Chapter 9  Carbon Chemistry

Section 9.1 Carbon Compounds  
(pages 262–269)

This section describes different forms of carbon that exist in nature. It also discusses saturated and unsaturated hydrocarbons. It explains the formation of fossil fuels and describes the products of their combustion.

Reading Strategy (page 262)

Previewing  Before you read, use the models in Figure 2 to describe the arrangement of carbon atoms in each form of carbon. For more information on this Reading Strategy, see the Reading and Study Skills in the Skills and Reference Handbook at the end of your textbook.

Forms of Carbon

<table>
<thead>
<tr>
<th>Form of Carbon</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond</td>
<td>Rigid, three-dimensional network</td>
</tr>
<tr>
<td>Graphite</td>
<td>Widely spaced layers</td>
</tr>
<tr>
<td>Buckminsterfullerene</td>
<td>Hollow spheres with a surface of carbon atoms arranged in alternating hexagons and pentagons</td>
</tr>
</tbody>
</table>

1. The two elements that all organic compounds contain are ________________ and hydrogen.

2. Circle the letter of the approximate percentage of all known compounds that are organic compounds.
   - a. 10 percent
   - b. 30 percent
   - c. 60 percent
   - d. 90 percent

3. Circle the letter of each form of carbon.
   - a. soot
   - b. diamond
   - c. fullerene
   - d. graphite

4. Describe a network solid. A network solid is a solid in which all the atoms are linked by covalent bonds.

5. Circle the letter of each property of graphite.
   - a. soft
   - b. rigid
   - c. compact
   - d. slippery

Saturated Hydrocarbons  
(pages 264–265)

6. Is the following sentence true or false? A hydrocarbon is an organic compound that contains carbon, hydrogen, and oxygen. ________________

7. Is the following sentence true or false? A saturated hydrocarbon contains only single bonds. ________________
8. Name the factors that determine the properties of a hydrocarbon.
   a. The number of carbon atoms
   b. How the atoms are arranged

9. Name the three ways that carbon atoms can be arranged in hydrocarbon molecules.
   a. A straight chain
   b. A branched chain
   c. A ring

10. Circle the letter of the correct answer. What does a structural formula show that a molecular formula does not?
    a. the type of atoms in the compound
    b. the number of atoms in a molecule of the compound
    c. the arrangement of atoms in the compound
    d. the state of the compound at room temperature

11. Describe isomers. Isomers are compounds that have the same molecular formula but different structural formulas.

12. Circle the letter of each type of unsaturated hydrocarbon.
    a. alkene
    b. alkane
    c. alkyne
    d. aromatic hydrocarbon

13. Circle the letter of the most reactive type of hydrocarbon.
    a. alkanes
    b. alkenes
    c. alkynes
    d. aromatic hydrocarbons

14. Define fossil fuels. Fossil fuels are mixtures of hydrocarbons that formed from the remains of plants or animals.

15. Circle the letter of each fossil fuel.
    a. coal
    b. natural gas
    c. ferns
    d. petroleum

16. Is the following sentence true or false? In a distillation tower, compounds with lower boiling points condense first. ___false___

17. Circle the letter of each primary product of the complete combustion of fossil fuels.
    a. carbon dioxide
    b. carbon monoxide
    c. sulfur dioxide
    d. water

18. When an insufficient amount of oxygen is available for complete combustion of a fossil fuel, one product of the combustion reaction is the deadly gas ___carbon monoxide___.

19. Why is rain always slightly acidic? Carbon dioxide dissolves in water droplets and forms carbonic acid.