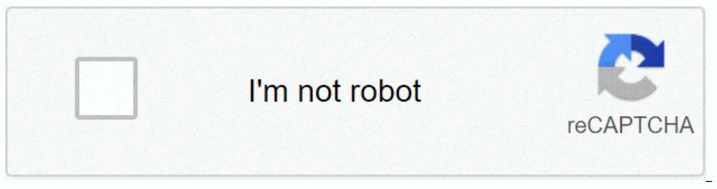

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How to name ethers and esters

Ethers & Esters Ethers are two simple hydrocarbon chains separated by an oxygen. Esters are the same, except they have a double-tbinded oxygen on the carbon next to the oxygen that separates the two hydrocarbon groups. Ethers tend to be very flammable and have been used as fuel additives, medicines, drugs and industrial solvents. Esters are present in many flavors and smells. The formula for an ether or an ester is basic hydrocarbon chains that sound a lot like the alkanes they make up. The functional groups go between the two hydrocarbon chains. ethoxyethane propoxybutane methylpropanoate ethoxy = 2C propoxy = 3C methyl = 1C ethyl = 2C Ethane = 2C butane = 4C propanoate = 3C pentanoate = 5C C2H5OC2H5 C 2H7OC4H9 CH3OOC3H5 C2H5OOC5H9 or CH3CH2OCH2CH3 or CH3 (CH2)2O (CH2)3CH3 or CH3COOCH2CH3 or CH3CH2COO (CH2)3CH3 There are generally two ways to name the most chemical substances, the IUPAC way and the common way. The IUPAC method was used above, however, the first example, ethoxyethane, can also be called dietary ether. Example three, methylpropanoate, can also be called methyl propyl ester. The general naming system is generally easier to remember. CH3CH2O(CH2)4CH3 CH3(CH2)3O(CH2)5CH3 CH3CH2COO(CH2)3CH3 CH3(CH2)4COO(CH2)7CH3 2C = ethoxy 4C = butoxy2C = ethyl 5C = pentyl 5C = pentane 6C = hexane 5C = pentanoate 9C = nonanoate ethoxypentane butoxyhexane ethylpentanoate pentylnonanoate or ethyl penis ether or butyl hexyl ether or ethyl esther or penises nonyl esther Esters are known for their distinctive odors and are commonly used for food flavor and flavors. The common formula of an ester is RCOOR'. Esters are shaped by reactions between an acid and an alcohol with the elimination of water. An example of this is the reaction of acetic acid with an alcohol, which produces a vinegar ester and water. The part included by the red circle represents the ethyl group of the alcohol and the part included by the green rectangle represents the aetate group of the acid. Esters are called as if the alkyl chain of the alcohol is a substitute. No number is assigned to this alkyl chain. This is followed by the name of the parent chain removed from the carboxy acid part of the ester with an e and replaced with the end -oate. Example Esters are shaped by reactions between an acid and an alcohol with the elimination of water. An example 1. First, identify the oxygen that is part of the continuous chain and bound to carbon on both sides. (On one side of this oxygen there will be a carbon present, but on the other hand there will not be.) 2. Secondly, start numbering the carbon chains on either side of the oxygen identified in step 1. 3. Next, use this format: [alkyl on side further from the carbon] (space) [alkanes on the side with the carbon] - (In this case: [methyl] [methane]) 4. Finally, change the end of the alkanes on the same side as the carbon from -e to -oate. (In this case: methyl methagoate) When an ester group is attached to a ring, the ester is named as a replacement on the ring. Other voters who exist on either side of the ester are mentioned in the same way they are on regular alkanes chains. The only thing you need to make sure of is putting the replacement name on the side of the name that matches the side of the ester it is on. CH3COOCH2CH2CH2CH2CH2CH3 References Leigh, G. J., H. Favre and Val Metanomski. Principles of Chemical Nomenclature A Guide to Iupac Recommendations (IUPAC Chemical Data Series). Malden: Blackwell Science, 1998. McNaught, A. D., and A. Wilkinson. Compendium of Chemical Terminology. 2nd ed. Blackwell Science, 1997. Vollhardt, K. Peter C., and Neil E. Schore. Organic Chemistry Structure and Function. New York: W. H. Freeman, 2007. Outside Links Name the following: Reply: propyl etanoate Answer: 3-bromopentyl 2-chlorobutanoate Answer: ethyl hexanoate Answer: ethyl 3-bromopentanoate Answer: 4-nitrogen displeasure acid or 4-nitrogen acid contributors Prof. Steven Farmer (Sonoma State University) Ethers are compounds with two alkyl or aryl groups bound to an oxygen atom, such as in the formula R1-O-R2. The ether functional group does not have a distinctive IUPAC overfix, so it is necessary to designate it as a replacement. To do this the common alkoxy alkoxy get names derived from their alkyl component (below): Alkyl Group Name Alkoxy Group Name CH3- Metiel CH3O- Methoxy CH3CH2 – Ethyl CH3CH2O – Ethoxy (CH3)2CH- Isopropyl (CH3)2CHO- Isop CH3)3C- tart-Butyl (CH3)3CO- tart-Butoxy C6H5- Phenyl C6H5O- Phenoxy Ethers can be called by forming each of the two carbon groups