Tybsc organic chemistry notes

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Welcome! Here you will find notes and classes of organic chemistry for different levels, that is a basis for advancing. What is the organic chemistry? Organic chemistry is a subdiscipline of organic chemistry that studies the structure, properties and reactions of compounds Organic, which contain carbon in a covalent bond. The study of the structure determines their chemical composition and formula. The study of the properties includes physical and chemical properties, and the evaluation of chemical reactivity to understand their behavior. The study of organic reactions includes the chemical synthesis of natural products, drugs and polymers, and the study of individual organic molecules in the laboratory and theoretical (silico). The range of chemical products studied in organic chemistry includes hydrocarbons (compounds containing only Carbon and hydrogen) and carbon-based compounds, but also containing other elements, in particular oxide nitrogen, sulfur, phosphorus (included in many biochemical products) and halogens. Organometallica chemistry is the study of compounds containing carbon-metallic links. Contemporary research focuses on organic chemistry involving other organometers, including lantanids, but above all transition metals, zinc, copper, palladium, nickel , cobalt, titanium and chrome. Life and make up most of the known chemicals. Carbon binding models, with its value of four formal, single, double and triple bonds, as well as structures with delocalized electrons, make the range of structurally diverse organic compounds, and their range of huge applications. They constitute the base or constitute an integral part of numerous commercial products, including pharmaceutical, petrochemical and agrochemical products, and produced by them derivatives, including lubricants, solvents, plastics, fuels and explosives. The study of organic chemistry overlaps organometallic chemistry and biochemistry, but also to medical chemistry, polymer chemistry and material science. On the Green Download button below, where you will find a series of notes and loss related to analytical chemistry , each with two links for download.1.ã, chemistry alicyclicÂ, notedownload Link 1Download link 22.ã, halogenates of alkyl and Aril Free Download Link 1Scaricate Link 23.ã, halogenats of alkyl and Aril Halide, Download Link 1Scake Links 24.ã, Aromatic Chemistria & Eerciclica Free Download Link 1Scaric Link 25.ã, Aromaticity, Free Download Link 1Scaric Link 26.ã, Orgeneral Mechanisms Notedownload Link 1Scaric Link 27.ã, Organic Reaction Mechanism & Name ReavingDownload Link 1Scaric Link 28. , Organic Reaction MechanismScarica Link 1Scaric Link 29.ã, Organic Spectroscopy Notedownload Link 1Scaric Link 110.ã, Organelements Free Download Link 1Scake Link 211.ã, Organometallica In Sinte Sidownload Link 1Scake Link 212.ã, Notes link 2download links 213. 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Personally, I liked two things in these notes: A) The progressive depth of the concepts, which has spared me the overwhelming feeling that is felt when the information (unorganized) of the so-called "mandatory textbooks" come from all sides; B) The abundance of problems and their detailed solutions! Moreover, it seems strange, but the professor – on his website – promises to respond FREE and ISTANTANEOUSMENTE to any email that asks for chemistry through his website. Tell me where you can find such a level of service in any university tutoring center! All in all, I'm a happy customer! Senior Chemistry Teacher Thank you for this great resource. This allowed me more time to help students understand key concepts rather than spend time copying notes. I can suggest examples of more elaborate problems with particular attention to the problem solving process. Thanks again Download Organic Chemistry Notes for immediate use. Our organic chemistry notes are true, perfectly clean, handwritten notes that helped thousands of students get the help of organic chemistry they need. So, “Stop writing, we have already taken your notes.” Section 1 – Structural, binding and molecular properties of organic molecules Section 2 – The nature of organic compounds: Alkanes and cycloalkanes Section 3 – Stereochemistry of alkanes and cycloalkanes: 3-D structures of molecules Section 4 – The study of organic reactions: an overview Section 5 – Structure and Reactivity Section 6 – Reactions and synthesis of Alkenes Section 7 – Alchines Section 8 – Stereochemical: a detailed look Section 9 – Alchil Halides (R-X) Section 10 – Replacement (SN2, SN1) and Elimination (E2, E1) Section 11 – Spettrometry of Massa and Spettroscopy IR Section 12 Notes – RM Section 13 – Conjugated systems and UV spectroscopy Section 14 – aromatic compounds andSection 15 – Replacement of aromatic electrophilic (E.A.S.) Section 16 – Reactions and synthesis of alcohols Section 17 – Ethers, Epoxys, and andSection 18 â Aldeides and Ketones Section 19 â Carboxylic acids Section 20 â Carboxylic acid derivatives and nucleophilic substitution reactions Acil Section 21 â Alpha-carbonyl substitution reactions Section 22 â Carbonyl condensation reactions Section 23 â Amines Do you want to learn organic chemistry? If your answer is yes, you are in the right place. Here in this article, you will find the link to Organic Chemistry Notes Pdf Free Download. The topic is quite broad. It’s very difficult to deal with the whole subject. So we brought these notes. These notes are prepared by experienced teachers. These notes cover the basic concepts of the world of organic chemistry. You can also learn the basic study of organic compounds. These notes are needed to understand advanced levels of Organic Chemistry. This provides a solid foundation for understanding the complex topics of higher education. There are many notes available on the internet. but the main problem is which notes are better. So, to solve your problem, we brought you these notes. We did a lot of research to find these notes. Now you can easily download these notes. And another thing, these bills are free. You do not have to pay any fee for these notes. The notes can be easily downloaded. There are no registrations required. There’s no redirection. Just click on the name of the notes and download the notes in pdf format. There are three main branches of science. These are Chemistry, Physics and Biology. All three are connected. Eleventh and twelfth are the milestones of your career. These classes decide the future of students. Students in Class 11, 12 Â°, and B.Sc. may also benefit from these notes. The notes are also useful for preparing for the NEET and JEE exams. So if you do not want to pay for the banknotes you can download the banknotes for free here. 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Here are the notes for you:- These notes are very useful in the revision point of you the notes are are The notes are written neatly and cleanly. You can easily review your chapter with the help of these notes. You do not need to open several books to understand the subject. The key points are also present in the notes. We've eliminated the material that's not necessary from the notes. The last minute of preparation for the exam is very important. So we have provided these notes for you. These quick review notes will save time for you. 21:15 PM Â 5 comments 1. Organic Chemistry Second Edition 2. The INSTANT NOTES Series Editor: B.D. Hames School of Biochemistry and Molecular Biology, University of Leeds, UK Animal Biology 2nd edition Biochemistry 2nd edition Bioinformatics Chemistry for Biologists 2nd edition Ecology of development 2nd edition Immunology 2nd edition Genetics 2nd edition Organic Chemistry Second Edition G. L. Patrick Department of Chemistry and Chemical Engineering, Paisley University, Paisley, Scotland 4. Â© Garland Science/BIOS ScientiÃ¤c Publishers, 2004 First publication 2000 Second edition published 2004 All rights reserved. No part of this book can be reproduced or transmitted, in any form or by any means, without authorization. A CIP catalog disc for this book is available at the British Library. _ "2a ed. p. cm. « (Series of instant notes) Includes bibliographical references and indexes. ISBN 1-85 996-264-5 (other document) 1. Chemistry, organic, syllabi, etc. I. Title: Instant notes of organic chemistry. Second. Title. TheSeries. QD256.5.P37 2003 547Â" dc22 Production Editor: Andrew Watts This edition was published in Taylor & Francis e-Library, 2005. Buy your copy of this or one of the thousands of Taylor & Francis or Routledge eBooks, go to www.eBookstore. ISBN 0-203-42Â 761-0 Master e-book ISBN 0-203-44Â 168-0 (Adobe eReader Format) (Print Edition) tandf.co.uk. Preface ix Section A "Structure and Bond" 1 A1 Atomic Structure of Carbon 1 A2 Covalent Bond and Hybridization 3 A3 sp3 Hybridization 5 A4 sp2 Hybridization 8 A5 sp Hybridization 14 A6 Hybrid bonds and centres 17 Section B Â" Alkanes and cycloalkanes 19 B1 DeÃ¯ Classification 19 B2 Design structures 20 B3 Nomenclature 22 Section C Functional groups 27 C1 Functional group recognition 27 C2 Aliphatic functional groups and aromatic 29 C3 Intermolecular bond 30 C4 Properties and reactions 33 C5 Nomenclature of compounds with functional groups 35 C6 Primary, secondary, tertiary and quaternary nomenclature 43 Section D Â"Stereochemistry 45 D1 Constitutional isomers 45 D2 Isomers conÃ¯Â¬Â¤gur Â"alkanes" and cycloalkanes 46 D3 Conical isomers Â"optical isomers 49 D4 Conformational isomers 56 Section E Â" Nucleophiles and electrophils 63 E1 DeÃ¯nition 63 E 2 Charged species 64 E3 Neutral inorganic species 66 E 4 Organic Structures 69 Section F Â" Reactions and Mechanisms 73 F1 Reactions 73 F2 Mechanisms 75 Section G Â" Acid-base reactions 79 G1 BrÃ Ì§nstedÂ" Low acids and bases 79 G2 Acid intensity 82 G3 Base intensity 88 G4 Lewis acids and bases 94 G5 Enola 95 CONTENTS 6. 