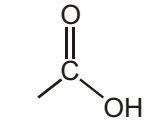
CHAPTER

10

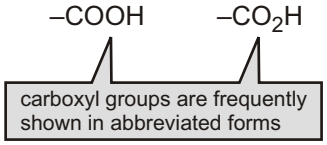
Nomenclature of Carboxylic Acid, Ester, Cyanide, Amide, Amine and Anhydride

NAMING CARBOXYLIC ACIDS

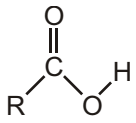
The functional group of carboxylic acid is called a carboxyl group.



a carboxyl group



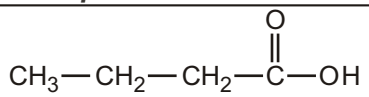
In systematic (IUPAC) nomenclature, a carboxylic acid is named by replacing the terminal "e" of the alkane name with "oic acid." For example, the one-carbon alkane is methane, so the one-carbon carboxylic acid is methanoic acid.



Substituent suffix = -oic acid *e.g.* ethanoic acid

Substituent prefix = carboxy

Solved Example

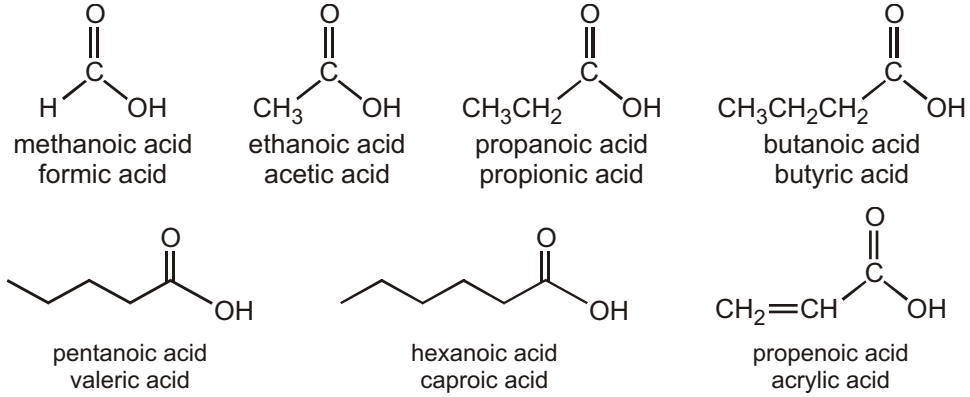


- The root name is based on the longest chain including the carboxylic acid group.
- Since the carboxylic acid group is at the end of the chain, it must be C1.
- The carboxylic acid suffix is appended after the hydrocarbon suffix minus the
- "e" : *e.g.* -ane + -oic acid = -anoic acid etc.

- Hydrocarbon structure is an alkane therefore-ane
- The longest continuous chain is C4 therefore root = but

  Butanoic acid

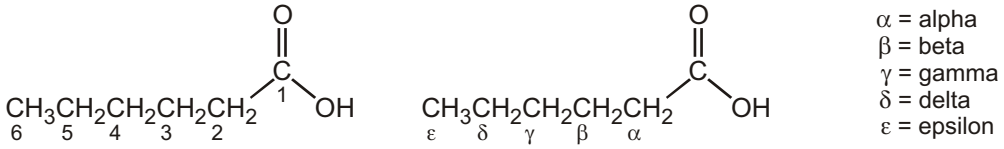
Solved Example



systematic name:	methanoic acid	ethanoic acid	propanoic acid	butanoic acid
common name:	formic acid	acetic acid	propionic acid	butyric acid

pentanoic acid (valeric acid) | hexanoic acid (caproic acid) | propenoic acid (acrylic acid)

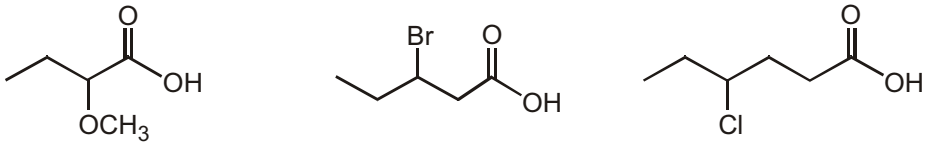
In systematic nomenclature, the position of a substituent is designated by a number. The carbonyl carbon is always the C-1 carbon. In common nomenclature, the position of a substituent is designated by a lowercase Greek letter, and the carbonyl carbon is not given a designation. Thus, the carbon adjacent to the carbonyl carbon is the -carbon, the carbon adjacent to the -carbon is the -carbon, and so on.



systematic nomenclature | common nomenclature

α = alpha
β = beta
γ = gamma
δ = delta
ε = epsilon

Take a care full look at the following examples to make sure that you understand the difference between systematic (IUPAC) and common nomenclature :



systematic name:	2-methoxybutanoic acid	3-bromopentanoic acid	4-chlorohexanoic acid
common name:	α-methoxybutyric acid	β-bromovaleric acid	γ-chlorocaproic acid

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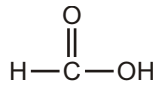
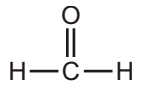
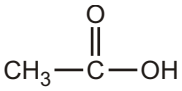
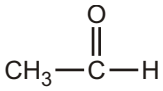
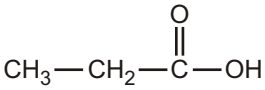
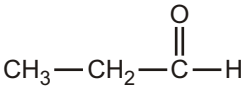
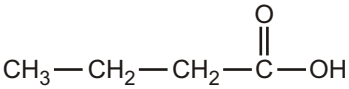
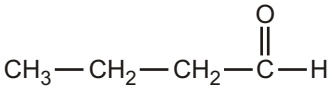
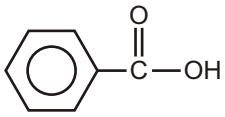
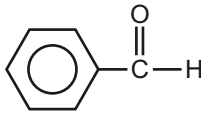
COMMON NAMES

Carboxylic acids containing six or fewer carbons are frequently called by their common names. These names were chosen by early chemists to describe some feature of the compound, usually its origin. For example, formic acid is found in ants, bees, and other stinging insects; its name comes from formica , which is Latin for “ant.” Acetic acid— contained in vinegar—got its name from acetum, the Latin word for “vinegar.” Propionic acid is the smallest acid that shows some of the characteristics of the larger fatty acids its name comes from the Greek words pro (“the first”) and pion (“fat”). Butyric acid is found in rancid butter; the Latin word for “ butter” is butyrum. Valeric acid got its name from valerian, an herb that has been used as a sedative since Greco/Roman times. Caproic acid is found in goat’s milk. If you have ever smelled a goat, then you know what caproic acid smells like. Caper is the Latin word for “goat.”

