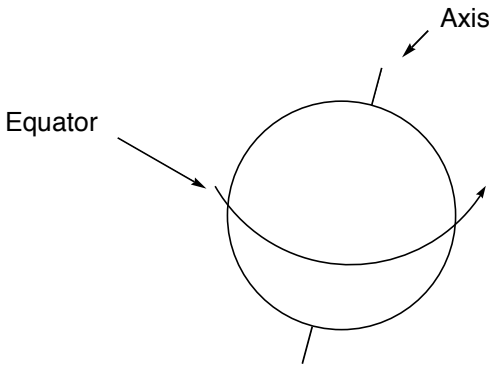
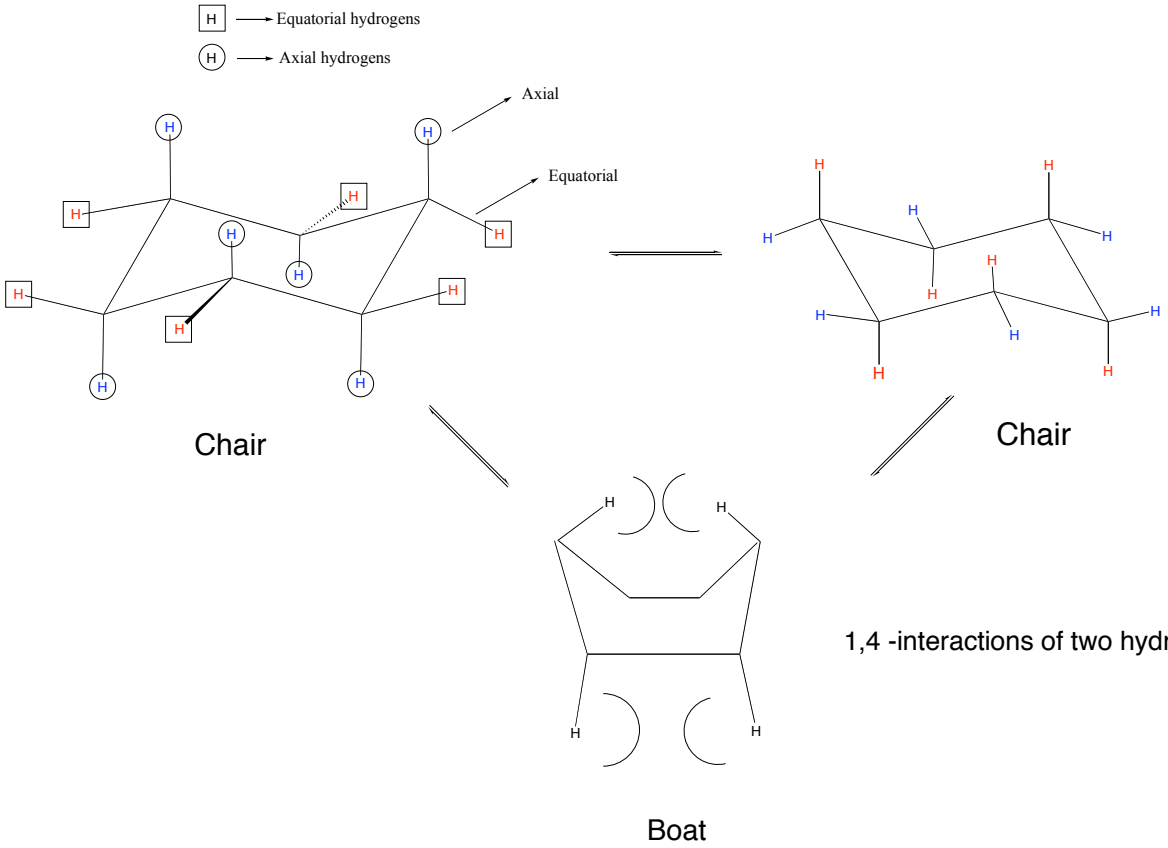
Review

