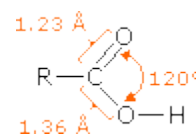


Carboxylic Acids and its Nomenclature

The carboxyl functional group that characterizes the carboxylic acids is unusual in that it is composed of two functional groups described earlier in this text. As may be seen in the formula on the right, the carboxyl group is made up of a hydroxyl group bonded to a carbonyl group. It is often written in condensed form as $-\text{CO}_2\text{H}$ or $-\text{COOH}$. Other combinations of functional groups were described previously, and significant changes in chemical behavior as a result of group interactions were described (e.g. phenol & aniline). In this case, the change in chemical and physical properties resulting from the interaction of the hydroxyl and carbonyl group are so profound that the combination is customarily treated as a distinct and different functional group.



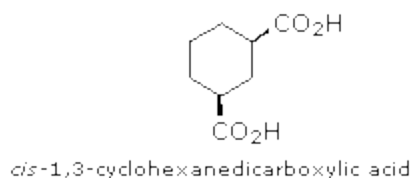
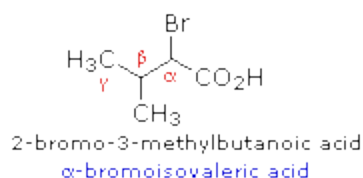
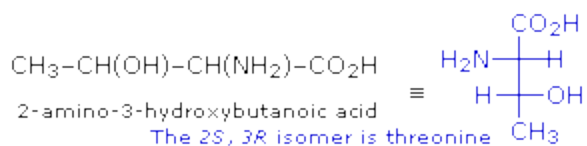
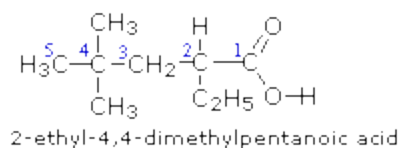
Nomenclature :

As with aldehydes, the carboxyl group must be located at the end of a carbon chain. In the IUPAC system of nomenclature the carboxyl carbon is designated #1, and other substituents are located and named accordingly. The characteristic IUPAC suffix for a carboxyl group is "**oic acid**", and care must be taken not to confuse this systematic nomenclature with the similar common system. These two nomenclatures are illustrated in the following table, along with their melting and boiling points.

Formula	Common Name	Source	IUPAC Name	Melting Point	Boiling Point
HCO_2H	formic acid	ants (L. formica)	methanoic acid	8.4 °C	101 °C
$\text{CH}_3\text{CO}_2\text{H}$	acetic acid	vinegar (L. acetum)	ethanoic acid	16.6 °C	118 °C
$\text{CH}_3\text{CH}_2\text{CO}_2$	propionic	milk (Gk. protus)	propanoic	-20.8 °C	141 °C

H	acid	prion)	acid		
$\text{CH}_3(\text{CH}_2)_2\text{CO}_2\text{H}$	butyric acid	butter (L. butyrum)	butanoic acid	-5.5 °C	164 °C
$\text{CH}_3(\text{CH}_2)_3\text{CO}_2\text{H}$	valeric acid	valerian root	pentanoic acid	-34.5 °C	186 °C
$\text{CH}_3(\text{CH}_2)_4\text{CO}_2\text{H}$	caproic acid	goats (L. caper)	hexanoic acid	-4.0 °C	205 °C
$\text{CH}_3(\text{CH}_2)_5\text{CO}_2\text{H}$	enanthic acid	vines (Gk. oenanthe)	heptanoic acid	-7.5 °C	223 °C
$\text{CH}_3(\text{CH}_2)_6\text{CO}_2\text{H}$	caprylic acid	goats (L. caper)	octanoic acid	16.3 °C	239 °C
$\text{CH}_3(\text{CH}_2)_7\text{CO}_2\text{H}$	pelargonic acid	pelargonium (an herb)	nonanoic acid	12.0 °C	253 °C
$\text{CH}_3(\text{CH}_2)_8\text{CO}_2\text{H}$	capric acid	goats (L. caper)	decanoic acid	31.0 °C	219 °C

Substituted carboxylic acids are named either by the IUPAC system or by common names. If you are uncertain about the IUPAC rules for nomenclature you should [review](#) them now. Some common names, the amino acid threonine for example, do not have any systematic origin and must simply be memorized. In other cases, common names make use of the Greek letter notation for carbon atoms near the carboxyl group. Some examples of both nomenclatures are provided below.



Simple dicarboxylic acids having the general formula $\text{HO}_2\text{C-(CH}_2\text{)}_n\text{-CO}_2\text{H}$ (where $n = 0$ to 5) are known by the common names: Oxalic ($n=0$), Malonic ($n=1$), Succinic ($n=2$), Glutaric ($n=3$), Adipic ($n=4$) and Pimelic ($n=5$) Acids. Common names, such as these can be troublesome to remember, so mnemonic aids, which take the form of a catchy phrase, have been devised. For this group of compounds one such phrase is: "Oh My Such Good Apple Pie".

Source : <http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/crbacid1.htm#crbacd1>