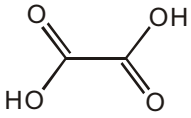
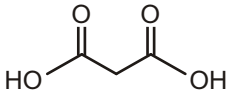
COMMON NAMES OF ACIDS AND ALDEHYDES

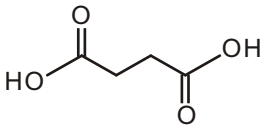
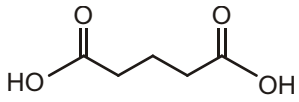
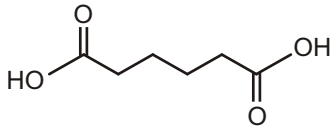
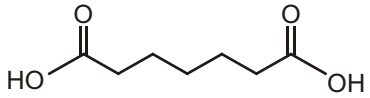
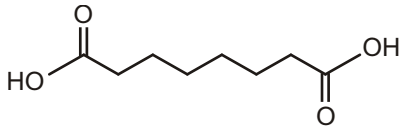
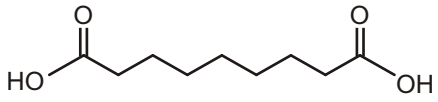
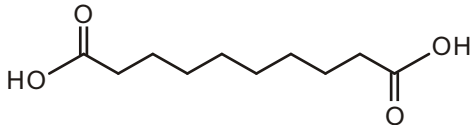
Carboxylic Acid	Derivation	Aldehyde
 formic acid (methanoic acid)	*formica,* "ants"	 formaldehyde (methanal)
 acetic acid (ethanoic acid)	*acetum,* "sour"	 acetaldehyde (ethanal)
 propionic acid (propanoic acid)	*protos pion,* "first fat"	 propionaldehyde (propanal)
 butyric acid (butanoic acid)	*butyrum,* "butter"	 butyraldehyde (butanal)
 benzoic acid	*gum benzoin,* "blending"	 benzaldehyde

DICARBOXYLIC ACIDS

A dicarboxylic acid is an organic compound containing two carboxyl functional groups (–COOH). The general molecular formula for dicarboxylic acids can be written as $HO_2C-R-CO_2H$, where R can be aliphatic or aromatic. In general, dicarboxylic acids show similar chemical behavior and reactivity to monocarboxylic acids. Dicarboxylic acids are also used in the preparation of copolymers such as polyamides and polyesters. The most widely used dicarboxylic acid in the industry is adipic acid, which is a precursor used in the production of nylon. Other examples of dicarboxylic acids include aspartic acid and glutamic acid, two essential amino acids in the human body.

General formula $HO_2C(CH_2)_nCO_2H$.

Common name	IUPAC name	Structure	pKa_1	pKa_2
Oxalic acid	Ethanedioic acid		1.27	4.27
Malonic acid	Propanedioic acid		2.85	5.05

Succinic acid	Butanedioic acid		4.21	5.41
Glutaric acid	Pentanedioic acid		4.34	5.41
Adipic acid	Hexanedoic acid		4.41	5.41
Pimelic acid	Heptanedioic acid		4.50	5.43
Suberic acid	Octanedioic acid		4.526	5.49
Azelaic acid	Nonanedioic acid		4.550	5.49
Sebacic acid	Decanedioic acid			

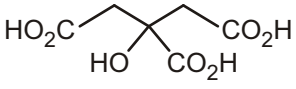
☞ **To memorize: OMSGAPSAS**
$HOOC-(CH_2)_n-COOH$

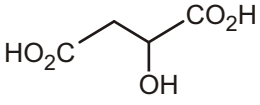
for
- *n* 0 Oxalic acid
- *n* 1 malonic acid
- *n* 2 Succinic acid
- *n* 3 Glutaric acid
- *n* 4 Adipic acid
- *n* 5 Pimielic acid
- *n* 6 Suberic acid
- *n* 7 Azelaic acid
- *n* 8 Sebacic acid

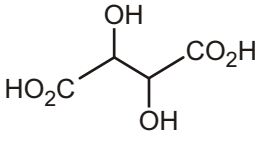
☑ SPECIAL TOPIC

SPECIAL TOPIC : CARBOXYLIC ACIDS ($R–CO_2H$) CONTAIN THE CARBOXYL GROUP CO_2H

As their name implies, compounds containing the carboxylic acid (CO_2H) group can react with bases, losing a proton to form carboxylate salts. Edible carboxylic acids have sharp flavours and several are found in fruits—citric, malic, and tartaric acids are found in lemons, apples, and grapes, respectively.

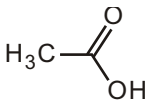
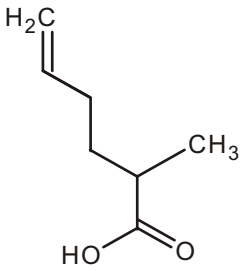
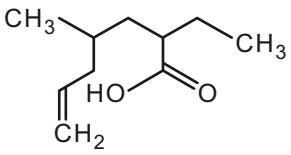
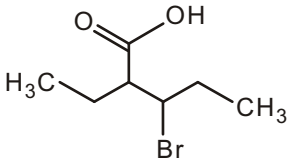
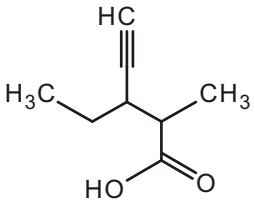
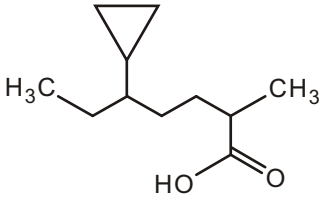
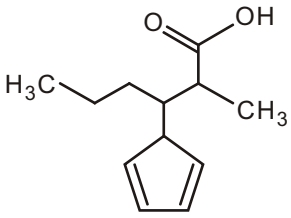

citric acid


malic acid


tartaric acid

EXERCISE

WORK SHEET - 1

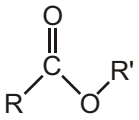
S.No.	Compounds	Write IUPAC - Name
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Answers

