

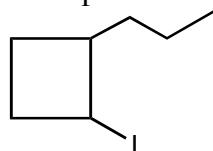
Naming Cycloalkanes: Nomenclature Examples*

Substituents on cycloalkanes are named using the rules for alkanes, except that on rings with only one substituent, no number is needed; otherwise numbering proceeds to produce the lowest number at the first point of difference.

Rule 1. Determine the parent. Count the number of carbon atoms in the ring and also in the largest alkyl substituent.

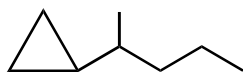
- a) If the number of carbon atoms in the ring is equal to or greater than the number in the largest substituent, the compound is named as an alkyl-substituted cycloalkane (see Example 1). If the number of carbon atoms in the ring is less than the number of carbon atoms in the substituent, it is named as a cycloalkyl-substituted alkane (see Example 2).

Example 1:



1-iodo-2-propylcyclobutane

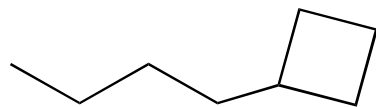
Example 2:



2-cyclopropylpentane

- b) If there is a tie between the number of carbons on the cycloalkane part of the molecule and the acyclic alkane part, choose the cycloalkane as the parent (main) chain.

Example 3:

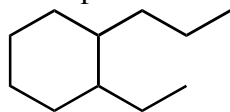


butylcyclobutane, not 1-cyclobutylbutane

Rule 2. Number and name the substituents. If two or more substituents are on a cycloalkane, start C-1 at a point of attachment such that that the *second* substituent has as low a number as possible. If there is still an ambiguity, number so that the third substituent has as low a number as possible. If there is still an ambiguity, continue as before until a point of difference is found.

- a) When two or more different substituents could receive the same number, number them by alphabetical order (see Example 3). Halogens are treated exactly like alkyl groups. (See also item b) below).

Example 4:

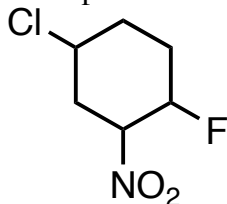


1-ethyl-2-propylcyclohexane, not 2-ethyl-1-propylcyclohexane

- b) Number the substituents on the cycloalkane, as in alkanes, so that you get the lowest numbering possible, and use alphabetical order only to order the presentation of the name. That is, in the example below, it should be called 4-chloro-1-fluoro-2-nitrocyclohexane, not 1-chloro-3-fluoro-4-nitrocyclohexane.

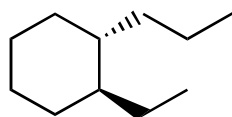
*Stereocenter carbons have been disregarded in examples 1-5 and will be covered in the Stereochemistry chapter; dashes and/or wedges would have to be shown to determine stereochemistry.

Example 5:

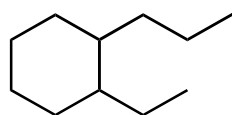


4-chloro-1-fluoro-2-nitrocyclohexane

Rule 3. Indicate the stereochemistry if possible. If there are two substituents on a ring, remember to indicate whether they are cis or trans to each other, provided the stereochemistry can be determined.¹



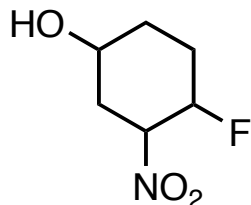
trans-1-ethyl-2-propylcyclohexane (You can see which stereoisomer it is.)



1-ethyl-2-propylcyclohexane (You can't see which stereoisomer it is.)

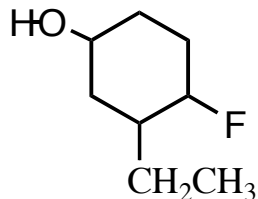
Name the following molecules.

1)



Name: _____

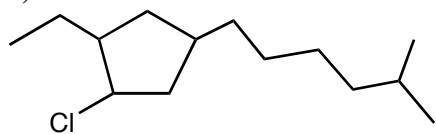
2)



Name: _____

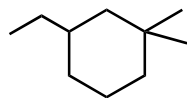
¹ In the Stereochemistry chapter we will use R and S notation to distinguish cis and trans isomers from each other; we can also use R/S configuration when there are more than two substituents on a ring (cis and trans won't usually work. See # 9 below however.).

3)



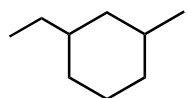
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4)



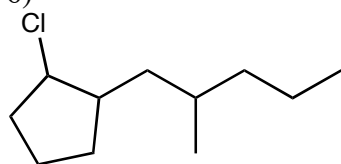
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5)



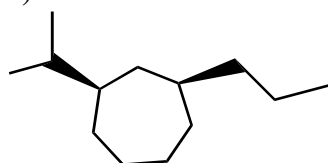
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6)



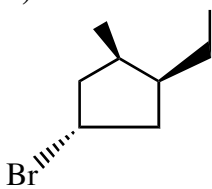
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7)



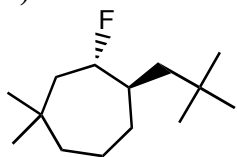
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8)



Name: _____

9)



Name: _____