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Nomenclature of cyclic organic compounds pdf

The nomenclature of substituted benzene ring compounds is less systematic than that of alkans, alkenes and alkynas. Some substituted compounds are appointed by using a group name as the prefix of benzene, as shown by the combined names listed below. However, most of these compounds are called unique unique names. There is no simple alternative to memorization in learning names. There are two commonly occurring substitute groups that include benzene ring phenyl, abbreviated as Ph, and benzyl, abbreviated as Bn-. These are examples of their use. Be careful not to mix the phenyl (pronounced phenyl) group with the compound phenol (pronounced weak fan). A general and useful generic label supplementing its use in the R-alkyl group for ar-agarakult group (any aromatic ring). If more than one substitute element is present on a benzene ring, the relative location of the substitute continuents shall be indicated by the numbering of substitute CARBON markers or by other marking. For disubstituted benzenes, ortho, meta & para prefixes are usually used for a 1.2- or 1.3- or 1.4-relationship. In the following examples, the first line of compounds shows this use in red. Some disubstituted toluene have a unique name (e.g. xylene, cresol & toluidine) and their isomers are usually referred to by the orthopaedic, meta- or para-prefix. Some disubstituted benzenes have unique names given to specific isomers (e.g. salicylic acid & resorcinol). Finally, if there are three or more substitute groups, the ring must be numbered in such a way as to assign the lowest possible numbers to the substitutes, as shown in the last example row. Substitute control is listed alphabetically in the final name. If the substitution is symmetrical (the third example from the left), the numbering corresponds to the alphabetical order. Many organic compounds found in nature or created in laboratories contain rings of carbonatoms with distinctive chemical properties; these compounds are called cycloalcans. Cyclones contain only carbon-hydrogen bonds and carbon-carbon joints, but in cycloalcans, carbon atoms are connected in a ring. The smallest cycloalcan is cyclopropane. Figure 1: On the first four cycloalks, if you count the serors and hydrogens, you will see that they no longer correspond to the general formula CnH2n+2CnH2n+2. By connecting the carbon atoms in the ring, two hydrogen atoms were lost. The general formula for cycloalcan is CnH2nCnH2n. CnHnCnH2n. Cyclic compounds are not all flat molecules. On all the cycloalcans, the cyclontan up, there are puckered rings. Cyclohexane, for example, has a ring structure that looks like this: Figure 2: This is known as the shape of the cyclohexane chair, which vaguely resembles a chair. Note: The cyclohexane molecule is constantly changing, the atom on the left side, which is currently pointing downwards, turns upwards, and the atom on the right Down. During this process, another (slightly less stable) form of cyclohexane is formed, called the ship form. In this arrangement, both atoms either point upwards or downwards in addition to saturated cisclic hydrocarbons, cycloalcans may have several surrogate or functional groups that further determine their unique chemical properties. The most common and useful cycloalcans are organic chemistry cyclontan and cyclohexane, although other cycloalcans varying in carbon dioxide numbers can be synthesized. Understanding cycloalcans and their properties is crucial to many of the biological processes that occur in most living cycloalcan-like structures. drawing012.gif drawing013.gif cholesterol.gif glucose (6 carbon sugars) Ribose (5 carbon sugars) Cholesterol (polycyclic) Although polycyclic compounds are important, they are extremely complex and typically have common names accepted by IUPAC. However, common names do not generally follow the basic rules of the IUPAC nomenclature. The general formula for cycloalcans is CnH2nCnH2n, where nn is the number of carbons. Cycloalcans are named according to a simple set of rules based on the same basic steps of naming alkans. Cyclic hydrocarbons have a prefix: cyclic. Parent chains for simplicity, cycloalcan molecules can be drawn in the form of skeletal structures, in which each intersection of two lines is assumed to be the carbon atom with the right number of hydrogens. 