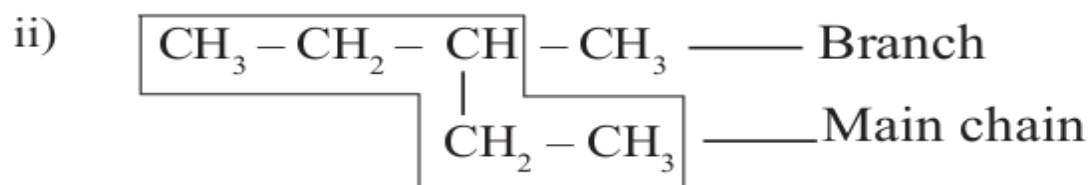
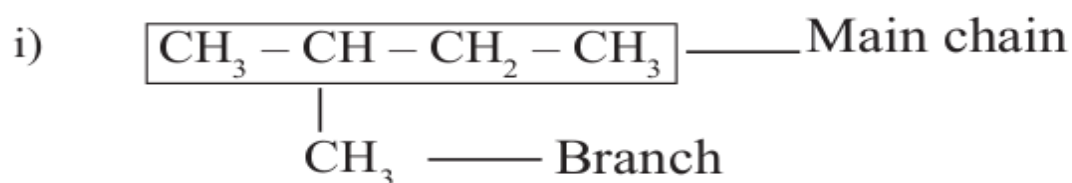
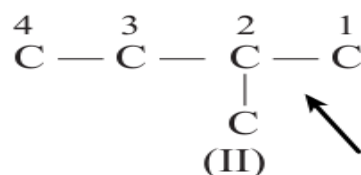
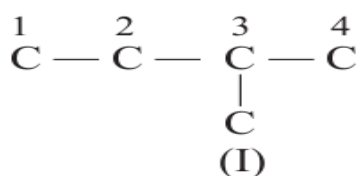


# NOMENCLATURE OF ORGANIC COMPOUNDS AND ISOMERISM

The longest chain containing maximum number of carbon atoms should be considered as the main chain and the remaining as branches.

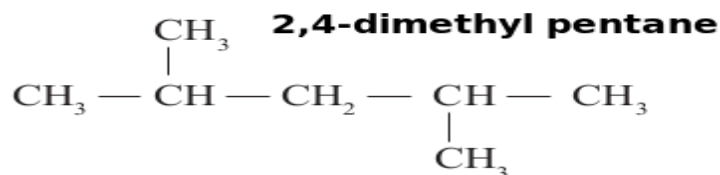


A carbon chain containing one branch is given below. Note that it is numbered in two ways.

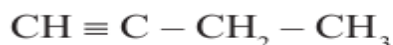


Name of alkyl group	Structural formula
Methyl	$-\text{CH}_3$
Ethyl	$-\text{CH}_2 - \text{CH}_3$
Propyl	$-\text{CH}_2 - \text{CH}_2 - \text{CH}_3$

Structural formula of a hydrocarbon is given below. Write the IUPAC name of this compound.

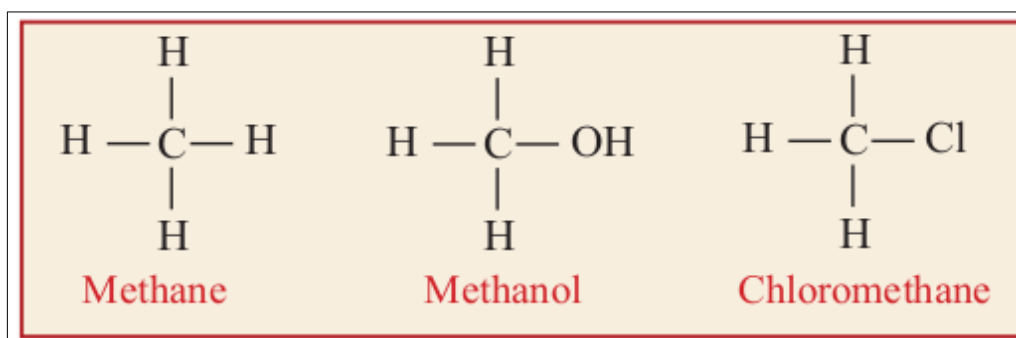


Structural formula of a compound is given below.



