

**TABLE 9** *Classes of Organic Compounds*

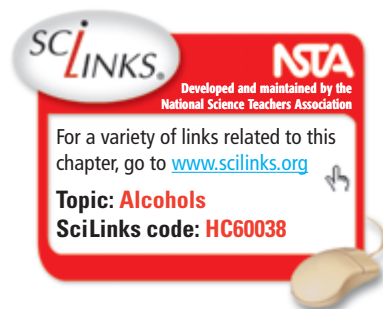
Class	Functional group	General formula
alcohol	—OH	$R-OH$
alkyl halide	—X (X = F, Cl, Br, I)	$R-X$
ether	—O—	$R-O-R'$
aldehyde	$\begin{array}{c} O \\    \\ -C-H \end{array}$	$\begin{array}{c} O \\    \\ R-C-H \end{array}$
ketone	$\begin{array}{c} O \\    \\ -C- \end{array}$	$\begin{array}{c} O \\    \\ R-C-R' \end{array}$
amine	$\begin{array}{c} -N- \\   \end{array}$	$\begin{array}{c} R-N-R'' \\   \\ R' \end{array}$
carboxylic acid	$\begin{array}{c} O \\    \\ -C-OH \end{array}$	$\begin{array}{c} O \\    \\ R-C-OH \end{array}$
ester	$\begin{array}{c} O \\    \\ -C-O- \end{array}$	$\begin{array}{c} O \\    \\ R-C-O-R' \end{array}$

## Alcohols

**Alcohols** are organic compounds that contain one or more hydroxyl groups. The general formula for a class of organic compounds consists of the functional group and the letter *R*, which stands for the rest of the molecule. The general formula for alcohols is  $R-OH$ .

Hydrogen bonding in alcohols can also explain other properties and uses of alcohols. Cold creams, lipsticks, body lotions, and similar products generally include 1,2,3-propanetriol, commonly called glycerol, to keep them moist. A model for glycerol is shown in **Figure 12**. Multiple hydroxyl groups allow glycerol to form many hydrogen bonds with water molecules.

Alcohols are sometimes used today as alternative fuels and as octane enhancers in fuel for automobiles. Ethanol is combined with gasoline, for example, in a one-to-nine ratio to produce gasohol. Some experts have promoted the use of gasohol as a fuel for automobiles because it burns more cleanly and efficiently. However, there are also disadvantages. The combustion of ethanol produces only about 60% as much energy per gram as the combustion of gasoline does. The presence of ethanol also causes increased water absorption in the fuel.



**FIGURE 12** Glycerol contains three hydroxyl groups. This structure allows it to form multiple hydrogen bonds with water. Glycerol is added as a moisturizer to skin products.

