Lecture 12: Conformational Effects (the end) & Kinetics (the beginning)

Announcements:
• Midterm 1 is not yet graded. Hopefully graded by Thursday.
• Problem Set 3 due Thurs, Oct 20. I will post it by this weekend.
• Seminar tomorrow: Dr. Martin Schnermann (National Cancer Institute)
  Wed, 4pm, 219 BRL
  "Remodeling the Cyanine Scaffold for New Applications in Drug Delivery and Imaging"

Today:
• Conformational Analysis to explain/predict reaction rates
• Thorpe-Ingold Effect
• Kinetics
Conformation effects to explain rates.

- Different reactivity for axial vs. equatorial substituents.

  ![Chemical Structures](image)

  $k_{rel} = 1$

  In general, equatorial substituents react more quickly because less hindered.

  ![Chemical Structures](image)

  $k_{rel} = 1$

  $0.13$

  $0.04$

  $0.05$
Thorpe–Ingold Effect (Gem-dimethyl effect)

A&I, D, p. 496-497

Geminal substitution accelerates cyclization reactions.

Consider: $\text{H}_3\text{C} - \text{CH}_3$

Possible Conformations:

C2-C3: 2GB's

C3-C4: 2GB's

Same as previous 2GB's
Slight angle compression.

Syn-pentane, too

C2-C3:

H
2
H
H
H
CH3
Et
CH3

2 GB's

C3-C4:

H
3
H
H
H
CH3
Et
CH3

2 GB's
\textbf{ex}: \quad \begin{align*}
\text{HO} & \quad \text{Cl} \\
\text{HO} & \quad \text{CH}_3 \\
\text{HO} & \quad \text{CH}_3
\end{align*}
\quad \begin{array}{c}
\text{krel} \\
1 \\
5.5 \\
21
\end{array}
\quad \begin{align*}
\text{HO} & \quad \text{CH}_3 \\
\text{HO} & \quad \text{CH}_3
\end{align*}
\quad \begin{array}{c}
\text{krel} \\
248 \\
252 \\
1360\end{array}