ORGANIC CHEMISTRY CH 384 **Fall 2012**

WORKSHOP 3

Conformations of Alkanes and Cycloalkanes

1. Consider all the rotations around the C2-C3 bond of 3-methylpentane**:**
   a. Draw all six rotational conformers using a Newman projection.
   b. Calculate and identify the *highest* and *lowest* energy conformations in KJ/mol.
   c. Construct a qualitative plot of energy versus angle of rotation around the C2-C3 bond.

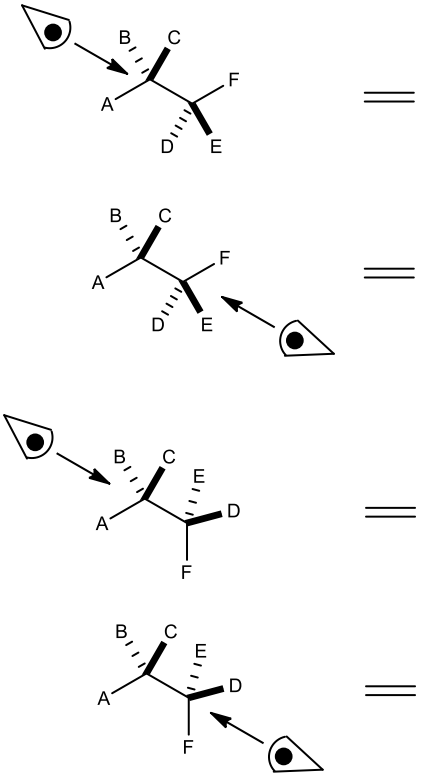
Interaction	**Energy cost (KJ/mol)**
H-H *gauche*	0.0
H-H *eclipse*	4.0
methyl-H *gauche*	0.0
methyl-H *eclipse*	6.0
ethyl-H *gauche*	0.0
ethyl-H *eclipse*	6.4
methyl-methyl *gauche*	3.8
methyl-methyl *eclipse*	11.0
methyl-ethyl *gauche*	4.2
methyl-ethyl *eclipse*	12.0

2. Draw and name all isomeric dimethylcyclobutanes, clearly showing stereochemistry. Indicate whether the structures are related as constitutional isomers or stereoisomers.

3. Using only chair conformations, make and draw molecular models for all of the 1,4-dibromocyclohexanes. Clearly indicate which are related as conformational isomers and which are related as stereoisomers isomers. Designate the configurational isomers as cis or trans. Explain which isomers equilibrate rapidly with each other (interconvert).

*Remember on exams:
YOU are graded on how your chair looks and proper bond angles*

4. Draw the corresponding Newman projection looking down the indicated bond.



5. Complete the structures below by adding all the missing substituents. Then do a chair inversion (flip) and fill-in the missing substituents Label C^1 and C3 in the new chair and in the double Newman.