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CHAPTER 22 STUDY GUIDE FOR CONTENT MASTERY

Hydrocarbons

Section 22.1 Alkanes

In your textbook, read about organic chemistry, hydrocarbons, and straight-chain alkanes.

Use each of the terms below just once to complete the passage.

hydrocarbons	homologous series	organic compounds	straight-chain alkanes

Most compounds that contain carbon are known as **(1)** organic compounds. The simplest group of such compounds are **(2)** hydrocarbons, which contain only carbon and hydrogen. If all of the carbon atoms are linked by single covalent bonds and there are no branches, the compounds are called **(3)** straight-chain alkanes. Ethane, propane, and butane are three examples. They are members of one **(4)** homologous series because they differ from each other by a repeating unit (— CH_2 —).

In your textbook, read about branched-chain alkanes and naming them.

For each statement below, write *true* or *false*.

true **5.** The ability of carbon atoms to bond to two, three, or four other carbon atoms makes possible a variety of branched-chain alkanes.

true **6.** A carbon atom or group of carbon atoms that branch off the main hydrocarbon chain of an alkane is a substituent group.

false **7.** A skeletal formula is a way of representing an organic compound by showing only the hydrogen atoms.

Use the IUPAC rules to name the following structures.

8. $CH_3CH_2CH_2CH_2CH_2CH_2CH_3$

octane

9. $CH_3CHCH_2CH_2CH_2CHCH_3$ (with CH_3 substituents at positions 2 and 6)

2,6-dimethyloctane

Draw the structure of each of the following alkanes.

10. 2-methylheptane $CH_3CHCH_2CH_2CH_2CH_2CH_3$

11. 2,3,4-trimethylpentane $CH_3CH(CH_3)CH(CH_3)CH_3$

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CHAPTER 22 STUDY GUIDE FOR CONTENT MASTERY

Section 22.2 Cyclic Alkanes and Alkane Properties

In your textbook, read about cycloalkanes.

For each item in Column A, write the letter of the matching item in Column B.

	Column A	Column B
c	**1.** A simplified way of representing an organic compound by showing only the carbon-carbon bonds	**a.** *cyclo-*
b	**2.** A way of representing an organic compound that saves space by not showing how the hydrogen atoms branch off the carbon atoms	**b.** condensed structural formula
a	**3.** Indicates that a hydrocarbon has a ring structure	**c.** line structure
d	**4.** A hydrocarbon that has a ring of carbon atoms in its structure	**d.** cyclic hydrocarbon

Use the IUPAC rules to name the following structure.

5. CH_3, CH_2CH_3

1-ethyl-4-methylcyclohexane

Draw the structure of the following cycloalkane.

6. 1-ethyl, 2-propylcyclobutane $CH_2CH_2CH_3$, CH_2CH_3

In your textbook, read about the properties of alkanes and multiple carbon-carbon bonds.

In the space at the left, write the word or phrase in parentheses that correctly completes the statement.

nonpolar **7.** All the bonds in an alkane are (polar, nonpolar).

stronger **8.** The attractive forces between alkane molecules are (stronger, weaker) than the attractive forces between alkane and water molecules.

not very **9.** Alkanes are (very, not very) soluble in water.

increase **10.** The boiling points of alkanes (increase, decrease) with increasing molecular mass.

low **11.** The chief chemical property of alkanes is their (low, high) reactivity.

fuels **12.** Alkanes are often used as (solvents, fuels) because they readily undergo combustion in oxygen.

saturated **13.** Alkanes are (saturated, unsaturated) hydrocarbons because they have only single bonds.