Today

Sections 3.11 – 3.15
Rotation about single C–C bonds and conformations of cyclohexanes

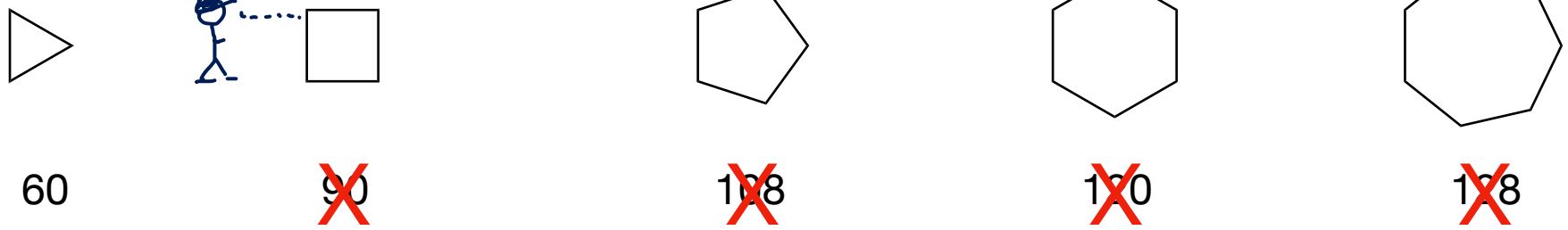
Sections 4.1 and 4.2
Isomers and the stereoisomers of rings and alkenes

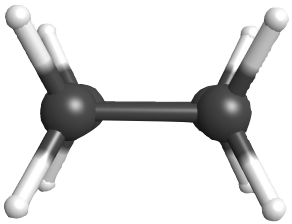
Next Class

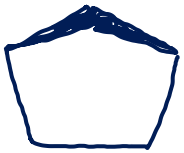
Sections 4.1 and 4.2
Isomers and the stereoisomers of rings and alkenes

Sections 4.3 - 4.8
Chirality

Sections 4.9-4.14
Optical activity and compounds with more than one center of chirality



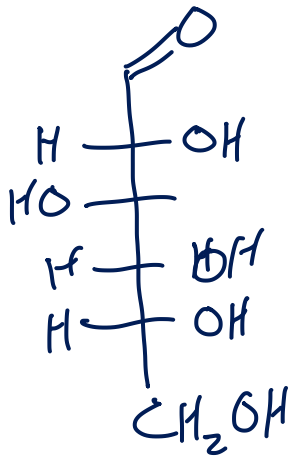




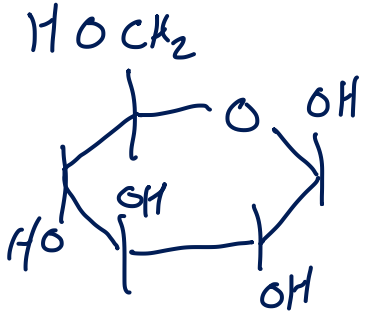
all of the H's eclipse each other. causes more strain

puckered structures relieve torsional strain cause by eclipsing interactions

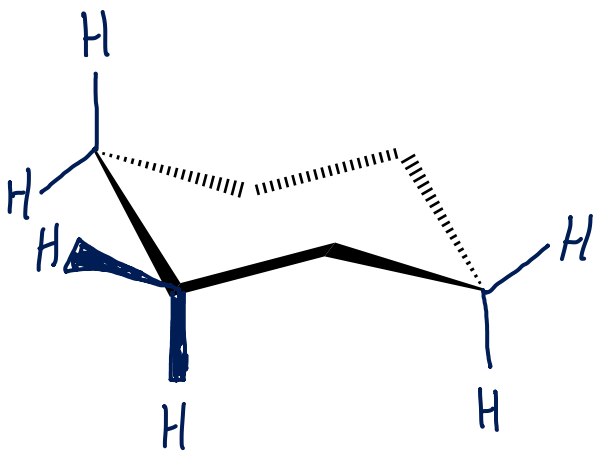
Why are we interested in 6-membered rings?

