~ B V K k T t hI Y g r n I y u . **meso stilbene dibromide structure:** *Organic Experiments* Louis Frederick Fieser, Kenneth L. Williamson, 1983 **meso stilbene dibromide structure: Organic Reaction Mechanisms 1966** B. Capon, M. J. Perkins, C. W. Rees, 2008-05-27 The only book series to summarize the latest progress on organic reaction mechanisms, Organic Reaction Mechanisms, 1966 surveys the development in understanding of the main classes of organic reaction mechanisms reported in the primary scientific literature in 1966. The 2nd annual volume in this highly successful series highlights mechanisms of stereo-specific reactions. Reviews are compiled by a team of experienced editors and authors, allowing advanced undergraduates, graduate students, postdocs, and chemists to rely on the volume's continuing quality of selection and presentation. **meso stilbene dibromide structure: Reviews on Heteroatom Chemistry** , 1993 **meso stilbene dibromide structure: Australian Journal of Chemistry** , 1986 **meso stilbene dibromide structure:** *Bulletin of the Chemical Society of Japan* Nihon Kagakkai, 2001 **meso stilbene dibromide structure:** Progress Report Massachusetts Institute of Technology. Laboratory for Nuclear Science, 1957 Progress is reported in fission elements chemistry, organic and inorganic nuclear chemistry, cosmic ray research, high-energy accelerator experimentation and physics, bubble chamber experimentation, and theoretical physics. Considerable attention was given to the ionization of mineral acids and hydrogen haloraetallates in inorganic solvents and to anion exchnnge behavior in metal complexes. Studies of various chemical reaction mechanisms were continued. The self-energy of a Dirac particle coupled through its charge with the electromagnetic field was investigated without perturbation theory. (For preceding period see AECU-3580.) (D.E.B.).

meso stilbene dibromide structure: Reagents for Organic Synthesis Louis Frederick Fieser, 1967 **meso stilbene dibromide structure: Mechanisms of Elimination Reactions** William Hundley Saunders, Anthony F. Cockerill, 1973 **meso stilbene dibromide structure:** Progress Report on Contract N5ori, Task Orders VI and XVII Massachusetts Institute of Technology. Laboratory for Nuclear Science, 1957 **meso stilbene dibromide structure: Experimental Organic Chemistry** John C. Gilbert, Stephen F. Martin, 2002-01-01 **meso stilbene dibromide structure: An Introduction to Experimental Organic Chemistry** B. E. Hoogenboom, 1971 **meso stilbene dibromide structure:** Indian Journal of Chemistry , 1988 **meso stilbene dibromide structure: Journal of the American Chemical Society** American Chemical Society, 1957 **meso stilbene dibromide structure: The Participation of a Neighboring Carboxyl Group in Addition Reactions** Walter Peter Miller, 1957 **meso stilbene dibromide structure: Chemistry of Carbon Compounds** E. H Rodd, 1964 **meso stilbene dibromide structure: Rodd's Chemistry of Carbon Compounds** E. H. Rodd, 1964 **meso stilbene dibromide structure:** *Journal of Chemical Education* , 1924 Includes Report of New England Association of Chemistry Teachers, and Proceedings of the Pacific Southwest Association of Chemistry Teachers. **meso stilbene dibromide structure:** *Advanced Organic Chemistry: Structure and mechanisms* Francis A. Carey, Richard J. Sundberg, 2000 The material in this book is organized on the basis of fundamental structural topics such as structure, stereochemistry conformation and aromaticity and basic mechanistic types, including nucleophilic substitution, addition reactions, carbonyl chemistry, aromatic substitution and free radical reactions. **meso stilbene dibromide structure:** Dissertation Abstracts , 1958-04 **meso stilbene dibromide structure: British Chemical Abstracts** , 1945 **meso stilbene dibromide structure: Journal of the Indian Chemical Society** , 1988 **meso stilbene dibromide structure:** Polycyclic Aromatic Hydrocarbon Structure Index Lane C. Sander, 2020 NIST Special Publication (SP) 922 is an aid in the identification of the chemical structures of polycyclic aromatic hydrocarbons (PAHs). The Structure Index consists of two parts: (1) a cross index of named PAHs listed in alphabetical order and (2) chemical structures including ring numbering, name(s), Chemical Abstract Service (CAS) Registry numbers, chemical formulas, molecular weights, and length-to-breadth ratios (L/B) and shape descriptors of PAHs listed in order of increasing molecular weight. **meso stilbene dibromide structure: British Abstracts** , 1945 **meso stilbene dibromide structure:** Solid State Photochemistry Gerhard M. J. Schmidt, 1976

1. meso stilbene dibromide structure

Related Articles

- like ohenrys gift of the magi
- lonely on the mountain louis lamour
- lake keowee history