Topics:
- Physical properties of alkanes
- Intermolecular non-bonding interactions
- Conformational stereochemistry of alkanes
- Conformational stereochemistry of cycloalkanes

Must learn nomenclature on own.

Recap of 9/13

\begin{align*}
\text{C}_4\text{H}_{10} & \quad \text{Butane} \quad 0^\circ \\
\text{C}_5\text{H}_{12} & \quad \text{Pentane} \quad 36^\circ \\
\text{C}_6\text{H}_{14} & \quad \text{Hexane} \quad 175^\circ \\
\end{align*}

Increase in boiling point as chains get longer.

- BP: the chain it gets
- 3°C to a "kink" the point
- 28°C down the boiling point
- ~16°C branching lowers boiling point
\[ N^+ + Cl^- \rightarrow NaCl \text{ liquid} \]

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\[ \text{dipoles attract each other} \]

\[ H^+ \quad O^2- \quad \text{hybridized} \]

\[ \text{van der Waals forces} \]

\[ \text{sometimes electron cloud becomes dipolar} \]

\[ \text{protons in background} \]

\[ \text{clouds around boron} \]

\[ 8^8 \quad 8^8 \]

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partial charges are created, molecules attract to each other, and the overall energy is lowered.

Strength of forces is directly related to length of chain.

Isomers (compounds with same formula and different 3-D arrangement of atoms)

- Constitutional isomers
- Stereoisomers (same order of connection, but different 3-D arrangement of atoms)

Conformational isomers

Neuromon projection of ethane "eclipsed" or "crowded" at top of each other.
Neumann projection of propane \( \text{CH}_3\text{CH}_2\text{CH}_3 \)

- Staggered
- Eclipsed

Because methyl is bigger than \( \text{H} \), this is even less favored.

Neumann projection for butane

- Anti
- Gauche
- Both staggered
- Both eclipsed

Stereochemistry of cyclic compounds

- \( 60^\circ \) versus \( 109^\circ \)
- \( 90^\circ \) difference is bend & compression

Also, hydrogen must be eclipsed
preferred 90°  again, hydrogens
  ideal 109°  still eclipsed
  compression 19°

preferred 105°  still, hydrogens
  ideal 109°  eclipsed
  1°

5 membered rings are much
more stable because of this
smaller compression.

preferred 120°
  ideal 109°

expansion 11° of plane, but can distort to be 109°