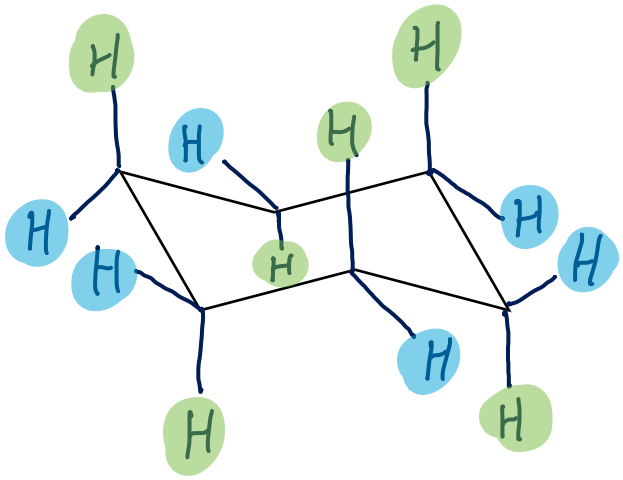


D - glucose



glucose an other sugars form pyranoses .... six membered rings

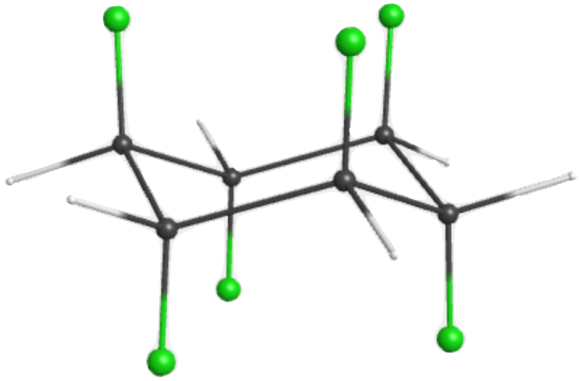


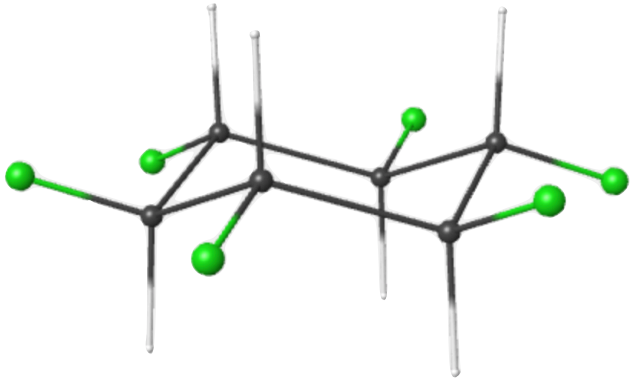


ax axial positions

eq equitorial positions

https://www.westfield.ma.edu/PersonalPages/cmasi/organic/cyclohexanes/cyclohexanes-plain.html



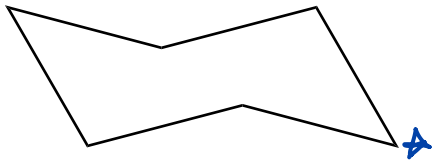


partial rotations convert one conformation to another. In a ring flip all of the axial positions flip to equitorial + all equitorial positions flip to axial.

https://www.westfield.ma.edu/PersonalPages/cmasi/organic/cyclohexanes/cyclohexanes-plain.html

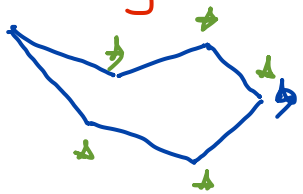
highest E structure on ring flip path
- bad bond angles
- many eclipsing interactions

reasonable bond angles but eclipsing interactions a ★ C atoms

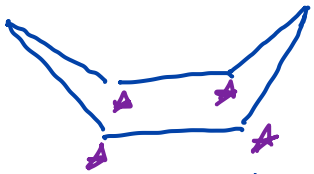


grab a C

push it up

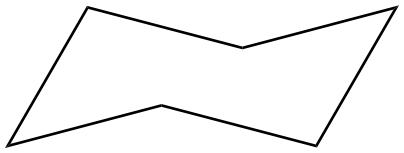


pushed C up ... ★ C atoms are in the same plane



boat structure can be made better by twisting and eliminating eclipsing interactions

