

NOMENCLATURE OF ORGANIC COMPOUNDS AND ISOMERISM

What is an Organic Compound?

Organic compounds are chemical compounds that mainly contain carbon (C) and hydrogen (H). Most organic compounds also contain elements like oxygen (O), nitrogen (N), sulfur (S), and halogens (Cl, Br, etc.).

These are the **building blocks of life** and are found in living organisms, food, fuels, medicines, plastics, etc.

Examples:

- Methane (CH_4)
- Ethanol ($\text{C}_2\text{H}_5\text{OH}$)
- Acetic acid (CH_3COOH)

What is an Inorganic Compound?

Inorganic compounds are chemical compounds that do not contain carbon-hydrogen (C–H) bonds. These compounds are usually formed from non-living sources like minerals.

They include **salts, metals, oxides, acids, bases**, and more.

Examples:

- Sodium chloride (NaCl) – common salt
- Water (H_2O)
- Carbon dioxide (CO_2)

What is IUPAC?

IUPAC stands for **International Union of Pure and Applied Chemistry**.

IUPAC develops standard rules for naming chemical compounds so that scientists all over the world can communicate clearly.

Word Root – Based on Number of Carbon Atoms

No. of Carbons	Word Root
1	Meth
2	Eth
3	Prop
4	But
5	Pent
6	Hex
7	Hept
8	Oct
9	Non
10	Dec

Condensed Formula

A condensed formula shows all atoms of a molecule but not all bonds.

Example:

Ethane: CH_3CH_3

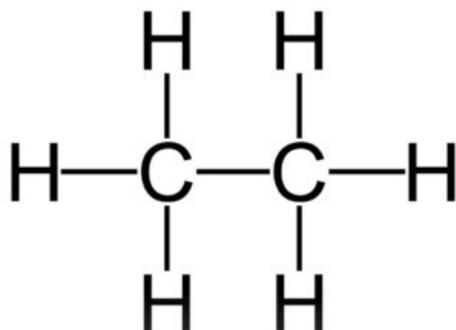
Propane: $\text{CH}_3\text{CH}_2\text{CH}_3$

Structural Formula

A diagram showing all atoms and the bonds between them in a molecule.

Example:

Ethane:



Each line Represents Bond

? Why Carbon is Surrounded by 4 Bonds

General Formula of Homologous Series

Type	Formula
Alkane	C_nH_{2n+2}
Alkene	C_nH_{2n}
Alkyne	C_nH_{2n-2}

Where “n” is the number of carbon atom

Saturated Hydrocarbons

Saturated hydrocarbons are compounds made up of only carbon and hydrogen atoms, where all carbon-carbon bonds are single bonds.

Example: Alkanes

Unsaturated Hydrocarbons

Unsaturated hydrocarbons are compounds that contain one or more double or triple bonds between carbon atoms.

Example: Alkenes, Alkynes

Functional Groups & Their Suffixes

Functional group	Name of functional group	Common name	IUPAC Suffix
-OH	Hydroxyl	Alcohol	-ol
-COOH	Carboxylic	Carboxylic acid	-oic acid
-CHO	Aldehydic	Aldehyde	-al
>C=O	Keto	Ketone	-one
-O-R	Alkoxy	Ether	(no suffix) (named as alkoxy-alkane)
-F, -Cl, -Br, -I	Halogen	Halo compounds	(no suffix) (used as prefix: fluoro-, chloro-, bromo, iodo etc.)

Nomenclature – Definition

Nomenclature is the systematic method of naming chemical compounds according to a set of rules defined by scientific organizations like IUPAC (International Union of Pure and Applied Chemistry).

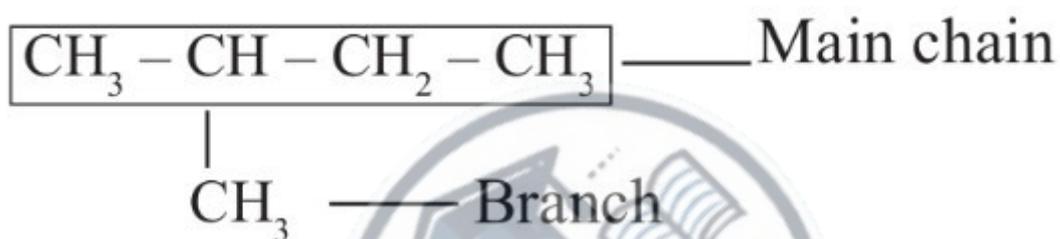
Main Chain – Definition

The main chain is the longest continuous chain of carbon atoms in a hydrocarbon compound. It can be straight or branched, and it's the base for naming the compound.

Branch – Definition

A branch is a side group of carbon atoms that is not part of the main chain. These are also called alkyl groups

Example:1



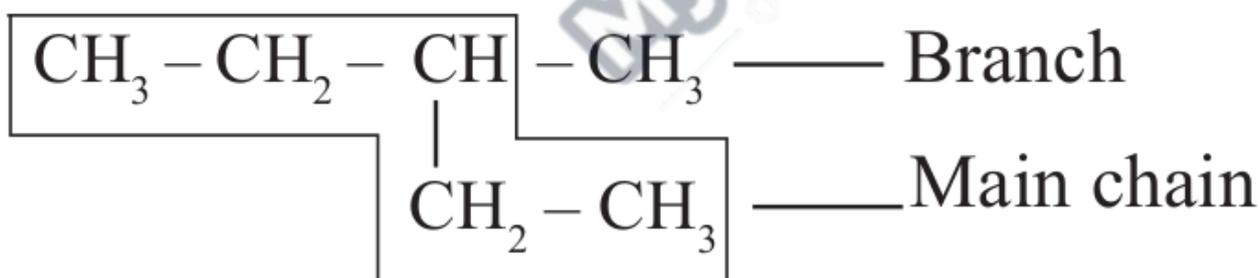
? Find the Number of Carbons in the Main Chain ?

Ans: 4

? Find the Number of Carbons in the Branch chain

Ans:1

Example:2



? Find the Number of Carbons in the Main Chain ?

Ans:5

? Find the Number of Carbons in the Branch chain

Ans:1

Alkyl Group

The small branches attached to the carbon atoms in a hydrocarbon chain are called alkyl groups. An alkyl group is named by adding '-yl' to the word root of the corresponding alkane.

Name of alkyl group = Word root corresponding to the number of carbon atom / atoms in the branch + 'yl'

Example

Name of alkyl group	Structural formula
Methyl	$-\text{CH}_3$
Ethyl	$-\text{CH}_2-\text{CH}_3$
Propyl	$-\text{CH}_2-\text{CH}_2-\text{CH}_3$

Nomenclature of Unbranched Alkanes

Alkanes without any branches are named using the suffix 'ane'

1? Name the Alkane $\text{CH}_3-\text{CH}_2-\text{CH}_3$

Ans:

Number of Carbon = 3

Word root = Prop (*based on 3 carbon atoms*)

Name = Word Root + Suffix 'ane' = Propane

2? Name the Alkane $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$

Ans:

Number of Carbon = 4

Word root = But (*based on 4 carbon atoms*)

Name = Butane

3? Name the Alkane $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$

Ans: Hexane

Nomenclature of Branched Alkanes

Name = Position number of branch + hyphen +
name of alkyl group + word root + suffix (ane)

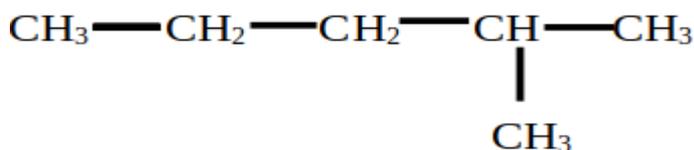
Steps to Name Alkanes (IUPAC Nomenclature)

- 1, Identify the longest continuous carbon chain — this becomes the parent chain.
- 2, Find the number of carbon atoms in the parent chain
- 3, Find the word root
Based on the number of carbon atoms in the parent chain.
(1 = meth, 2 = eth, 3 = prop, 4 = but, etc.)
- 4, Find the suffix
→ For **alkanes**, the suffix is “-ane”
- 5, Identify and name the side chain(s)
→ These are alkyl groups (like methyl, ethyl, propyl, etc.).
- 6, Determine the position number(s) of the side chain(s)
→ Write the **carbon number** where the branch is attached.
- 7, Write the final IUPAC name in the format

