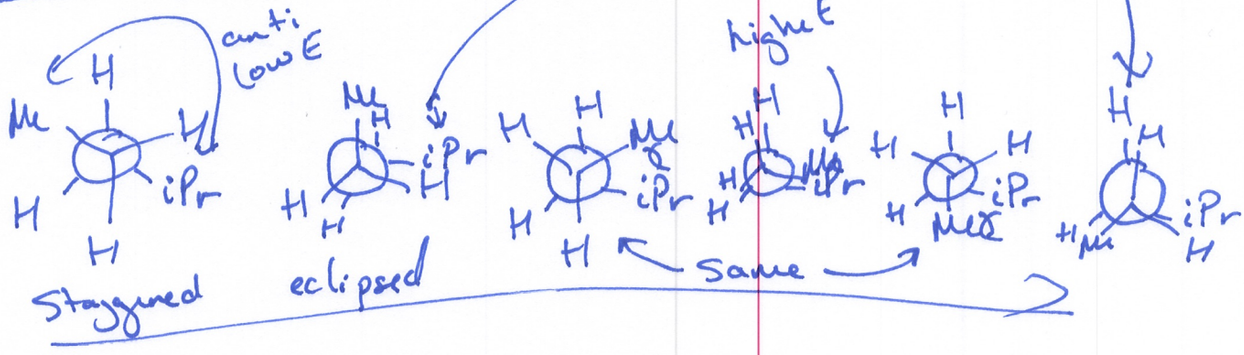
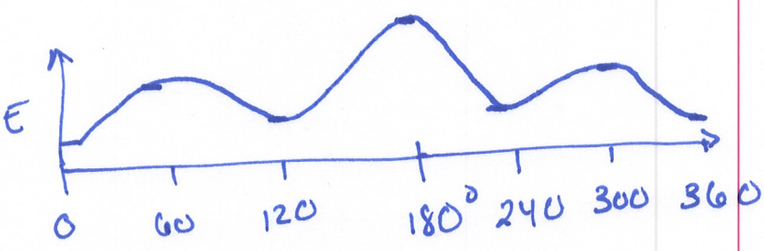
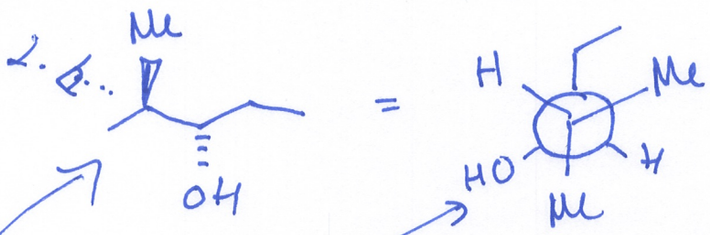
Worksheet 4 (partial Key)

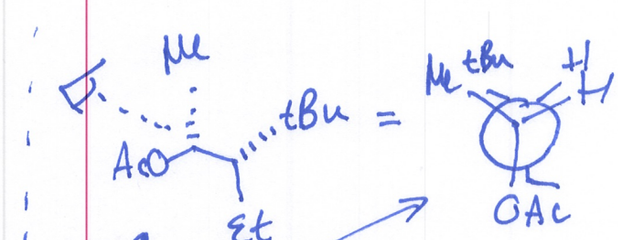
1.





2.

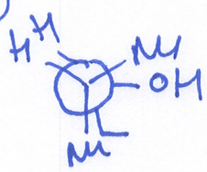




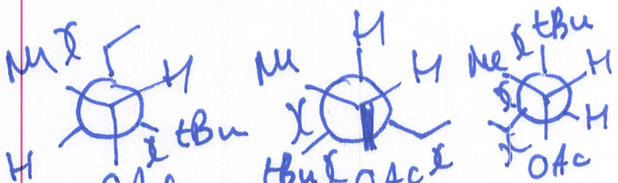
3.

