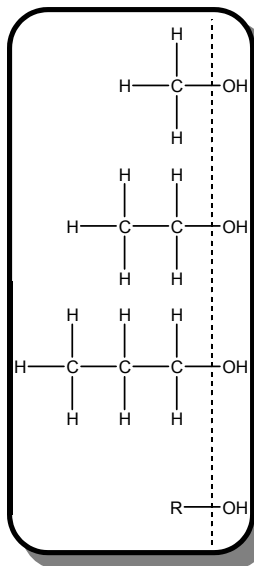


Naming Substituted Hydrocarbons

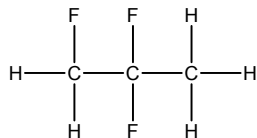
A substituted hydrocarbon is a hydrocarbon with an element other than hydrogen attached somewhere along the hydrocarbon chain. It is named in a similar fashion to a hydrocarbon. This can be illustrated with alcohols as an example. The compounds pictured to the lower left are



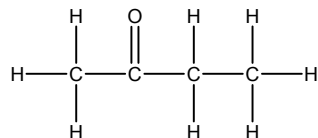
alcohols. They look like alkanes with -OH at one end where a hydrogen would have been. The -OH is called a functional group. The rest of the molecule is called a residue (R). The general formula for alcohols is $R\text{-OH}$. CH_3OH , the first alcohol pictured to the left is formed by substituting an -OH group for hydrogen on methane (CH_4). As a result, it is called 1-methanol. The suffix *ol* shows that it is an alcohol. The root *methan* comes from methane. The number 1 shows the location of the -OH . The next alcohol in the series, $\text{CH}_3\text{CH}_2\text{OH}$, formed from ethane, is called 1-ethanol.

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ is 1-propanol.

The alcohols and several other classes of substituted hydrocarbons are found in *Table R*. The root is determined by counting the number of carbons in the chain. For halides, the substitution is identified with a prefix. For the remaining substitutions, a suffix is used. (See *Table R*.) As with all hydrocarbons, the number and location of groups needs to be identified.



1,2,2-trifluoropropane



2-butanone

Name the following compounds using the rules for naming hydrocarbons and by referring to the reading and *Table R* above.

1. $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$

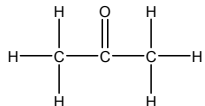
2. 

Table R
Organic Functional Groups

| Class of Compound | Functional Group | General Formula | Example |
|---------------------|---|--|---|
| halide (halocarbon) | -F (fluoro-) -Cl (chloro-) -Br (bromo-) -I (iodo-) | $R\text{-X}$ (X represents any halogen) | $\text{CH}_3\text{CHClCH}_3$ 2-chloropropane |
| alcohol | -OH | $R\text{-OH}$ | $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ 1-propanol |
| ether | -O- | $R\text{-O-R'}$ | $\text{CH}_3\text{OCH}_2\text{CH}_3$ methyl ethyl ether |
| aldehyde | $\begin{array}{c} \text{O} \\ \\ \text{-C-H} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ R\text{-C-H} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ \text{CH}_3\text{CH}_2\text{C-H} \end{array}$ propanal |
| ketone | $\begin{array}{c} \text{O} \\ \\ \text{-C-} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ R\text{-C-R'} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ \text{CH}_3\text{CCH}_2\text{CH}_2\text{CH}_3 \end{array}$ 2-pentanone |
| organic acid | $\begin{array}{c} \text{O} \\ \\ \text{-C-OH} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ R\text{-C-OH} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ \text{CH}_3\text{CH}_2\text{C-OH} \end{array}$ propanoic acid |
| ester | $\begin{array}{c} \text{O} \\ \\ \text{-C-O-} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ R\text{-C-O-R'} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ \text{CH}_3\text{CH}_2\text{COCH}_3 \end{array}$ methyl propanoate |
| amine | $\begin{array}{c} \\ \text{-N-} \end{array}$ | $\begin{array}{c} R' \\ \\ R\text{-N-R''} \end{array}$ | $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ 1-propanamine |
| amide | $\begin{array}{c} \text{O} \\ \\ \text{-C-NH} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ R\text{-C-NH} \end{array}$ | $\begin{array}{c} \text{O} \\ \\ \text{CH}_3\text{CH}_2\text{C-NH}_2 \end{array}$ propanamide |

3. $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$
4. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$
5. CH_3OCH_3
6. $\begin{array}{c} \text{H} \quad \text{O} \\ | \quad || \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$
7. $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{CH}$
8. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHOHCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
9. CH_3CHO
10. $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
11. $\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ | \quad | \quad || \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
12. CCl_4
13. CF_2CH_2
14. $\text{HC}\overset{\text{O}}{\parallel}-\text{O}-\text{CH}_3$
15. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
16. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
17. $\text{CH}_3\text{CH}_2\text{CHOHCH}_2\text{CH}_2\text{CH}_3$
18. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
19. $\text{CH}_3\text{CH}_2\text{CHBrCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
20. $\text{CH}_3\text{CHNH}_2\text{CH}_2\text{CH}_3$