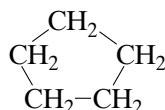


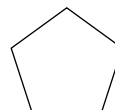
Cycloalkanes

Cycloalkanes are alkanes in which the carbon atoms are arranged in a ring, or cyclic, structure. The structural formulas for cycloalkanes are often drawn in a simplified form. In these skeletal representations, such as the one below on the right, it is understood that there is a carbon atom at each corner and enough hydrogen atoms to complete the four bonds to each carbon atom.



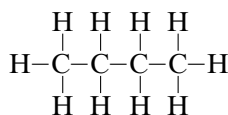
cyclopentane

or

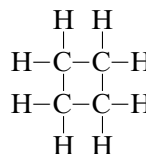


cyclopentane

The general structure for cycloalkanes, C_nH_{2n} , shows that they have $2 \times n$ hydrogen atoms, two fewer hydrogen atoms than noncyclic alkanes, C_nH_{2n+2} , have. This is because cycloalkanes have no free ends where a carbon atom is attached to three hydrogen atoms. Another example, of a four-carbon alkane and cycloalkane, is shown below.



butane
 C_4H_{10}



cyclobutane
 C_4H_8

TABLE 3 Carbon-Atom Chain Prefixes

Number of carbon atoms	Prefix
1	meth-
2	eth-
3	prop-
4	but-
5	pent-
6	hex-
7	hept-
8	oct-
9	non-
10	dec-

Systematic Names of Alkanes

Historically, the names of many organic compounds were derived from the sources in which they were found. As more organic compounds were discovered, a systematic naming method became necessary. The systematic method used primarily in this book was developed by the International Union of Pure and Applied Chemistry, IUPAC.

Unbranched-Chain Alkane Nomenclature

To name an unbranched alkane, find the prefix in **Table 3** that corresponds to the number of carbon atoms in the chain of the hydrocarbon. Then add the suffix *-ane* to the prefix. An example is shown below.



heptane

The molecule has a chain seven carbon atoms long, so the prefix *hept-* is added to the suffix *-ane* to form *heptane*.