

## Today

Sections 3.8 – 3.10  
Structures and properties of organic molecules

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

## Next Class

Sections 4.1 and 4.2  
Isomers and the stereoisomers of alkenes

Sections 4.3 - 4.8  
Chirality

Bring Modeling Kits to Class

# Newman Projections

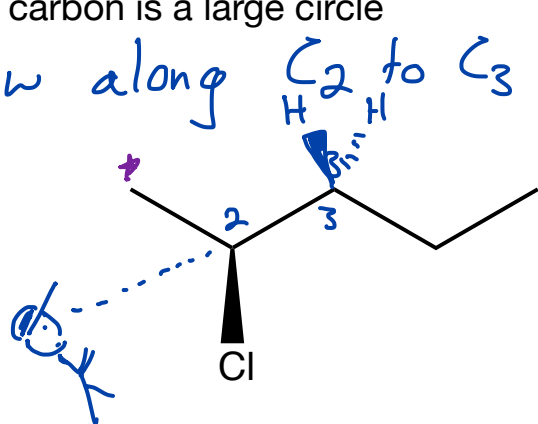
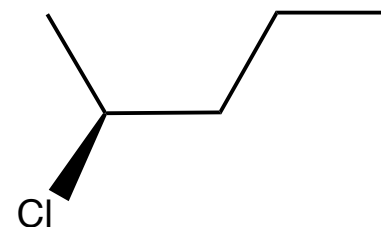
Drawn as though one is looking along a bond

Front carbon is a where three bonds come together

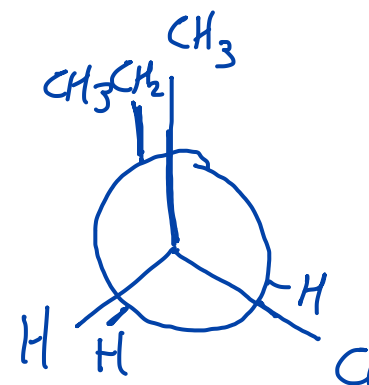
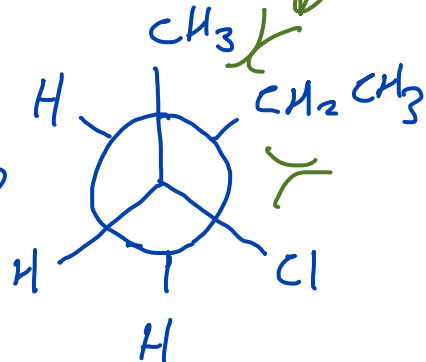
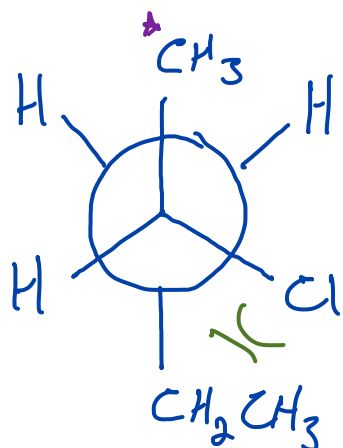
Back carbon is a large circle

view along  $C_2$  to  $C_3$  bond

eclipsed  
butane



gauche  
interactions  
raise  
energy

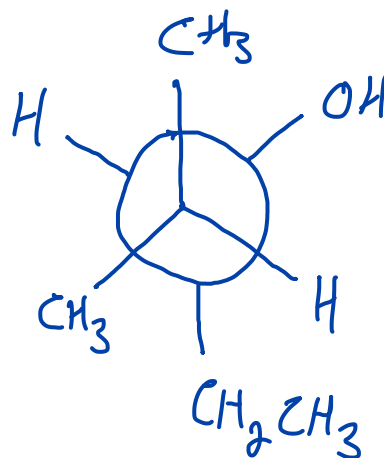
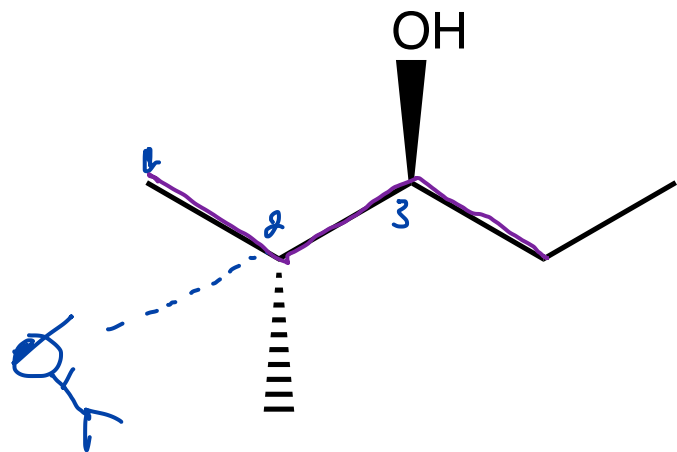


