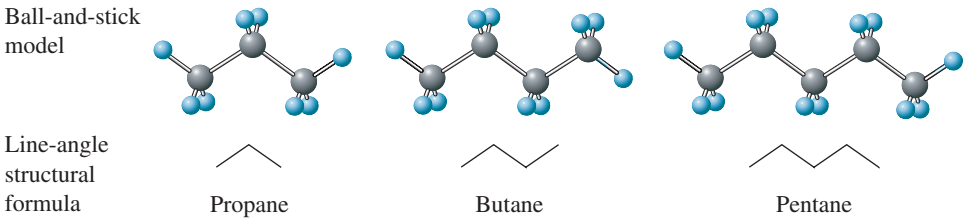
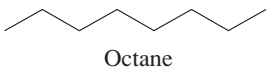
A **line-angle structural formula** *is a structural representation in which a line represents a carbon–carbon bond and a carbon atom is understood to be present at every point where two lines meet and at the ends of lines.* Ball-and-stick-models and line-angle structural formulas for the alkanes propane, butane, and pentane are as follows:

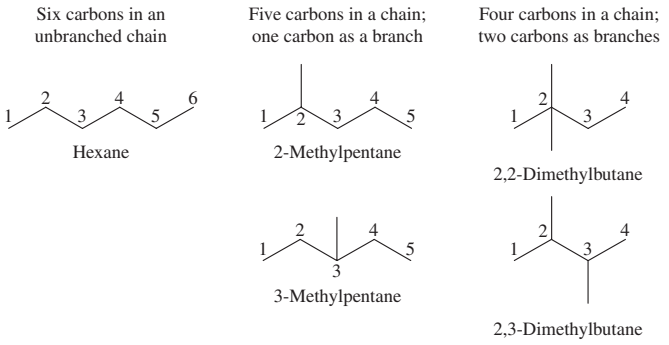


Note that the zigzag (sawtooth) pattern used in line-angle structural formulas has a relationship to the three-dimensional shape of the molecules that are represented.

The line-angle structural formula for an unbranched chain of eight carbon atoms would be



The structures of branched-chain alkanes can also be designated using line-angle structural formulas. The five constitutional alkane isomers in which six carbon atoms are present (C_6H_{14}) have the following line-angle formulas:

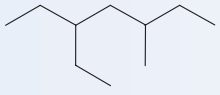


Example 12.5 gives further insights concerning the use and interpretation of line-angle structural formulas.

EXAMPLE 12.5
Generating Condensed Structural Formulas from Line-Angle Structural Formulas for Alkanes

For each of the following alkanes, determine the number of hydrogen atoms present on each carbon atom and then write the condensed structural formula for the alkane.

a. 

b. 

Solution

a. Each carbon atom in an alkane must be bonded to four atoms. Thus, carbon atoms bonded to only one carbon atom have three hydrogen atoms attached; those bonded to