2 (1).gif equal to 4.gif cyclohexane.gif cycloalkane molecular formula basic structure cyclopropane (C3H6\0 cyclopropane.gif C Cyclontan .gif C5H10C5H10 cyclopentane.gif cyclohexane C6H12C6H12 cyclone .gif cyclo c7H14C7H14 cycloheptane.gif C8H16C8H16 cyclaman.gif Cyclononane C9H18C9H1 cyclononane.gif C10H20C10H20 cyclodekan.gif IUPAC nomenclature rules specify the cycloalcan used as a parent. The mother chain has the most carbonates. If you're on two cycloalks, use the cycloalcan, where there's a higher number of carbon in the mother chain. If there is an alkyl straight chain that has a higher number of carbons than cycloalcan, then the alkyl chain should be used as the primary parent chain. The cycloalcan acting as a substitute for the alkyl chain has an -yl ending and should therefore be named as cycloalkyl. Cycloalcan-cycloalcan-cyclopropane-cyclobutyl-cyclopentane cyclohexane cyclohexane cyclohexyl-cycloheptane-cycloheptane-cyclohept heptylcyclooctane cyclooctyl cyclononane cyclononanyl cyclodecane cyclodecanyl Example 1 drawing020.gif The longest straight chain contains 10 carbons compared to cyclopropane, containing only 3 coals. Since cyclopropane is a substitute, it is called cyclopropyl substitute alkane. Define functional groups or other alkyl groups. Number of carbon dioxide in the cycloalkan to keep the number of CO2 groups with functional groups or alkyl groups as low as possible. Coal with more substitutes should have a lower number than a coal with a replacement or functional group. One way to make sure that the lowest possible number is assigned is carbon numbering, so that when adding numbers corresponding to the surrogate continus, their sum is as low as possible. drawing01 (2).gif(1+3=4) NO drawing02 (4).gif(1+5=6) When naming cycloalcan, the substic and functional groups shall be alphabetical. noname20.gif drawing03.gif (e.g. 2-bromine-1-chloro-3-methyl cyclonethane) The number of carbon with the highest priority functional group shall be given according to alphabetical order. A hyphen must be placed between the numbers and the surrogate name. After the carbon number and hyphen, the surrogate name can follow. If there is only one substitute element in the nut chain, there is no need to indicate the number of replacement carbonates. (e.g. 1-chlorcikhexane or cholorocyclohexane acceptable) drawing3.gif If there are several functional groups on a carbon, you must describe the number of carbon two, three or four times, depending on how many of the same functional group are present on that carbon. The numbers must be separated by commas and the name of the next functional group must be separated by a hyphen. If there are two of the same functional group, the name must have the prefix di. If there are three of the same functional group, the name must have a tri prefix. If there are four of the same functional group, the name must have the tetra prefix. However, these prefixes cannot be used to determine alphabetical priorities. There must always be commas between numbers and hyphens that are between numbers and names. Example 2 .gif noname21.gif (2-bromine-1,1-dimethylcyclohexane) Note that fluoro f precedes the m of methyl. Although di precedes f in alphabetical order, it is not used to define the alphabetical order. Drawing 307.gif (2-fluoro-1,1,-dimethylcyclohexane NOT 1,1-dimethyl-2-fluorochloroexane) 8) If the substitutes for cycloalcan are related by cis-sz or transconfiguration, place the configuration with the cis or trans setting in front of the name of the structure. 3D2.gif Blue=Carbon Yellow=Hydrogen Green=Chlorine Notice that chlorine and methyl group point in the same direction on the axis of the molecule; therefore these cis. drawing13.gif cis-1-chlorine-2-methylcyclopentane 9) After all functional groups and substitutes have been mentioned with the corresponding numbers, the name of the cycloalcan can be followed. The reactivity of cycloalcans is very similar to the reactivity of alkans, except for very small ones, especially cyclopropan. Cyclopropane is significantly more reactive than expected between the binding angles in the ring. Normally, if the carbon forms four joints, the angles of joint are about 109.5°. In cyclopropane, the binding angles are 60°. Electron pairs are so close together, there is a significant degree of repulsion between the bonding pairs connecting the carbonatoms, which makes it easier to break the bonds. Alcohol Substituents in Cycloalkanes Alcohol (-OH) substitutonyes are the highest priority in the carbon atom numbering iUPAC nomenclature. The substitute carbonatome shall be labelled 