

Molecular Modeling Experiment: High Tech to Very, Very Low Tech

Crystal Yau, Ph.D.
Associate Professor & Chemistry Coordinator
at Community College of Baltimore County, Catonsville
cyau@cCBCMD.edu

- I. Spartan software (www.wavefun.com)
- II. Hands on Experiment on Application of VSEPR to Predict Molecular Geometry
- III. Hands on Experiment on Valence Bond Theory
- IV. Geometric Isomers

Procedure:

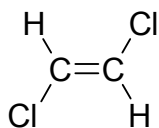
Part I: Using the ball-and-stick model kits, build models for the structures shown in Table 13.2 and complete the table. In building the structures, use BLACK for all central atoms.

Part II: Examine the ball-and-stick models that are on display and fill in Table 13.3.

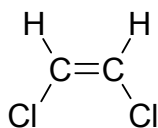
Assume all atoms satisfy the Octet Rule. The models do not show lone pairs (non-bonding electrons). In your table, under "Lewis Structure," fill in all the missing lone pairs. Be sure you do this before you give the "Molecular Geometry" as the lone pairs can affect your decision on the molecular geometry and ultimately the "Molecular Polarity."

Part III: Pair up with any student who has completed Parts I and II and is ready to do this section.

1. Together with your partner, build the following pair of molecules:



trans double bond



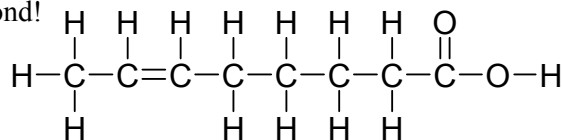
cis double bond

Use BLACK for carbon YELLOW for hydrogen GREEN for chlorine

Describe in words the difference in appearance of a *trans* and a *cis* double bond. (Describe the location of the Cl atoms with respect to each other.)

Show your molecules to your instructor. Do this **BEFORE** you continue to the next step.

2. Together with your partner, build the following molecule with a *trans* double bond. Note that shown below is a Lewis structure which does **not** necessarily show the correct geometry. Be sure that you are building a *trans* double bond!



Use BLACK for carbon YELLOW for hydrogen RED for oxygen 2 springs for double bond.

Find two other pairs of students who have completed this section of the assignment, and bring the molecules to your instructor.

You are about to form a molecule of *trans*-fat! Discuss with others in your group what is known about *trans*-fat.

Search the Internet on information of what it is, why it was introduced to foods and why it is no longer considered an acceptable substitute for animal fat. Write in your own words, on your own paper. Do not plagiarize. Be sure to provide the source of reference in the proper format.