Work Sheet-1

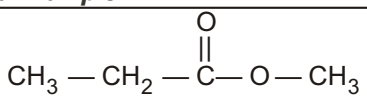
1. ethanoic acid **2.** 2-methylhex-5-enoic acid **3.** 2-ethyl-4-methylhept-6-enoic acid
4. 3-bromo-2-ethylpentanoic acid **5.** 3-ethyl-2-methylpent-4-ynoic acid
6. 5-cyclopropyl-2-methylheptanoic acid **7.** 3-(cyclopenta-2,4-dien-1-yl)-2-methylhexanoic acid

ESTERS



Functional class name **= alkyl alkanoate**
Substituent suffix **= –oate**

Solved Example

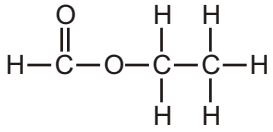


- Functional group is an ester
- The alcohol component here is methanol, so the alkyl = methyl
- The acid component here is propanoic acid, so propanoate

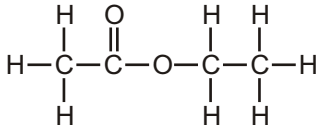
Methyl propanoate

☞ The homologous series of linear esters that include an ethyl group attached (via a single covalent bond) to the oxygen atom in the chain of the ester molecule. This description is easier to follow in conjunction with viewing the molecular structures in the table :

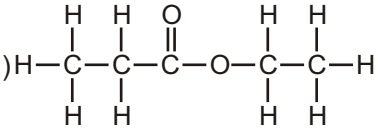
1. ethyl formate ($C_3H_6O_2$)



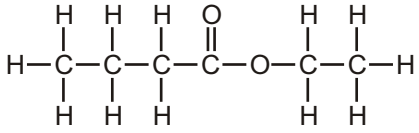
2. ethyl ethanoate ($C_4H_8O_2$)



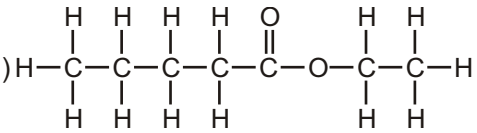
3. ethyl propanoate ($C_5H_{10}O_2$)



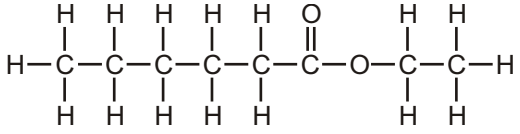
4. ethyl butanoate ($C_6H_{12}O_2$)



5. ethyl pentanoate ($C_7H_{14}O_2$)



6. ethyl hexanoate ($C_8H_{16}O_2$)

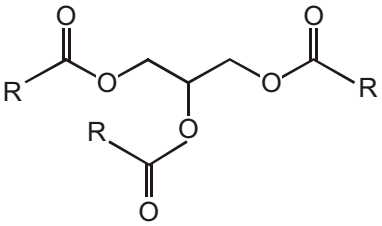


☑ SPECIAL TOPIC

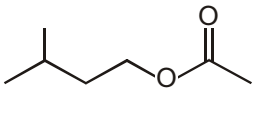
SPECIAL TOPIC : ESTERS ($R^1-CO_2R^2$) CONTAIN A CARBOXYL GROUP WITH AN EXTRA ALKYL GROUP (CO_2R)

Fats are esters; in fact they contain three ester groups. They are formed in the body by condensing glycerol, a compound with three hydroxyl groups, with three fatty acid molecules. Other, more volatile esters, have pleasant, fruity smells and flavours. These three are components of the flavours of bananas, rum, and apples:

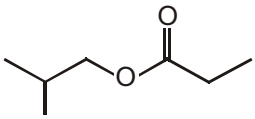
► The terms 'saturated fats' and 'unsaturated fats' are familiar—they refer to whether the R groups are saturated (no C=C double bonds) or unsaturated (contains C=C double bonds) —see the box on p. 000. Fats containing R groups with several double bonds (for example, those that are esters formed from linoleic acid, which we met at the beginning of this chapter) are known as'polyunsaturated'.



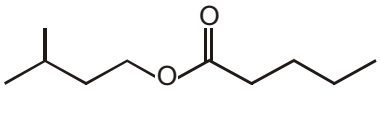
a fat molecule
(R = a long alkyl chain)



isopentyl acetate
(bananas)



isobutyl propionate
(rum)



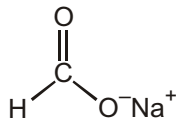
isopentyl valerate
(apples)

SALTS OF CARBOXYLIC ACIDS

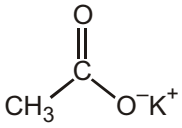
Salts of carboxylic acids are named in the same way. That is, the cation is named first, followed by the name of the acid, again with "ic acid" replaced by "ate."

Solved Example

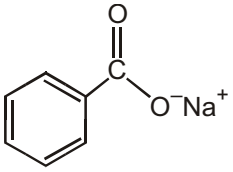
▸



systematic name:
common name:
sodium methanoate
sodium formate

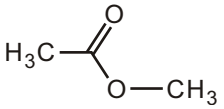
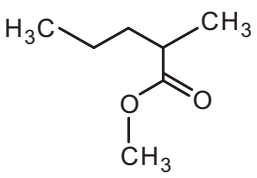


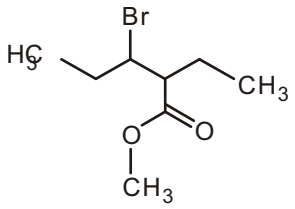
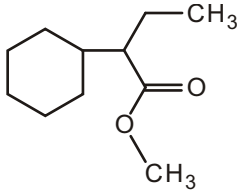
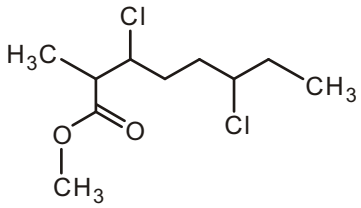
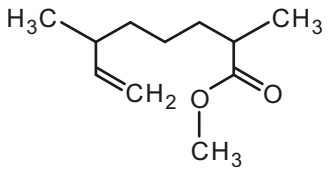
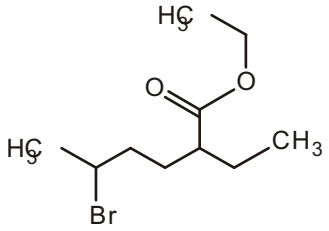
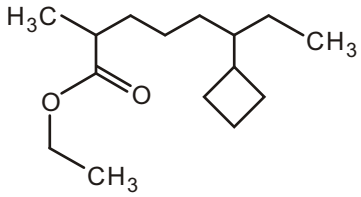
potassium ethanoate
potassium acetate



sodium benzenecarboxylate
sodium benzoate

WORK SHEET

S.No.	Compounds	Write IUPAC - Name
1.		
2.		

