Goals

After this lesson you should be able to:

- Identify different ways of drawing organic molecules and when each should be used.
- Draw molecules using condensed structures.
- Draw molecules using skeletal structures.
Representations

On a street, what does this shape mean?

Color?

Words?

We use shape, color, and words all to convey the idea of “stop”. 
Many Methods of Representing Molecules

- Learn to think on the molecular level.
- Recognize multiple representations of the same molecule.

Acetic acid

\[ \text{acidic } H \quad \text{acetate ion} \]

\[ \text{CH}_3\text{CO}_2\text{H} \]

\[ \text{CH}_3\text{COOH} \]

Condensed structures convey order of atoms.
More Representations

\[
\text{H}_2\text{C} = \text{C} - \text{O} - \text{H} \\
\text{H}_3\text{C} - \text{C} - \text{O} - \text{H}
\]

\[
\text{O} \\
\text{H}_3\text{C} - \text{C} = \text{O} - \text{OH}
\]
Three-Dimensional Representations
Why Do We Need MORE Ways to Draw Structures?

Ways to represent molecules you already know:

- Molecular formulas
- Lewis structures

Why do we need more ways?

Imagine drawing a large molecule as a full Lewis structure!
Condensed Structures

How to draw:

- Generally only atoms, usually listed in order of how they’re bonded
- Leave out nonbonding pairs
- Use parentheses around multiple groups bonded to the same atom.

When to draw:

- Use for relatively simple or small molecules where structure can easily be conveyed by order
Condensed Structure Examples
Common Condensed Structure Mistakes

- H can’t be in the middle!
- C must be tetravalent

\[ \text{CH}_3\text{CH}_3 \not\equiv \text{C-H-H-H-C-H-H-H} \]
Skeletal Structures

We can also draw structures and leave out most of the atoms.

How to draw:

- Ends and junctions of lines = C atom
- Leave out H (but remember they are there!)
- Draw in all atoms other than C or H (heteroatoms). Draw any H bonded to heteroatoms.

When to draw:

- Big molecules
- Picture explains more than condensed structure
Skeletal Structure Examples
Common Mistakes

Don’t forget that the H-atoms are there!
Wrapping Up

- Practice going back and forth between multiple forms
- Practice making some models
- Practice looking at a formula and imagining the 3-D shape