already in low

high =

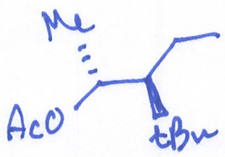


already in highest



4. lowest

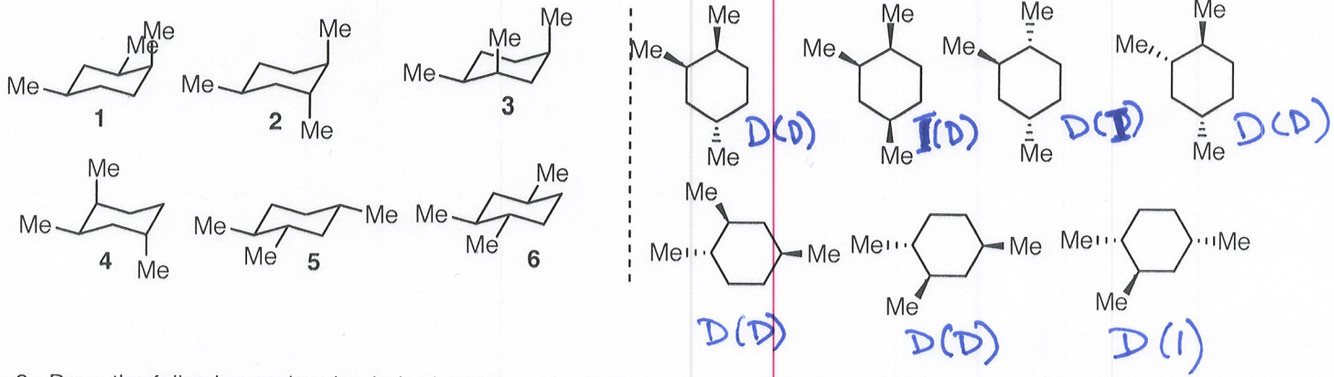
5.



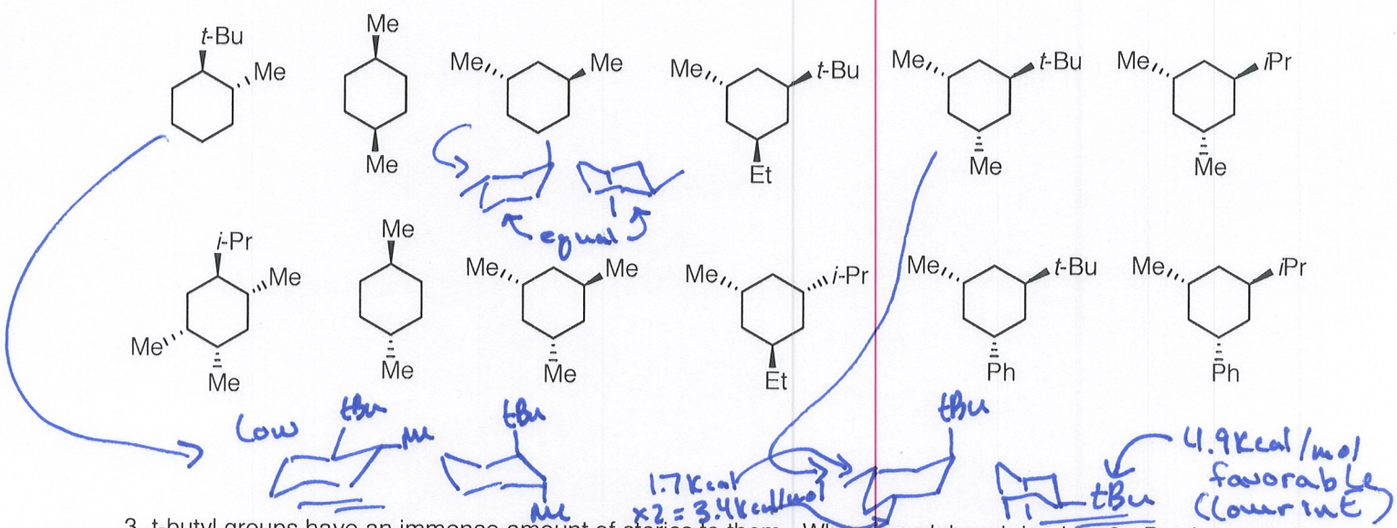
Worksheet 5: Chair Conformations Partial Key

Skill-Building Goals: Get comfortable drawing Chair conformations and predicting relative energy barriers. Be careful not to scramble absolute stereochemistry when you are interconverting, which is a common mistake.