3.		
4.		
5.		
6.		
7.		
8.		

Answers

Work sheet

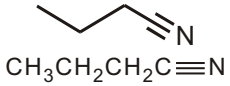
1. methyl acetate or methyl ethan oate
2. methyl-2-methylpentanoate
3. methyl-3-bromo-2-ethylpentanoate
4. methyl-2-cyclohexylbutanoate
5. methyl-3,6-dichloro-2-methyloctanoate
6. methyl-2,6-dimethyloct-7-enoate
7. ethyl-5-bromo-2-ethylhexanoate
8. ethyl-6-cyclobutyl-2-methyloctanoate

NITRILES

Functional group suffix = nitrile or **-onitrile**

Substituent prefix **= cyano-**

Solved Example



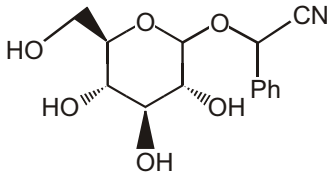
$CH_3CH_2CH_2C{\equiv}N$

- Functional group is a – C N, therefore suffix **= -nitrile**
- Hydrocarbon structure is an alkane therefore **-ane**
- The longest continuous chain is C4 therefore root **= but**

butanenitrile

NITRILES OR CYANIDES (R–CN) CONTAIN THE CYANO GROUP – C N

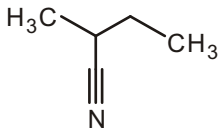
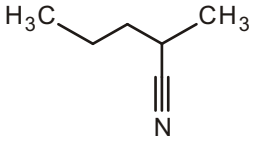
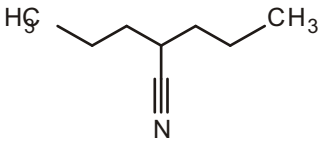
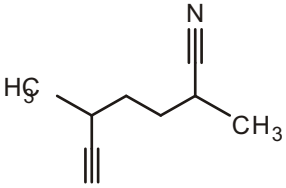
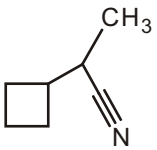
Nitrile groups can be introduced into molecules by reacting potassium cyanide with alkyl halides. The organic nitrile group has quite different properties associated with lethal inorganic cyanide: Laetrile, for example, is extracted from apricot kernels, and was once developed as an anticancer drug. It was later proposed that the name be spelt 'liar-trial' since the results of the clinical trials on laetrile turned out to have been falsified!



laetrile

EXERCISE

WORK SHEET

S.No.	Compounds	Write IUPAC - Name
1.		
2.		
3.		
4.		
5.		

Answers

Work sheet

1. 2-methylbutanenitrile **2.** 2-methylpentanenitrile **3.** 2-propylpentanenitrile

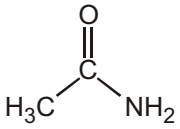
4. 2,5-dimethylhept-6-ynenitrile **5.** 2-cyclobutylpropanenitrile

AMIDES, $RCONH_2$

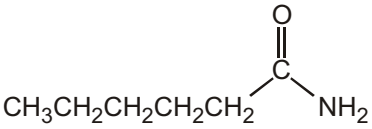
Functional class name **= alkyl alkanamide**

Substituent suffix **= -amide**

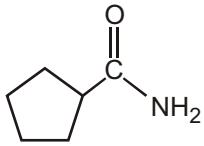
Amides with an unsubstituted $-CONH_2$ group are named by replacing the -oic acid or -ic acid ending with -amide, or by replacing the -carboxylic acid ending with -carboxamide.



Acetamide

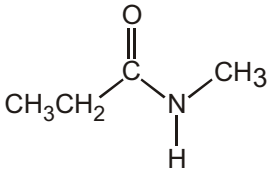


Hexanamide

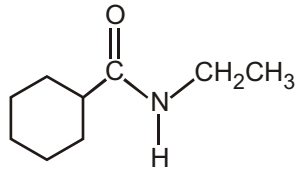


Cyclopentane-carboxamide

If the nitrogen atom is further substituted, the compound is named by first identifying the substituent groups and then the parent amide. The substituents are preceded by the letter -N to identify them as being directly attached to nitrogen.



N-Methylpropanamide

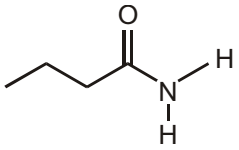


N-Ethylcyclohexanecarboxamide

Solved Example

- Functional group is an amide therefore suffix = -amide
- Hydrocarbon structure is an alkane therefore **-an-**
- The longest continuous chain is C4 therefore root = but

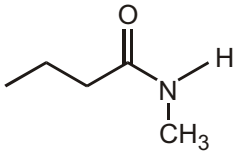
Butanamide



Solved Example

- Functional group is an amide therefore suffix **= -amide**
- Hydrocarbon structure is an alkane therefore-ane
- The longest continuous chain is C4 therefore root = but
- The nitrogen substituent is C1 *i.e.*, an **N-methyl** group

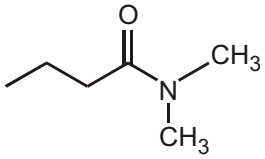
N-methylbutanamide



Solved Example

- Functional group is an amide therefore suffix **= -amide**
- Hydrocarbon structure is an alkane therefore**-ane**
- The longest continuous chain is C4 therefore root **= but**
- The two nitrogen substituents are C1 *i.e.* an **N-methyl** group
- There are two methyl groups, therefore multiplier **= di-**