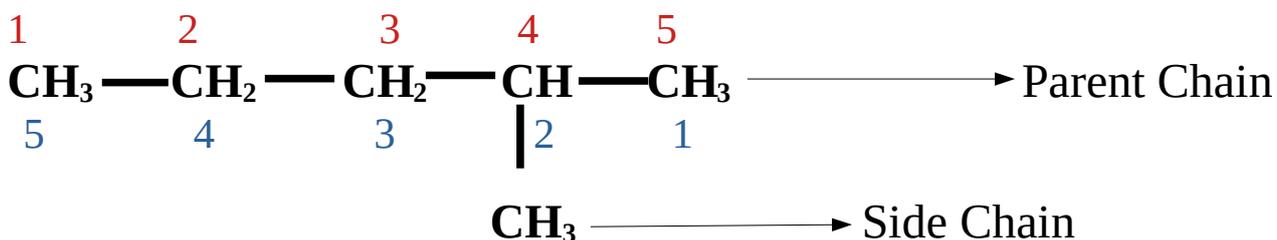
Position number – Alkyl group name + Word root + Suffix

Case 1: Only one branch

1? Write the IUPAC name of the compound given below



Ans:



Red = Left to Right numbering

Blue = Right to Left numbering

Number of carbon atoms in the main chain = 5

Word root = Pent (based on 5 carbon atoms)

Suffix = ane (For alkane suffix is 'ane')

Number of branches = 1

Name of branches = Methyl

Position of the first branch while numbering from left to right = 4

Position of the first branch while numbering from right to left = 2

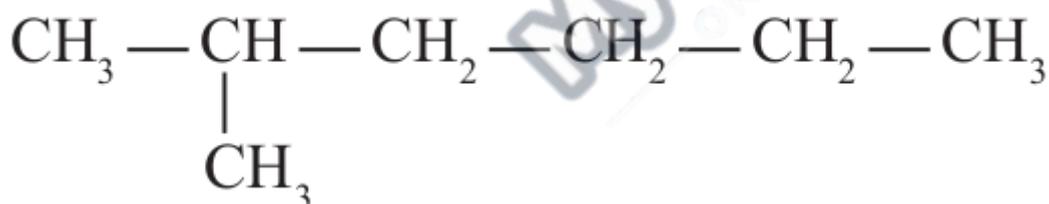
Correct Position of the branch = 2 (Choose the direction that gives the lowest position number to the branch. So the correct position is 2)

IUPAC Name = Position number – Alkyl group name + Word root + Suffix

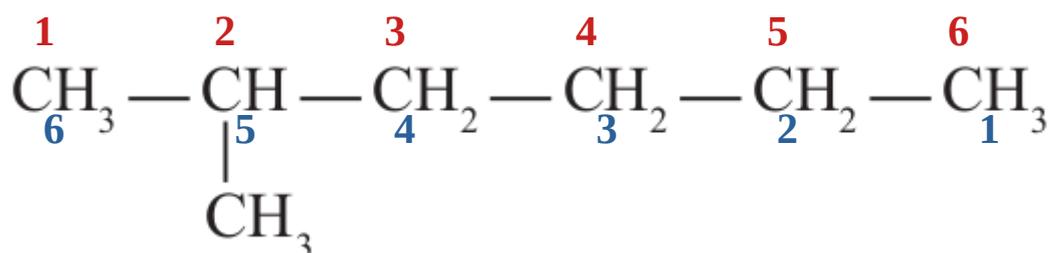
□

2-Methylpentane

2? Write the IUPAC name of the compound given below



Ans:



Number of carbon atoms in the main chain = 6

Word root = Hex (based on 6 carbon atoms)

Suffix = ane (For alkane suffix is 'ane')

Number of branches = 1

Name of branches = Methyl

Position of the first branch while numbering from left to right = 2

Position of the first branch while numbering from right to left = 5

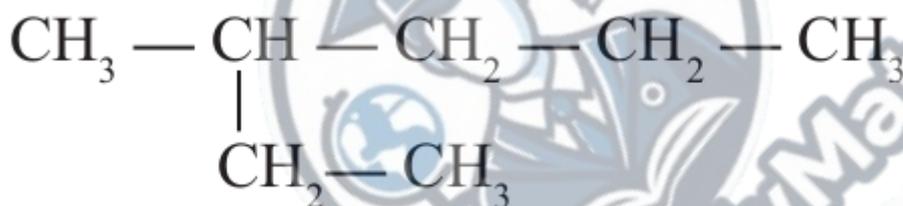
Correct Position of the branch = 2

IUPAC Name =

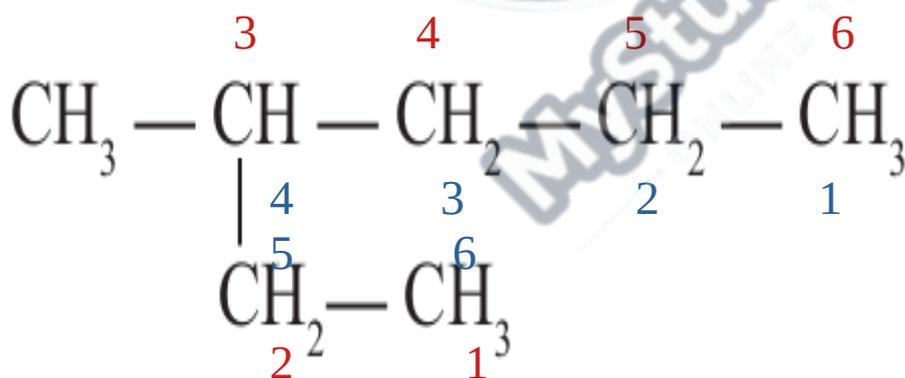
Position number – Alkyl group name + Word root + Suffix

2-Methylhexane

3? Write the IUPAC name of the compound given below



Ans:



Number of carbon atoms in the main chain = 6

Word root = Hex (based on 6 carbon atoms)

Suffix = ane (For alkane suffix is 'ane')

Number of branches = 1

Name of branches = Methyl

Position of the first branch while numbering from left to right = 3

Position of the first branch while numbering from right to left = 4

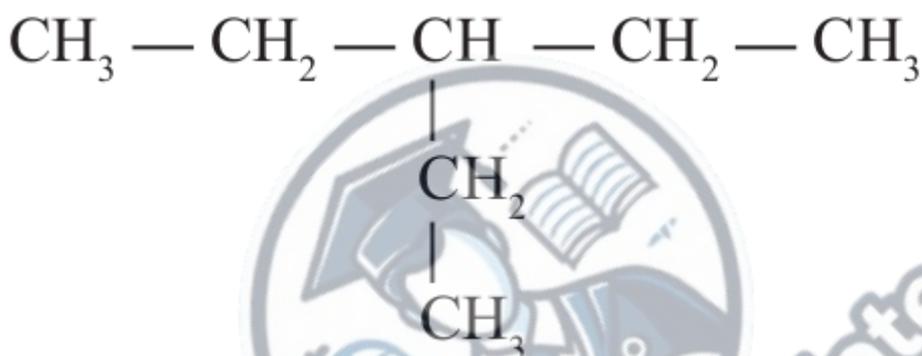
Correct Position of the branch = 3

IUPAC Name =

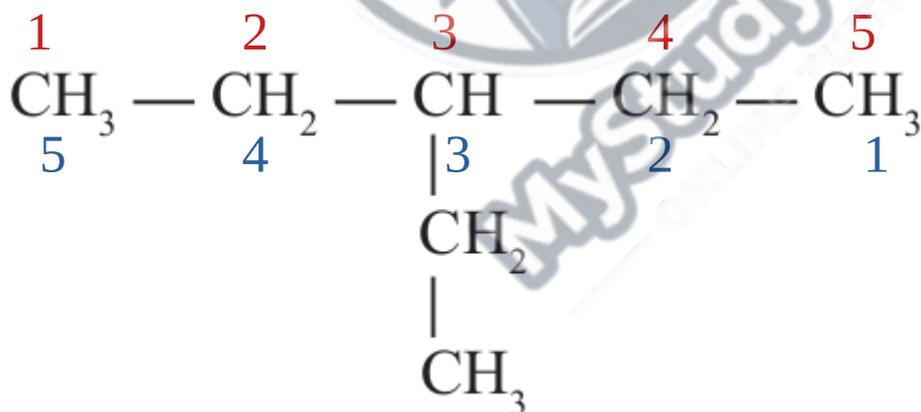
Position number – Alkyl group name + Word root + Suffix

