SECTION 3

Functional Groups

Objectives

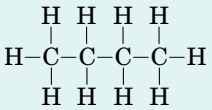
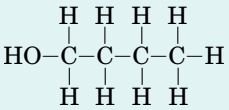
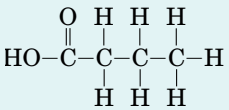
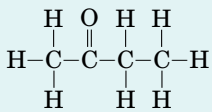
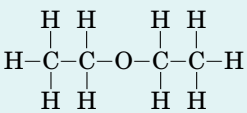
- Define "functional group" and explain why functional groups are important.
- Identify alcohols, alkyl halides, ethers, aldehydes, ketones, carboxylic acids, esters, and amines based on the functional group present in each.
- Explain the relationships between the properties and structures of compounds with various functional groups.

A **functional group** *is an atom or group of atoms that is responsible for the specific properties of an organic compound.* A given functional group undergoes the same types of chemical reactions in every molecule in which it is found. Therefore, compounds that contain the same functional group can be classified together.

Classes of Organic Compounds

A functional group gives an organic compound properties that are very different from those of the corresponding hydrocarbon. The compounds in **Table 8** have four carbon atoms, but they have very different physical properties due to their different functional groups. Some functional groups and their characteristic general formulas are shown in **Table 9.**

TABLE 8 *Comparing Classes of Organic Compounds*

Name	Structural Formula	Melting Point (°C)	Boiling Point (°C)	Density (g/mol)
Butane		–138.4	–0.5	0.5788
1-Butanol		–89.5	117.2	0.8098
Butanoic acid		–4.5	163.5	0.9577
2-Butanone		–86.3	79.6	0.8054
Diethyl ether		–116.2	34.5	0.7138