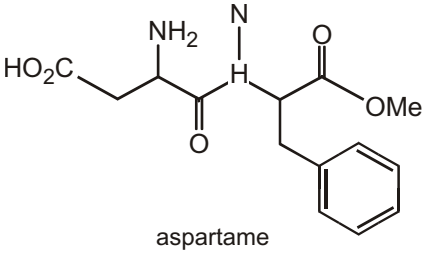
N,N-dimethylbutanamide



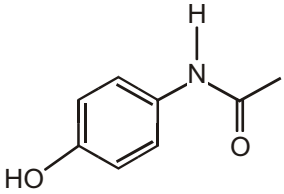
☑ SPECIAL TOPIC

AMIDES ($R–CONH_2$, $R^1–CONHR^2$, OR $R^1CONR^2R^3$)

Proteins are amides: they are formed when the carboxylic acid group of one amino acid condenses with the amino group of another to form an amide linkage (also known as a peptide bond). One protein molecule can contain hundreds of amide bonds. Aspartame, the artificial sweetener marketed as NutraSweet®, on the other hand contains just two amino acids, aspartic acid and phenylalanine, joined through one amide bond. Paracetamol is also an amide.



aspartame



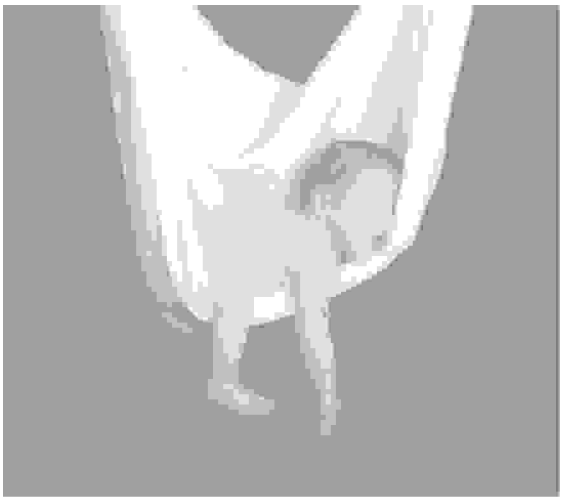
paracetamol

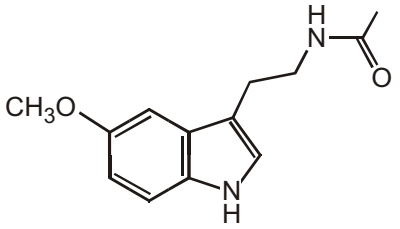
☑ SPECIAL TOPIC

AMIDES AND SLEEP

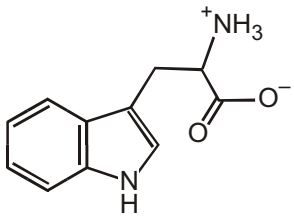
Melatonin, a naturally occurring amide, is a hormone synthesized by the pineal gland from the amino acid tryptophan. An amino acid is an a - aminocarboxylic acid. Melatonin regulates the dark–light clock in our brains that governs such things as the sleep–wake cycle, body temperature, and hormone production.

Melatonin levels increase from evening to night and then decrease as morning approaches. People with high levels of melatonin sleep longer and more soundly than those wi th low levels. The concentration of the hormone in our bodies varies with age—6-year-olds have more than five times the concentration that 80-year-olds have—which is one of the reasons young people have less trouble sleeping than older people. Melatonin supplements are used to treat insomnia, jet lag, and seasonal affective disorder.





melatonin

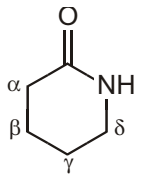


tryptophan

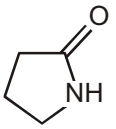
CYCLIC AMIDES

Cyclic amides are called lactams. Their nomenclature is similar to that of lactones(cyclic esters). In systematic nomenclature, they are named as "2-azacycloalkanones" ("aza" designates the nitrogen atom). For their common names, the length of the carbon chain is indicated by the common name of the carboxylic acid, and a Greek letter specifies the carbon to which the nitrogen is attached.

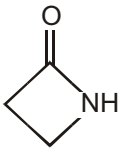
Solved Example



2-azacyclohexanone
δ-valerolactam
a δ-lactam



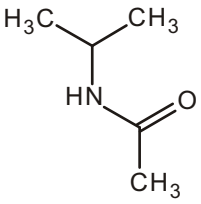
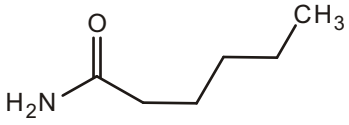
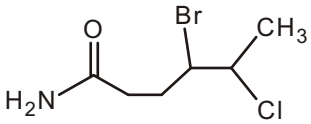
2-azacyclopentanone
γ-valerolactam
a γ-lactam

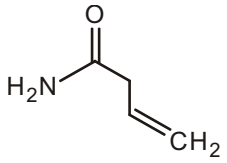
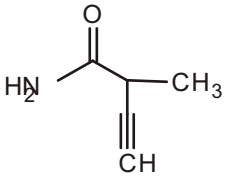
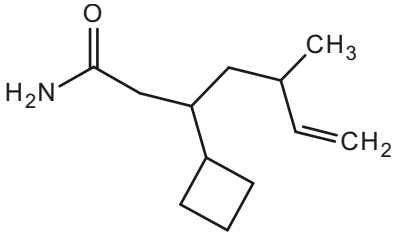


2-azacyclobutanone
β-propiolactam
a β-lactam

EXERCISE

WORK SHEET

S.No.	Compounds	Write IUPAC - Name
1.		
2.		
3.		

4.		
5.		
6.		

Answers

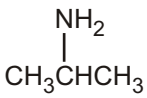
Work sheet

1. *N*-(1-methyl ethyl) ethanamide
2. hexanamide
3. 4-bromo-5-chlorohexanamide
4. but-3-enamide
5.2-methylbut-3-ynamide
6. 3-cyclobutyl-5-methylhept-6-enamide

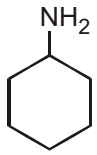
HOW DO WE NAME AMINES ?