this is one of many possible

<https://www.westfield.ma.edu/cmasi/organic/newman/newman-plain.html>

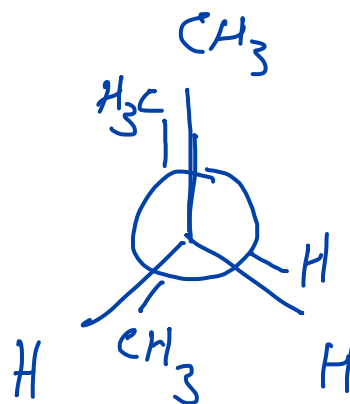
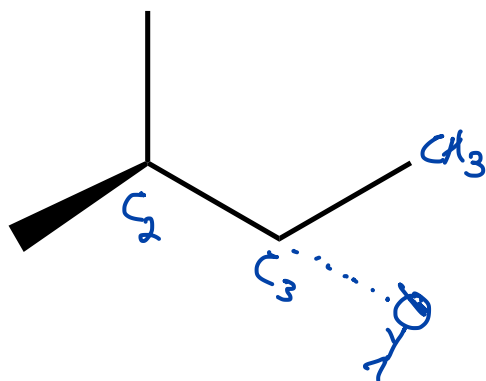
rotamers

Draw the Newman projection along the  $C_2$  to  $C_3$  bond in the following structure



1. Find  $C_2-C_3$  bond  
(draw person)
2. draw  $Y$  or  $\lambda$  and place groups

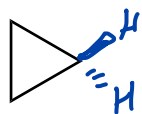
Draw the Newman projection along the  $C_3$  to  $C_2$  bond in the following structure



3. staggered  
or  
eclipsed?
4. draw circle + lines
5. place groups

# Ring Strain and the Structure of Cyclohexane

Section 3.12



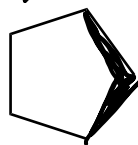
60

not planar

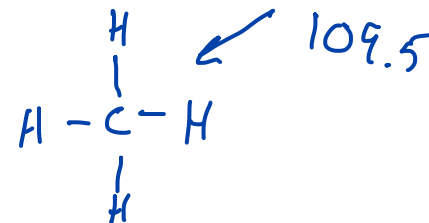


90

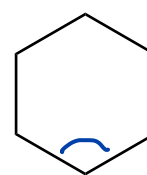
looks like an envelope



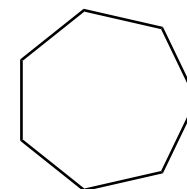
108



109.5

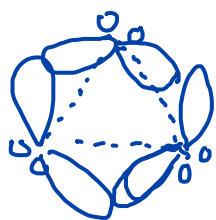


120



128

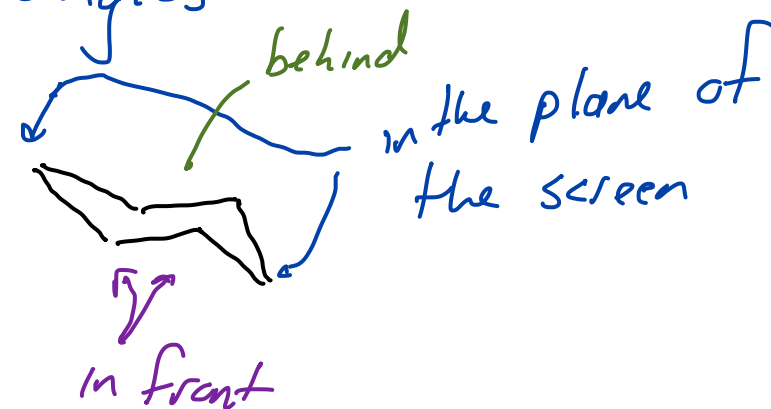
60 vs 109.5



very reactive too!

