Background: At this point you've named some hydrocarbons, and you are feeling pretty confident about it. We are now going to 'lock in' something about the molecule, and see how that influences things. This gets into 3D visualization of a molecule, and despite 200 years of teaching this, our best tools include little balls and sticks.

All of this starts at a place where there is restricted rotation about a bond. The two situations we will look at are double bonds and cyclic structures. Double bonds can't rotate so substituents that are on the same side of the bond are 'cis' and they are 'trans' when they are on the opposite side of the bond. These kinds of isomers are chemically and physically different from one another, so they can be separated.

The other situation is cyclic compounds. There is no rotation in these molecules so the 3D arrangement will get worked into the naming of the molecule. We will spend most of our time with cyclohexane because it is the most prevalent and most stable of these structures. We will use wedges and dashes to show how substituents are arranged in 3D space.

Finally, we will look at something called chirality. This is a property of molecules where there is an asymmetric center. These molecules have the same physical properties, but they may undergo reactions at different rates. Think of it as a handedness. Some molecules are right handed, and others are left handed. Right handed molecules react with each other faster than right and left handed molecules. It also turns out that these molecules will rotate a plane of polarized light in a certain direction, which is very unique.

This is important in medicinal chemistry, and we will learn about the story of thalidomide, which has a chiral center that created deformities for infants in Europe. Without even knowing it, you just became a more interesting dinner party guest.

Outcomes: Upon successful completion of the week, students should be able to:

1. Distinguish between cis and trans isomers of alkenes and cyclic compounds.
2. Identify the chiral center of a molecule if one exists.
3. Properly label molecules as R or S based on their arrangement at the chiral center.
4. Distinquish between diastereomers, enantiomers, and meso compounds.

Recommended Problems:

4.66, 4.68, 4.70, 4.71, 4.77, 4.79, 4.84, 4.87, 4.92