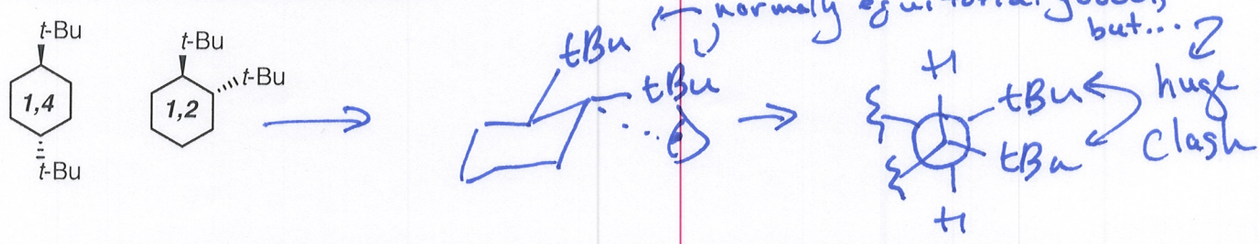
1. For each chair conformation on the left, what is the relationship with the structures on the right? Enantiomers, Diastereomers or Identical.



2. Draw the following molecules in both chair conformations and predict which of the two are lower in energy. It may also be possible that they are equal in energy. You may need to do an online search for A-values to help decide in some cases. You can 'Google' A value table' and you should be able to find some.

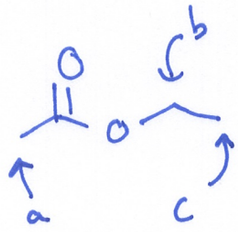


3. t-butyl groups have an immense amount of sterics to them. When a cyclohexyl ring has 2 *t*-Butyl groups, if they are in the 1,4 positions, it should be easy to predict the product if you have a good understanding of chair conformations. However, the lowest energy conformation when they are in the1,2 positioning is not so obvious. What may be the complicating factor arising from the 1,2 orientation? Draw chair conformations and perhaps some other conformations to help you



Worksheet 6 - NMR

1.

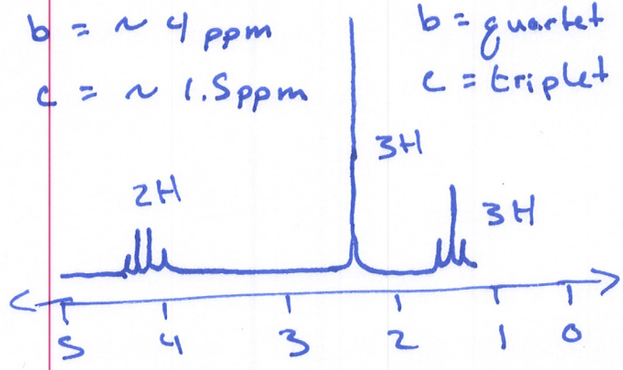


A. 3

B. 3:2:3

C. a = ~ 2.1ppm
b = ~ 4 ppm
c = ~ 1.5ppm

D. a = Singlet
b = quartet
c = triplet



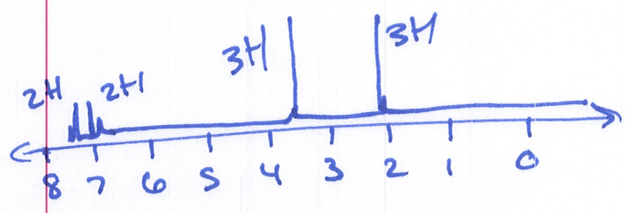
5.

A. 4

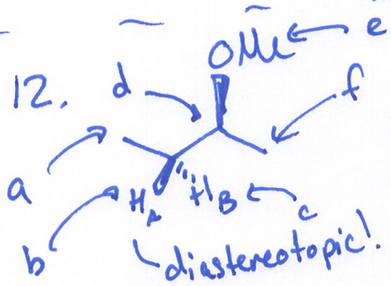
B. 3:2:2:3

C. a = ~2ppm
b = ~ 7.5ppm
c = ~ 7.5ppm
d = ~ 3.5ppm

D a = Singlet
b = doublet
c = doublet
d = Singlet



12.



diastereotopic!

A. 6

B. 3:1:1:1:3:3

C. a = ~1.5ppm
b/c/f ~ 1.7ppm
d/e = ~ 3.5ppm

D a = triplet
b = dd
c = dd
b/c = dd
d = tq
e = s
f = d

b/c/f will/may be tough to decifer

d will be tough to decifer