as a separate word followed by a space and the word ether. The -OR group can also be named as a substitute using the group name, alkox Example \(\PageIndex{1}\) CH3-CH2-O-CH3 called ethyl methyl ether or methoxyethane. The smaller, shorter alkyl group becomes the alkoxy substitute. The larger, longer alkyl group side becomes the alkanes base name. Each alkyl group on each side of the oxygen is numbered separately. The numbering priority is given to the carbon closest to the oxen. The alkoxy side (shorter side) has an -oxy ending with its matching alkyl group. For example, CH3CH2CH2CH2CH2-O-CH2CH2CH3 is 1-propoxycent optane. If there is cis or trans stereochemistry, the same rule still applies. Examples \(\PageIndex{2}\) \(CH_3CH_2OCH_2CH_3\), dietary ether (sometimes referred to as just ether) \(CH_3OCH_2CH_2OCH_3\), ethylene glycol dimethyl ether (glyme). Exercises \(\PageIndex{2}\) Try to name the following connections using these conventions: J J Tries to draw structures for the following connections: 2-penis 1-propyl ether J 1 -(2-propoxy)cyclopentene J Simple eaters get common names in which the alkyl groups bound to the oxygen are named in alphabetical order followed by the word eternity The upper-left example shows the common name in blue under the IUPAC name. Many simple eaters are symmetrical, in that the two alkiel voters are the same. It's named as dialkyl eaters. anisole (try naming anisole through the other two conventions. J) 1,2-epoxyethane, ethylene oxide, dimethyleneoxide, oxacyclopropane, furan (this compound is aromatic) tetrahydrofuran oxacyclopentane, 1,4-epoxybutane, tetramethyleneoxide, 1,4-dioxacyclohexane Exercise \(\PageIndex{2}\) Try to draw structures for the following compounds- 3-bromoanisole J 2-methyloxirane J 3-ethylfuran J In cyclic eaters (heterocycles), one or more carbon replaced with oxygen. Often it is called heteroatoms, when carbon is replaced by an oxygen or any atom other than carbon or hydrogen. In this case, the stem is called the ocsacycloalkans, where the prefix is oxa- an indication of the replacement of the carbon by an oxygen in the ring. These compounds are numbered starting at the oxygen and continue around the ring. For example, if a substitute is an alcohol, the alcohol has higher priority. However, if a subsidiary is a halide, ether has higher priority. If there is both an alcohol group and a halide, alcohol has higher priority. The number begins with the end closest to the higher priority division. There are eater eaters contains several ether groups called cyclical polythetes or crown eaters. It is also called using the IUPAC system. Sulphur analoges of eaters (R-S–R') are called sulfides, e.g. Sulfides are chemically more reactive than eaters, reflecting the larger core of sulfur relative to oxygen. References Schore, Neil E. and Vollhardt, K. Peter C. Organic Chemistry: Structure and Function. New York: Bleyer, Brennan, 2007. Winter, Arthur. Organic Chemistry for Dummies. Hoboken, New Jersey: Wiley, 2005. Pellegrini, Frank. Cliffs QuickReview Organic Chemistry II. Foster City, CA: Wiley, 2000 Name the following eaters: (Answers to problems above: 1. dietary ether; 2. 2-ethoxic-2-methyl-1 propane; 3. cis-1-ethoxy-2-methoxycyclopentane; 4. 1-ethoxy-1-methylsiclelohexane; 5. oksacyclopropane; 6. 2,2-Dimethyloxacyclopropane) Contributors When there is more than one allowable IUPAC name, the first name is preferred. Ethers There are two systems of IUPAC names for eaters. 1. Replacement names. The eaters are designated as alkoxyalkanes, with the senior component selected as the parent connection. So, #CH_3OCH_2 CH_2CH_3# is 1-methoxypropane. 2. Functional group names. The eaters are called alkyl alkyl eaters, with the alkyl groups in alphabetical order followed by the class name ether, each as a separate word. So, #CH_3OCH_2 CH_2CH_3# is methyl propyl ether. Esters Esters are named as alkyl alkanoates. The name of the alkyl group was written first, followed by the name of the acid with the end -ic acid replaced by the end -e. So, #CH_3CH_2COO-CH_3# is methyl propanoate (two words). Cyanides (nitriles) There are three systems of IUPAC names for nitriles. 1. As alkanenitriles. The end nitrile is added to the name of the alkanes with the same number of carbon atoms. So, #CH_3CH_2C≡# is propanenitrile. 2. If the compound is considered to be formed from a carboxylic acid with a trivial name (#RCOOH → RC≡N#), the end -ic acid is changed to -onitrile. Thus, #CH_3CH_2C ≡# is also called propionitrin (from propionic acid). 3. If alkyl cyanids. The name of the alkyl group precedes the class name cyanide. So, #CH_3CH_2-C≡# is ethyl cyanide (two words). words).