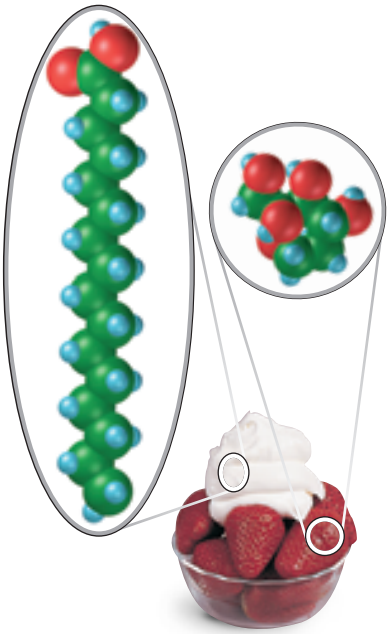


FIGURE 2 Compare the shape of a fatty acid found in cream with that of fructose, found in fruit. In the fatty acid, the carbon atoms are in chains. In fructose, carbon atoms form a ring.

Carbon-Carbon Bonding

Carbon atoms are unique in their ability to form long chains and rings of covalently bonded atoms. This type of bonding is known as **catenation,** *the covalent bonding of an element to itself to form chains or rings*. In addition, carbon atoms in these structures can be linked by single, double, or triple covalent bonds. Examples of molecules containing carbon-atom rings and chains are shown in **Figure 2.**

Carbon Bonding to Other Elements

Besides binding to other carbon atoms, carbon atoms bind readily to elements with similar electronegativities. Organic compounds consist of carbon and these other elements. **Hydrocarbons** *are composed of only carbon and hydrogen; they are the simplest organic compounds.* Other organic compounds contain hydrocarbon backbones to which other elements, primarily O, N, S, and the halogens, are attached. **Figure 3** shows a molecule in which carbon atoms are bound to other elements.

Arrangement of Atoms

The bonding capabilities of carbon also allow for different arrangements of atoms. This means that some compounds may contain the same atoms but have different properties because the atoms are arranged differently. For example, the molecular formula C_2H_6O represents both ethanol and dimethyl ether. *Compounds that have the same molecular formula but different structures are called* **isomers.**

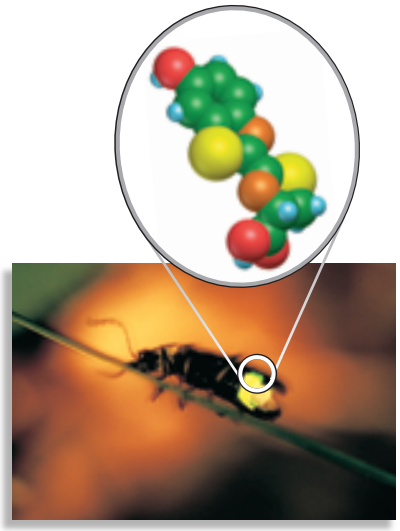
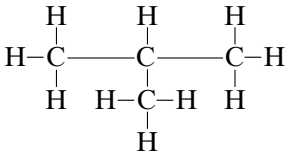


FIGURE 3 In firefly luciferin, carbon atoms bind to hydrogen, oxygen, nitrogen, and sulfur. Luciferin is responsible for the light emitted from the tail of a firefly.

Structural Formulas

Organic chemists use structural formulas to represent organic compounds. *A* **structural formula** *indicates the number and types of atoms present in a molecule and also shows the bonding arrangement of the atoms.* An example of a structural formula for an isomer of C_4H_{10} is the following.



Structural formulas are sometimes condensed to make them easier to read. In one type of condensed structure, hydrogen single covalent bonds are not shown. The hydrogen atoms are understood to bind to the atom they are written beside. The following structural and condensed structural formulas represent the same molecule.