IUPAC names for aliphatic amines are derived just as are for alcohols. The final -e of the parent alkane is dropped and replaced with -amine. Indicate the location of the amino group on the parent chain by a number.

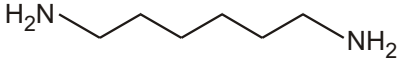
No. of C-atoms	Molecular formula	Parent	Common Name	IUPAC name
1.	CH_3NH_2	Methane	Methylamine	Methanamine
2.	$C_2H_5NH_2$	Ethane	Ethylamine	Ethanamine
3.	$CH_3H_7 — NH_2$	Propane	Propylamine	Propanamine
4.	$C_4H_{10}NH_2$	Butane	Butylamine	Butanamine



2-Propanamine

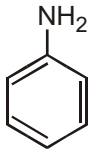


Cyclohexanamine

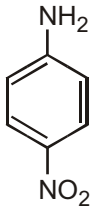


1,6-Hexanediamine

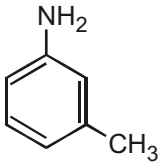
☞ IUPAC nomenclature retains the common name aniline for $C_6H_5NH_2$, the simplest aromatic amine. Its simple derivatives are named using numbers to locate substituents or, alternatively, using the locators ortho(o), meta(m), and para(p).



Aniline

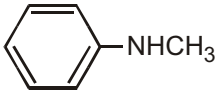


4-Nitroaniline
(p-Nitroniline)

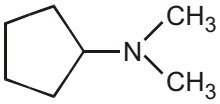


3-Methylaniline
(m-Toluidine)

Unsymmetrical secondary and tertiary amines are commonly named as N-substituted primary amines.

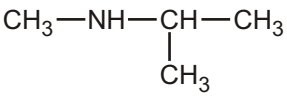


N-methylaniline

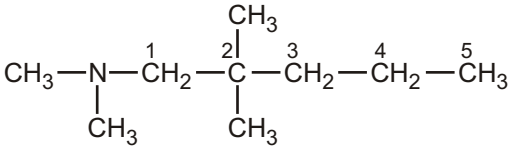


N, N-Dimethyl
cyclopentanamine

RNH_2	R_2NH	R_3N
Alkanamine	N-alkyl alkanamine	N,N-Di alkyl alkanamine
$CH_3CH_2CH_2NH_2$	$CH_3NHCH_2CH_3$	$(CH_3)_2NCH_2CH_2CH_2CH_3$
Propanamine	N-methyl ethanamine	N,N-Dimethyl Butanamine



N-methyl propan-2-amine



N,N,2,2-tetramethyl pentanamine

☞ Primary amines have one alkyl groups attached to the N.

- ⋆ The root name is based on the longest chain with the -NH_2 attached.
- ⋆ The chain is numbered so as to give the amine unit the lowest possible number.
- ⋆ The amine suffix is appended to the appropriate alkyl root or alkane-root.

Solved Example

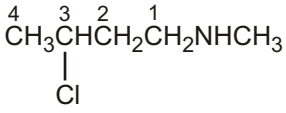
- ▸ $CH_3CH_2CH(NH_2)CH_3$
  - ◆ Functional group is an amine, therefore suffix = -amine
  - ◆ Hydrocarbon structure is an alkane therefore -ane
  - ◆ The longest continuous chain is C4 therefore root = but
  - ◆ The first point of difference rule requires numbering from the right as drawn to make the amine group locant **Name: butan-2-amine or 2-butylamine (or sec-butylamine)**

☞ Secondary amines have two alkyl groups attached to the N.

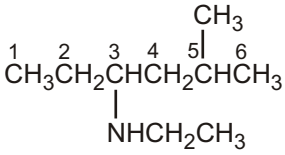
- ⋆ The root name is based on the longest chain with the -NH attached.
- ⋆ The chain is numbered so as to give the amine unit the lowest possible number.
- ⋆ The amine suffix is appended to the appropriate alkyl root or alkane-root.

The substituents—regardless of whether they are attached to the nitrogen or to the parent hydrocarbon—are listed in alphabetical order, and then a number or an "*N*" is assigned to each one. The chain is numbered in the direction that gives the functional group suffix the lowest number.

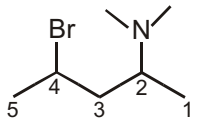
Solved Example



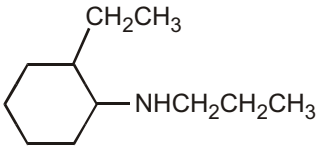
3-chloro-*N*-methyl-1-butanamine



N-ethyl-5-methyl-3-hexanamine



4-bromo-*N*,*N*-dimethyl-2-pentanamine



2-ethyl-*N*-propylcyclohexanamine

Solved Example

- $CH_3NHCH_2CH_3$
  - Functional group is an amine, therefore suffix = -amine
  - Hydrocarbon structure is an alkane therefore -ane
  - The longest continuous chain is C2 therefore root =eth

    Name: N-methylethanmine

☞ Tertiary amines have three alkyl group attached to the N.

- ★ The root name is based on the longest chain with the -N attached.
- ★ The chain is numbered so as to give the amine unit the lowest possible number.
- ★ The other alkyl groups are treated as substituents, with N as the locant.
- ★ The amine suffix is appended to the appropriate alkyl root or alkana-root.

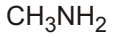
Solved Example

- $(CH_3)_3N$
  - Functional group is an amine, therefore suffix = -amine
  - Hydrocarbon structure is an alkane therefore -ane
  - The longest continuous chain is C1 therefore root =meth

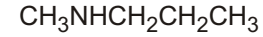
    Name : N, N-dimethylmethylamine or N,N-dimethylmethanamine or Trimethylamine

COMMON NAMES

The common name of an amine consists of the names of the alkyl groups bonded to the nitrogen, in alphabetical order, followed by “amine.”