3-Methylhexane

4? Write the IUPAC name of the compound given below



Ans:



Number of carbon atoms in the main chain = 5

Word root = Pent (based on 5 carbon atoms)

Suffix = ane (For alkane suffix is 'ane')

Number of branches = 1

Name of branches = Ethyl (-CH₂-CH₃)

Position of the first branch while numbering from left to right = 3

Position of the first branch while numbering from right to left = 3

Correct Position of the branch = 3

IUPAC Name =

Position number – Alkyl group name + Word root + Suffix

3-Ethylpentane

5? Write the structural formulae of the compounds given below.

a, 2-Methylheptane

b, 2-Ethylpentane

Solution :

a, 2-Methylheptane

Branch position Branch Name Parent chain suffix

Step 1: Identify the main (parent) chain

The parent chain is heptane, which means 7 carbon atoms in a straight chain

C-C-C-C-C-C-C

Step 2: Identify and place the substituent (branch)

The branch is methyl ($-\text{CH}_3$)

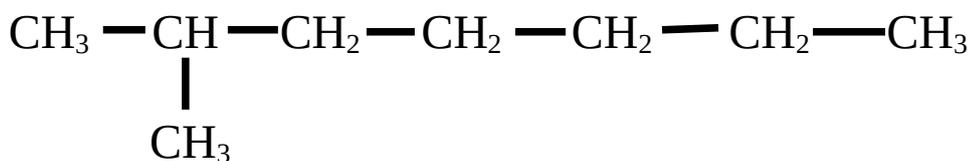
Its position is at carbon number 2 in the parent chain

C-C-C-C-C-C-C
|
C

Step 3: Add hydrogen atoms

Ensure that each carbon forms 4 bonds (Because valency of Carbon is 4)

Final structural formula will be:



b, 2-Ethylpentane

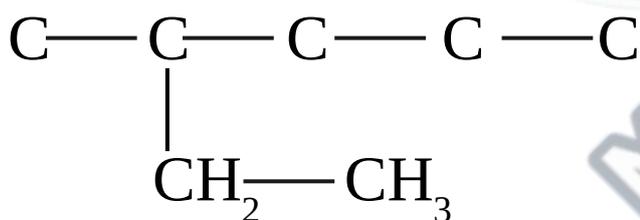
Branch position Branch Name Parent chain suffix

Step 1: Identify the main (parent) chain

Parent chain is Pentane which means 5 carbon atoms
In straight chain
C-C-C-C-C

Step 2: Identify and place the substituent (branch)

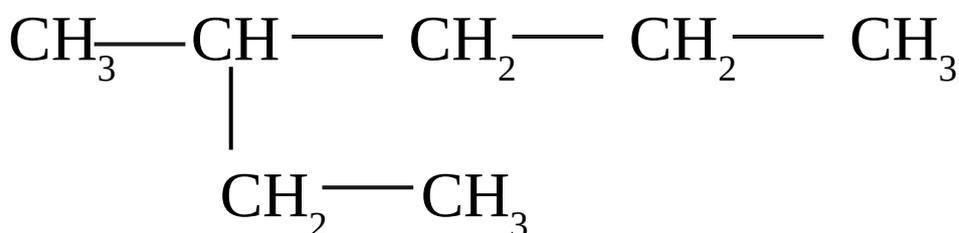
The branch is Ethyl (-CH₂-CH₃)



Step 3: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

Final structural formula will be:

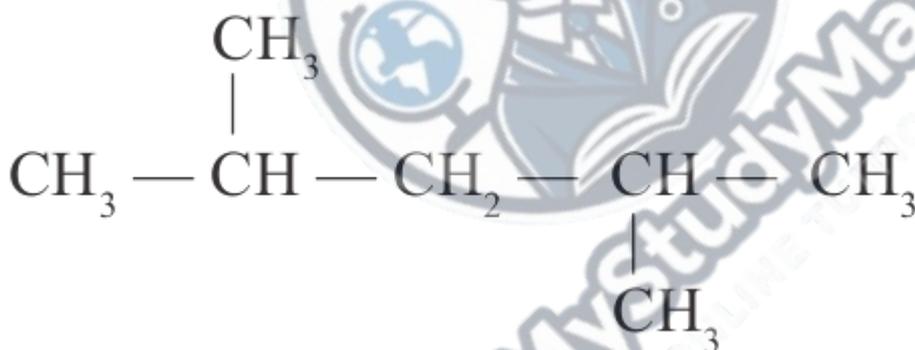


Case 2 :More than one Branch

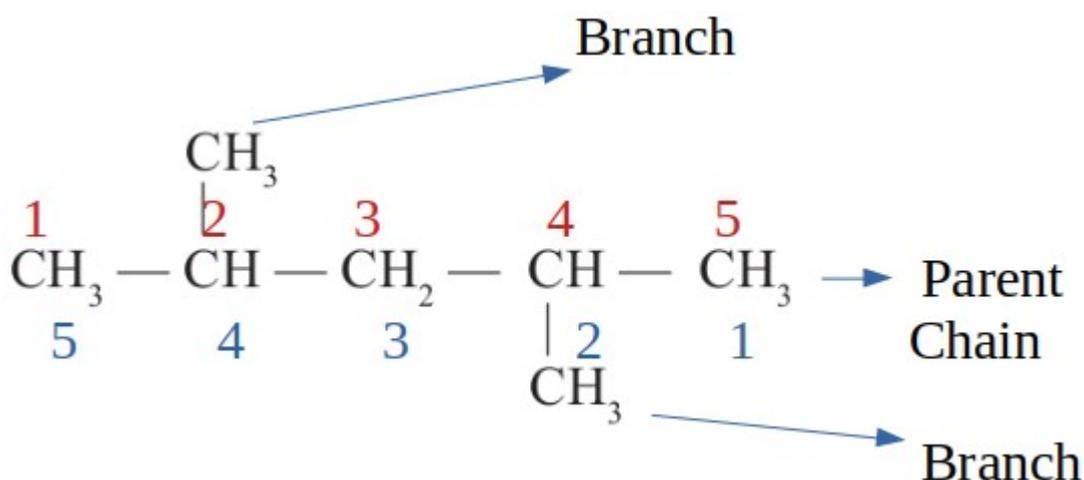
If the same branch appears more than once in a carbon chain, the number of branches is to be indicated using prefixes like

Two = Di
Three = Tri
Four = Tetra

1? Write the IUPAC Name of the compound given below



Ans:



Number of Carbons in Main chain = 5

Word root = Pent

Suffix = ane

Number of Branches = 2

Name of Branches = Methyl(-CH₃), Methyl(CH₃)

Position of Branches (Left to Right) = 2,4

Position of Branches (Right to Left) = 2,4

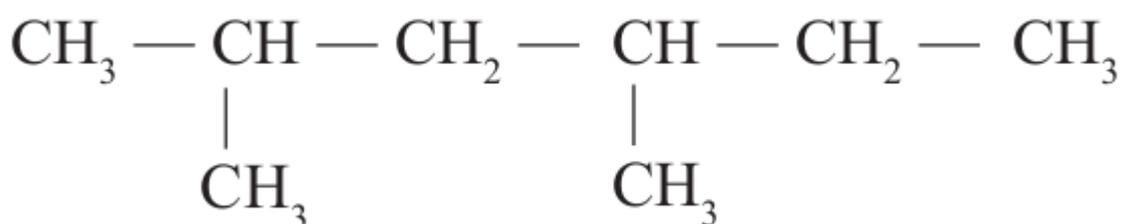
Correct Position of Branches = 2,4 (Choose the numbering that gives the lowest possible numbers)

Since there are two methyl groups present, we use the prefix 'di'.

