
6.3 NOMENCLATURE OF CARBOXYLIC ACIDS

In IUPAC system, carboxylic acids are named by replacing the suffix “-e” of the corresponding alkane with “-oic acid”. It is not necessary to indicate the position of the -COOH group because this group will be at the end of the parent chain and its carbon is assigned as C-1. The common names and IUPAC names for some straight chain saturated carboxylic acids are given in *Table-6.1*.

Table 6.1–Common names and IUPAC names of some straight chain saturated carboxylic acids

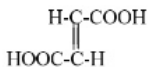
Carboxylic acids	Common name	IUPAC name
HCOOH	formic acid	methanoic acid
CH ₃ COOH	acetic acid	ethanoic acid

$\text{CH}_3\text{CH}_2\text{COOH}$	propionic acid	propanoic acid
$\text{CH}_3(\text{CH}_2)_2\text{COOH}$	butyric acid	butanoic acid
$\text{CH}_3(\text{CH}_2)_3\text{COOH}$	valeric acid	pentanoic acid
$\text{CH}_3(\text{CH}_2)_4\text{COOH}$	caproic acid	hexanoic acid
$\text{CH}_3(\text{CH}_2)_5\text{COOH}$	enanthic acid	heptanoic acid
$\text{CH}_3(\text{CH}_2)_6\text{COOH}$	caprylic acid	octanoic acid
$\text{CH}_3(\text{CH}_2)_7\text{COOH}$	pelargonic acid	nonanoic acid
$\text{CH}_3(\text{CH}_2)_8\text{COOH}$	capric acid	decanoic acid
$\text{CH}_3(\text{CH}_2)_9\text{COOH}$	-	undecanoic
$\text{CH}_3(\text{CH}_2)_{10}\text{COOH}$	lauric	dodecanoic

IUPAC nomenclature of di-carboxylic acids: If there are two $-\text{COOH}$ groups are present in an acid; the acid is called dicarboxylic acid. To construct the IUPAC name of these compounds, add the suffix *-dioic* acid to the name of the parent alkane containing both carboxylic groups (*Table-6.2*).

Table 6. 2-Common names and IUPAC names of some di-carboxylic acids

Carboxylic acids	Common name	IUPAC name
$\text{HOOC}-\text{COOH}$	oxalic acid	ethanedioic acid
$\text{HOOC}.\text{CH}_2\text{COOH}$	malonic acid	propanedioic acid
$\text{HOOC}.\text{CH}_2\text{CH}_2\text{COOH}$	succinic acid	butanedioic acid
$\text{HOOC}(\text{CH}_2)_4\text{COOH}$	adipic acid	hexanedioic acid
$\begin{array}{c} \text{H}-\text{C}-\text{COOH} \\ \\ \text{H}-\text{C}-\text{COOH} \end{array}$	maleic acid	<i>cis</i> -2-butenedioic acid



fumaric acid

trans-2-butenedioic
acid

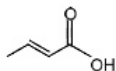
IUPAC nomenclature of hydroxyl derivatives of carboxylic acids: The hydroxyl derivatives of carboxylic acids are called hydroxyl carboxylic acids. In common system, the position of -OH group in a hydrocarbon chain is indicated by the *Greek alphabets* α , β , γ , δ etc. whereas in IUPAC system the position of -OH group in a hydrocarbon chain is indicated by the *numbering*, 1, 2, 3, 4 etc. (Table-6.3)

Table 6.3-Common names and IUPAC names of some hydroxyl derivatives of carboxylic acids.

Carboxylic acids	Common name	IUPAC Name
HOCH ₂ COOH	glycollic acid	hydroxyethanoic acid
CH ₃ CHOHCOOH	lactic acid	2-hydroxypropanoic acid
HOOCCH ₂ CHOHCOOH	malic acid	2-hydroxybutanedioic acid
HOOC(CHOH) ₂ COOH	tarteric acid	2,3-dihydroxy butanedioic acid
HOC(COH)((CH ₂)COOH) ₂	citric acid	2-hydroxypropane-1,2,3 tri carboxylic acid

Table 6.4-If a carboxylic compound contains double bond (alkene), then replace the infix from “-an to -en” and the placement of the infix is determined by the *numbering*, 1, 2, 3, 4 etc. (Table-6.4).

Carboxylic acids



Common name

crotonic acid

IUPAC name

trans-2-Butenoic acid

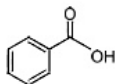


acrylic acid

propenoic acid

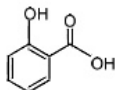
IUPAC nomenclature of aromatic carboxylic acids: Aromatic carboxylic acids are named by adding the suffix "*-carboxylic acid*" to the name of a parent hydride (*Table 6.5*).

Table 6.5–Common names and IUPAC names of some aromatic carboxylic acids:

Carboxylic acids**Common name****IUPAC name**

benzoic acid

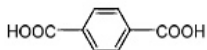
benzene carboxylic acid



salicylic acid

2-hydroxybenzene
carboxylic acid

Table 6.6–If the two carboxylic acid groups are in the benzene ring it is named as "*di-carboxylic acid*".

Carboxylic acids**Common
name****IUPAC name**phthalic
acid1,2-
benzenedicarboxylic
acidterephthalic
acid1,4-
benzenedicarboxylic
acid