

Chap 3

Alkanes

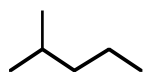
1. Physical properties-

A) Solubility- non-polar solvents.

B) Boiling points- low boiling point due to induced dipole IMF.

Larger the size, increase in IMF, increase in B.P.

More branching, lower B.P. Decrease surface area contact and thus lower induced dipole effect.



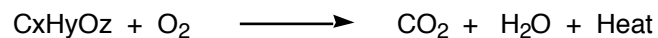
bp = 60 c



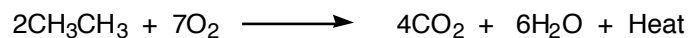
bp = 50 c

2. Reactions of Alkanes-

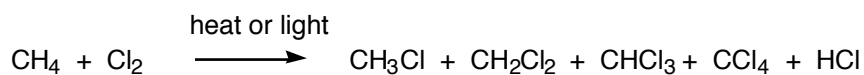
A) Combustion- organic molecule



Organic molecule (C,H,O)

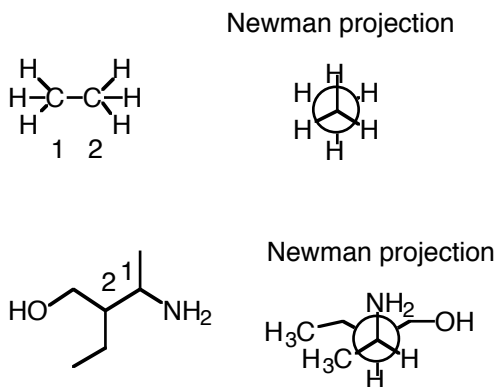


B) Halogenation- limited use, difficult to control.

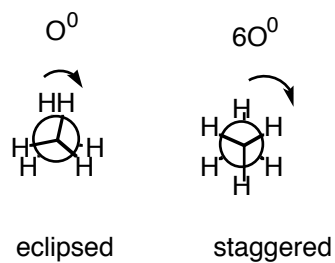


3. Conformations of Alkanes-

Conformation- different arrangement in space formed by rotation of a single bond.

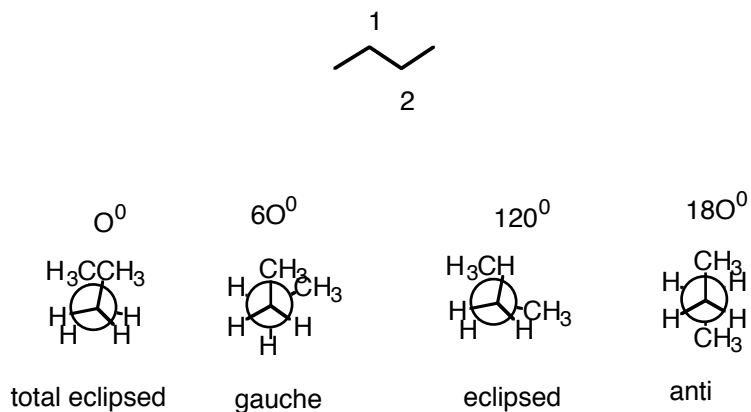


Dihedral Angle- (show 120, 180)



show potential energy diagram. Based on steric hindrance- repulsion of e' clouds.

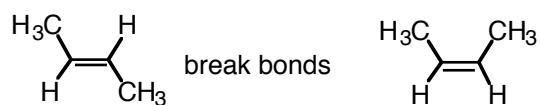
Butane-



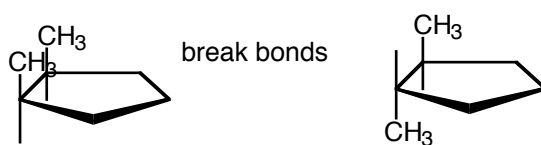
*show energy diagram. Lowest energy is gauche than anti.

Geometric isomers of alkenes- cannot interconvert without breaking bonds.

1) Alkenes, alkynes

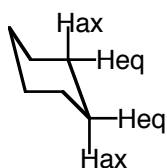


2) Rings of 1-5 in carbons

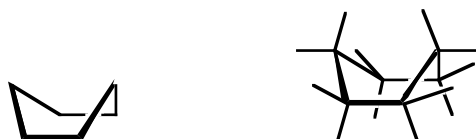


six membered rings- have two major conformations

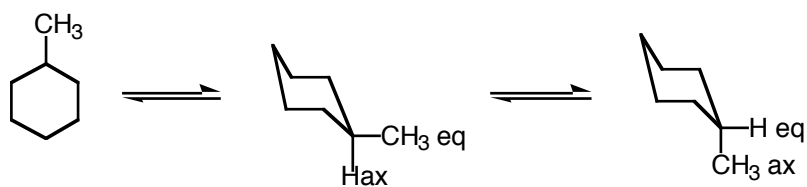
a) chair- more stable.



b) boat- has eclipsed so is less stable.

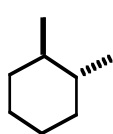


Mono-substituted cyclohexanes

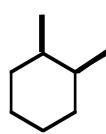


Cis and trans cyclohexane-

1,2 substitution

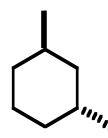


trans

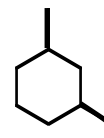


cis

1,3 substitution



trans



cis

cis 1,2

ax-eq

eq-ax

cis 1,3

ax-ax

eq-eq

trans 1,2

ax-ax

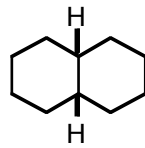
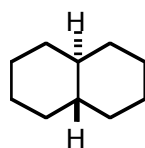
eq-eq

trans 1,3

ax-eq

eq-ax

For fused ring systems the trans di-axial junction is the most stable due to the alkyl groups able to be all eq. Trans decalin is a more stable.



decalin