43. Give the molecular formula for each type of hydrocarbon if it contains seven carbon atoms.
   a. an alkane
   b. an alkene
   c. an alkyne

44. a. Alkyne nomenclature is very similar to the nomenclature of what other group of hydrocarbons?
   b. How do these nomenclatures differ?

45. a. What are delocalized electrons?
   b. What is their effect on the reactivity of aromatic hydrocarbons?

CRITICAL THINKING

46. Inferring Conclusions Why are organic compounds with covalent bonds usually less stable when heated than inorganic compounds with ionic bonds?

47. Inferring Relationships The element that appears in the greatest number of compounds is hydrogen. The element found in the second greatest number of compounds is carbon. Why are there more hydrogen compounds than carbon compounds?

48. Relating Ideas As the number of carbon atoms in an alkane molecule increases, does the percentage by mass of hydrogen increase, decrease, or remain the same?

49. Applying Ideas How does ethylene glycol protect radiator fluid in an automobile from both freezing in the winter and boiling over in the summer?

USING THE HANDBOOK

50. The top 10 chemicals produced in the United States are listed in Table 7B of the *Elements Handbook.* Review this material, and answer the following:
   a. Which of the top ten compounds are organic?
   b. Write structural formulas for the compounds you listed in item (a).
   c. To what homologous series do each of these compounds belong?

51. The reaction of methane with oxygen produces two different oxides of carbon. Review this material in the *Elements Handbook,* and answer the following:
   a. What condition determines whether the product of the methane reaction is CO_2 or CO?
   b. If a home heating system is fueled by natural gas, what difference does it make if the combustion produces CO_2 or CO?

52. Silicon is similar to carbon in forming long-chain compounds. Review the material on silicon in the *Elements Handbook* and answer the following.
   a. How does a long-chain silicon compound differ in composition from a long-chain carbon compound?
   b. The simplest alkane is methane. Methyl groups are found in all alkanes. What is a common subunit of a silicate? What is the geometry of that subunit?

53. Mercury in the environment poses a hazard to living things. Review the section on mercury poisoning in the *Elements Handbook.*
   a. Draw a structural formula for the organic mercury compound described in that section.
   b. What is the IUPAC name for this compound?

RESEARCH & WRITING

54. *Chemical and Engineering News* publishes a list once a year of the top 50 chemicals. Find out which chemicals on the current year's list are hydrocarbons, and report your findings to the class.

55. Consult reference materials at the library, and read about products made from hydrocarbons. Keep a list of the number of petroleum-related products you use in a single day.

56. The widespread use of synthetic polymers in modern society has led to a number of new environmental problems. Find out what some of these problems are and what can be done to reduce them.