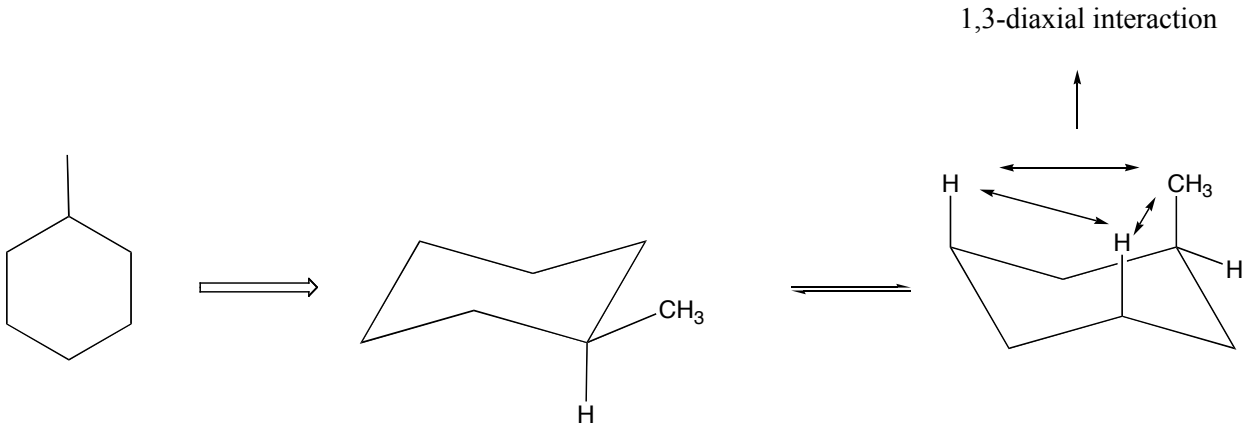


a globe



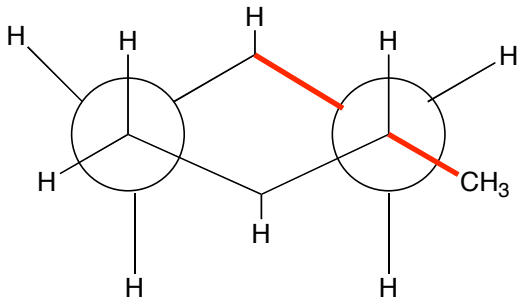
1,4 -interactions of two hydrogens

Substituted Cyclohexanes – Draw most stable conformation

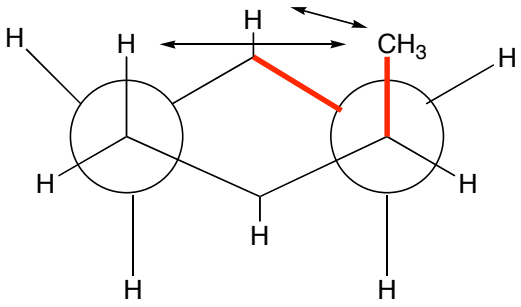


- Largest (bulkiest group close to ring) group generally placed equatorial – otherwise get unfavorable 1,3-diaxial interactions

- 1,3-diaxial interaction (steric effect) makes this conformation less stable.

