

Week 3

Nomenclature and Conformations of Alkanes and Cycloalkanes

3.1 Conformers

10/21:

- **Conformational isomers:** Groups connected by single bonds undergo rotation resulting in different molecular conformations. *Also known as conformers.*
 - These are transient states.
- **Conformational analysis:** The process of understanding how the conformation relates to the energy of the molecule.
- Newman projections and the sawhorse model.
- Staggered to eclipsed ethane conformations: $\Delta E = 12 \text{ kJ/mol}$.
 - Rate = $5 \times 10^{10} \text{ Hz}$.
- **Torsional strain:** Repulsive interactions (steric hindrance) between the clouds of electrons of bonded groups.
- Goes through butane conformations.
 - **Gauche** vs. **anti** methyl groups.
- **Ring strain:** The combination of angle strain and torsional strain in a cycloalkane.
- Puckering of cyclobutane relieves some of the torsional strain.
- Puckering of cyclopentane relieves some torsional strain *and* angle strain.
- Cyclohexane has chair and boat conformations.
 - Goes through Newman projections for each.

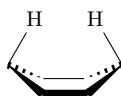


Figure 3.1: Flagpole interactions.

- **Flagpole interaction:** The interaction between the two hydrogens on opposite carbons in cyclohexane that bend toward each other.

- Axial and equatorial positions.
- In a ring flip, axial and equatorial hydrogens invert.
- When you have substituents on a ring, you have 1,3-diaxial interactions.