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Section M Â «Alcoli, Phenols and Tioli 263 m1 Preparation of alcohols 263 m2 Phenols Preparation 264 m3 Property of alcohols and phenols 266 m4 Alcohol's reactions 270 m5 Phenolian reactions 277 m6 chemistry of Tioli 281 Section N Â «Ethers, epoxides and tioetri 283 N1 Preparation of ethers, epoxides and tioeters 283 N2 Properties of ethers, epoxides and tioeters 286 n3 reactions of ethers, epoxides and tioeters 289 Section or â« Amine and nitrili 295 O1 Preparation of amines 295 O2 properties of amines 299 o3 amine reactions 305 o4 chemistry of nitrile 311 section P organic spectroscopy and analysis 315 p1 spectroscopy 315 p2 spectroscopy visib ile and ultraviolet 317 p3 infrared spectroscopy 322 p4 nuclear nuclear magnetic resonance spectroscopy 324 p5 13 c nuclear magnetic resonance spectroscopy 339 p6 mass spectroscopy 342 additional readings 347 index 349 index vii 8. This manual intends to provide a complete set of basic notes Organic chemistry, which will be suitable for university students who follow chemical courses, or courses involving organic chemistry as auxiliary matter. The book focuses on key topics that most likely are common to those courses of organic chemistry that follow a course of foundation or introduction of general chemistry. Organic chemistry is a subject that can bring some students to the peak of ecstasy, while others climb to the wall. Some students «turn on» immediately, while others can't understand anything, as far as they try. Undoubtedly one of the major problems in the study of this topic is the enormous quantity of material that often needs to be treated. Many students dismay to the prospect of having to learn an apparently infinite number of reactions, and when it comes to drawing curled mechanisms and arrows, they only see a confused maze of winding lines that go anywhere but anywhere. The concepts of organic reaction mechanisms are often the most difficult to master. These difficulties "are often aggravated by the fact that the current organic chemistry textbooks generally have a length of over 1200 pages and can be very expensive to buy. This book tries to condense the essential organic chemistry in a text of 310 manageable pages, suitable for students and that does not cost a head of the head. It does it focusing exclusively on the basics of the topic, without entering the exhaustive details or in repetitive examples. Furthermore, the key notes at the beginning of each topic summarizes the treated essential facts and help focus your mind on essential elements. Organic chemistry is aTopic as it becomes easier as you go on! This may seem an outrageous affirmation to do, especially to a student in the first year that struggles to come to terms with the rules of the nomenclature, trying to memorize about twenty reactions and at the same time make sense of mechanisms. However, these arguments are the basis of the subject and, once grasped, the general framework becomes clear. Understanding the mechanism of how a reaction takes place is particularly important for this purpose. It carries a logic to the reactions of the different functional groups. This in turn transforms a list of apparently unrelated facts in a sensitive issue that makes the remembrance of the reactions a piece of cake "(well, almost). Once this happy state of things reached, the importance of organic chemistry for other topics such as genetics and biochemistry suddenly leaps out of page. Understanding organic chemistry leads to a better understanding of the chemistry of life and how the body works at the molecular level. It also helps to understand the molecular mechanisms involved in the disease and in body dysfunction, carrying in turn to understand how drugs can be designed to treat these diseases, says the "science of medical chemistry." And it's not all. Knowledge of organic chemistry will help industrial chemist or chemical engineer in front of unexpected side reactions in a chemical process and the agricultural process that tries to understand the molecular processes that take place in plants and crops; It will also help design and synthesize new herbicides and fungicides respectful of the environment. And â € ™ PREFACE 9. will help your legal doctor who wants to analyze a non-describable white powder Â «It is heroin or Ã¯â¬ Ã¯â¬ Ã¯â¬ Ã¯â¬ Ã¯â¬ Ã¯â¬ Ã¯â¬ Ã ã ¯â¬ Ã¯â¬ Ã¯ ™ list of scientific disciplines involving the organic chemistry Ãƒ ì infinitus Â «Designing spatial suits, developing new photographic dyes, inventing new molecular technologies in microelectronicsÂ" you could go ahead at Infinite ™. Organic chemistry is an exciting topic as it leads to an essential understanding of molecules and their own properties. The order in which the first topics of this book is presented is important. The first two sections concern the structure and gluing, which are fundamental for subsequent sections. Why does the carbon shape four links? What is hybridization? The third section on functional groups is equally fundamental to classify the apparent labyrinth of reactions that organic compounds can suffer. It follows section D on stereochemistry, then sections and and F, which deal with the basic theory of reactions and mechanisms. What are nucleophiles and electrophiles? What is a mechanism? What does a curly arrow mean? The remaining sections can be used in any order. These reactions and mechanisms of common functional groups that are important in chemistry and biochemistry. Hopefully students follow this text text book textin their studies and that once they have understood that organic chemistry is all about them read more widely and enter a truly exciting world of molecular science. x Preface 10. Section A – Structure and gluing A1 ATOMIC OF CARBON atomic orbital Carbon has six electrons and is in row 2 of the periodic table. This means there are two atomic orbital shells available for these electrons. The first shell closer to the nucleus has a single orbital s - the 1s orbital. The second shell has a single orbital s (the 2 orbital) and three orbital p (3). 2p). Therefore, there are a total of five atomic orbitals in which these six electrons can adapt. The spherical orbitals are of spherical shape with the orbital 2s much larger then the 1s orbital. P orbitals are handlebar-shaped and are aligned along the x, y and z axes. Therefore, the 2px, 2py and 2pz atomic orbitals (Fig. 1) are assigned. Key notes The atomic orbitals available for the six carbon electrons are the orbital s in the first shell, the orbital s in the second shell and the three orbital p in the second shell. The orbitals 1 and 2 are of spherical shape. 2p orbitals are handlebars in shape and can be assigned 2px, 2py or 2pz depend- ing on the axis along which they are aligned. The 1s orbital have a lower energy than the 2 orbital orbits that have a lower energy than the 2p orbital. 2p orbitals have equal energy (i.e. degenerated). Carbon is in the second row of the periodic table and has six electrons that will fill atomic orbitals with lower energy before entering high-energy orbitals (principle of aufbau). Each orbital is allowed a maximum of two opposite rotational elecns (the principle of exclusion Paul). When orbital equal energy is available, the electrons will occupy separate orbitals before mating (Hund rule). Thus, the electronic configuration of a carbon atom is 1s 2 2 2 2px 1 2py 1 . Covalent binding and hybridization (A2) Atomic orbital electronic configuration 1s 2s 2px 2pz y xz y xz y xz y xz y xz y xz y xz Fig. 1. atomic orbitals. 11. 2 Section A – Structure and gluing Energy levels The atomic orbits described above are not of equal energy (Fig. 2). The orbital 1 has the lowest energy. The orbital 2 is next in energy and the 2p orbitals have the highest energies. The three 2p orbitals have the same energy, which means they are degenerated. Electronic Carbon is in the second line of the periodic table and has six electrons that are configured to fill the low energy atomic orbits first. This is known as the aufbau princi- ple. The 1s orbital is filled before the 2s orbital, which is filled before the 2p orbitals. Pauli's exclusion principle states that each orbital is allowed to a maximum mass of two electrons and that these electrons must have opposite spins. There, the first fourThey fill the orbitals 1 and 2. Electrons in each orbital have opposite opposite and this is represented in Fig. 3 by drawing the arrows facing up or down. There are two electrons left to enter the remaining 2p orbital. These go into separate orbitals so that there are two semi-finished orbitals and one empty orbital. Whenever there are orbitals of equal energy, the electrons only begin to pair when all the degenerate orbitals are halfway. This is known as HundÃ¢Â¦ rule. The electronic configuration for carbon Ã2 1s 2s 2px 1 2py 1 . The numbers at the top refer to the number of electrons in each orbital. The letters refer to the types of atomic orbital involved and the numbers on the front refer to the shell to which the orbital belongs. Energy 1s 2s 2px 2py 2pz Fig. 2. Energy levels of atomic orbitals. Energy 1s 2s 2px 2py 2pz Fig. 3. Electronic configuration for carbon. The 12. Section A "Structure and bond A2 COVALENT BONDAMENT AND IBRIDIZATION Covalent bond A covalent bond binds two atoms together in a molecular structure and is formed when the atomic orbitals overlap to produce a molecular orbital "", so called because the Orbital belongs to the molecule as a whole rather than to a specific atom. A simple example is the formation of a hydrogen molecule (H2) from two hydrogen atoms. Each hydrogen atom has an atomic orbital of 1s and when the atoms approach each other, the atomic orbits interact to produce two MO (the number of MO resulting must be equal to the number of original atomic orbits, Fig. 1). The MO have different energies. One is more stable than the original atomic orbitals and is called MO binder. The other is less stable and is called the MO antibonding. The MO binder is shaped like a rugby ball and is derived from Key Notes When two hydrogen atoms approach each other, their 1s atomic orbitals interact to form a bond and an antibonding molecular orbital (MO). A stable covalent bond is formed when the binding MO is bound to a pair of electrons and the antibinding MO is empty. Sigma bonds (ÃÂ) are strong bonds with a circular section formed by the frontal overlap of two atomic orbitals. The electronic configuration of atomic carbon means that carbon must form two bonds. However, it is known that carbon forms four bonds. When carbon is part of an organic structure, it can "mix" the 2s and 2p orbitals of the valence shell in a process known as hybridization. There are three possible types of hybridization sp 3, sp 2 and sp hybridization sp. Related topics Atomic structure of carbon (A1) sp 3 Hybridization (A3) sp 2 Hybridization (A4) sp Hybridization (A5) Covalent bond Hybridization + 1s atomic orbital 1s atomic orbital = Molecular orbital bond (complete) Molecular orbital antibonding orbital (empty) Energy HH H H H H H H Fig. 1. Molecular orbitals for hydrogen (H2). The 13. 