- What is the molecular formula of this compound? ..... **C<sub>4</sub>H<sub>6</sub>** .....
- To which category does this compound belong?      **alkyne**

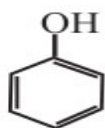
## Functional groups



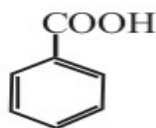
An atom or a group of atoms, bonded to carbon in an organic compound, determines the distinctive chemical and physical properties of that compound. This atom or group of atoms is called a functional group.

Hydroxyl group---OH  
 carboxylic group---COOH  
 aldehyde---CHO  
 Keto group---CO  
 halo group---F,Cl,Br

## Aromatic compounds



Phenol  
( $C_6H_5 - OH$ )

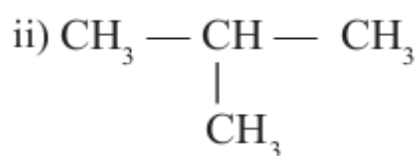
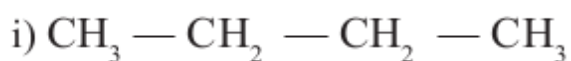


Benzoic acid  
( $C_6H_5 - COOH$ )

## Isomerism

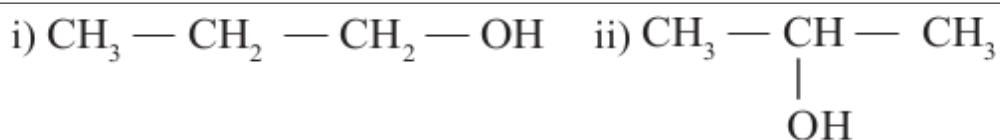
Compounds having same molecular formula and different chemical and physical properties are called isomers. This phenomenon is called isomerism.

### Chain isomerism



Compounds that have the same molecular formula but differ in the structures of carbon chain are called chain isomers. This phenomenon is known as chain isomerism.

### Position isomerism



When two compounds have same molecular formula and same functional group, but differ in the position of the functional group, they are called position isomers, and this phenomenon is known as position isomerism.

## Functional isomerism

- |  |                             |
|--|-----------------------------|
| i) $\text{CH}_3 - \text{CH}_2 - \text{OH}$ | IUPAC name - Ethanol        |
| ii) $\text{CH}_3 - \text{O} - \text{CH}_3$ | IUPAC name - Methoxymethane |

When compounds have the same molecular formula but different functional groups, they are known as functional isomers, and this phenomenon is called functional isomerism.

## Metamerism

- |  |
|--|
| i) $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$  |
| ii) $\text{CH}_3 - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ |

The isomerism exhibited by compounds with the same molecular formula but different alkyl groups on either side of the bivalent functional group (group having valency 2, eg. ( O , C = O ) is known as metamerism.

Examine the compounds given below and identify the isomeric pairs. Specify the type of isomerism exhibited by each pair.

- |   |   |
|---|---|
| i) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$  | ii) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$         |
| iii) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{O} - \text{CH}_3$ | iv) $\text{CH}_3 - \text{CH}_2 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_3$ |
| v) $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$   | vi) $\text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$   |

Chain isomerism	<b>2&amp;4</b>
Position isomerism	<b>1&amp;6</b>
Functional isomerism	<b>3&amp;6</b>
Metamerism	<b>3&amp;5</b>

Complete the table.

Compound	Number of carbon atoms in the longest chain	Name of branch	Position of branch	IUPAC name
$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \\   \\ \text{CH}_3 \end{array}$	<b>6</b> .....	<b>methyl</b> .....	<b>2</b> .....	.....
$\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_3 \\   \\ \text{CH}_3 \end{array}$	<b>2</b> .....	<b>methyl</b> .....	<b>2</b> .....	.....
$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \\   \\ \text{CH}_2 - \text{CH}_3 \end{array}$	<b>6</b> .....	<b>methyl</b> .....	<b>3</b> .....	.....
$\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3 \end{array}$	<b>5</b> .....	<b>ethyl</b> .....	<b>3</b> .....	.....

