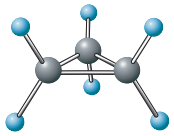
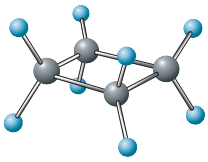
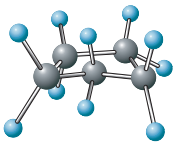

(a) **Cyclopropane,** C_3H_6


(b) **Cyclobutane,** C_4H_8


(c) **Cyclopentane,** C_5H_{10}

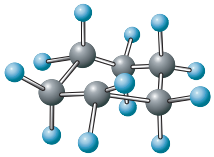
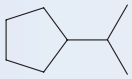

(d) **Cyclohexane,** C_6H_{12}

Figure 12.6 Three-dimensional representations of the structures of simple cycloalkanes.

EXAMPLE 12.6
Generating Condensed Structural Formulas from Line-Angle Structural Formulas for Cycloalkanes

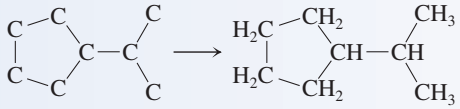
Generate the condensed structural formula for each of the following cycloalkanes.

a. 

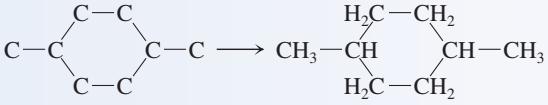
b. 

Solution

a. First replace each angle and line terminus with a carbon atom, and then add hydrogens as necessary to give each carbon four bonds. The molecular formula of this compound is C_8H_{16}.

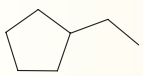


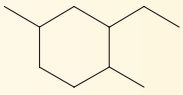
b. Similarly, we have

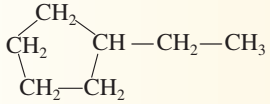


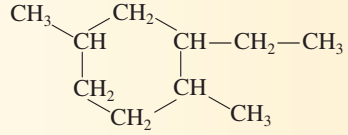
Practice Exercise 12.6

Generate the condensed structural formula for each of the following cycloalkanes.

a. 

b. 

Answers: **a.** 

b. 

The observed C—C—C bond angles in cyclopropane are 60°, and those in cyclobutane are 90°, values that are considerably smaller than the 109° angle associated with a tetrahedral arrangement of bonds about a carbon atom (Section 5.8). Consequently, cyclopropane and cyclobutane are relatively unstable compounds. Five- and six-membered cycloalkane structures are much more stable, and these structural entities are encountered in many organic molecules.

12.13 IUPAC NOMENCLATURE FOR CYCLOALKANES

IUPAC naming procedures for cycloalkanes are similar to those for alkanes. The ring portion of a cycloalkane molecule serves as the name base, and the prefix *cyclo-* is used to indicate the presence of the ring. Alkyl substituents are named in the same