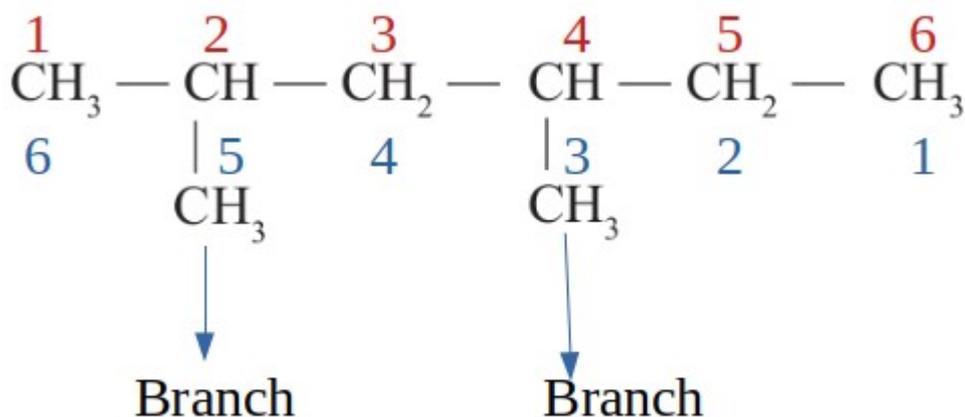
IUPAC = Position of Branches – Alkyl group Name +
Word root + suffix

= 2,4-Dimethylpentane

2? Write the IUPAC Name of the compound given below



Ans:



Number of Carbons in Main chain = 6

Word root = Hex

Suffix = ane

Number of Branches = 2

Name of Branches = Methyl(-CH₃), Methyl(CH₃)

Position of Branches (Left to Right) = 2,4

Position of Branches (Right to Left) = 3,5

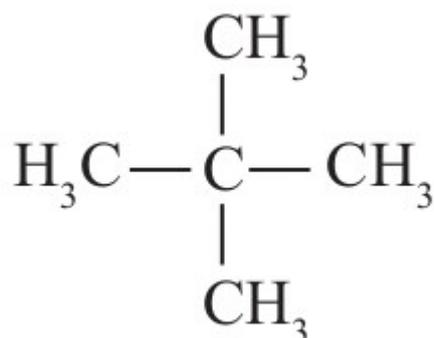
Correct Position of Branches = 2,4 (Choose the numbering that gives the lowest possible numbers)

Since there are two methyl groups present, we use the prefix 'di'.

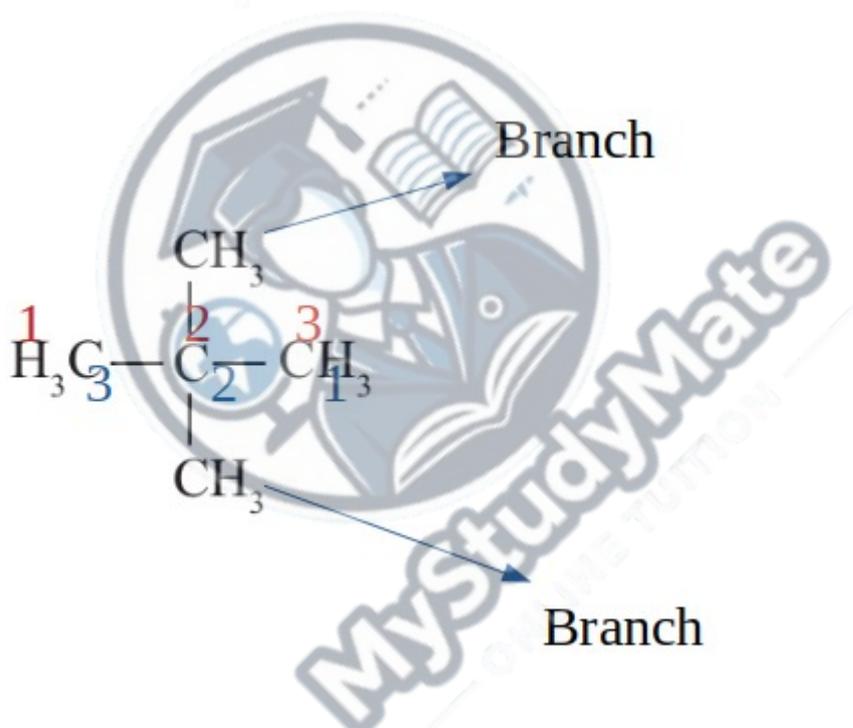
IUPAC = Position of Branches – Alkyl group Name +
Word root + suffix

= 2,4-Dimethylhexane

3? Write the IUPAC Name of the compound given Below



Ans:



Number of Carbons in Main chain = 3

Word root = Prop

Suffix = ane

Number of Branches = 2

Name of Branches = Methyl(-CH₃), Methyl(CH₃)

Position of Branches (Left to Right) = 2, 2

Position of Branches (Right to Left) = 2, 2

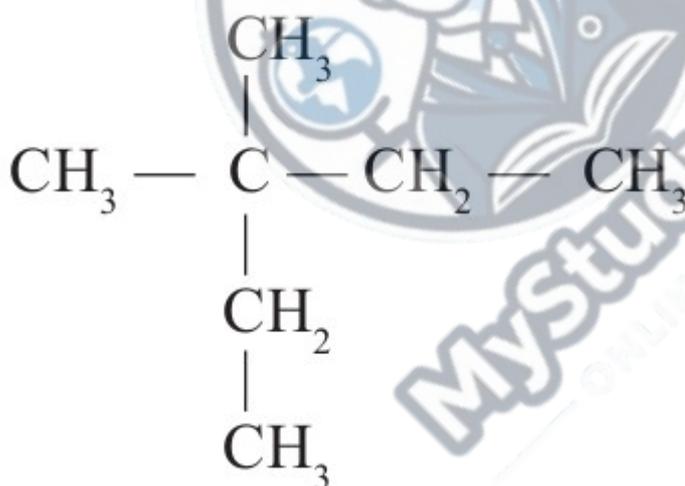
Correct Position of Branches = 2,2

Since there are two methyl groups present, we use the prefix 'di'.

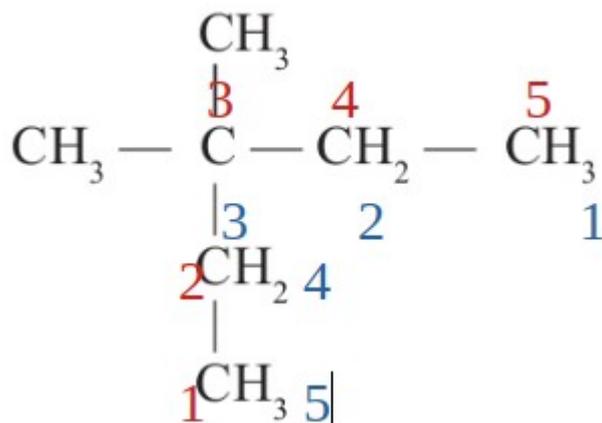
IUPAC=Position of Branches – Alkyl group Name+
Word root + suffix

=2,2-Dimethylpropane

4? Write the IUPAC Name of the compound given Below



Ans:



Step 1: Identify the main (parent) chain

Parent chain is Pentane which means 5 carbon atoms

In straight chain



Step 2: Identify the Substituents (Side Chains)

The alkyl group name is trimethyl, which means

3 methyl groups are present in the compound

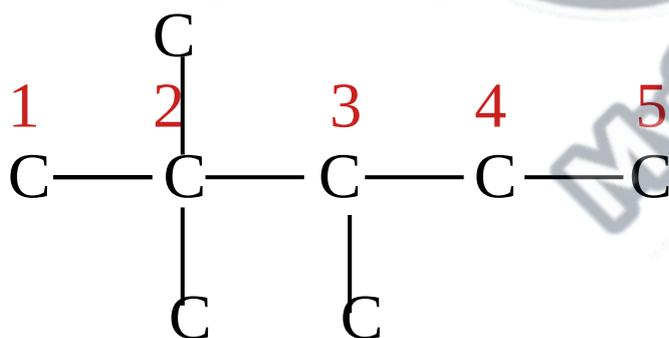
Step 3: Locate the Position Numbers

2,2,3

Step 4: Attach the Substituents

*Place each substituent on the correct carbon atom of the main chain

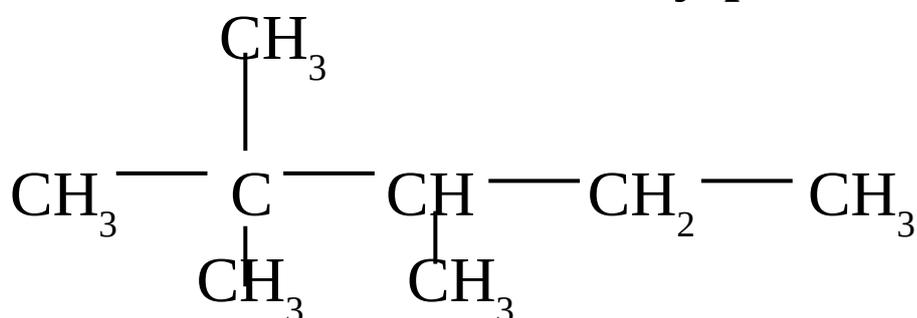
*If multiple identical substituents exist, attach each to its specified position



