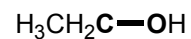
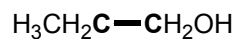
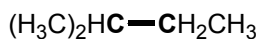
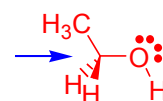
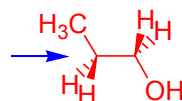
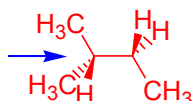
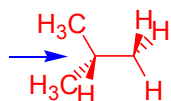


Alkane Stereochemistry

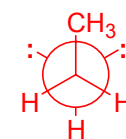
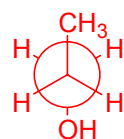
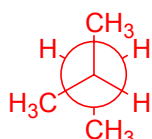
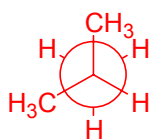
- 1) For the molecules below:
 - a) Provide a 3 dimensional structure at the indicated atoms.
 - b) Draw the Newman projection for your structure indicating the direction of sight with an arrow.
 - c) Draw the Newman projection for the most stable conformation.
 - d) Draw the Newman projection for the least stable conformation.
 - e) If possible, calculate the energy difference between the most and least stable conformations.



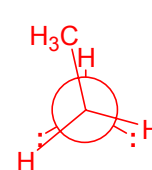
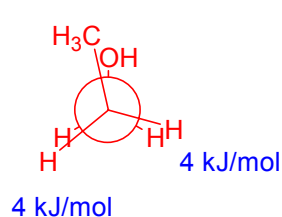
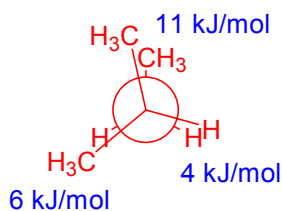
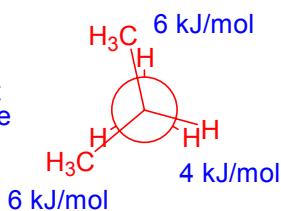
barrier to rotation =
17kJ/mol (why?)



Most Stable



Least Stable



17 - 4 - 4 = 9 kJ/mol for
each CH₃ : OH eclipse

- 2) a) Draw a chair cyclohexane and put in all the axial bonds.
- b) On a second chair cyclohexane, put in all the equatorial bonds.
- c) Draw a cyclohexane with a bromine in an equatorial position.
- d) Draw a cyclohexane with a bromine in an axial position.

(a)



axial bonds

(b)



equatorial bonds

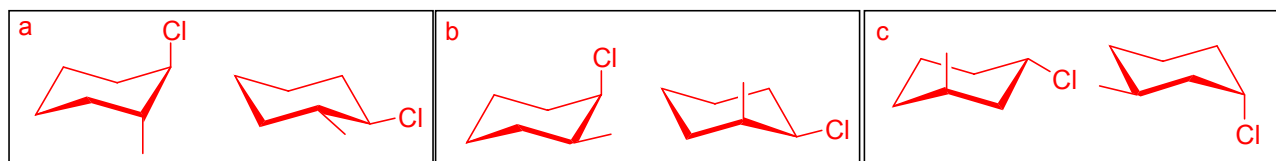
(c)

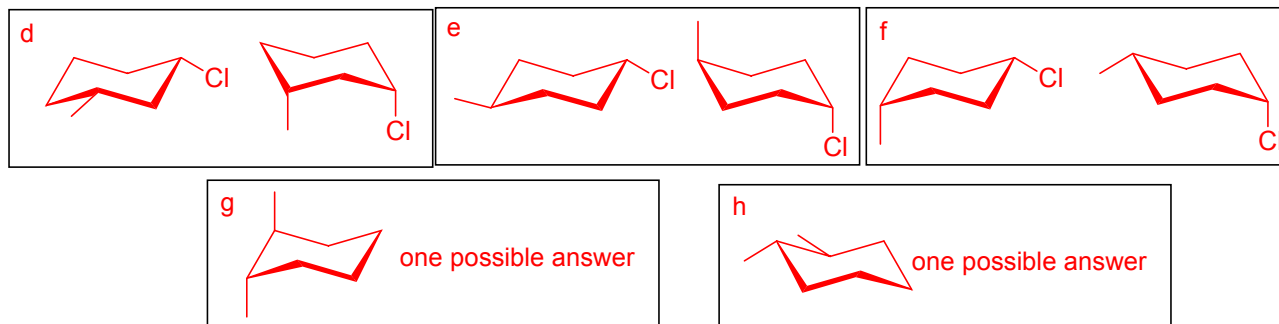


(d)