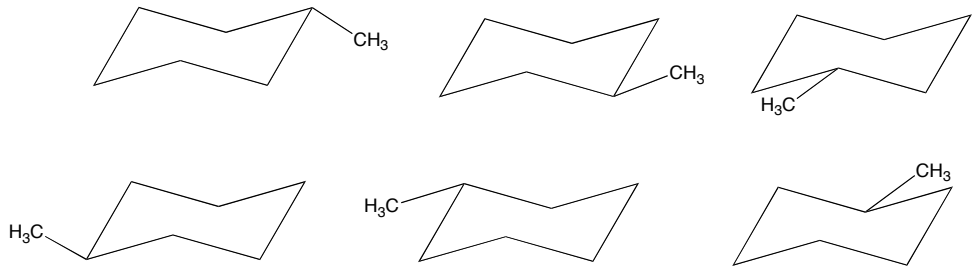


anti conformation

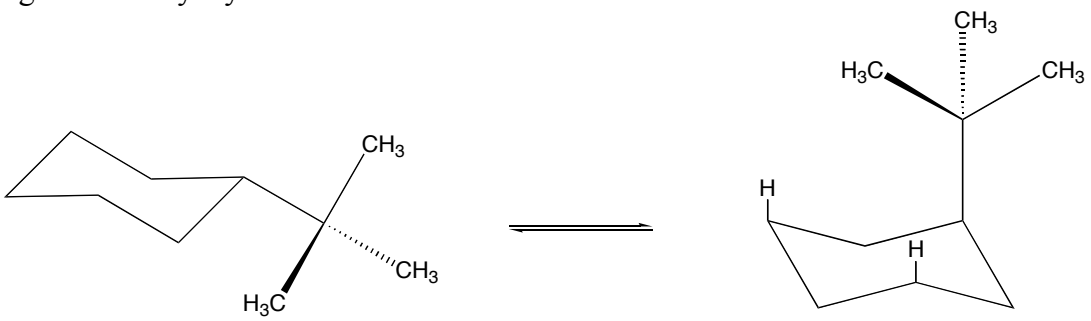


gauche conformation

Most Stable Conformation of Methylcyclohexane – 6 drawings of same molecule below



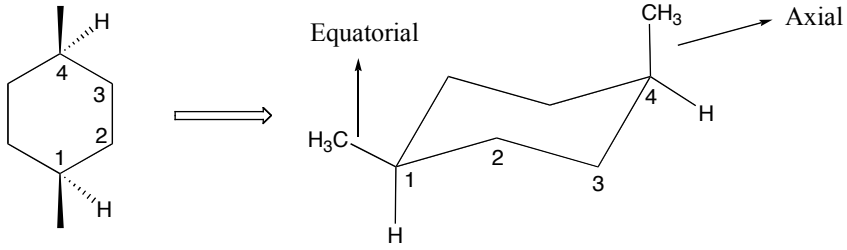
Eg #1 tert-butyl cyclohexane



99.99%

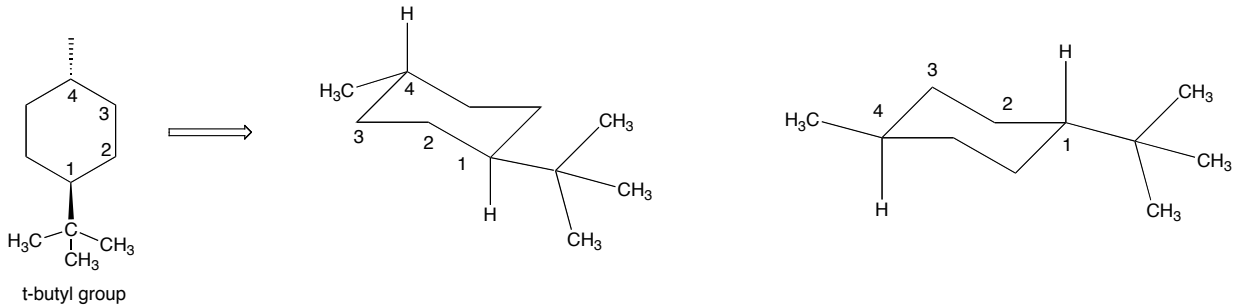
"Locked" conformation

Eg #2 – cis-1,4-dimethylcyclohexane



1,4 - dimethylcyclohexane

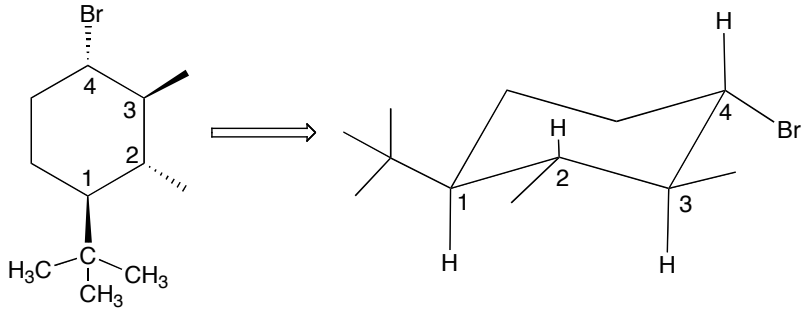
Eg #3 – a trans-1,4-disubstituted cyclohexane



1-*tert*-butyl-4-methylcyclohexane

Generally, draw a chair, add the most bulky group at one end in equatorial position. Then determine where the next group should go (which carbon and whether axial or equatorial) – remember: the given flat drawing geometry determines the 3D orientation

Eg. # 4 – A poly-substituted cyclohexane – most stable conformation ?
First draw chair conformation, then place bulkiest (largest) group (e.g. t-butyl) equatorial at one end.
Then work on the orientation of the remaining substituents based on the given "flat" geometry picture. So for position 2, the **methyl** must be below the hydrogen at the same carbon because at position 1 the **t-butyl group** is above the hydrogen at position 1 and trans geometry (opposite sides) is required for the relationship of the two groups (methyl and t-butyl). Etc.