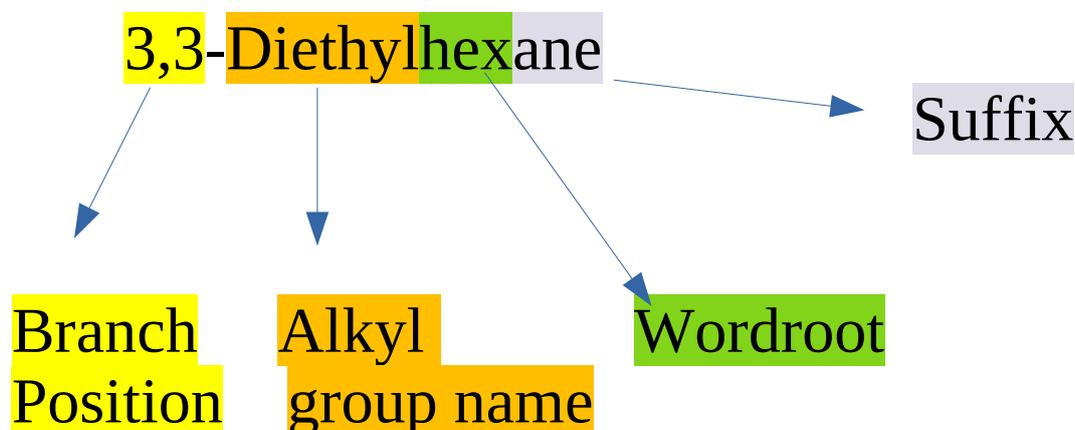
Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

Final structure for 3-methylpentane:



b, 3,3-Diethylhexane



Step 1: Identify the main (parent) chain

Parent chain is hexane which means 6 carbon atoms

In straight chain

C-C-C-C-C-C

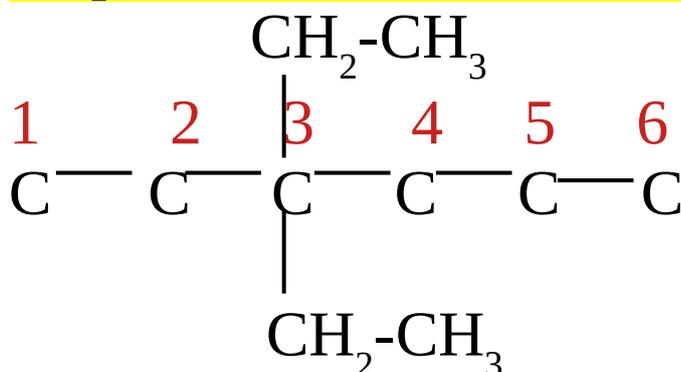
Step 2: Identify the Substituents (Side Chains)

The alkyl group name is Diethyl, which means 2 ethyl (-CH₂-CH₃) groups are present in the compound

Step 3: Locate the Position Numbers

3,3

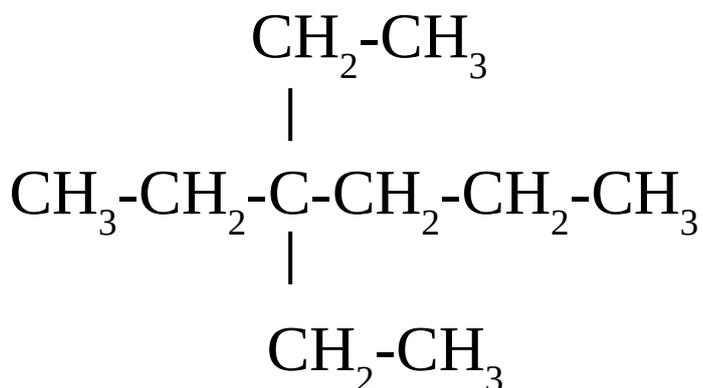
Step 4: Attach the Substituents



Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

Final structure for 3,3–Diethylhexane:



Nomenclature of unsaturated hydrocarbons

Case1:Nomenclature of Alkenes

In the nomenclature of hydrocarbons with double bonds, the numbering should be done in such a way that the carbon atoms linked by the double bond gets the lowest position number

IUPAC Name = Word root + hyphen + position of double bond + hyphen + suffix (ene).

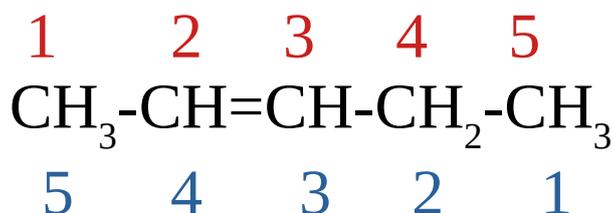
Molecular Formula

A molecular formula shows the actual number of atoms of each element in one molecule of a compound. For example, the molecular formula of glucose is $\text{C}_6\text{H}_{12}\text{O}_6$, which means one molecule contains 6 carbon atoms, 12 hydrogen atoms, and 6 oxygen atoms.

1? Write the IUPAC Name and molecular formula of compound given below



Ans:



Total number of carbon atoms in Main chain =5

Word root = Pent (based on 5 carbon atoms)

Position of the double bond while numbering from left to right =2

Position of the double bond while numbering from Right to left =3

The correct position number of carbon atom having double bond.= 2(Choose the numbering direction that gives the lowest position number to the double bond.)

Suffix = 'ene' (Suffix of Alkene is 'ene')

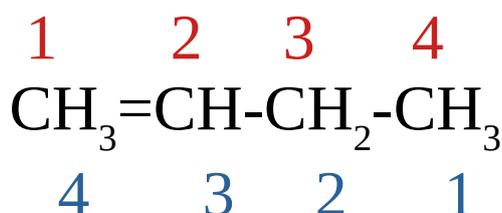
IUPAC Name = Pent-2-ene

Molecular formula = 5 carbon,10 Hydrogen = C_5H_{10}

2? Write the IUPAC Name and molecular formula of compound given below



Ans:



Total number of carbon atoms in Main chain = 4

Word root = But (based on 4 carbon atoms)

Position of the double bond while numbering from left to right = 1

Position of the double bond while numbering from Right to left = 3

The correct position number of carbon atom having double bond. = 1 (Choose the numbering direction that gives the lowest position number to the double bond.)

Suffix = 'ene' (Suffix of Alkene is 'ene')

IUPAC Name = But-1-ene

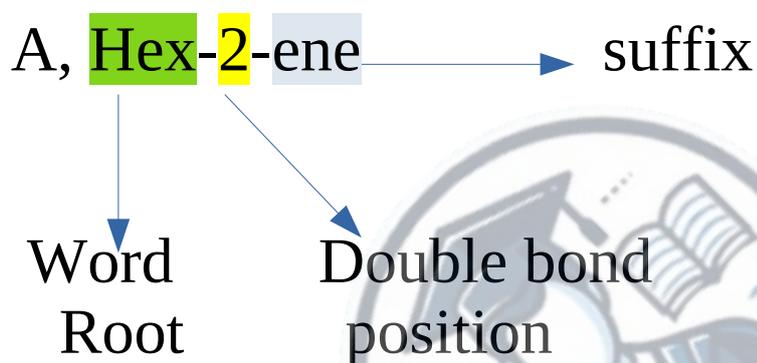
Molecular Formula = C_4H_8

3? Write the structural formulae of the compounds given below

a, Hex-2-ene

b, Prop-1-ene

Solution:



Step 1: Identify the Root Name

Hex (6 carbon main chain)

Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of the Double Bond

2

Step 4: Draw the Double Bond

Place the double bond (C=C) at the specified position

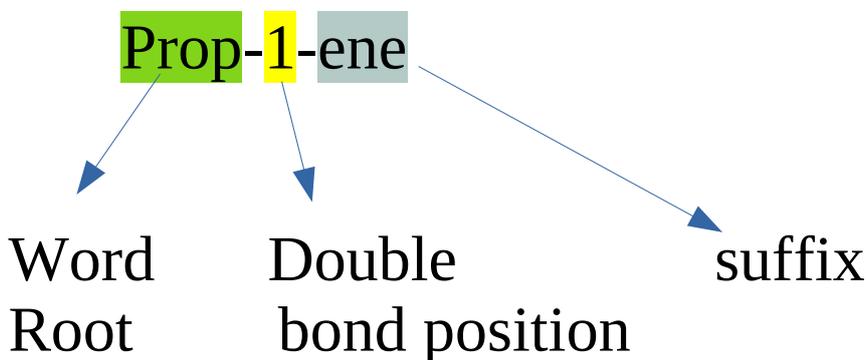


Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds



B, Prop-1-ene



Step 1: Identify the Root Name

Prop(3 carbon main chain)

Step 2: Draw the Main Carbon Chain

C-C-C

Step 3: Identify the Position of the Double Bond

1

Step 4: Draw the Double Bond

Place the double bond (C=C) at the specified position

C=C-C

Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

Final Structure : $\text{CH}_2=\text{CH}-\text{CH}_3$

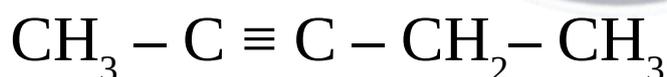
Molecular Formula : C_3H_6

Case1:Nomenclature of Alkynes

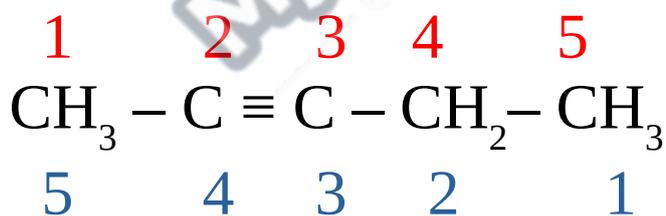
In the nomenclature of hydrocarbons with triple bonds, the numbering should be done in such a way that the carbon atoms linked by the triple bond gets the lowest position number

IUPAC Name = Word root + hyphen + position of triple bond + hyphen + suffix (yne).

1? Write the IUPAC Name and molecular formula of compound given below



Ans:



*Total number of carbon atoms in Main chain =5

*Word root = Pent (based on 5 carbon atoms)

*Position of the triple bond while numbering from left to right =2

*Position of the triple bond while numbering from Right to left =3

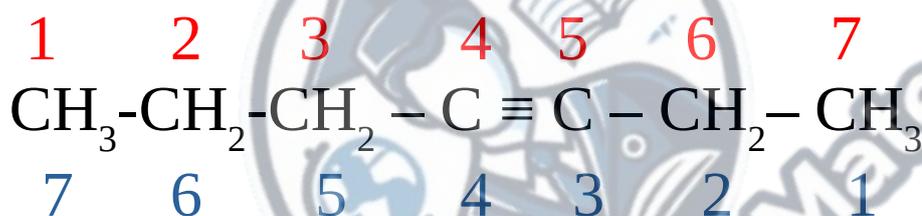
The correct position number of carbon atom having triple bond = 2

IUPAC Name : Pent-2-yne

2? Write the IUPAC Name and molecular formula of compound given below



Ans:



Total number of carbon atoms in Main chain =7

Word root = Hept (based on 7 carbon atoms)

Position of the triple bond while numbering from left to right =3

Position of the triple bond while numbering from Right to left =4

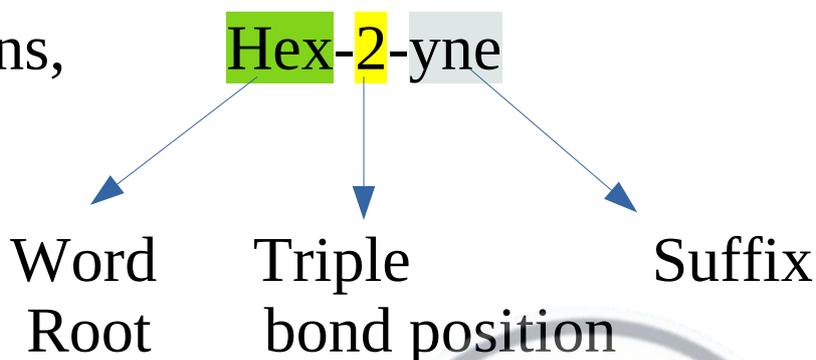
The correct position number of carbon atom having triple bond = 3

IUPAC Name : Hept-3-yne

3? Write the structural formulae of the compounds given below

Hex-2-yne

Ans,



Step 1: Identify the Root Name

Hex(6 carbon main chain)

Step 2: Draw the Main Carbon Chain

C-C-C-C-C-C

Step 3: Identify the Position of the Triple Bond

2

Step 4: Draw the Triple Bond

Place the Triple bond (C≡C) at the specified position

C-C≡C-C-C-C

Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

The Final Structure : $\text{CH}_2\text{-C}\equiv\text{C-CH}_2\text{-CH}_2\text{-CH}_3$

Functional Group

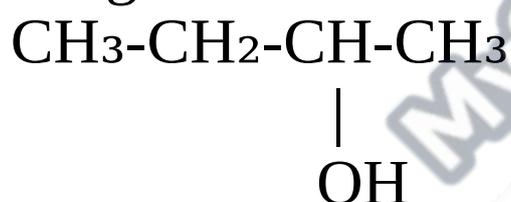
An atom or a group of atoms, bonded to carbon in an organic compound, determines the distinctive chemical and physical properties of that compound. This atom or group of atoms is called a functional group.

1. Hydroxyl group (-OH)

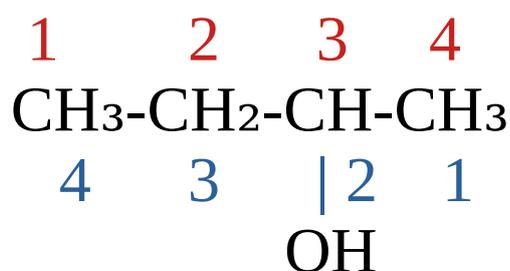
IUPAC Naming Rule for Alcohols

Formula: Alkane - e + hyphen + position number of -OH group + hyphen + o

1? Write the IUPAC Name and molecular formula of compound given below



Ans,



Total number of carbon atoms in Main chain = 4
Word root = But (based on 4 carbon atoms)

Position of -OH group while numbering from left to right = 3

Position of -OH group while numbering from right to left = 2

The correct position number of carbon atom having -OH group = 2

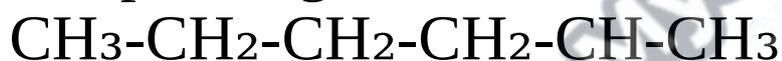
Apply IUPAC naming rule

Alkane name = Butane

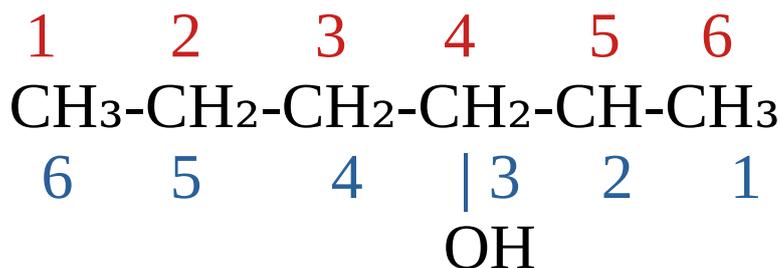
Remove 'e' = Butan

Add position number and 'ol' = Butan-2-ol

2? Write the IUPAC Name and molecular formula of compound given below



Ans,



Total number of carbon atoms in Main chain = 6

Word root = Hex (based on 6 carbon atoms)

Position of -OH group while numbering from left to right = 5

Position of -OH group while numbering from right to left = 2

The correct position number of carbon atom having -OH group = 2

Apply IUPAC naming rule

Alkane name = Hexane

Remove 'e' = Hexan

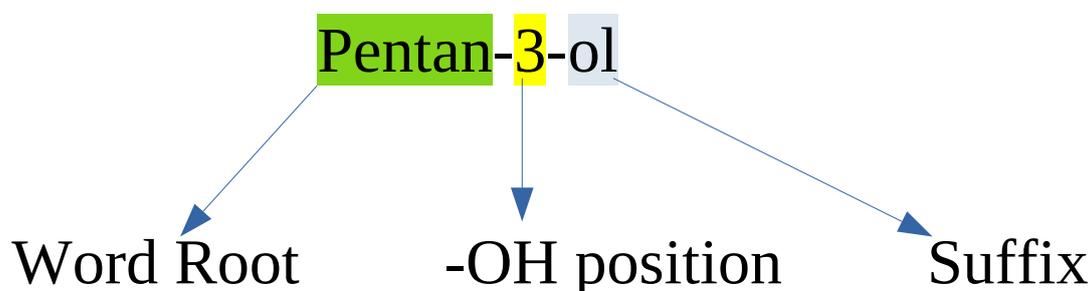
Add position number and 'ol' = Hexan-2-ol