4 A Â"Structure and linkage of the combination of atomic orbitals 1s. Since this is the most stable MO, valence electrons (one from each hydrogen) go into this and make a couple. The antibonding MO is of superior energy and consists of two deformed spheres. This remains empty. As the electrons end up in a more stable bond MO than the original atomic orbitals, the energy is released and bond formation is encouraged. In the discussions that follow, we will focus exclusively on bonding MO to describe bonding and molecular shape, but it is important to realize that there are also anti-bonding molecular orbitals. Sigma bonds The molecular hydrogen bonding orbital is an example of a sigma bond (ÃÂ): the Â bonds have a circular section and are formed by the frontal overlap of two atomic orbitals. It's a strong interaction, so sigma bonds are strong bonds. Further examples of bonds formed by the interaction of atomic orbits other than the 1s orbital will be discussed in future discussions. Hybridization Atoms can bond with each other by sharing unpaired electrons so that each bond contains two electrons. In Theme A1, we identified that a carbon atom has two unpaired electrons and so we expect carbon to form two bonds. However, carbon forms four bonds! How does a carbon atom form four bonds with only two unpaired electrons? So far we have described the electronic configuration of an isolated carbon atom. However, when a carbon atom forms bonds and is part of a molecular structure, it can "mix" the orbitals s and p of its second shell (the valence shell). This phenomenon is known as hybridization and allows carbon to form the four bonds that we see in reality. There are three ways in which this mixing process can happen. It's the 2sorbitalismmixed with all etre2porbitali.This is known as hybridization 3; The 2s orbital is mixed with two of the 2p orbital. This is known as sp2 hybridization; The 2s orbital is mixed with one of the 2p orbital. This is known as hybridization sp. 14. Section A "Structure and Link A3 SP 3 IBRIDIZATION DeÃ¯nition In the sp 3 hybridization, the 2s orbital is mixed with all three 2p orbital to form a set of four hybrid sp 3 orbital. (The number of hybrid orbits must be equal to the number of original atomic orbits used for mixing.) The hybrid orbitals will each have the same energy but will be different from the original atomic orbitals. This energy difference will again influence the mixing of the respective atomic orbitals. The energy of each hybrid orbital is greater than the original s orbital but lower than that of the original p orbital (Fig. 1). Electronics Carbon valence electrons can now be conveyed in the hybrid sp 3 orbital configuration (Fig. 1). There were a total of four electrons in the original 2s and 2p orbitals. The orbital s was Ã¯Â¤lled and two of the P were Ã¯â € ¤lled at half. After hybridization, there are a total of four Sp 3 orbits all of equal energy. According to the rule of HundÃ ¢ Â¦, Key Note in the SP 3 hybridization, the s and P orbits of the second shell are â € "MixÂ" To form four hybridized. hybridized. 3 orbitals of equal energy. Each hybrid orbital contains a single non-alloy electron and therefore four ties are possible. Each sp 3 orbital is shaped as a deformed handlebar with a much larger lobe than the other. Hybrid orbitals are organized as much as possible, as the main lobes point to the body-ners of a tetrahedron. sp 3 Hybridization explains tetraheric carbon in saturated hydrocarbon structures. The Sigma bonds (σ) are strong bonds formed between two auto hybrid mouths sp 3 or between a hybrid carbon sp 3 and a hydrogen atom. A σ bond formed between two hybrid carbon atoms sp 3 entails overlapping of hybrid orbitals by full sp 3 from each carbon atom. A σ bond formed between a hybrid carbon sp 3 and a hydrogen atom involves a sp 3 carbon orbital half and a 1s semi-filled hydrogen orbital. Nitrogen, oxygen and chlorine atoms can also be sp 3 hybridized in organic molecules. This means that nitrogen has three semi-filled sp 3 orbitals and can form three ties that are pyramid-shaped. Oxygen has two semi-filled sp 3 orbitals and can form two ties that are angled to each other. Chlorine has only one half filled sp 3 orbital and can form only a single bond. All ties forming are σ bonds. Covalent bonding and hybridization (A2) Bonds and hybrid centers (A6) Electronic configuration Nitrogen, oxygen and chlorine Sigma bonds Definition Geometry 15. are all half filled with electrons which means there are four undamaged electrons. Four bonds are now possible. Geometry Each hybrid orbital sp 3 has the same shape – a rather deformed look handlebar (Fig. 2). This deformed dumbbell looks more like an orbital p than an orbital s because more orbital p were involved in the mixing process. Each orbital sp 3 will occupy a space as far as possible apart from each other by pointing to the corners of a tetrahedron (Fig. 3). Here, only the main lobe of each hybrid orbital was shown and the angle between each of these lobes is 109.5.. This is what is meant by the expression tetraedral carbon. The three-dimensional shape of the tetrahedral carbon can be represented by the design of a standard line for the links in the page plane. The bonds that go behind the page are represented by a closed-door wedge, and the bonds that exit the page are represented by a solid wedge. Sigma Bonds A hybridized orbital half filled sp 3 by a carbon atom can be used to form a bond with a hybrid orbital half filled sp 3 by another carbon atom. In Fig. 4a, the main lobes of the two orbital sp 3 overlap directly with a strong σ bond. It is the ability of hybrid orbitals to form strong σ bonds that explain why hybridization occurs inlocation. The shapes of the deformed handlebar allow for a much better orbital overlap than would be obtained from a pure orbital orbital. A Ï Î Among one Ibridious carbon atom SP 3 and a hydrogen atom involves the carbon atom that uses one of his orbitals SP 3 to half and the hydrogen atom using his semi-Ã¯-lled 1s orbital (fig. 4b). 6 Section A Ã ¢ â,¬ "Structure and bonding 2PY 2PZ 2S 2PX Original Original Atomic Orbitals Energy SP3 Hybrid orbitals Fig. 1. SP 3 Hybridization. Lobe greater lobe minimum lobes Fig. 2. SP 3 Orbital Hybridized. HHCHCCH BOND It goes behind the bond page that comes out of the PageTetrahedral shape binding in the page of page 109 or .5 fig. 3. Tetrahedral shape of a SP 3 hybridium carbon 16. A3 Ã ¢ â,¬ "SP 3 hybridization 7 nitrogen, oxygen, nitrogen. Oxygen and chlorine atoms can also be SP 3 hybridized in organic and chlorine structures. Nitrogen has Ã¯â¬ real electrons in its second shell. After hybridization, you will have three orbital defir-Ã¯â¬lled SP 3 and can form three bonds. Oxygen has six electrons of value. After hybridization, you will have two orbital two orbitals wishing and we will find two bonds. Chlorine has seven valence electrons. After hybridization, you will have a semi-Ã¯â¬ Lled SP 3 Orbital and form a bond. The four SP 3 orbits for these three atoms form a tetrahedral arrangement with one or more orbital occupied by a pair of solitary electrons. Considering only atoms, nitrogen forms a pyramidal shape in which bond angles are slightly lower than 109.5Ã Â (c. 107Ã ° å¡) (Figure 5a). This compression of bond angles is due to the orbital containing the solid pair of electrons, which requires a slightly greater amount of space than a link. The oxygen forms an angled or folded shape where two lonely pairs of electrons compress the binding angle from 109.5Ã Â to c. 104Ã Â (Figure 5b). Alcohols, amines, alkyls and ethers contain all the sigma bonds that involve nitrogen, oxygen or chlorine. The links between these atoms and carbon are formed by the overlapping of hybridized orbitals to half-lled SP 3 of each atom. The bonds involving hydrogen atoms (eg or ... H and NÃ ¢ â,¬ "h) are formed by the overlapping of the orbital semi-lled 1S hydrogen and half-Ã¯â¬ Lled SP 3 Orbital orbital oxygen or nitrogen. C + SP3 SIGMA BONDSP3 C CAA) C Fig. 4. (a) Ã¯ æ 'BOND between two Ibridized Carbons SP 3; (b) Ã¯æ' Bond between a SP 3 hybridium carbon and Hydrogen + SP3 C H 1S SIGMA BOND HCB) N CH3 HHN CH3 HH 107O = Pyramidal A) Fig. 5. (a) GEOMETRY OF SP 3 Nitrogen Ibridized SP 3; (b) Geometry of hybridium oxygen SP 3 SP. o H3C HHO CH3 104o angled molecule = b) 17. Section a Ã ¢ â,¬ "Structure and bonding A4 SP 2 Hybridization key Notes Notes in SP 2 Hyridirizzo, 2S Orbital Ã¨ Ã ¢ â,¬ Â« ixixedÃ ¢ Â, Â "¢ with two of the 2p orbital to form three Ibridatizz SP 2 orbital energy. A single 2P Orbital is left above which has a slightly higher energy than the hybridized orbits. For carbon, each hybridized orcher of each SP 2 contains a single electron Split. There is also a semi-Helled 2p Orbital. Therefore, four bonds are possible. Every SP 2 Orbital is modeled as a deformed handlebar with a much larger lobe than others. The