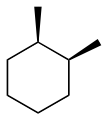
<u>Isomers</u> - different compounds with same molecular formula – 2 basic types

1. structural/constitutional isomers
   – compounds with same molecular formula and different names, numbers

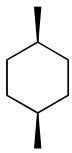
2. Stereoisomers – have normally same name but different 3-D structure – 2 sub-types
   (a) diastereomers/diastereoisomers (geometric isomers)
   (b) enantiomers (non-superposable mirror images of same molecule)

eg.

structural isomers

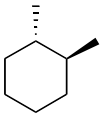


cis-1,2-dimethylcyclohexane

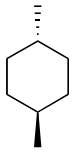


cis-1,4-dimethylcyclohexane

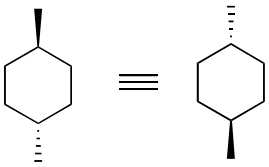
stereoisomers
(diastereomers)



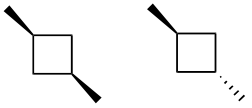
trans-1,2-dimethylcyclohexane



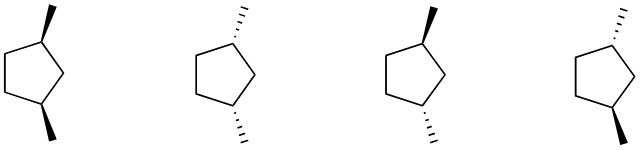
trans-1,4-dimethylcyclohexane



same molecule



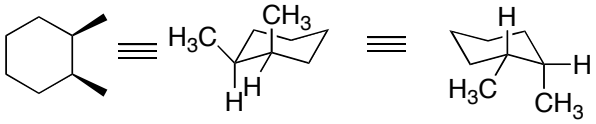
diastereomers



A & B: same molecule

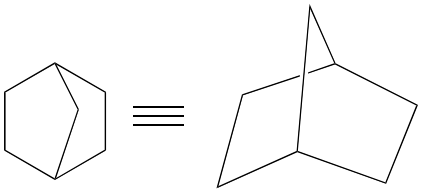
A & C: diastereomers

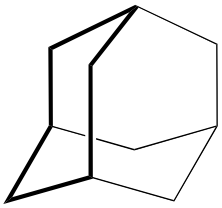
C & D: same molecule



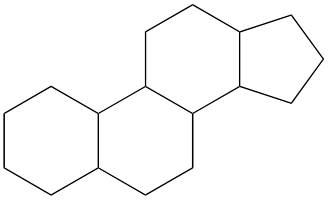
Adamantane
-part of diamond structure
-very stable chair conformation

Bicyclic system

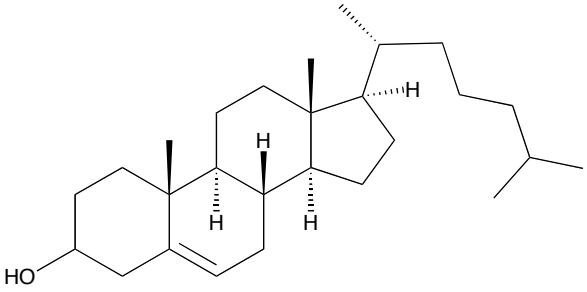




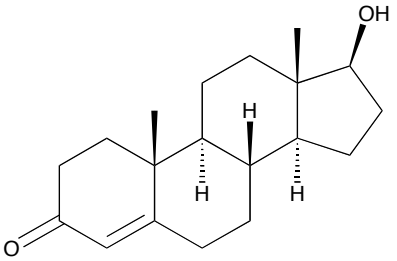
Adamantane



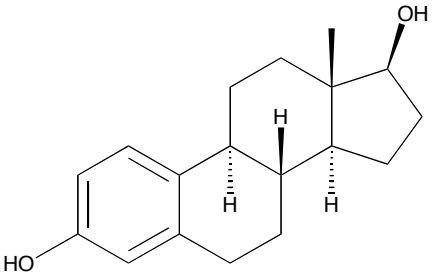
Steroid Backbone



Cholesterol



Testosterone - Male Hormone



Estradiol Female Hormone