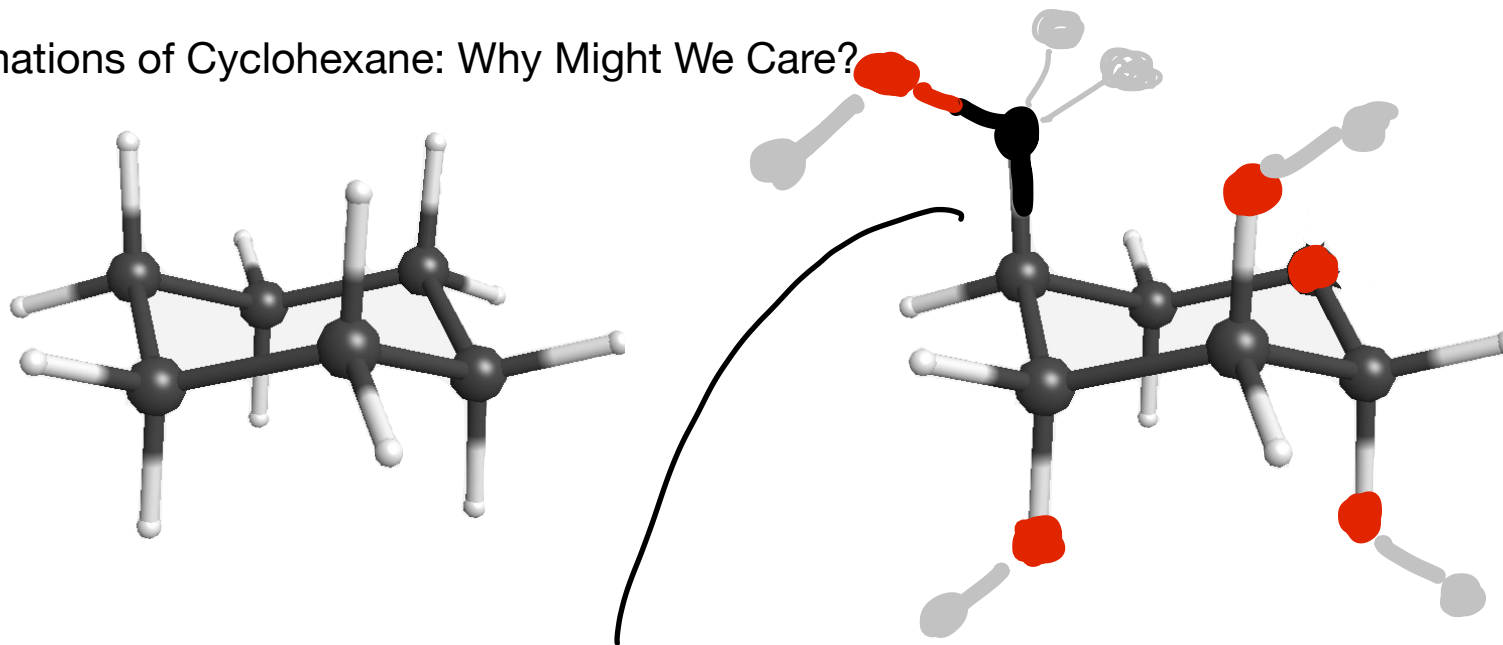
envelope

not planar so these are not the bond angles



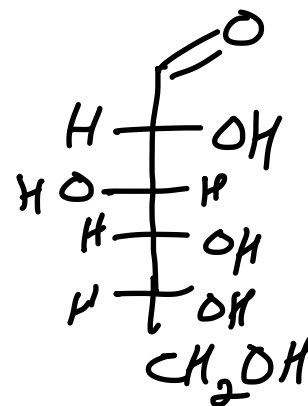
bond angles are so far from "ideal" that cyclopropanes are explosively reactive

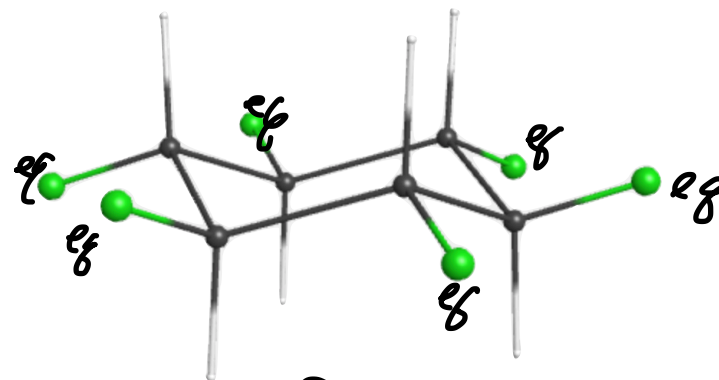
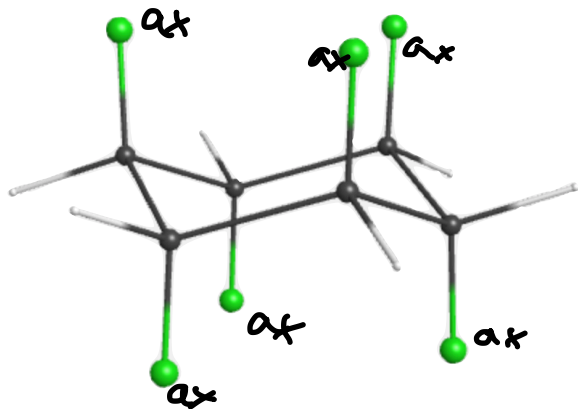
<https://www.westfield.ma.edu/cmasi/organic/cyclohexanes/cyclohexanes-plain.html>



this is  
an axial  
position...  
higher  $\Delta$   
conformation

D-glucose





Chair is the lowest energy conformation  
 axial positions have gauche interactions with  
 ring  $\text{CH}_2$ 's + other axial positions.  
 Large groups in axial positions are higher in  $E$   
 Partial ring flips convert chair to twist boat  
 Ring flips convert one chair to another chair conform-  
 ation and axial + equatorial positions change places.

