Organic Compounds

Textbook pages 244–251

Before You Read

What do you think of when you hear the term "organic"? Outline your thoughts in the lines below.

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🖉 ***Make Flash Cards***

Create flash cards to help you remember common organic compounds. Write the name of the compound on the front of the card and the information you want to recall on the back.
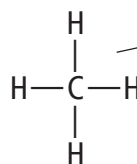
What are organic compounds?

Organic compounds are any compounds that contain carbon (with a few exceptions). All other compounds are referred to as **inorganic compounds**. In almost all organic compounds, carbon atoms are bonded to hydrogen atoms or other elements that are near carbon in the periodic table, especially nitrogen, oxygen, sulphur, phosphorus, and the halogens. Other elements, including metals and non-metals, may also be present.

The carbon in organic compounds forms four bonds, which enables it to form complex, branched-chain structures, ring structures, and even cage-like structures. Several different methods can be used to model these structures. These include the structural formula, the ball-and-stick model, and the space-filling model shown below.
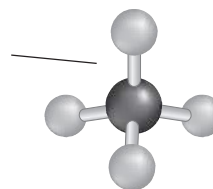
CH_4

molecular formula

H
|
H—C—H
|
H

Shows a single covalent bond

structural formula   ball-and-stick model

space-filling model

To recognize a compound as organic, look for an indication of the presence of carbon in its name, chemical formula, or diagram. However, there are a few exceptions to this rule. Certain compounds that contain carbon are classified as inorganic carbon compounds. These include any compounds that contain carbonates, (i.e., $CaCO_3$); carbides, (i.e., SiC); and oxides (i.e., CO_2, CO). ✅
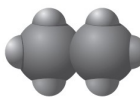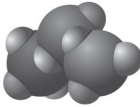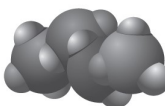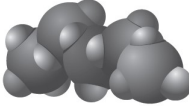
What are some common organic compounds?

Two common organic compounds are hydrocarbons and alcohols.

1. Hydrocarbons: A **hydrocarbon** is an organic compound that contains only the elements carbon and hydrogen. The simplest of all organic compounds is the hydrocarbon molecule called methane (CH_4) which consists of a carbon atom bonded to four hydrogen atoms. Other hydrocarbons are formed by linking two or more carbons together to make a chain. The first five hydrocarbons are given in the table below.

✔️ **Reading Check**

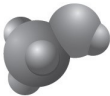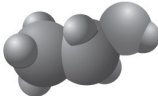How does an organic compound differ from an inorganic compound?

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_____

_____

Name	Molecular Formula	Structural Formula	Shortened Structural Formula	Space-Filling Model	Common Uses
methane	CH_4		CH_4		• Natural gas heaters
ethane	C_2H_6		CH_3CH_3		• Manufacturing plastic
propane	C_3H_8		$CH_3CH_2CH_3$		• Camp fuel
butane	C_4H_{10}		$CH_3CH_2CH_2CH_3$		• Hand-held lighters
pentane	C_5H_{12}		$CH_3CH_2CH_2CH_2CH_3$		• Component of gasoline

✔ **Reading Check**

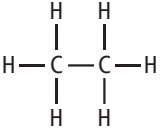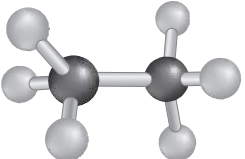Provide the molecular formula for ethanol.

_____

2. Alcohols: An **alcohol** is one kind of organic compound that contains C, H, and O in a specific structure. The table below shows some common alcohols. ✔

Name	Molecular Formula	Structural Formula	Shortened Structural Formula	Space-Filling Model	Common Use
methanol	CH_4O		CH_3OH		• Solvent
ethanol	C_2H_6O		CH_3CH_2OH		• Fuel
isopropyl alcohol	C_3H_8O		$(CH_3)CH_2OH$		• Sterilizer • Cleaner

Use with textbook pages 244–248.

Organic compounds

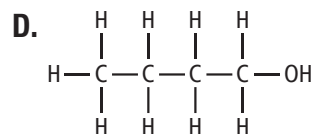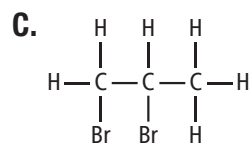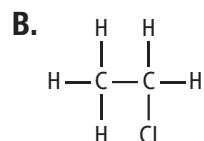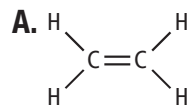| **Using the compound ethane, match the Descriptor on the left with the best Formula / Model that represents ethane on the right. Each Formula / Model may be used only once.**	
Descriptor	**Formula / Model**
1. _____ structural formula	**A.** C_2H_6
2. _____ molecular formula	**B.**
3. _____ space-filling model	**C.**
4. _____ ball-and-stick model	**D.**

5. What element must always be present in an organic compound?

   A. carbon

   B. oxygen

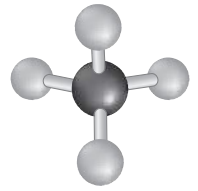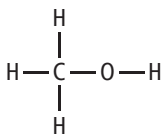   **C.** chlorine

   D. hydrogen

6. Which formula represents a hydrocarbon?

   A. $HClO_3$

   B. CH_3COOH

   C. $CH_3CH_2CH_2COOH$

   D. $CH_3CH_2CH_2CH_2CH_3$

7. Which of the following represents an alcohol?

   A.

   B.

   C.

   D.

8. Which of the following represents methane, CH_4?

I.	
II.	
III.	

   A. I and II only

   B. I and III only

   C. II and III only

   D. I, II, and III