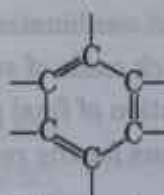
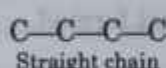


Organic Chemistry

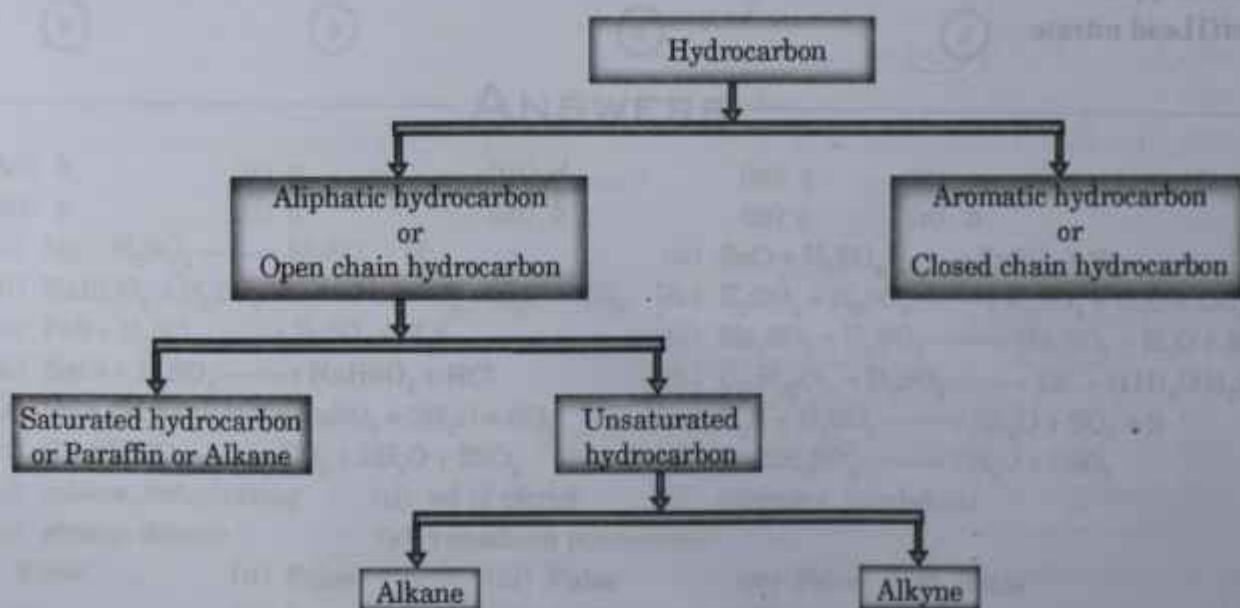
IMPORTANT POINTS TO REMEMBER

1. **Organic chemistry** is a special branch of chemistry which deals with the study of **compounds of Carbon** other than **Carbonates, Bicarbonates, Oxides of Carbon, Cyanides** etc.
2. Earlier it was regarded that organic compounds can only be produced by nature under the influence of living force called **vital force**.
3. The vital force theory got the deathblow after the synthesis of **Urea** by **Wohler** by heating **Ammonium cyanate**.
4. Carbon atom has unique property to link with each other so as to form long chain or ring structure. This property is called **catenation**.
5. All **organic compounds** essentially contain carbon atom. Carbon has 4 valence electrons. Therefore to satisfy its valency carbon shares its electrons with other carbon atoms or with the atoms of other elements. As a result of sharing it leads to the formation of **straight chain, branched chain, closed chain or the ring structures**.



Ring structure
or
Closed chain of carbon atoms

6. The simplest organic compound is called **hydrocarbon**. These are the compounds of Hydrogen and Carbon only.
- 7.



8. The characteristics of organic compounds are :

- All organic compounds are **covalent** in nature.
- Almost all the organic compounds are **insoluble** in water but **soluble** in **organic solvents** like benzene, ether, carbon tetrachloride.
- Organic compounds have relatively **low melting point** and **boiling point**.
- All organic compounds are **combustible** in nature.