remaining orbital 2p is a symmetrical handlebar. The main lobes of the three SP 2 hybridized orbits focus on the corners of a triangle, with the 2p perpendicular orbital on the floor. Each Sp 2 hybridium carbon shapes three bonds ïƒ Using three hbridized orbidate orbits 2. The remaining orbital 2p overlaps â € œllate with an orbital 2p close to form a bond pi (ï €). The bond ï € is weaker than the bond ïƒ, but it is strong enough to avoid the rotation of the bond C.C. Therefore, the Alkenes are planar, with every carbon that is trigonal planar. Oxygen and carbon atoms are both SP 2 hybridized. Carbon has three SP 2 hybridized orbitals and can form three bonds ïƒ, one of which is oxygen. Oxygen has an orbital SP 2 which is used in the bond ïƒ with carbon. Carbon or oxygen p orbits are used to form a bond ï €. The chromatic rings consist of six SP 2 hybrid coals. Each carbon forms three ties ïƒ that translates into a planar ring. The remaining orbital 2p on each carbon is perpendicular to the plane and can overlap with an orbital 2p neighty on both sides. This means that a molecular orbital is formed around the whole ring, such that the six electrons ï € are delocalized around the ring. This causes a greater stability, such that the aromatic rings are less reactive than the alks. Systems conjugated as conjugated alkenes and carbonyl compounds Î ±, Î²-unsaturated involve the alternation of single and double bonds. In such systems, lobes p of a bond ï € are able to overlap with lobi p of a border bond ï €, and then give a small double link level to the link link. This partial delocalization gives greater stability to the conjugated system. Alchini and Alchini Properties (H2) Digiata (H11) Aromatic (I1) Property (J2) Î ±, Î²-aldehyde and unsaturated ketones (J11) Eproprieity structure (K1) Electronic geometry configuration Definition Alkenes Carbon groups Aromatic rings Conjugated systems 18. A4 â € œ SP 2 hybridization 9 Definition in SP 2 hybridization, the orbital S is mixed with two of the 2P orbitals (for example 2px and 2pcs) to give three Sp 2 hybridized orbitals of equal energy. The remaining orbital 2PY is not affected. The energy of each hybridal orbital is greater than the original orbital but lower than the original p orbitals. The remaining orbital 2p (in this case the 2py Orbital) remains at its original energy level (fig. 1). Electronic electronics for carbon, there are four electrons of value to adapt to the three hybridized SF 2 configuration orbital and to the remaining 2P orbitals. The first three electrons are mounted in each of the hybrid orbitals according to the Hund rule, so that they are all filled in half. This still leaves an electron in place. There is a choice between pairing in an orbital by filled SP 2 or put it in the 2py vacant orbital. The prin-ciple is to fill orbitals of equal energy before switching toorbital of higher energy. However, if the energy difference between the orbitals is small (as here) it is easier for the electron in the energy of higher energy orbital 2PY resulting in three orbitals to half-Ã¯Â¬ lled sp 2 orbitals and a half-Ã¯Â¬ Lled P orbital (Figure 1). Four bonds are possible. Geometry The 2PY orbital has the usual shape of dumbbells. Each of the SP 2 hybrid orbital has a deformed dumbbell shape similar to a hybrid SP 3. However, the difference between the size of the major and minor lobes is greater for the SP 2 Hybridized Orbital. Hybrid orbitals and 2PY orbital spaces occupy as far apart as possible. The lobes of the 2PY orbital occupy the space above and below the plane of the X and Z axes (Figure 2a). The three orbitals of three SP 2s (main lobes only) then occupy the remaining space so that they are as far away from the orbital 2PY and from each other as possible. As a result, they are all placed in the X plane "Z" pointing towards the angle of a triangle (planar trigonal shape, Figure 2b). The angle between each of these lobes is 120°Å¡. Now we're ready to look at the bond of a hybrid carbon SP 2 SP. SP2 2PX 2PY 2S 2PZ original atomic orbitals 2PY SP2 hybrid energy orbitals fig. 1. SP 2 hybridization. x y z z b) 120o a) y x Fig. 2. (a) Geometry of the orbital 2PY; (b) Geometry of the 2 PY orbital and hybrid orbitals SP 2 SP 2. 19. 10 Section A – Structure and Gluing Allekenes SP 2 Hybridization result in three hybrid orbitals DEI-Ã¯Â¬LLED SP 2 which form a trigonal planar shape. The use of these three orbitals in the bond explains the shape of an alchena, such as Ethene (H2Cach2). As far as the H bonds are concerned, the hydrogen atom uses an orbital medium of 1s and a half to form a strong bond Ã¯Ã¨ with a medium Ã¯Â¬ lled SP 2 orbital from carbon (Figure 3a). A strong bond is also possible between the two carbon atoms of Ethene due to the overlap of the hybrid SP 2 orbitals of each carbon (Fig. 3b). The full glue diagram Ã¯Æ for Ethene is shown in Fig. 4a and can be simplified as shown in Fig. 4b. Ethene is an Ã¯Â¬ molecule, rigid in which every carbon is the trigonal plane. We have seen how sp 2 hybridization explains the Trigonal Planar carbons, but we have not explained why the molecule is rigid and planar. If the bonds were the only bonds present in Ethene, the molecule would not remain planar as the rotation could occur around the c ... c̈Æ Bond (Figure 5). Therefore, there must be the bond that â¨¨ Ã¨¨ the alchena in this planar form. This bond involves the remaining semi-Ã¯-lled 2PY orbitals on each carbon overlapping laterally to produce a PI (P) bond, with a lobe above and a lobe below the plane of the Mol-Ecule (fig. 6). This bond Ã¯ prevents the rotation of the c ... The link c since the Ã¯ must be broken to allow rotation. A â¨¬ bond is weaker than a â¨ bond because the orbital 2PYs overlap laterally, resulting in weaker overlap. Presence presence A bond is also explain why the alkens are more reactive than the Alks, since a bond is easier to break and is more likely to participate in the reactions. H SP2 1S C + C H Fig. 3. (a) Training of a security CÃ ¢ â € ¡âƒ; (b) Training of a security cÃ ¢ â¡Ã¡âƒ. + C C SP2 C SP2 C fig. 4. Ã Âƒ Binding diagram for ethylene; (b) Simple representation of bonds Ã Ã Ã ™ for ethylene. C H H H H H H H H rotation of the bond Fig. 5. Rotation of the obligation around a bond Ã Âƒ. CCHHHHHHCC HH H 20. A4 Â «SP 2 hybridization 11 carbonyl groups The same theory explains the link to the inside of a carbonal group (CÃ -o) in which both carbon and oxygen atoms are hybridized SP 2. The following diagram of the energy level (Fig. 7) shows how the oxygen value electron is arranged after the SP 2 hybridization of hybridized orbitals SP 2 are tied with pairs of electron alone, which leaves two seed orbitals -i-LEDs available for the link. The orbital SP 2 can be used to form a strong bond, while the 2py orbital can be used for the tie Ã Â weaker. Figure 8 shows how ties are formed Ã Âƒ and ~ in the carbonyl group and explains why carbonyl groups are planar and the carbon atom has a trigonal flat shape. Also explain the reactivity of carbonyl groups, since the bond is weaker than the bond Ã Âƒ and it is more likely to be involved in reactions. Fig. 6. Training of a link. sp2 hybridized orbital 2px 2PY 2pz 2s Energy 2PY sp2 original atomic orbitals Fig. 7. the energy level diagram for oxygen sp hybridized 2. C O H H H H sp2 a) sigma bondsp2 Fig. 8. (a) formation of the carbonyl bond; (b) formation of the carbonal bond. C o h h h h h h h 2py2py2py2py2py b) obligation 21. Aromatic rings All coals of an aromatic ring are hybridized SP 2, which means that each carbon can form three bonds Ã Âƒ and a bond ~. In Figure 9a, all single bonds are Ã âƒ while each double consists of a bond Ã Âƒ and from a bond Ã Âƒ. However, this is an excessive simplification of the aromatic ring. For example, double ties are shorter than individuals and if benzene had the same structure, the ring would be deformed with longer ties longer than double bonds (fig. 9b). In fact, the bonds CÃ ¢ Â¡c in benzene are all of the same length. To understand it, we must look more closely the link that happens. Figure 10a shows benzene with all its ties Ã Âƒ and is designed in such a way as to examine the plane of the benzene ring. Since all coals are hybridized SP 2, there is an orbital 2pids on each carbon that can overlap with 2pid orbital on both sides (fig. 10b). From this, it is clear that each orbital 2py can overlap with its neighbors just around the ring. This leads to an orbital which involves all 2py orbitals where the upper and lower lobes merge to give two doughnut-like lobes above and below the plane of the ring (Fig. 11a). The molecular orbit is symmetrical and the six electrons are delocalized around the aromatic ring. aromatic. are not located between two particular carbon atoms. The aromatic ring is often represented as shown in Fig. 11b to represent this delocalization of the « 12 Section A « H H H H H H H H H H H b) = a) Fig. 9. (a) representation of the aromatic ring; (b) 'deformed' structure resulting from ï¤xed ties. H H H H H H H H H H H H H H H H H H H H H H H H H H H H H H Fig. 11. Molecular Orbital of Liaison for Benzene; (b) representation of benzene to illustrate delocalization. Fig. 10. (a) Link diagram for benzene, (b) Link diagram for benzene. (b) 22. A4 'sp 2 Hybridation 13 electrons. The delocalization increases the stability of the aromatic rings in order to make them less reactive than the alchenes (i.e. it requires more energy to interrupt the delocalized system of an aromatic ring that to break the isolated bond of an alchenes). Conjugated aromatic rings are not the only structures in which electron delocalization systems can occur. The delocalization occurs in the conjugated systems in which individual and double ties alternate (e.g. 1,3-butadiene). All four carbons in the 1.3-butadiene are hybridized sp2 and therefore each of these carbons has a semi-finished p orbital that can interact to give two "legislators" (Fig. 12a). However, it is also possible a certain overlap between the