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.

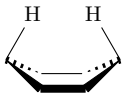

Figure 3.1: Flagpole interactions.

- **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.

10/26:
- Covers disubstituted cyclohexanes and bicyclic/polycyclic alkanes.