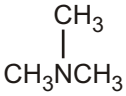


methylamine

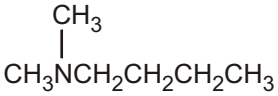


methylpropylamine

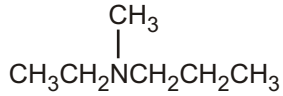
diethylamine



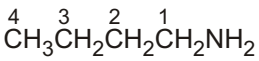
trimethylamine



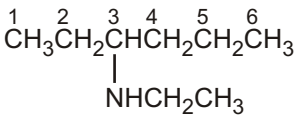
butyldimethylamine



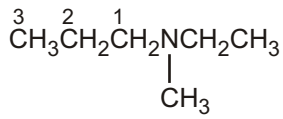
ethylmethylpropylamine



1-butanamine
or
butan-1-amine



N-ethyl-3-hexanamine
or
N-ethylhexan-3-amine

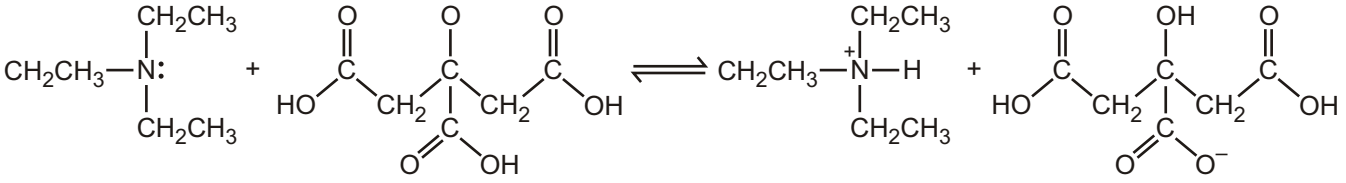


N-ethyl-*N*-methyl-1-propanamine
or
N-ethyl-*N*-methylpropan-1-amine

☑ SPECIAL TOPIC

SPECIAL TOPIC : BAD-SMELLING COMPOUNDS

Amines are responsible for some of nature's unpleasant odors. Amines with relatively small alkyl groups have a fishy smell. For example, fermented shark, a traditional dish in Iceland, smells exactly like triethylamine. Fish is often served with lemon, because the citric acid in lemon protonates the amine, thereby converting it to its better smelling acidic form.



triethylamine
bad smelling

citric acid

protonated
triethylamine
better smelling

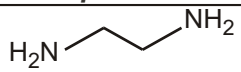
conjugate base
of citric acid

☑ SPECIAL TOPIC

SPECIAL TOPIC: SOURCE OF NAME AMMONIA

Most people can associate the name ammonia (NH_3) with a gas having a pungent odor; the systematic name "nitrogen trihydride" (which is rarely used) will tell you its formula. What it will not tell you is that smoke from burning camel dung (the staple fuel of North Africa) condenses on cool surfaces to form a crystalline deposit. The ancient Romans first noticed this on the walls and ceiling of the temple that the Egyptians had built to the Sun-god Amun in Thebes, and they named the material "sal ammoniac," meaning "salt of Amun". In 1774, Joseph Priestly (the discoverer of oxygen) found that heating sal ammoniac produced a gas with a pungent odor, which a T. Bergman named "ammonia" eight years later.

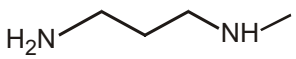
Solved Example



- Functional group is an amine, therefore suffix = -amine
- There are two amines, so insert the multiple di
- The longest continuous chain is C2 therefore root = eth

Name: 1,2-ethyldiamine or ethane-1,2-diamine

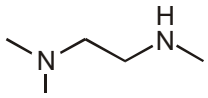
Solved Example



- The longest continuous chain is C3 therefore root = prop
- The methyl group is located on the amine, so locant = N

Name: N-methyl-1,3-propyldiamine or N-methypropane-1,3-diamine

Solved Example

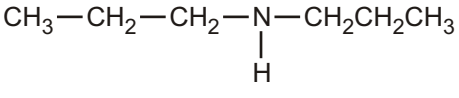


- Functional group is an amine, therefore suffix = -amine
- The longest continuous chain is C2 therefore root = eth
- There is are three C1 substituents = trimethyl

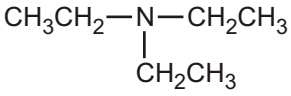
Name: N,N,N'-trimethyl-1,2-ethyldiamine or N,N,N'-trimethylethane-1,2-diamine

Solved Example

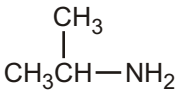
- Name the following amines (Common names) :



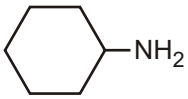
Dipropylamine



Triethylamine



Isopropylamine

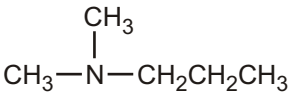


Cyclohexylamine

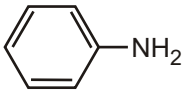
Solved Example

- Name of following amines (IUPAC names):

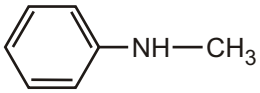
N-Ethylpropanamine



N-N Dimethylpropanamine



Aniline



N-Methylaniline

Solved Example

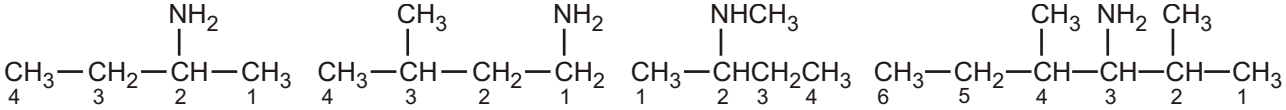
- Name the following amine :

$H_2NCH_2CH_2COOH$

Sol. 3-Aminopropanoic acid

Solved Example

- IUPAC of the given amines :



2-butanamine

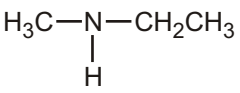
3-methyl-1-butanamine

N-methylbutan-2-amine

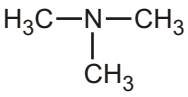
2,4-dimethyl-3-hexanamine

Solved Example

- Give IUPAC and common names and degrees of the given Amines:



Ethylmethylamine — N-Methylethanamine — 2º



Trimethylamine — N,N-Dimethylmethanamine — 3º

Solved Example

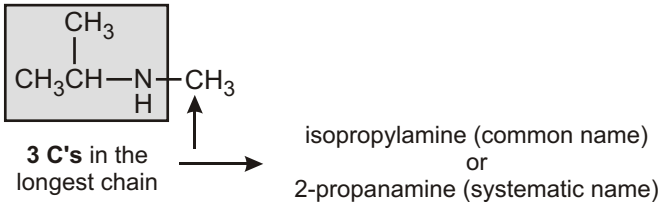
- Give the IUPAC name of $H_2N-CH_2-CH_2-CH \quad CH_2$.