ring flip



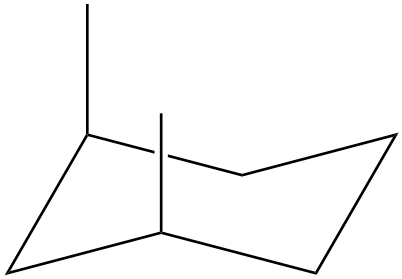
through another half planar structure

twist boat

bond angles ok
eclipsing interactions reduced

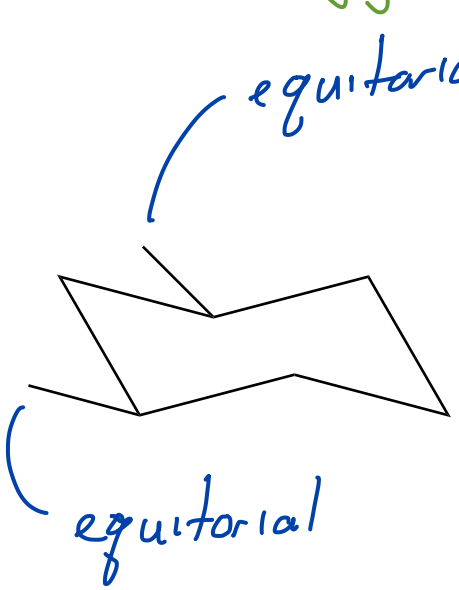
https://www.westfield.ma.edu/PersonalPages/cmasi/organic/cyclohexanes/cyclohexanes-plain.html

higher E conformation



axial positions cause more strain substituents have gauche interactions with the ring + large substituents will bump into other axial groups

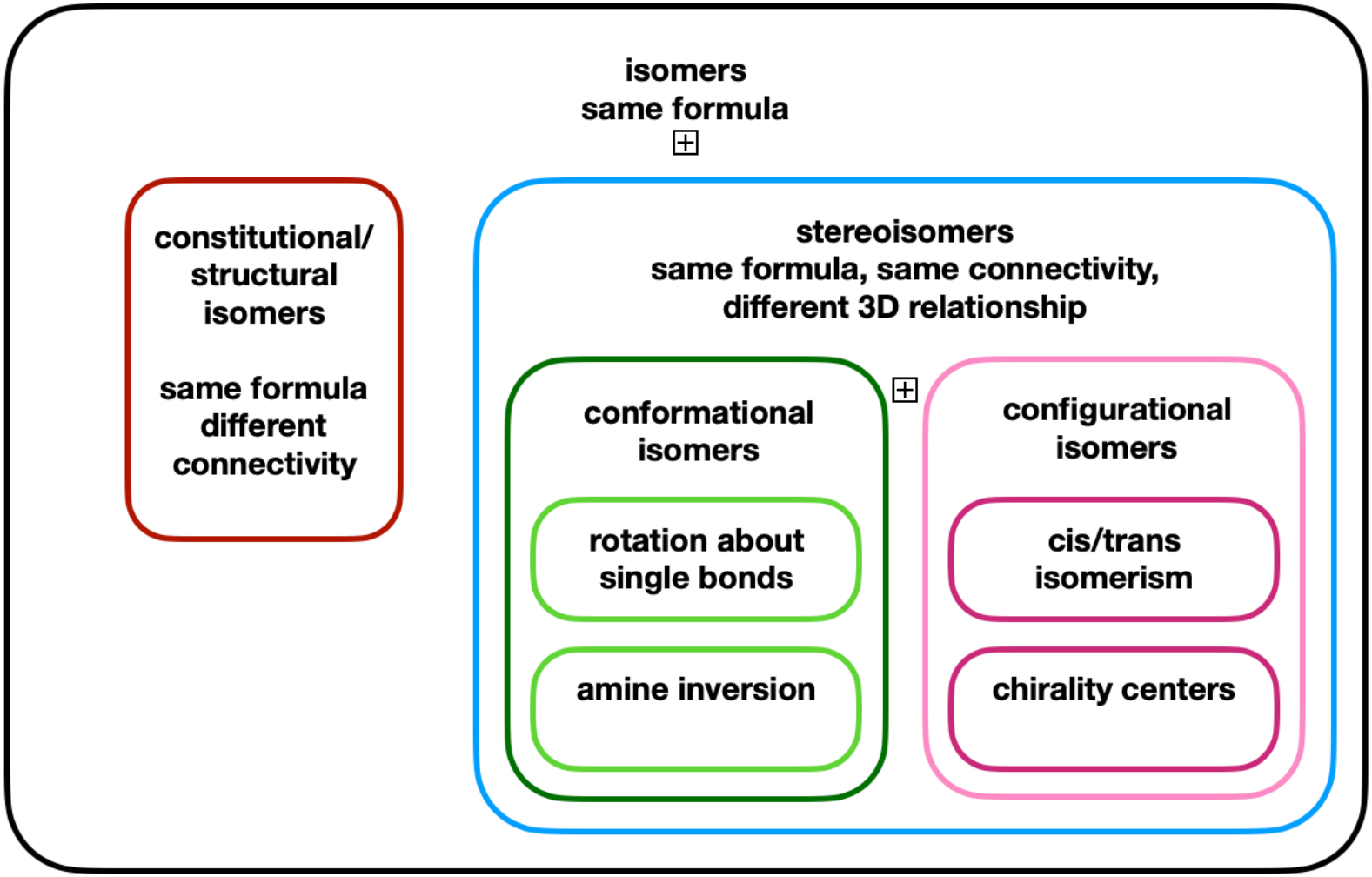
molecule takes this shape more often lower energy conformation