9. Differences between Organic compounds and Inorganic compounds.

Organic Compounds	Inorganic Compounds
1. The essential element present in all the organic compounds is carbon.	1. Carbon is not the essential element in inorganic compounds.
2. Organic compounds are insoluble in water but soluble in organic solvents.	2. Inorganic compounds are soluble in water.
3. Organic compounds are covalent in nature.	3. Inorganic compounds are either ionic or polar covalent in nature.
4. They have low melting point and boiling point.	4. They have high melting point and boiling point.
5. They are poor conductor of heat and electricity.	5. They conduct electricity in fused molten state and in its aqueous solutions.

10. Earlier, the organic compounds were known by their common names. However, with the discovery of large number of organic compounds the proper scheme for the naming of the organic compounds was formulated by the **International Union of Pure and Applied Chemistry**. In short, this scheme is referred to as **IUPAC** nomenclature.

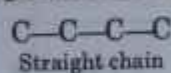
11. The various guidelines given by **IUPAC** for the naming of organic compounds are :

- The chain having the **maximum number of Carbon atoms** is selected *i.e.* the number of carbon atoms present in one molecule of an organic compound.
- The **kind of covalent bonds** present between the carbon atoms in the molecule.

For example

$C-C$	Single covalent bond
$C=C$	Double covalent bond
$C \equiv C$	Triple covalent bond

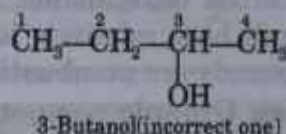
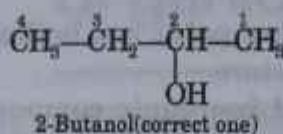
- The **spatial arrangement** of carbon atoms *i.e.* **straight chain** or **branched chain**.



- On the basis of the number of carbon atoms in one molecule the numbering is assigned from **Greek language** as shown in the table given below:

Number of Carbon atoms	Greek name
One	meth
Two	eth
Three	prop
Four	but
Five	pent
Six	hex
Seven	hept
Eight	oct
Nine	non
Ten	dec

- (v) In case, a functional group is present then the chain containing the functional group is selected (no matter it is longest or not). The numbering of carbon chain is done in such a way that the functional group gets the lowest number, e.g.,



12. The compounds of carbon and hydrogen in which the valencies of all the carbon atoms are satisfied by **single covalent bonds** are called as **saturated hydrocarbons** or **alkanes (Paraffins)**. The compounds having only carbon to carbon single bonds are called as saturated hydrocarbons.
13. The general formula for alkane is $\text{C}_n\text{H}_{2n+2}$ where n = number of carbon atoms.
14. In alkane, *alk* - number of carbon atoms present in the hydrocarbon
- *ane* is the single covalent bond present in the hydrocarbon.

For example :

The hydrocarbon with one carbon atom	Meth	-	ane
The hydrocarbon with two carbon atoms	Eth	-	ane
The hydrocarbon with three carbon atoms	Prop	-	ane
The hydrocarbon with four carbon atoms	But	-	ane

15. For deriving the molecular formula of alkane, the general formula $\text{C}_n\text{H}_{2n+2}$ is used. The names and formulae of the first four saturated hydrocarbons are given in the table.

No. of Carbon atoms	IUPAC name	Molecular formula	Structural formula	Condensed formula
1	Methane	CH_4	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$	CH_4
2	Ethane	C_2H_6	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	CH_3-CH_3
3	Propane	C_3H_8	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2-\text{CH}_3$
4	Butane	C_4H_{10}	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$

16. The difference between **two consecutive members** of alkane is **$-\text{CH}_2$ group** or 14 a.m.u. The **$-\text{CH}_2$ group** is called as the **methylene group**.
17. The members of the **same class** of organic compounds are called as **homologue**.
The characteristics of homologous series are
- (i) The **homologues** are represented by the **same general formula**.

For example, Alkanes - C_nH_{2n+2}

Alkenes - C_nH_{2n}

Alkynes - C_nH_{2n-2}

- (ii) Each member of the homologous series differs from the next by $-CH_2$ group or 14 a.m.u.
- (iii) All homologues can be prepared by the same general method of preparation.
- (iv) All homologues have similar chemical properties but different physical properties due to the change in molecular mass.
18. The hydrocarbons in which the valency between atleast two carbon atoms is satisfied with a double or a triple bonds are called as **unsaturated hydrocarbons**.
19. **Alkenes** and **Alkynes** are the **unsaturated hydrocarbons**.
20. The hydrocarbons which contain atleast one **double covalent bond** between two carbon atoms are called as **alkenes**.
21. The general formula for deriving an alkene is C_nH_{2n} (where n = number of the carbon atoms).
22. The names and the formulae of the first five alkenes are given below in the table.

