Structure and Conformations of Organic Molecules

Read: Ch 3, Sections 1, 2  Introduction to Organic Chemistry
Do Problems: 1-16

After going through the readings & problems and attending the lectures & discussion groups, you should be able to:

- Draw and interpret two- and three-dimensional representations of molecules, and describe the structural information each reveals.
- Use ChemDraw and Chem3D to build, manipulate and energy minimize molecular structures.
- Draw Newman structures and visualize molecules from Newman structures.
- Understand and give examples or identify the different terms used to describe molecular conformations (dihedral angles, staggered, eclipsed, gauche, anti-).
- Understand graphs of potential energy vs. dihedral angle, and why the potential energy depends on dihedral angles.
- Understand the terms torsional strain and steric strain and be able to identify strained conformations.
- Calculate the ratio of two conformations given their relative energy ($\Delta G^\circ = -RT \ln K_{eq}$).
- Describe the conformations of cyclopropane, cyclobutane, cyclopentane, cyclohexane and their relative stabilities.
- Relate the degree of strain to the size of a ring.
- Identify axial and equatorial substituents.
- Visualize and draw the chair and boat conformations of cyclohexane, and identify significant non-bonded interactions.
- Identify and draw cis, trans isomers in substituted cyclohexanes and determine their relative stabilities.
- Determine the relative conformational stabilities of di-substituted and tri-substituted cyclohexanes.