Sol. But-3-en-1-amine

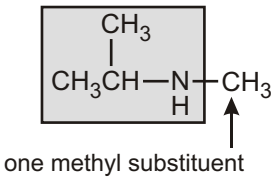
Solved Example

Step-1 Name the following 2º amine : $(CH_3)_2CHNHCH_3$

Designate the longest alkyl chain (or largest ring) bonded to the N atom as this parent amine and assign a common or systematic name.

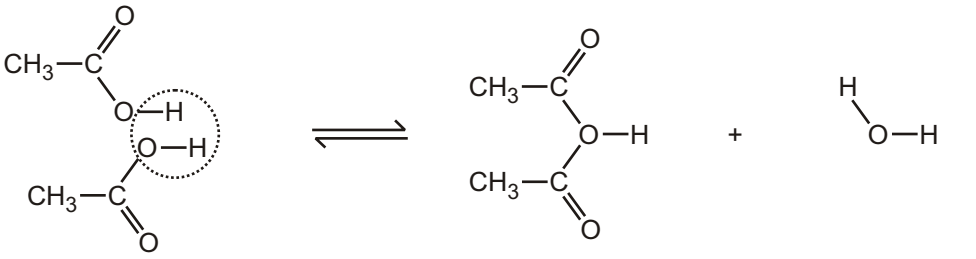


Step-2 Name the other groups on the N atom as alkyl groups, alphabetize the names, and put the prefix N-before the name.



Ans. N-methylisopropylamine (common name) or N-methyl-2-propanamine (systematic name)

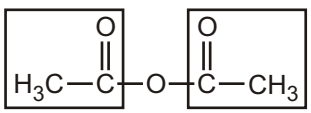
FORMATION OF ANHYDRIDES



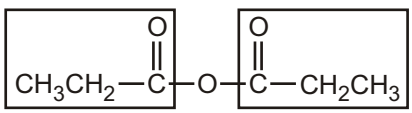
NOMENCLATURE OF ANHYDRIDES

The acid anhydride functional group results when two carboxylic acids combine and lose water (anhydride = without water). Symmetrical acid anhydrides are named like carboxylic acids except the ending-acid is replaced with -anhydride. This is true for both the IUPAC and Common nomenclature.

SYMMETRICAL ANHYDRIDES



IUPAC : ethanoic anhydride
Common : acetic anhydride

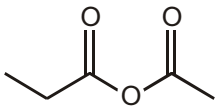


IUPAC : Propanoic anhydride
Common : Propionic anhydride

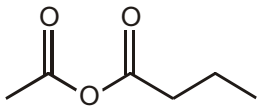
UNSYMMETRICAL ACID ANHYDRIDES

Unsymmetrical acid anhydrides are named by first naming each component carboxylic acid alphabetically arranged (without the word acid) followed by spaces and then the word anhydride.

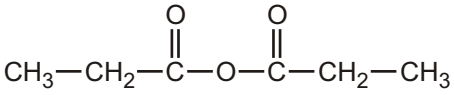
Solved Example



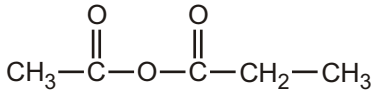
Ethanoic propanoic anhydride
(Acetic propionic anhydride)



Butanoic ethanoic anhydride
(Acetic butyric anhydride)



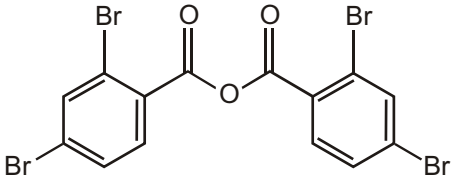
Propanoic anhydride



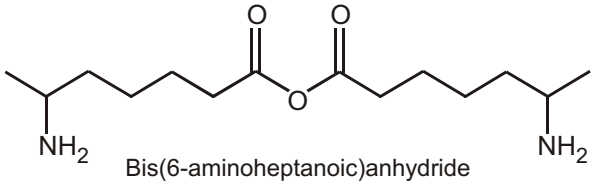
ethanoic propanoic anhydride

☞ Anhydrides of substituted monocarboxylic acids, if symmetrically substituted, are named by prefixing "bis-" to the name of the acid and replacing the word "acid" by "anhydride" The "bis" may, however, be omitted.

Solved Example



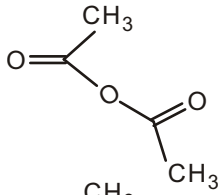
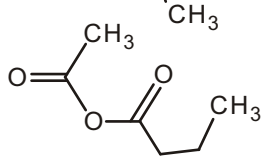
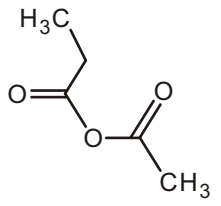
Bis(2,4-dibromobenzoic) anhydride

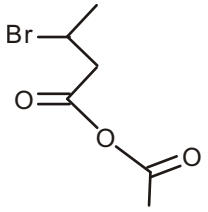
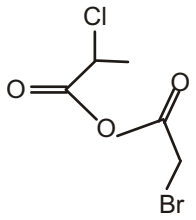
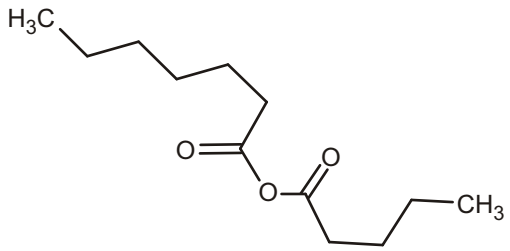


Bis(6-aminoheptanoic)anhydride

EXERCISE

WORK SHEET

S.No.	Compounds	Write IUPAC - Name
1.		
2.		
3.		

4.		
5.		
6.		

Answers

Work sheet

1. ethanoic anhydride
2. butanoic ethanoic anhydride
3. ethanoic propanoic anhydride
4. 3-bromobutanoic ethanoic anhydride
5. 2-bromoethanoic 2-chloropropanoic anhydride
6. heptanoic pentanoic anhydride

❑❑❑