- a) 2-methyl hexane    b) 2-methyl butane    c) 3-methylhexane  
d) 3-ethylpentane

$$\begin{array}{ccccccc} \text{C} & - & \text{C} & - & \text{C} & - & \text{C} \\ & & & & | & & \\ & & & & \text{C} & & \\ & & & & | & & \\ & & & & \text{C} & & \end{array}$$

- a)  $\text{CH}_3\text{---CH}_2\text{---CH---CH}_2\text{---CH}_3$       b)  $\text{C}_6\text{H}_{14}$     c) 5    d) 3-methyl pentane



g) Pentanal

$$\text{a) CH}_3\text{---CH} \begin{array}{c} | \\ \text{CH}_3 \end{array} \text{-----} \begin{array}{c} \text{CH}_3 \\ | \\ \text{C} \\ | \\ \text{CH}_3 \end{array} \text{---CH}_2\text{---CH}_2\text{---CH}_3$$

b)  $\text{CH}_3\text{---CH}_2\text{---O---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH}_3$     c)  $\text{CH}_2\text{---C=O---CH}_2\text{---CH}_3$

d)  $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---C}\equiv\text{CH}$       e)  $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH---CH}_3$

f)  $\text{CH}_3\text{---CH}_2\text{---}\underset{\text{Br}}{\text{CH}}\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH}_3$     g)  $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---}\overset{\text{OH}}{\text{CH}}\text{---CHO}$

2. Write down the IUPAC names of the given compounds.

- a) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2 - \text{CH}_3$$
- b) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_3$$
- c) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{C} - \text{CH}_3$$
- d) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$$
- e) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$$
- f) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CO} - \text{CH}_3$$
- g) 
$$\text{CH}_3 - \text{CH}_2 - \overset{\text{Cl}}{\underset{\text{Cl}}{\underset{|}{\text{C}}}} - \text{CH}_3$$
- h) 
$$\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$$
- i) 
$$\text{CH}_3 - \overset{\text{CH}_3}{\underset{|}{\text{C}}} = \text{CH} - \text{CH}_3$$
- j) 
$$\text{CH} \equiv \text{C} - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_3$$

a) 3-methylhexane b) 2-hexene c) 2-hexyne d) pentanoic acid

e) butanal f) pent-2-one g) 2,2-dichlorobutane h) ethoxyethane

i) 2-methyl but-2-ene j) 3-methyl but-1-yne

4. The structural formulae and IUPAC names of certain compounds are given. Identify the wrong ones and correct them.

- i) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \underset{\text{CH}_2 - \text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_3$$
 2-Ethylpentane
- ii) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CO} - \text{CH}_3$$
 Pentan-2-one
- iii) 
$$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{C} - \text{CH}_3$$
 Hex-3-yne
- iv) 
$$\text{CH}_3 - \text{CH}_2 - \underset{\text{Cl}}{\underset{|}{\text{CH}}} - \overset{\text{Cl}}{\underset{\text{Cl}}{\underset{|}{\text{C}}}} - \text{CH}_3$$
 2,3-Dichloropentane

a) 3-methyl hexane    c) hex-2-yne    d) 2,2,3-trichloropentane

5.    i)  $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$                       ii)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$

- What type of isomerism do these compounds exhibit?
- Write the structural formula of the metamer of compound (i).

a) functional group    b)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{O} - \text{CH}_3$

6. The structural formulae of two compounds are given.

i)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$                       ii)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CO} - \text{CH}_3$

- What is the IUPAC name of the first compound?
- These two compounds are isomers. Why?
- What type of isomerism do these compounds exhibit?
- Write the structural formula of the position isomer of the second compound.

a) pentanal    b) same number of atoms    c) functional group

d)  $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}_2 - \text{CH}_3$

7. Examine the compounds given below and identify the isomeric pairs. What type of isomerism is shown by each pair?

- |                   |                       |
|-------------------|-----------------------|
| a) Methoxypropane | b) 2,3-Dimethylbutane |
| c) Propan-1-ol    | d) Ethoxyethane       |
| e) Propan-2-ol    | f) Hexane             |

chain isomerism---2 & 6

position isomerism---3 & 5

metamerism----1 & 4