orbital ps of the two average carbon atoms and therefore the bond that unites the two alchenes has a dual bond character (Fig. 12b) "' confirmed by the observation that this bond is shorter than a single typical bond. This delocalization also entails greater stability. However, it is important to realize that conjugation in a conjugated alchenene is not as large as in the aromatic system. In the latter system, the electrons are completely delocalized around the ring and all ties have the same length. In 1.3-butadiene, the electrons are not fully delocalized and are more easily located in the thermal ties Câ¡¡C. Although there is a certain amount of character in the intermediate bond, the latter is more similar to a single bond than a double bond. Other examples of conjugated systems include unsaturated Î±,I2-chestons and unsaturated Î±,I2- esters (Fig. 13). They also increased stability due to conjugation. C H H H H H H H H H H H C H H H 2py 2py 2py 2py 2py 2py 2py 2py 1.3-butadiene a) Fig. 12. (a) Lega in 1.3-butadiene; (b) delocalization in 1.3-butadiene. CC H H H H H C O CH3 CC H C OCH3 (b) Fig. 13. (a) I±,I2-knowledge; (b) I±,I2-extreme unsaturated. C H H H H H H H H H 2py 2py 2py 2py 2py 2py b) 23. Section A "Structure and binding A5 SP IBRIDIZZAZIONE Deï¬nizione In hybridization, the 2s orbital is mixed with one of the 2p orbitals (e.g. 2px) to obtain two hybrid sp orbitals of equal energy. This leaves two 2p (2py and 2pz) orbitals unchanged with a slightly higher energyof hybridized orbitals (fig. 1). Key notes in the SP hybridization, 2S orbital and one of the three 2P orbitals are «mixed» Â «Mixed» Form two orbitals hungry shots of equal energy. Two 2P orbitals are left and have slightly higher energy than fainted orbites. For carbon, each orbital hybridal SP contains a single non-split electron. There are also two orbitals semi-Ã¯â¬LED 2P. Therefore, four bonds are possible. Every SP Orbital is modeled as a deformed handlebar with a much larger lobe than the other. The remaining 2P orbitals are symmetrical handlebars. If we block the 2P orbitals as aligned along the Y and Z axles, the two Ibridized orbid orbits indicate in opposite directions along the X axis. Every Hybridized SP coal of an Alkyne can form two bonds Ã¯ æ 'using the Ibridized orbids sp. 2P orbital remaining can overlap Ã ¢ â,¬ â â â â â â â â â â â â â â â € ™ to form two bonds â,¬. The Alkulles are linear molecules and are reactive due to bonds Ã¯ â,¬. The nitrogen and carbon atoms of a group of nitracks (cÃ¯¼n) are both hybridized sp. The carbon has two SP orbitals SP and can form two bonds Ã¯ æ ', one of which is nitrogen. Nitrogen has a SP Orbital that is used in the bond Ã¯ æ 'with carbon. Both carbon and nitrogen have two 2P orbitals that can be used to form two bonds Ã¯ â,¬. Related topics Alkenes and Alkynes Properties (H2) Chemistry of Nitriles (O4) Electronic Competition Conjugation Aliknes Diction Geometry Geometry Nitrile Groups 2px 2pz Original Orbils Atomic Orbils SP Ibridized Oribals SP 2PY 2PZ Energy 2S 2PY Fig. 1. SP carbon hybridization. 24. Carbon electronics, the two electron Ã¯â¬ are in each SP Orbital according to the rule of the Hund rule, such that each orbital has a single non-split electron. This leaves two electrons that can be coupled in the SP orbital seeds or positioned in 2PY and 2PZ vacant orbites. The energy difference between the orbitals is small and therefore is easier for electrons Ã¯â¬ t in the higher energy orbitals than to mate. This is two orbitals SP semi-Ã¯ "and two semi-striced 2P orbitals (Figure 1), and therefore four bonds are possible. Geometry 2P orbitals are of dumbbell shape while the Ibridized spn orbits are deformed with a much more lobe Large of the other. The 2py and 2pz orbitals are at a right angle to each other (fig. 2a). The Ibridized SP orbitals take up the space left and are in the axis X pointing into opposite directions (only the Main lobe of the SP orbitals is shown in black; Fig. 2B). A molecule that uses the two SP Orbits for the link will be linear in shape. There are two common functional groups where this bond takes place - Alkynes and nitriles. Alkynes Consider the bond in Ethyne (Figure 3) where each carbon is hybridized SP On carbon. The remaining SP Orbital on each carbon comes to form a strong bond of carbon is carbon. The whole gluing diagram for Ethyne is linear (Figure 4a) and can be simplified as shown (fig. A further bond is possible since each carbon has semi-finished p-orbitals. Thus, the 2py and 2pz orbitals of each carbon atom can overlap side by side forming two "bonds" (Fig. 5). The bond formed by the overlap of the 2py orbitals is represented in the dark A5 "sp" hybridization 15 sp spz b) a) xx y 2py2py z y z2p z2p Fig. 2. (a) 2py and 2pz orbitals of a hybrid carbon sp; (b) orbital sp; 2py, 2pz and sp hybrids of a carbon hybrid sp. H C H Fig. 3. Ethyne. C CH HH a) b) C H Fig. 4. Ã Binding for ethylene; (b) representation of the Ã bond. 25th. Grey. The bond resulting from the overlap of the 2pz orbitals is shown in light grey. Alkines are linear and reactive molecules due to their relatively weak bonds. Nitrile Groups Exactly the same theory can be used to explain the bond within a nitrile group (CÃÎ1⁄4N) where both carbon and nitrogen are hybridized. The energy level diagram in Fig. 6 shows the arrangement of valence electrons of nitrogen after hybridization sp. An isolated pair of electrons occupies one of the sp orbital, but the other sp orbital can be used for a strong bond. The 2py and 2pz orbitals can be used for two links. Figure 7 depicts the ÂHCN bonds in the form of lines and how the remaining 2p orbitals are used to form two bonds. 16 Section A "Structure and bond C H 2py 2pz 2pz 2py C Pi bond (Ã) C Fig. 5. ÃÂ¡-Bonding in ethylene. 2py sp 2s 2px 2py 2pz Original Atomic Orbitals sp Hybrid Orbitals 2pz Energy Fig. 6. sp Nitrogen hybridization. C N H 2py 2pz 2py 2pz C N N N Pi Bond (Ã¯) Fig. 7. 26th. Section A Â"A6 BONDS AND IBRIDIZED CENTRES ÃÂ eÂ¦ Identifying the Â and Â¦ bonds in a molecule (Fig. 1) is quite simple if you remember the following rules: Â all bonds in organic structures are sigma (ÃÂ) or pi (Ã) Â all bonds individual bonds are ÃÂ bonds; ÃÂ all double bonds consist of an ÃÂ bond and an ÃÂ¦ bond; All triple bonds consist of one ÃÂ bond and two ÃÂ¤ bonds. Hybrid Centers All atoms of an organic structure (except hydrogen) are either sp, sp 2 or sp 3 hybridized (Fig. 2). Key Notes Every bond in an organic structure is a bond ÃÂ or a bond ÃÂ¦. Each atom of a structure is bound to another by a single bond ÃÂ. If there is more than one bond between two atoms, the remaining bonds are "bonds". All atoms in an organic structure (except hydrogen) are hybridized sp, sp2 or sp3. Single-bonded atoms are sp 3 hybrids, double-bonded atoms are sp 2* hybrids, and triple-bonded atoms are sp 3 hybrids.* sp 3 Hybrid centers are tetrahedral, sp 2 hybrid centers are planar trigonal, and sp centers are linear. This determines the shape of the functional groups. The functional groups containing sp 2 hybrid centres are planar while the Functional containing the hybridized centers are linear. The functional groups containing «Bonds» tend to be reactive since The obligation is weaker than an obligation and breaks more easily. Related Topics (* With the exception of the R2CÃ -cÃ -cÃ -CR2 fins) SP 3 hybridization (A3) SP 2 Hybridization (A4) SP hybridization (A5) hybridized centers Ã Âƒ and Ã¯Ã¯ bonds of chcccocho shape ch H OH3C CH3 H3CCH2 CH3 H3 H3 CCH2 CH3 H3C Fig. 1. Examples Â «All bonds shown are Ã Â Bonds except those marked as Â« 2.Â »The 27. The identification of the SP centers, SP 2 and SP 3 Â² simple if you remember the following rules: Ã ¢ â- All atoms related to a single bond are hybridized SP 3 (except hydrogen). Ã ¢ Â- Both carbon atoms involved in the double bond of an Alchenena (CÃ -c) must be hybridized SP 2. * Ã ¢ â- is the carbon and the oxygen of a carb the Nonil group (cÃ -O) It must be hybridified SP 2. Â- All aromatic coals must be hybridized SP 2. Â- Both atoms involved in a triple bond must be hybridized sp. Â - Hydrogen uses an orbital 1s for the bond and is not hybridized. Hydrogen atoms cannot be hybridized. They can only bind using an orbital s as there are no orbitals p in the first shell of the electron. It is therefore impossible for a hydrogen to participate in the bond. The oxygen, nitrogen and halogen of other part can form hybridized orbitals that are involved in the link or retaining isolated pairs of electrons. It forms the form of organic molecules and functional groups within them is determined by the hybridization of the atoms present. For example, the functional groups that contain SP 2 planar trigonal centers are planar while the functional groups that contain SP centers are linear: Ã ¢ â- Functional planar Aldoids, ketones, alkhens, carboxylic acid, acid chloride, acid anhydride, foreign, amide, aromatic. Ã ¢ â- linear functional groups Ã ¢ â- alchine, nitrile. Ã ¢ â- functional groups with tetrahedron coals Â «Alcoholâ», ether, halide alkyl. Reactivity The functional groups that contain «Bonds» are reactive since the «obligation» is weaker than a «obligation» and can be broken more easily. Common functional groups that contain ties are aromatic rings, alkens, alchini, aldehydes, ketones, carboxylic acids, foreign, amides, acid chlorides, acid and nitrile anhydrides. 