LESSON 47 ACTIVITY

Mirror, Mirror
Mirror-Image Isomers

Name _____

Date _____ Period _____

Purpose

To understand how mirror-image molecules can have different properties.

Materials

- molecular model kit
- vials A and Z
- small piece of masking tape

Instructions

1. Build a model of CH_4. Use a black sphere for the carbon atom and white spheres for the hydrogen atoms.
   a. Compare this model with its image in the mirror. Write the similarities and differences in the table.
   b. Build a second molecule that looks like the mirror image. Determine whether the mirror image can be superimposed on the original image. Enter your answer in the table. Take apart the models.
2. Repeat for CH_3F. Use a red sphere for the fluorine atom.
3. Repeat for CHFClBr. Use a red for the fluorine, a blue for the chlorine and a red with a piece of tape on it for the bromine atoms.
4. Repeat for $C(CH_3)HFCl$. Attach the CH_3 (called a methyl group) to the central carbon. Use a red for the fluorine and a blue for the chlorine.

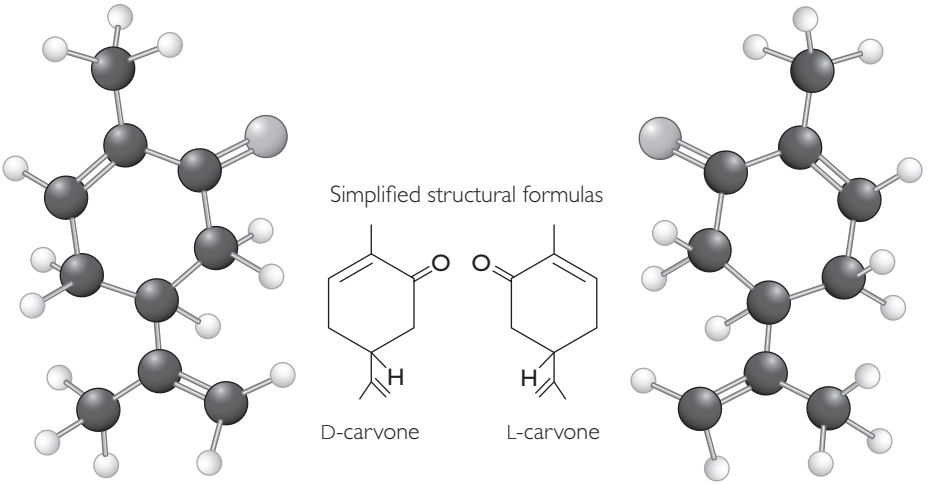
Molecule	Compare with mirror image		Can the second molecule be superimposed on the first?
	What is the same?	What is different?	
CH_4			
CH_3F			
CHFClBr			
$C(CH_3)HFCl$			

Analysis

1. When a molecule and its mirror-image cannot be superimposed on each other, they are called mirror-image isomers.
   a. Which molecules in the table have mirror-image isomers?

b. What do these two molecules have in common?

2. Carvone has the molecular formula $C_{10}H_{14}O$. The two mirror-image isomers are shown here as ball-and-stick models next to simplified structural formulas.



a. In the simplified structural formulas, label the location of each carbon atom with a C. What is missing from the simplified structural formulas?

b. Examine the molecular models provided by your teacher. Are the mirror images superimposable on each other? Explain why or why not.

c. The L-carvone molecule smells minty. Do you expect D-carvone to smell minty also? Explain your thinking.

d. Smell the contents of vials A and Z. Record your observations.

3. Making Sense Explain why mirror-image isomers have different smells.

4. If You Finish Early Does difluoromethane, CH_2F_2, have a mirror-image isomer? Explain your thinking. Build a model to check your answer.