1. Molecules containing the alcohol group have an -ol ending, which indicates the presence of a group of alcohol. If there are two groups of alcohol, the molecule becomes a di-prefix before -ol (diol). If there are three groups of alcohol, the tri-prefix of the molecule will be -ol (triol), etc. Example 4 The alcohol substitute will get the lowest number, even if the two methyl groups are on the same carbon atom and would give 1 on the carbon atom as low as possible. The numbering of the place of replacement alcohol is unnecessary, since the ending -ol indicates the presence of a group of alcohol on carbon 1. drawing04.gif 2,2-dimethylcyclohexanol NO 1,1-dimethyl-cyclohexane-2-ol Example 5 drawing05.gif 3-bromine-2-methylcyclopentanol NO 1-bromine-cyclopentanol 2-methylcyclontan-2-2-ol Example 6 noname30 (1).gif Blue=Carbon Yellow=Hydrogen Red=Oxygen drawing06.giftrans-cyclohexane-1,2-diol Other substitutes for Cycloalkanek There are many other functional groups than alcohol, which are subsequently covered by an organic chemistry course, and determine the closing name of a molecule. The names of these functional groups will be described in detail later, just as their chemical properties can be described. Alkene -ene alkyne -yne alcohol -ol ether -ether nitrile -nitrile-nitrile-amine -amine-alketon -a carboxylic acid -oic acid-oate amide-amide - Although alkyns determine the end of the end of the molecule, alkane as a substitute for a cycloalcan is not possible because it alkynes the plane and would require carbon, which is part of the ring in the form of 5 bonds, giving the carbon bat a negative charge. pz1.gif However, on a substitutive cyclone with a triple bandage, it is possible if the triple joint is not directly connected to the ring. Example 7 pz2.gif ethynylcyclooctane Example 8 drawing6.gif 1-propylcyclohexane summary Define the mother chain: the mother chain contains the most carbonatomes. Number the substitutes for the chain so that the sum of the numbers is as low as possible. Name the substitutes and put them in alphabetical order. If the stereochemistry of the compound is visible, the orientation shall be indicated as part of the nomenclature. Cyclic hydrocarbons have a prefix ending in cyclo- and alcan, unless an alcohol substitute is present. When an alcohol substitute is present, the molecule has an -ol ending. Sauce alcohol: Oxygen and hydroxyl group bound to a substituted alkyl group. alkyl: A structure formed when a hydrogen atom is removed from an alkane. cyclic: Chemical compounds arranged in the form of a ring or closed chain form. cycloalcans: cyclic saturated hydrocarbons with a cnh general formula [2n]. Cycloalcans are alkans, in the form of a closed ring with carbonates. functional groups: Atoms or groups of atoms that replace hydrogen atoms in an organic compound, giving unique chemical properties to the compound and determining its reactivity. hydrocarbon: Chemical compound containing carbon and hydrogen atoms only. saturated: All the atoms that make up the compound are single-glued to other atoms, not double or triple bonds. frame structure: A simplified structure in which crossings between two lines can be assumed to produce a carbon atom with the right number of hydrogen. Problems Name the following structures. (Note: Structures are complex in terms of practice and are not found in nature.) 1) cyclodecane.gif 2) drawing08.gif 3) drawing09.gif 4)drawing2.gif 5)drawing4.gif 6)drawing7.gif 7)drawing010.gif Draw the following structures. 8) 1,1-dibrome-5-fluoro-3-butyl-7-methylcyclocaline 9) trans-1-bromine-2-chlorine-cykonopentane 10) 1,1-dibrom-2 3-d ichloro-4-propyl cyclobutan 11) 2-methyl-1-ethyl-1,3-dipropyl-cyclopentane 12) cycloheptane-1,3,5-triol Name of the following structures. Blue=Carbon Yellow=Hydrogen Red=Hydrogen Green=Oxygen Green=Chlorine 13)noname05 (1).gif 14)noname06.gif 15)noname07.gif 16)noname08.gif 17)noname09.gif 18)noname10.gif 19)noname11.gif for practical problems 1) cyclodekan 2) chlorocyclopen 6-methyl-3-cyclopropyl-decanase 5) cyclolitkinks or 1-chlorochlorocyclosopecan 6) 1,3-dibrom-1-
chloroc
chlorocan 2-fluorochloropeda 7) 1-cyclobutyl-4-isopropyl cyclohexane 8)drawing10.gif 9)drawing11.gif 10)drawing12.gif 11)drawing9.gif 12)drawing011.gif 13) cyclohexane 14) c cylohexanol 15) chlorochony 2,3-dimethylcyclohexanol 19) cis-1-propylpropicive-ikl-ichlorocyclone 19) cis-1-propyl-2-methyl-cyclopentane cis-1-propyl-2-methyl-pentcycloane

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