18 Section A Structure and Tie H3C CH CH2 CH3 H3C C CH3 CH3 H3C CC CH3 CL OHH SP2 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP3 SP2 Fig. 2. Examples of Ibridiated Centers SP, SP 2 and SP 3. H3C Coco SP SP SP SP3 SP2 SP2 H * The functional groups known as fins (R2CÃ âcÂ âCr2) have a hybridium carbon spindle located in the center of two double ties, but these functional groups are outside the scope of the present text . The 28. Section B Â «Alcane and cyclohalcan B1 definition Alcane The Alks are organic molecules with the general formula CNH2NÃ © 2, consisting of carbon and hydrogen atoms tied by individual ties CÃ ¢ Â¡C and CÃ ¢ Â¡H. They are often called saturated "saturated" because all bonds are individual, hydrocarbons because the only atoms present are carbon and hydrogen. All the Atoms in an Alkano are SP 3 hybridized and tetrahedriles in shape. The ties h "c ec ... the ty ties are strong ties Ã¯ æ ', and therefore the alkanes are not idle for most chemical reagents. The Alkanes are sometimes defined as a straight chain or acyclic alkanes to distinguish them from cyclohalcan o Alicyclic compounds. Cycloalcan cycloalcanes are cyclic alcanes (alicyclic compounds) having the general formula CNH2N in which carbon atoms have been connected together to form a ring. All the dimensions of the ring are possible. However, the most commonly encountered cycloalchane In organic chemistry is the six-member ring (cyclohexane). Most cycloalcanes are not deactivated to chemical reagents. However, small three and four members rings are reactive and behave like alkenes. These cyclical structures are very much TESE Since it is impossible for carbon atoms to adopt their favorite tetramed shape. The key notes The alkene are organic molecules consisting exclusively from atoms of Carbon and hydrogen connected by single bonds Ã¯ æ '. All carbon atoms are tetraedral and sp 3 hybridized. The Alkanes are stable and non-reactive molecules to most chemical reagents. They have the general formula CNH2NÃ¯ Â © 2 cycloalcani are cyclical alcane structures. They have the general CNH2N formula. Most cycloalcanes are not deactivated to chemical reagents. However, three and four members rings are reactive due to the voltage of the ring and behave like alkenes. Related topics SP 3 Ibridization (A3) Conformational Isomers (D4) Cyclohalcan Alcani 29. Section B Ã ¢ â,¬ "Alkanes and Cycloalchanese B2 Design Structures CÃ ¢ â,¬" H Bond There are several ways to draw organic molecules. A molecule as the omission etane can be drawn showing every c ... c and cÃ ¢ â,¬ "h bond. However, this becomes boring, especially with more complex molecules, and it is much easier to lose ties h (Fig. 1). Skeletric A further simplification is often used where only carbon carbon bonds are the designs shown. This is a skeletal design of the molecule (Figure 2). With such drawings, it is understood that an atom Carbon is present in each binding junction and that each carbon has an attachment sufã ¬ (Figure 3). The key notes The alkene can be drawn more quickly and efÃ¯â¬, if the H ties are omitted. The skeletal drawings show only the bonds c ... It is assumed that every bond junction has a carbon atom with SUFÃ¯Â¬ cienti water hydrogens p ER create four links. The alkyl groups (CNH2NÃ¯ Â © 1) are alcane portions of a more complicated structure. They can be drawn as a skeletal design, or as CH3, CH2CH3, et cetera Relative topic (B1) câ € "H Bond Omission Skeletal drawings H H H H H H H H H H H H H H H H H3C CH3 = Fig. 1. Ethrane. C c h Skeletal design of cyclohexane. 30. B2 â€ "Disegno Structures 21 alkyl groups Alkyl groups (CNH2Nï © 1) are alkane substitutes of a complex molecule. The simple alkyl groups can beIn skeletal form (Figure 4a), or as CH3, CH2Ch3, CH2Ch2Ch3, et cetera. (Fig. 4b). Note how the CH3 groups were written in FIG. 5. The structure in Fig. 5a is more correct than the structure in Fig. 5b because the bond shown is between the coals. H c c c c h h h h h h h h h h h h h h h h h f fig. 3. Skeletal design of butane. H3C CH2CH2CH3 CH3A) or B) Fig. 4. Drawings of an alkyl substituted cyclohexane. CH3 CH2Ch2Ch3 H3C CH3 CH2CH2CH3 CH3A) B) Fig. 5. (a) Correction of the correct representation of the methyl group; (b) Incorrect deduction of the methyl group. 31. Section B â¨¬ "Alkanes and Cycloalkanes B3 Nomenclature Simple Alkanes The names of the simplest straight chain alkanes are shown in Fig. 1. Branched alkanes Branched alkanes are alkanes with alkyl substitutes protruding from the main chain. They are named by the following procedure: Key notes The names of the 10 simple simple alkanes are methane, ethane, propane, butane, pentane, hexane, heptane, octane, grandfather, and decans. Branched alkanes have alkyl substitutes protruding from the main chain. When naming a branched alkane, it identifies the longest chain and number from the end closest to the point of the branch. Identifies the replacement and its position on the longest chain. The name is N-Alkylalkane where n is the location of the substitute, alkyl is the substitute and alkane is the longest chain. If there is more than one substitute present, the substitutes are listed in alphabetical order. Identical substitutes are identified by price them with di-, tri-, tetra, etc., but the order of naming still depends on the alphabetical order of the substitutes themselves. If there are two different substituents at equal distances on both ends of the chain, the substituent with the alphabetical priority has the lowest numbering. This rule can be supported if there are several substitutes placed in this way. Cycloalkanes are named according to the number of carbon atoms that make up the ring, i.e. cyclopropane (C3H6), cycllobutane (C4H8), cyclopentane (C5H10), cyclohexane (C6H12), etc. Cycloalkanes attached to an alkane are usually named as such. Cycloalkanes is considered the parent system and the alkane group is an alkyl substitute (i.e. alkylcyclolchanes). However, the opposite is true if the alkaline portion has more carbon atoms than the cycloalkanes where the cycloalkane is considered a substitute for the alkaline portion (i.e. n-cycloalkylalkane). Cycloalkanes with different substitutes are numbered so that the substituent with alphabetical priority is in position 1. The numbering shall then be carried out in such a way that the total of the substituted positions is minimal. Related topic Deition (B1) Simple branched alkanes Multi-branched cycloalkanes Multi-branched cycloalkanes 32. Ã¢- Identify the longest chain of atoms of In the example shown (Fig. 2a), the longest chain consists of carbon atoms Ã¯â¬ and a pentane chain; Ã¨- Number the longest carbon chain, longest, from the nearest end to the branch point (Fig. 2b); • identify carbon with the branching group (number 2 in Fig. 2b); â° identify and appoint the branching group. (This example is CH3. The branching groups (or their substitutes) are called alkyl groups (CnH2nÎ©1) rather than alkanes (CnH2nÎ©2). Therefore, CH3 is called methyl and not methane.) â° Name of the structure first identifying the substitute and its position in the chain, then calling the longest chain. The structure of Fig. 1 is called 2-methylpentan. Note that the substitute and the main chain are a complete word, i.e. 2-methylpentane rather than 2-methylpentane. Multi-Ramo If more than one alchil substitute is present in the structure, alkanes substitutes are called alphabetically, numbering again from the end of the chain closer to the substituents. The structure of figure 3 is 4-etil-3-metilottano and not 3-methyl-4-ethylene. If a structure has identical substitutes, then the preï¬~xes di-, tri-, tetra-, etc. are used to represent the number of substitutes. For example, the structure of figure 4 is called 2.2-dimethylpentan and not 2-methyl-2-methylpentane. Nomenclature B3 23 H3C CH3CH4 Esano Eptano Octano Nonano Decano Metano Etano Propano Butano Pentano Fig. 1. Nomenclature of simple alkanes. H3C CH2 CH2 CH2 CH3 CH3 H3C CH2 CH2 CH2 CH3 CH3 35 b) 4 a) 1 2 Fig. 2. a) identify the longest chain; b) number the longest chain. CH3 CH3 CH3 H3C 3 1 2 7 5 6 methyl 4 8 ethyl Fig. 3. 4-etil-3-methylottano. H3C CH3 H3C CH3 3 1 2 4 Fig. 4. 2.2-dimethylpente. The 33rd Prizes of-, tri-, tetra- etc. are used for identical substitutes, but the order in which they are written still depends on the alphabetical order of the substitutes themselves (i.e. ignoring the di-, tri-, tetra-, etc.). For example, the structure of figure 5 is called 5-etil-2,2-dimethyldecano and not 2.2-dimethyl-5-etyldecano. Identical substitutions can be found in different positions in the chain, but the same rules apply. For example, the structure of figure 6 is called 5-etil-2,2,6-trimethyldecano. In some structures, it is difficult to decide from which extreme of the chain to count. For example, two different replacements could be placed at the same distance from both ends of the chain. In this case, the group with alphabetical priority should be given the lowest numbering. For example, the structure of figure 7a is 3-etil-5-methylptano and not 5-etil-3-methylptano. However, there is another rule that may have precedence over the previous rule. The structure (Fig. 7c) has ethyl and methyl groups placed equally from each end of the chain, but there are two methyl groups for a ethyl group. The numbering must be chosen so as to obtain the smallest total. In this example, the structure is called 5-etil-3,3-dimethylptano (Fig. 7c) rather than 3-etil-5.5-dimethylptano (Fig. 7b) since 5Ï©3±3 = 11 is less than= 13. Cicloalcani Cicloalcani24 Section B Â «Alcane and cycloalcanes H3C CH3 CH2CH3 CH3 CH2CH3 5 10 1 2 Fig. 5. 5-ETIL-2,2-dimethildheal. H3C CH3 CH2CH3 H3C CH3 CH2CH3 CH3 CH3 1 2 5 10 Fig. 6. 5-ETIL-2,2,6-trimethildecan. CH3 CH2CH3 ETILMETRE 135 CH3 CH2CH3 CH3 CH2CH3 H3C H3C ETIL B) Methyl 1357 1 3 57 Methyl 7 ETIL C) Fig. 7. (A) 3-ETIL-5-methyl retaining; (b) incorrect numbering; (c) 5-ethyl-3,3-dimethyleptane. c) d) a) b) fig. 8. (a) cyclopropane; (b) cyclobutane; (e) cyclopentano; (d) cyclohexane. 