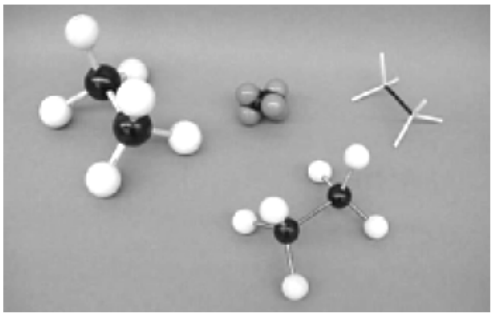
DATE: NAME: CLASS:

CHAPTER 14	Investigation 14.B: Modelling Organic Compounds	BLM 14.2.8
HANDOUT		

As you probably realize, the two-dimensional structures that you draw do not give you a good image of a molecule. Three-dimensional models help you understand the structure of organic compounds much better than sketches do. Chemists use models to help them predict the various ways in which a molecule might interact with other molecules. In this investigation, you will prepare molecular models to represent several organic compounds. You will also examine the changes to structure that result from the presence of an unsaturated bond. Along the way, you will gain practice in reading and interpreting structural diagrams.

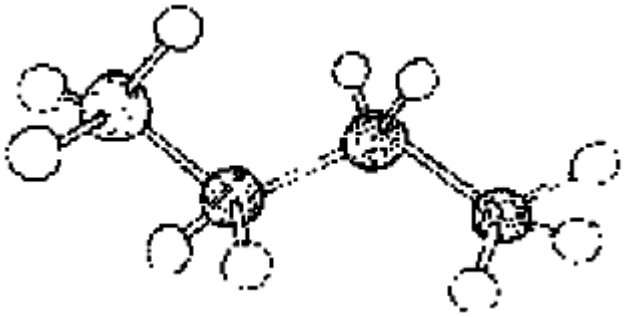


Materials

- paper and pencil
- molecular modelling kit

Procedure

1. Try to construct three-dimensional models for each of the indicated series of molecules. As you complete each model, try to rotate each of the bonds in the molecules, and then draw a careful diagram of the structure. Your diagram might be similar to the one shown below.



(a) propane, prop-1-ene, prop-1-yne

(b) methylcyclobutane, 3-methylcyclobut-1-ene, 3-methylcyclobut-1-yne

(c) cyclohexane, cyclohex-1-ene, benzene

Investigation 14.B: Modelling Organic Compounds (continued)

2. Beginning with a three-dimensional model for methane, replace hydrogen atoms with oxygen atoms to form carbon dioxide. Each oxygen atom should have two bonds with the carbon atom.

3. Again, as you complete each model, try to rotate each of the bonds in the molecules and then draw a careful diagram of the structure.

4. Build a model for carbonic acid. (**Hint:** Start with your model of carbon dioxide and add hydrogen atoms to each oxygen, and oxygen to the carbon atom.) Draw a careful diagram of the structure.

Investigation 14.B: Modelling Organic Compounds (continued)

Analysis

1. How did the addition of a multiple bond change the ability of a bond to rotate?

2. How did the addition of a multiple bond change the three-dimensional shape of each series of molecules?

3. Other than the presence of multiple double bonds, how do the structures of cyclohexane and benzene differ?

4. Were any molecules more difficult to construct than the others? Explain.

Investigation 14.B: Modelling Organic Compounds (continued)

Conclusion

5. How would you describe to another student the effect on a molecule of an increasing number of multiple bonds?

6. Inspect your drawings of carbonic acid and carbon dioxide. How are these compounds different from the other compounds that you constructed in this exercise?