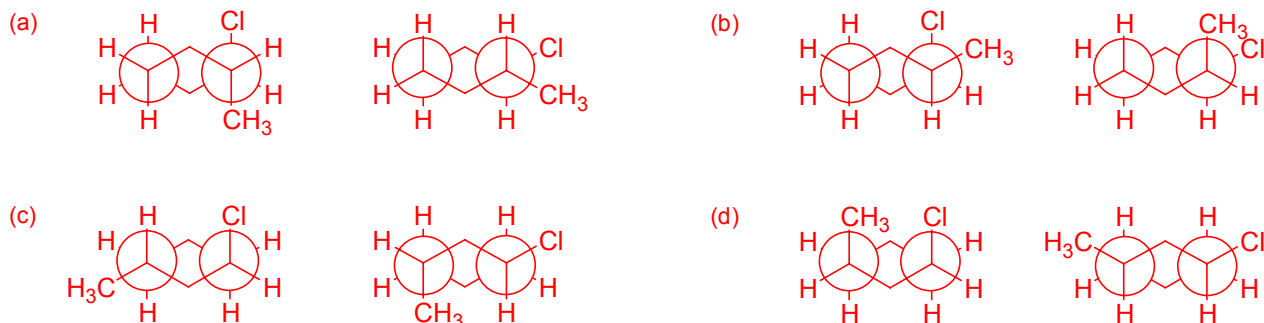


- 3) Draw both possible conformations for the indicated cyclohexane:
 - a) *trans*-1-chloro-2-methylcyclohexane.
 - b) *cis*-1-chloro-2-methylcyclohexane.
 - c) *trans*-1-chloro-3-methylcyclohexane.
 - d) *cis*-1-chloro-3-methylcyclohexane.
 - e) *trans*-1-chloro-4-methylcyclohexane.
 - f) *cis*-1-chloro-4-methylcyclohexane.
 - g) a cyclohexane with 2 methyl groups, both axial.
 - h) a cyclohexane with 2 methyl groups, both equatorial.



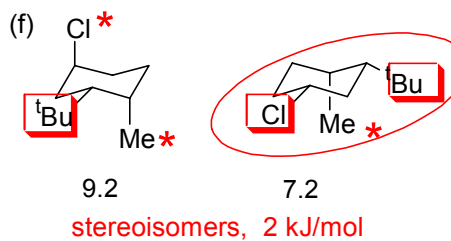
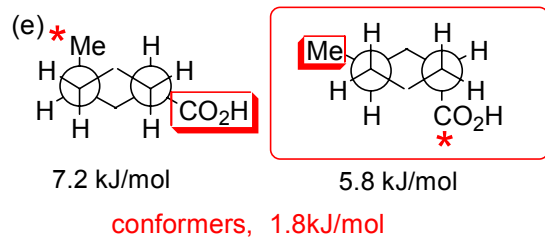
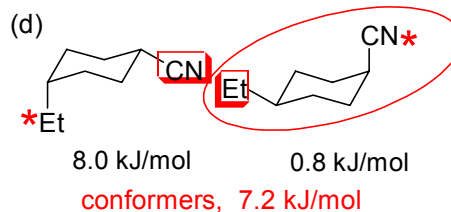
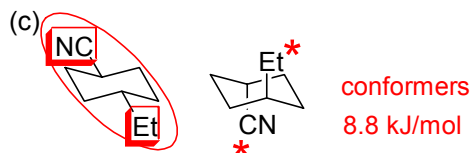
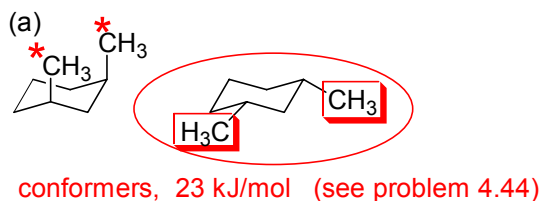


4) Draw the Newman projection for 3 a-d.



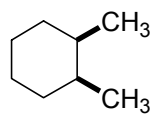
5) For the following pairs:

- a) Circle the more stable cyclohexane.
 b) Calculate the energy difference between the two structures, if possible. *see McMurry Fig. 4.22*
 c) Indicate whether the structures are conformers (conformational isomers) or stereoisomers.

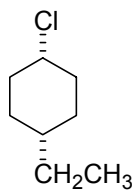
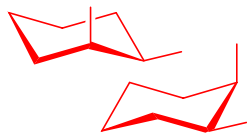


6) For every structure above, star the axial substituents and box the equatorial substituents.

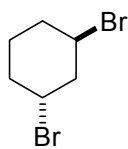
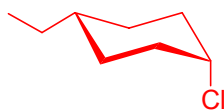
7) For every structure below, draw the most stable chair conformation. Where two or more conformations are equally stable, draw both.



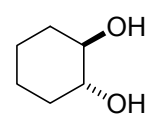
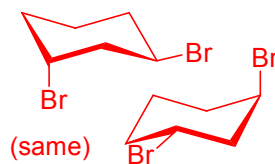
(a)



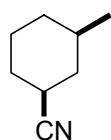
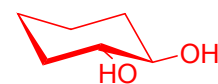
(b)



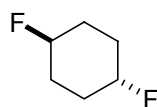
(c)



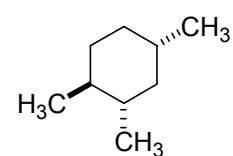
(d)



(e)



(f)



(g)