34. B3 - Nomenclature 25 The branched cycloids consisting of a cyclohalcan fraction linked to an Alcane hamlet are cycloesani usually denominated in such a way that the cycloalcan is the mother system and the Alcani hamlet is considered an alkyl substitute. Therefore, the structure of Fig. 9a is methylcycloesano and not the cyclohesilmethane. Note that it is not necessary to set the cyclohalcan ring when there is only one replacement. If the Alcano fraction contains more carbon atoms of the ring, the Alcano hamlet becomes the parent system and the cyclohalcan group becomes the substitute. For example, the structure of fig. 9b is called 1-cyclohexile and not optylecloesano. In this case, the numbering is necessary to identify the position of the cyclohalcan on the Alkanis chain. Multiracian branched cycloalcanes having different substituents are numbered so that the alkyl cyclohalcan substituent with alphabetical priority is in place 1. The numbering of the rest of the ring is then carried out so that the replacement positions are at a minimum. For example, the structure of Fig. 9c is called 1-ethyl-3-methyl-cyclohexane rather than 1-methyl-3-ethylcycloesan or 1-ethyl-5-methylcycloesano. The surname is not correct since the total obtained by adding the replacement positions is 5 ^ 1 ^ 6 higher than the total obtained with the correct name (ie 1 ^ 3 ^ 4). 8 CH3A) b) e) 1 1 3 5 Fig. 9. (A) MethylCycloesano; (b) 1-cyclohesilottano; (c) 1-ETIL-3-methylcycloesano. 35. SECTION C â € "FUNCTIONAL GROUPS C1 Recognition of functional groups DeÃ¯zione A functional group is a portion of an organic molecule consisting of atoms other than carbon and hydrogen, or containing links different from bonds C- and CH . For example, the ethane (fig. 1a) is an alkano and does not have a functional group. All atoms are carbon and hydrogen and all the ties are CÃ ¢ Â¡c and cÃ ¢ Â¡h. The ethanoic acid instead (fig. 1b), has a part of the molecule (box part) which contains atoms other than carbon and hydrogen, and ties different from the CÃ ¢ Â¡h and from the CÃ ¢ Â¡â B.C. This portion of the molecule is called functional group, in this case carboxylic acid. Municipalities The following are some of the most common functional groups in the chemistry of organic functional groups. Ã ¢ â- functional groups containing only carbon and hydrogen (fig. 2); Key notes Groups are portions of a molecule that contain atoms other than carbon and hydrogen, or which contain bonds other than c ... c... and there is "h. Some of the most common functional groups of organic chemistry are alchenes, alkynes, aromatic, nitrile, amines, ammides, Nitro compounds, alco-phores, phenols, etherics, aldehydes, chetons, esteryl acids, chlorides, chlorides, chlorides Related Topics Deition (B1) Drawing structures (B2) Functional groups Alifatic and aromatic (C2) Common functional groups (C2) Common functional groups Deition H3C CH3 H3C C O Oh or Carboxylic Acid Functional Group a) A) Fig. 1. (a) Ethrane; (b) ethanic acid. (b) fig. 2. (a) alkenes; (b) Alkyne; (c) aromatic. 36. 28 Section C â â â â â â â– Functional Groups containing nitrogen (figure 3); â- Functional groups involving individual ties and containing oxygen (figure 4); â- Functional groups involving double ties and containing oxygen (Figure 5); â- Functional groups containing a halogen atom (Figure 6); â- Functional groups containing sulphur (figure 7). (a) (d) 3. (a) nitrile; (b) Amine; (c) admire; Nitro. (b) fig. 4. (a) alcohol or alkalo; (b) ether. (c) (b) 5. (a) aldehyde or alkaline; (b) ketone or alcanone; (c) carboxylic acid; (d) carboxylic acid chloride; (e) carboxylic acid anhydride; (f) foreign; (g) admire; (h) phenolic. (a) c) fig. 6. (a) arilic halide (x ïf, cl, br, i); (b) halogenous alkyl or alogenoalchane (x = f, cl, br, i); (c) carboxylic acid chloride. (b) fig. 7. (a) tile; Thioigh. 37. Section C â Aliphatic functional groups can be classified as aliphatic or aromatic. A group of functional aliphatic groups is one in which there is no aromatic ring directly connected to the functional group (Fig. 1A and B). Aromatic A functional aromatic group is one in which an aromatic ring is directly connected to the functional groups of the functional group (figure 1C and D). There is a complication involving esters and starches. These functional groups are deï¬, as aromatic or aliphatic, depending on whether the arilic group is directly connected to the end of the carbonyl of the functional group, that is, ARâ € "Coâ €" x. If the aromatic ring is also attached to the heteroatom, then the ester or the amide is classified as aliphatic admide (figure 2). Key notes The functional groups are deï¬, as alifatic if there is no aromatic ring directly connected to them. It is possible to have an aromatic molecule that finds an aliphatic functional group if the aromatic ring is not directly connected to the functional group. The functional groups are deï¬ that are aromatichave an aromatic ring directly connected to them. In the case of esters and starches, the aromatic ring must be attached to the side of the charcoal of thegroup. If the aromatic ring is attached to heteroatom, functional groups are defined aliphatic. Corrent themes Recognition of functional groups (C1) Aromatic functional groups Aliphatic functional groups CH Ch3 C or CH3 H3C CO2CH2CH3 C or CH3 CO2H b) a) d) c) Fig. 1. (a) Aliphatic ketone; (b) aliphatic ester; (e) aromatic carboxylic acid; (d) aromatic ketone. C o o o h3c c o or ch3 nh c o h3c n or ch3 a) b) c) d) fig. 2. (a) aromatic foreign; (b) aliphatic ester; (e) aromatic amid; (d) Aliphatic amid. 38. SECTION C â € "Functional groups C3 Intermolecular bonding deÃ¯â¬Nition The intermolecular link is the link interaction that takes place between different molecules. This can take the form of ionic bond, hydrogen bond, dipolo interactions or van der doals interactions. These binding forces are weaker than covalent bonds, but they have an important impact on the physical and biological properties of a compound. Key notes The intermolecular link takes place between different molecules. This can take the form of ionic ties, hydrogen ties, dipolo interactions and van der doals interactions. The type of binding depends on the functional groups present. Ionic bonds are possible between ionized functional groups such as carbooxylic acids and amines. The intermolecular hydrogen bond is possible for alcohols, carboxylic acids, amides, amines and phenols. These functional groups contain a hydrogen atom linked to nitrogen or oxygen. The connection with the hydrogen involves the interaction of the partially positive hydrogen on a partially negative molecule and heteroatom on another molecule. It is also possible to tie hydrogen even with elements other than nitrogen or oxygen. Depiece interactions are possible between molecules with polarizing ties, in particular the carbonyl group (cÃ -o). These bonds have a dipole and molecules can align themselves so that their dipolo moments are parallel and in opposite directions. Ketones and aldehydes are able to interact through dipole interactions. The interactions of Van der Waals are weak intermolecular bonds between regions of different molecules that carry positive and negative transient loads. These transitional offices are caused by the random Ã¯s of the electrons. Alcani, alkeans, alchini and aromatic rings interact through the interactions of Van der Waals. Related topic Recognition of functional groups (C1) Depiolo interactions deÃ¯â¬tion Ionic bond Bonding of hydrogen van der Waals Interactions 39. C3 Â «Intermolecular bond 31 Ionic bond The ionic bond takes place between molecules having opposing charges and involves a € ™ Electrostatic interaction between the two opposite charges. The functional groups that ionize more easily are amines and carboxylic acids (fig. 1). The ion tie is possible between a molecule containing an ammonium ion and a molecule containing a carboxylate ion. Important natural molecules that occur in in contain both groups – amino acids. Both of these functional groups are ionized to form a structure known as zwitterion (a neutral molecule that carries both a positive and negative charge) and intermolecular ionic bonding can occur (Fig. 2). Hydrogen bond can occur when molecules have a hydrogen atom attached to a heteroatom such as nitrogen or oxygen. The common functional groups that can participate in the hydrogen association are alcohols, phenolics, carboxylic acids, amides and amines. Hydrogen bond is possible thanks to the polar nature of the N–H or O–H bond. Nitrogen and oxygen are more electronegative than hydrogen. As a result, heteroatom gets a slightly negative charge and hydrogen gains a slightly positive charge. The hydrogen bond involves the partially charged hydrogen of one molecule (the bond donor H) that interacts with the partially loaded heteroatom of another molecule (the bond receptor H) (Fig. 3). Dipolo-dipolo-dipolo interactions are possible between polarized bonds other than N-H interactions or O-H bonds. The most likely functional groups that can interact in this way are those that contain a carbonyl group (C).O). Electrons in the carbonyl bond are polarized towards the most electronegative oxygen such that oxygen obtains NR H NR H NR H CR O OH CR O Amine Ion Carboxylic Acid +H +H -Hb) Carboxylate ion a) Fig. 1. a) Ionization of an amine; b) ionization of a carboxylic acid. H3N C O R O H3N C O R O H3N C O R O R O Fig. 2. intermolecular ion bonding of amino acids. O H O H O H O H O R Hδ+ δ+ δ- δ- δ+ δ- Fig. 3. Intermolecular connection of hydrogen between alcohols. 40. a slight negative charge and carbon gains a slight positive charge. This results in a dipole moment that can be represented by the arrow shown in Fig. 4. The arrow points at the negative end of the time of the dipole. Molecules containing dipole moments can align with each other so that the dipole moments are in opposite directions (Fig. 4b). Van der Waal The Waals van der Waals interactions are the weakest of intermolecular bond forces interactions and involve the transitory existence of partial charges in a molecule. Electrons move continuously unpredictablely around any molecule. At any time, there is a slight excess of electrons in one part of the molecule and a slight deficit in another part. Although accusations are very weak and fluctuate around the molecule, they are strong enough to allow weak interaction between molecules, where opposite charging regions in different molecules attract each other. Alcan molecules can interact in this way and the force of interaction increases with the size of the alcan molecule. Van der Waals interactions are also important foralkynes and aromatic rings. The types of molecules involved in this form of internal bond are molecules of "fat" that do not dissolve easilyWater and such molecules are defined hydrophobic (obtivating). The hydrophobic molecules can dissolve in non-polar and hydrophobic solvents due to the interactions of Van der Waals and therefore this form of intermolecular bonding is sometimes defined as a hydrophobic interaction. 