Molecular Formula: $C_6H_{14}O$

3? Write the structural formula of the compound given below

Pentan-3-ol

Ans,



Step 1: Identify the Root Name

Pentan(5 carbon main chain)

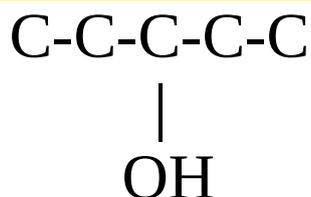
Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of -OH Group

Position = 3

Step 4: Attach the -OH Group



Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

The Final Structure: $\text{CH}_3\text{-CH}_2\text{-C-CH}_2\text{-CH}_3$

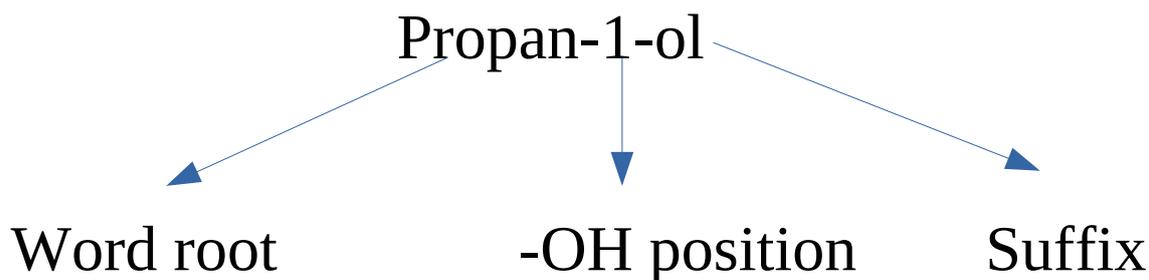


Molecular Formula: $\text{C}_5\text{H}_{12}\text{O}$

4? Write the structural formula of the compound given below

Propan-1-ol

Ans,



Step 1: Identify the Root Name

Propan(3 carbon main chain)

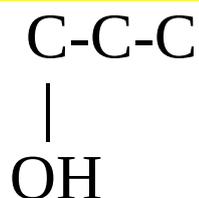
Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of -OH Group

Position = 1

Step 4: Attach the -OH Group



Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

The Final Structure: $\text{CH}_2\text{-CH}_2\text{-CH}_3$



or



or



Molecular Formula: $\text{C}_3\text{H}_8\text{O}$

2. Carboxyl group $\left[\begin{array}{c} \text{O} \\ \parallel \\ \text{C} \\ \diagup \quad \diagdown \\ \quad \quad \text{OH} \end{array} \right]$ or $-\text{COOH}$

Compounds containing the $-\text{COOH}$ functional group are known as carboxylic acids.

For Finding IUPAC Name from Structure:

- *The COOH group is always numbered as carbon 1
- *Find the longest carbon chain containing COOH group
- *Apply the rule: Alkane - e + oic acid
- *No position number needed for COOH (always Position 1)

For Finding Structure from IUPAC Name:

- *Identify the root name to determine chain length
- * COOH group is always at position 1 (terminal carbon)
- *Complete the structure by adding hydrogen atoms

Common Examples:

Methanoic acid (HCOOH) - Formic acid

Ethanoic acid (CH_3COOH) - Acetic acid

Propanoic acid ($\text{CH}_3\text{CH}_2\text{COOH}$) - Propionic acid

1? Write the IUPAC Name of the compound given Below



Ans,

Total number of carbon atoms in Main chain = 4

Word root = But (based on 4 carbon atoms)

Position of COOH group = 1 (always carbon number 1)

Apply IUPAC naming rule:

Alkane name = Butane

Remove 'e' = Butan

Add 'oic acid' = Butanoic acid

Molecular Formula: $\text{C}_4\text{H}_8\text{O}_2$

2? Write the IUPAC Name and molecular formula of compound given below



Ans, **6** **5** **4** **3** **2** **1**



Total number of carbon atoms in Main chain = 6

Word root = Hex (based on 6 carbon atoms)

Position of COOH group = 1 (always carbon number 1)

Apply IUPAC naming rule:

Alkane name = Hexane

Remove 'e' = Hexan

Add 'oic acid' = Hexanoic acid

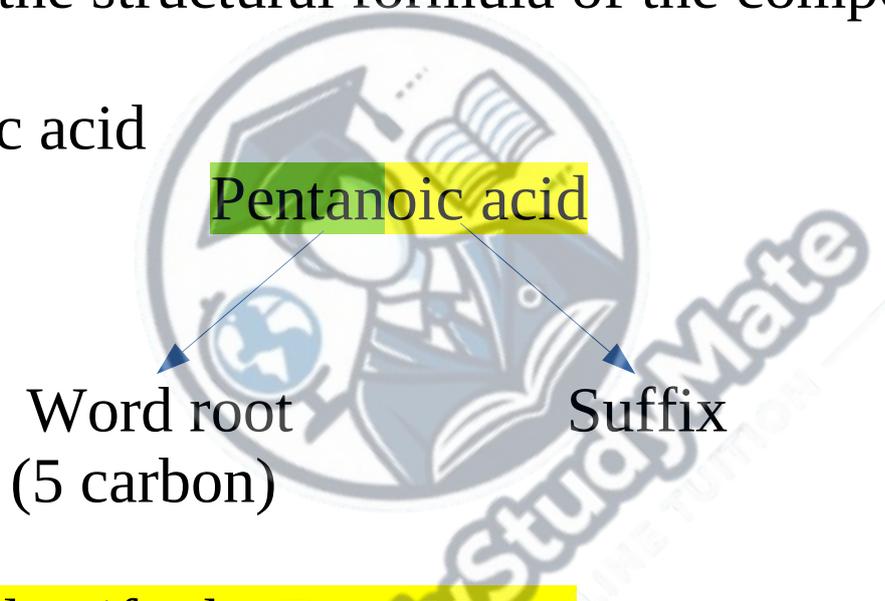
IUPAC Name: Hexanoic acid

Molecular Formula: $C_6H_{12}O_2$

3? Write the structural formula of the compound given below

Pentanoic acid

Ans,



Step 1: Identify the Root Name

Pentan (5 carbon main chain)

Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of COOH Group

COOH group is always at position 1 (terminal carbon)

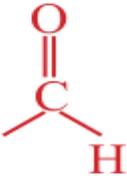
Step 4: Attach the COOH Group



Step 5: Add hydrogen atoms

Ensure that each carbon forms 4 bonds

The Final Structure: $\text{COOH-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3$
or $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-COOH}$
Molecular Formula: $\text{C}_5\text{H}_{10}\text{O}_2$

3. Aldehyde group ( or **-CHO**)

Functional Group: -CHO (Carbonyl group with hydrogen)
IUPAC Naming Rule: Alkane - e + al → Alkanal
Position: Always at terminal carbon (carbon 1)

1? Write the IUPAC Name of the compound given below
 $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$

Ans,

4 3 2 1

$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$

CHO group is always numbered as carbon 1

Step 1: Identify the Longest Carbon Chain

Total number of carbon atoms in main chain = 4

Word root = But (based on 4 carbon atoms)

Step 2: Identify the Position of CHO Group

Position of CHO group = 1 (always carbon number 1)

Step 3: Apply IUPAC Naming Rule

Alkane name = Butane

Remove 'e' = Butan

Add 'al' = Butanal

IUPAC Name: Butanal

Molecular Formula: C₄H₈O

2? Write the structural formula of the compound given below

Pentanal

Ans,

Pentanal

Word root

Suffix

Step 1: Identify the Root Name

Pentan (5 carbon main chain)

Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of CHO Group

CHO group is always at position 1 (terminal carbon)

