

1. Draw Newman projections for all of the eclipsed and staggered conformations of 1,2-dichloroethane. Label the highest and lowest energy conformations and give a *brief* explanation for your choices. Do you think that the eclipsed conformation in which the two chlorines are eclipsed is higher or lower in energy than the eclipsed conformation of butane where the methyl groups are eclipsed (discussed in class)?
Hint: Size isn't everything!
2. Consider 2-methylbutane (isopentane). Sighting along the C2–C3 bond:
 - (a) Draw a Newman projection of the most stable conformation.
 - (b) Draw a Newman projection of the least stable conformation.
 - (c) Given that a CH₃–CH₃ eclipsing interaction costs 2.5 kcal/mol, a CH₃–H eclipsing interaction costs 1.6 kcal/mol, a H–H eclipsing interaction costs 0.9 kcal/mol, and a CH₃–CH₃ gauche interaction costs 0.9 kcal/mol, make a quantitative plot of energy versus rotation about the C2–C3 bond.
3. Answer the following questions concerning *cis*-1,3-dimethylcyclohexane
 - a) Draw the two chair conformations and label both methyl groups as axial or equatorial.
 - b) Label the higher energy conformation and the lower energy conformation.
 - c) The energy difference in these two conformations has been measured to be about 5.4 kcal/mol. Given that a CH₃–H 1,3-diaxial interaction costs 0.9 kcal/mol, what is the energy costs of a CH₃–CH₃ 1,3-diaxial interaction?