32 Section C Ã ¢ â,¬ "Functional groups Cracrorrora) b) Ãž '+ Ãž'- fig. 4. (a) dipolo moment of a ketone; (b) intermoleculecular dipole - dipole interaction between ketones. 41. Section C Ã ¢ â,¬ "Functional groups properties and reactions Property and reactions The chemical and physical properties of an organic compound are determined by the type of intermolecular binding forces present, which in turn depend on the present functional group. Holyecule as Ethane has At low boiling point and is a gas at room temperature because its molecules are linked together by weak van der doals forces (figure 1a). On the contrary, methanol is a liquid at room temperature as hydrogen bonding is among the alcohol functional groups (Figure 1b). The polarity of the molecules depends on which functional groups are present. A molecule will be polar and has a dipolo moment if it contains polar functional groups such as alcohol, amine or ketone. The polarity also determines the solubility in different solvents. The polar molecules prefer to dissolve in polar solvents such as water or alcohols, while the non-clean molecules prefer to dissolve exclusively envisaged as ether and chloroform. The polar molecules that can dissolve into the water are defined hydrophilic (watering water) while non-polar molecules are defined hydrophobic (water hate). Key Notes The presence of functional groups affects these properties as melting points, boiling points, polarities, dipole moments and solubilities. The molecules with strongly polar functional groups tend to have higher fusion points and boiling points with respect to molecules with non-polar functional groups and prefer to dissolve in polar solvents rather than non-polar solvents. The types of reactions that compounds are determined by the types of functional groups present. The functional groups undergo characteristic reactions, but the rates of these reactions are influenced by stereoelectronic factors and conjugation. Related topics Recognition of functional groups (C1) Acid force (G2) Force force (G3) Conjugate-cuisine (H11) Î ±, Î²-Î²-Athehyhydes and unsaturated ketones (J11) HC HC HH CH3C HHH van der? OC HHH HC HC OHH HYDROGEN BONDING HH A) b) Fig. 1. (a) VAN DER WAALS intermolecular (methane); (b) Bonding of intermolecular hydrogen (methanol). 42. 34 SECTION C Ã ¢ â,¬ "Functional groups in most cases, the presence of a polyal functional group will determine the physical properties of the molecule. However, this is not always true. If a molecule has a polar group like A carboxylic acid, but has a long alkanic chain The molecule will tend to be hydrophobic. Reactions The vast majority of organic reactions takes place in functional functional groups They are characteristic of this functional group. However, the functional group's reactivity is influenced by stereoelectronic effects. For example, a functional group can be surrounded by bulky groups that hinder the approach of a reagent and slow down the reaction speed. This is indicated as a sterial shielding. Electronic effects can also in-eachisale the speed of a reaction. Adjacent groups may in use the reactivity of a functional group if they take electrons or donate electrons and inifuge the electronic density within the functional group. The conjugation and aromaticity also have an important effect on the reactivity of functional groups. For example, an aromatic keton reacts to a speed different from an aliphatic ketone. The aromatic ring is conjugated with the carbonyl group and this increases the entire system stability, making it less reactive. 43. Section C â € "Functional groups C5 Nomenclature of the compounds with functional groups Key Notes The main chain (or parent chain) must include the functional group. The presence of functional groups is indicated by adding the relative suffix for that functional group. The position of the functional group must be defined and the other substitutes must be identified as described for the Alkanes. The alkens and alchini are desired by adding the Sufi-Xes -ene and -yne respectively. The stereochemistry of the alkens could need to be defined. The simplest aromatic ring is benzene. Other important aromatic molecules include toluene, phenol, aniline, benzoicacid and benzaldehyde. Any name can be used as a parent name if other substituents are present. The position of the substituents is determined by the numbering around the ring or, in the case of disaster aromatic rings, from the vegetable nomenclature, destination, para. The alcohols (or alkanol) are given the sufix -anol. Alkyl ethers and halides are not identified with Sufi-X. These functional groups are considered substitutes of the main Alkanean chain. The halogen of a halogen alkyl is a halogen substitute, while the ether is an alkoxyard substitute. The aldehydes (or alkaneals) are identified by the Sufi-X -Anale. The ketones (or alkamines) are identified by Sufi-X -Anone. The aldehydes must always be in position 1 of the main chain and must not be numbered. Carboxylic acids and acid chlorides are identified by adding the sufix -anoic acid and anoile chloride respectively. Both of these functional groups are always at the end of the main chain and do not require numbering. Foreign amendments takes its name from carboxylic acid and the parent alcohol. The alkanoic acid is renamed alkanoate and the alkanol is treated as an alkyl substitute. The combined denomination is alkyl alkanoate. There must be a space between the two parts Name. Amides are defined as alkanamides based on the parent carboxylic acid. If amide nitrogen has alkyl groups, these are considered as alkyl substitutes. The symbol N is used to indicate that the substitutes are running. function. Nitrogen and not another part of the Alcanamide skeleton. Simple amines can be named by placing the sufÃ¯â¬ x -ylamine after the name of the root. Other amines are appointed considering the Amino Group as a subdituent of the main chain in the same way as halides and alkyl ethers. ETERNESS AND ALCHILE GENERAL GENERAL RULES ALTI AND ALKYNES AROMATICS ALDEIDES AND KETONS Carboxylic acids and acid chlorides Amidine Amines 46. 36 SECTION C Ã ¢ â,¬ "Functional groups General rules Many of the nomenclature rules for molecules containing a functional group , but extra rules are needed for DeÃ¯â¬ the type of functional group present and its position within the molecule. The main rules are the following: (i) the main chain (or parent) must include the functional group, and therefore it may not necessarily be the longest chain (fig. 1); (ii) the presence of some functional groups is indicated by replacing - to the parent alkaline chain with the following sufÃ¯¬: functional sufÃ¯â ¬ group x Functional Group Sufã¯â X Alkene -Enne Alkyne -Yne Alcohol -Al Aldehyde -Anal Ketone -Anone Carboxylic acid-acid acid-high acid acid chloride -OYL chloride amine chloride -Ylamine. The example in fig. 1 is a but Anolus. (iii) The numbering must start from the end of the main chain closest to the functional group. Therefore, the numbering should position the alcohol (Figure 2) to position 1 and not position 4. (iv) The position of the functional group must be deÃ¯â¬ nered in the name. Therefore, alcohol (figure 2) is a 1-butanol. (v) Other substituents are appointed and ordered in the same way for the Alkanis. Alcohol (Figure 2) has an ethyl group in position 2 and then the full name for the structure is 2-ethyl-1-butanol. The Tioli are appointed by adding the sufÃ¯â¬ x Thiolo to the name of the main alkaline chain. The ThioEthers are appointed in the same way as the ethers in which the main alkyl substituent is considered the main chain with a subdituent alkillo. Simple teters can be identified as DialkylsulÃ¯â¬ des. Related Topics Nomenclature (B3) Gurthectionary Isomers - Alkenes and Cycloalcanes (D2) Tioli and Thioetherchers OH CH3 OH CH3 CH3 CH3 Main Chain = 5C Errata Main Chain = 4C Fig. 1. Identification of the main chain. Or h CH3 or H CH3 CH3 CH3 CH3 2 4Correct 3 3 1 Incorrect 124 Fig. 2. Longest chain number. 45. Nomenclature of functional groups 37 There are other rules designed for specified situations. For example, if the functional group is an equal distance from both ends of the main chain, the numbering starts from the end of the chain closest to any substituent. For example, alcohol (figure 3) is 2-methyl-3-pentanol and not 4-methyl-3-pentanol. Alcheni and Alkhenes and Alkynes have sufã¯â¬ age -ene and -yne respectively (figure 4). With Alkyres some alkenes is necessary deÃ¯â¬ the the double link (subject D2). Aromatics The best known aromatic structure is benzene. If an alkane chain is connected to a benzene molecule, benzene, The Alcano chain is usually considered an alkyl substituent of the benzene ring. However, if the Alcano chain contains more than six coals, then the benzene molecule is considered a phenyl replacement of the alkaline chain (Figure 5). Note that a benzile group consists of an aromatic ring and a methylene group (fig. 6). Benzene is not the only main name that can be used for comfortable aromatic (Figure 7). H O CH3 H3C H O O CH3 H3C CH3 CH3 CH3 Incorrect 12 3 4 3 2 4 5 1 5 Correct Fig. 3. 2-methyl-3-pentanol. H3C C C C CH3 CH3 CH3 CH CH CHH3C CH3 CH3 CH (CH3) H3C CH2CH3 1 A) b) c) 1 53 3 34 4 45 1 22 2 Fig. 4. (a) 2-butene; (b) 3-methyl-2-pentene; (c) 4.4-dimethyl-2-powder. CH3 CH3 CH3 CH3 A) 1 2 3 4 b) 5 Fig. 5. (a) ETILBENZENE; (b) 1-phenyl-2,3-dimethylpental. CH2 Fig. 6. Benzil Group. 46. â €