Step 4: Attach the CHO Group



Step 5: Add Hydrogen Atoms

Ensure that each carbon forms 4 bonds

The Final Structure: CHO-CH₂-CH₂-CH₂-CH₃

or CH₃-CH₂-CH₂-CH₂-CHO

Molecular Formula: C₅H₁₀O

4. Keto group ($>C=O$)

Functional Group: $C=O$ (Carbonyl group between two carbons)

IUPAC Naming Rule: Alkane - e + one \rightarrow Alkanone

Position: Can be at any internal carbon (not terminal)

1? Write the IUPAC Name of the compound given below



Ans,



Step 1: Identify the Longest Carbon Chain

Total number of carbon atoms in main chain = 6

Word root = Hex (based on 6 carbon atoms)

Step 2: Find the Position of $C=O$ group

Position of $-CO$ group while numbering from left to right = 4

Position of $-CO$ group while numbering from right to left = 3

The correct position number = 3 (Choose the numbering direction that gives the lowest position number)

Step 3: Apply IUPAC Naming Rule

Alkane name = Hexane

Remove 'e' = Hexan

Add 'one' = Hexanone

Add position number = Hexan-3-one

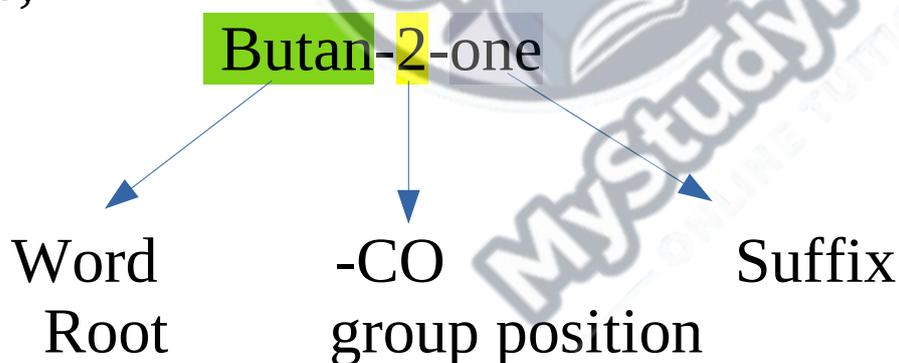
IUPAC Name: Pentan-3-one

Molecular Formula: $C_5H_{10}O$

2? Write the structural formula of the compound given below

Butan-2-one

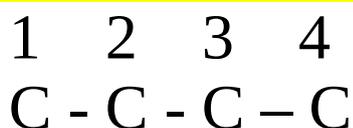
Ans,



Step 1: Identify the Root Name

Butan (4 carbon main chain)

Step 2: Draw the Main Carbon Chain



Step 3: Identify the Position of C=O Group

C=O group is at position 2

Step 4: Attach the C=O Group



Step 5: Add Hydrogen Atoms

Ensure that each carbon forms 4 bonds

The Final Structure: $\text{CH}_3\text{-CO-CH}_2\text{-CH}_3$

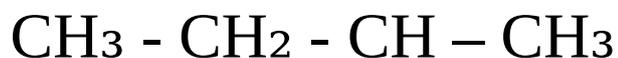
Molecular Formula: $\text{C}_4\text{H}_8\text{O}$

5. Halo group (-F, -Cl, -Br, -I)

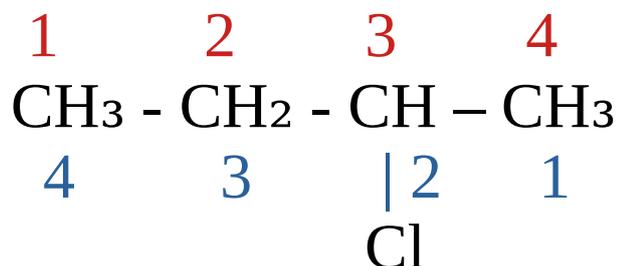
IUPAC Name = Position of the halo group + hyphen + name of the halo group + name of the alkane

Halogen	Symbol	Prefix
Fluorine	-F	Fluoro-
Chlorine	-Cl	Chloro-
Bromine	-Br	Bromo-
Iodine	-I	Iodo-

1? Write the IUPAC Name of the compound given below



Ans,



Step 1: Identify the Longest Carbon Chain

Total number of carbon atoms in main chain = 4

Word root = But (based on 4 carbon atoms)

Step 2: Find the Position of Halo group

Position of Halo group while numbering from left to right = 3

Position of Halo group while numbering from right to left = 2

Correct position number = 2 (Choose the numbering direction that gives the lowest position number)

Step 3: Apply IUPAC Naming Rule

Alkane name = Butane

Halogen = Chlorine → Chloro-

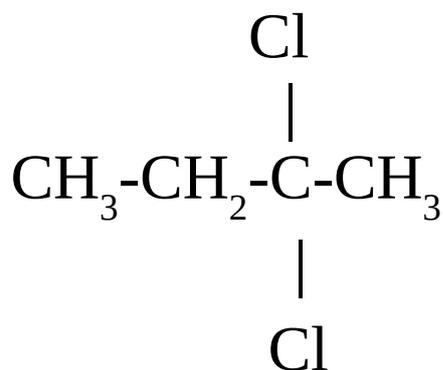
Position = 2

Combined = 2-Chlorobutane

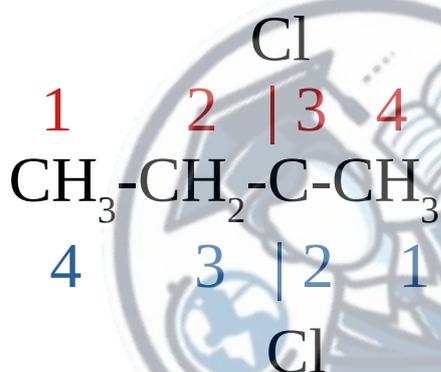
IUPAC Name: 2-Chlorobutane

Molecular Formula: $\text{C}_4\text{H}_9\text{Cl}$

2? Write the IUPAC Name of the compound given below



Ans,



Step 1: Identify the Longest Carbon Chain

Total number of carbon atoms in main chain = 4

Word root = But (based on 4 carbon atoms)

Step 2: Find the Position of Halo group

Position of Halo group while numbering from left to right = 3,3

Position of Halo group while numbering from right to left = 2,2

Correct position number = 2,2 (Choose the numbering direction that gives the lowest position number)

Step 3: Apply IUPAC Naming Rule

Alkane name = Butane

Halogen = Chlorine → Chloro-

Position = 2,2

2 Chlorine Atoms So Dichloro

Combined = 2,2-Dichlorobutane

IUPAC Name = 2,2-Dichlorobutane

Molecular Formula = $C_4H_8Cl_2$

2? Write the structural formula of the compound given below

3-Bromopentane

Ans,

3-Bromopentane



Halo

Halo Group

Root Name

Group position

Step 1: Identify the Root Name

Pentane (5 carbon main chain)

Step 2: Draw the Main Carbon Chain

1 2 3 4 5

C - C - C - C - C

Step 3: Identify the Position of Halogen

Bromo- group is at position 3

Step 4: Attach the Br Group



Step 5: Add Hydrogen Atoms

Ensure that each carbon forms 4 bonds

The Final Structure: $\text{CH}_3\text{-CH}_2\text{-CHBr-CH}_2\text{-CH}_3$

Molecular Formula: $\text{C}_5\text{H}_{11}\text{Br}$

6. Alkoxy group (-O-R)

-O- group is called ether linkage. Of the alkyl groups on either side of ether linkage (-O-), the longer alkyl group is considered as alkane and the shorter as alkoxy group.

IUPAC Naming Rule: Alkyl + oxy + alkane name

1? Write the IUPAC name of the compound given below



Ans,



Long chain



Short chain

Number of carbons in Short chain = 1 = Methoxy

Number of carbons in Long chain = 4 = Butane

IUPAC Name = MethoxyButane

Molecular Formula: $C_5H_{12}O$

2? Write the structural formula of the compound given below

Ethoxypentane

Ans,

Ethoxypentane

Short chain (2 carbon) Long chain (5 carbon)

It means -O is between 2 carbon chain and 5 carbon Chain

C-C-O-C-C-C-C-C

Add Hydrogen Atoms

Ensure that each carbon forms 4 bonds

The Final Structure:



Molecular Formula: $C_7H_{16}O$



MyStudyMate
ONLINE TUTORING