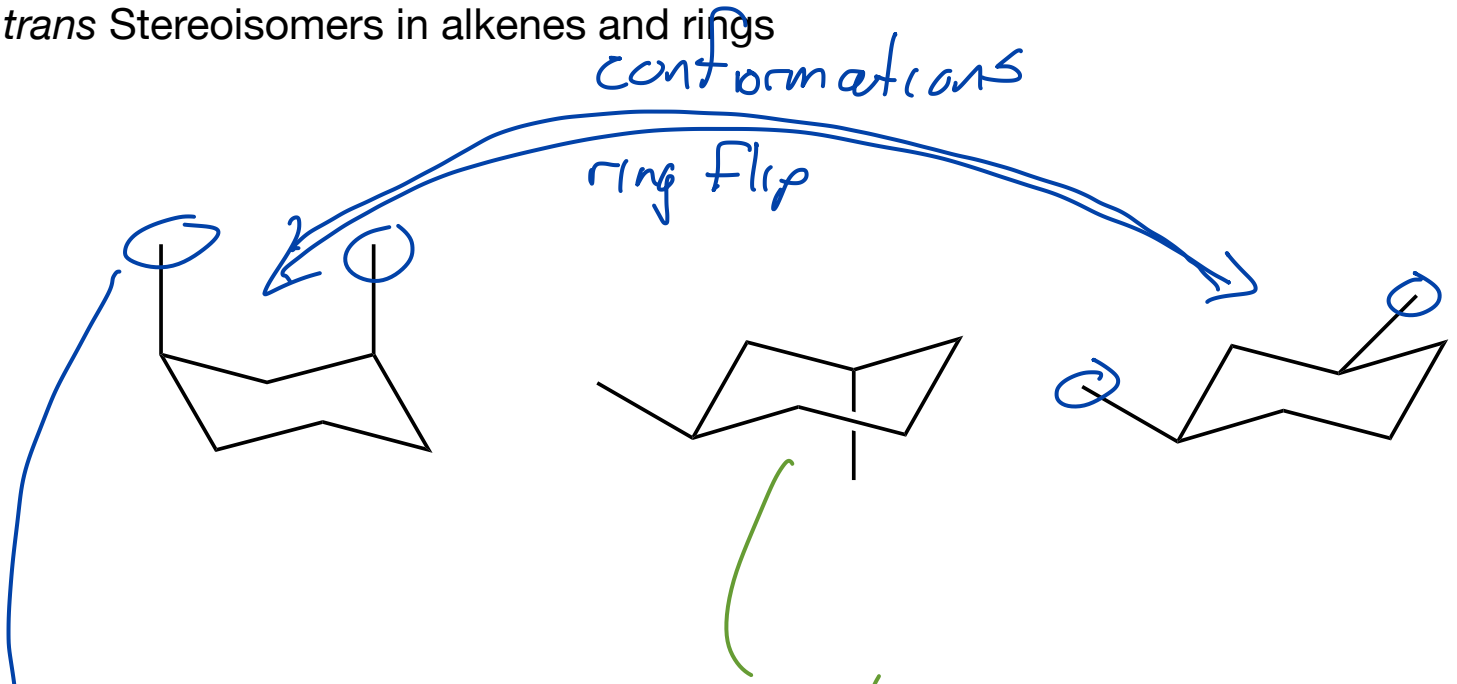


equitorial postions put substituents out away from the ring + other substituents

https://www.westfield.ma.edu/PersonalPages/cmasi/organic/cyclohexanes/cyclohexanes-plain.html

Isomers


isomers
same formula
⊞
constitutional/
structural
isomers
same formula
different
connectivity
stereoisomers
same formula, same connectivity,
different 3D relationship
conformational
isomers
rotation about
single bonds
amine inversion
⊞
configurational
isomers
cis/trans
isomerism
chirality centers



a stereoisomer (a configurational stereoisomer)

methyls are trans (opposite face of ring) to each other

Methyl groups are cis (same face of ring) to each other

cis + trans molecules cannot be interconverted by rotation; breaking bonds is required.