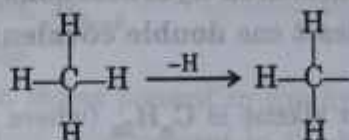
No. of Carbon atoms	IUPAC name	Molecular formula	Structural formula	Condensed formula
1	—	—	Not possible	—
2	Ethene	C_2H_4	$\begin{array}{c} H-C=C-H \\ \quad \\ H \quad H \end{array}$	$CH_2=CH_2$
3	Propene	C_3H_6	$\begin{array}{c} H \quad H \quad H \\ \quad \quad \\ H-C-C=C-H \\ \\ H \end{array}$	$CH_3-CH=CH_2$
4	Butene	C_4H_8	$\begin{array}{c} H \quad H \quad H \quad H \\ \quad \quad \quad \\ H-C-C-C=C-H \\ \quad \\ H \quad H \end{array}$	$CH_3-CH_2-CH=CH_2$
5	Pentene	C_5H_{10}	$\begin{array}{c} H \quad H \quad H \quad H \quad H \\ \quad \quad \quad \quad \\ H-C-C-C-C=C-H \\ \quad \quad \\ H \quad H \quad H \end{array}$	$CH_3-CH_2-CH_2-CH=CH_2$

23. The hydrocarbons which contain a **triple bond** between two carbon atoms are called as **alkynes**.
24. The general formula for alkyne is C_nH_{2n-2} (where n = number of carbon atoms).
25. The names and the formulae of the first five alkynes are given below in the table.

No. of Carbon atoms	IUPAC name	Molecular formula	Structural formula	Condensed formula
1	—	—	Not possible	—
2	Ethyne	C_2H_2	$H-C \equiv C-H$	$HC \equiv CH$
3	Propyne	C_3H_4	$\begin{array}{c} H \\ \\ H-C \equiv C-C-H \\ \\ H \end{array}$	$HC \equiv C-CH_3$

4	Butyne	C_4H_6	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{C}\equiv\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2-\text{C}\equiv\text{CH}$
5	Pentyne	C_5H_8	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}\equiv\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{HC}\equiv\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_3$

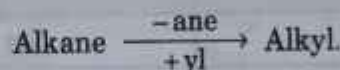
26. An **alkyl radical** or an **alkyl group** is part of an alkane molecule from which one hydrogen atom is removed.



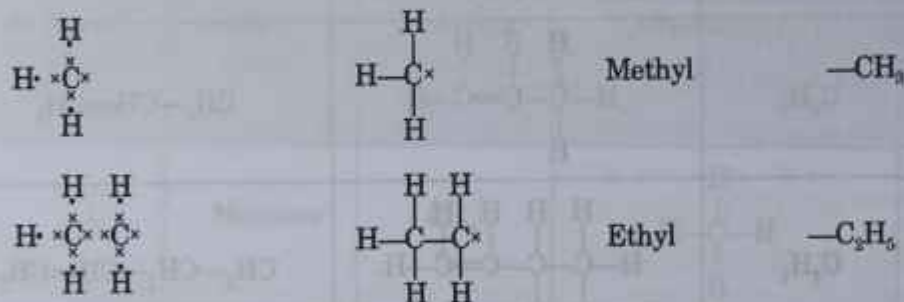
27. An **alkyl group** is represented by 'R'. It is the **hydrocarbon skeleton** of any organic compound.

28. The general formula of alkyl group is C_nH_{2n+1} (where n = number of carbon atoms).

29. In IUPAC alkyl group is named by replacing terminal **'ane'** of alkane by suffix **'yl'**



30. An alkyl group has **one unpaired electron** which is shown by a line.



31. The names and the formulae of the **first four members** of the **alkyl group** are given below in the table :

No. of Carbon atoms	IUPAC name	Molecular formula	Structural formula	Condensed formula
1	Methyl	$-\text{CH}_3$	$\begin{array}{c} \text{H} \\ \\ -\text{C}-\text{H} \\ \\ \text{H} \end{array}$	$-\text{CH}_3$
2	Ethyl	$-\text{C}_2\text{H}_5$	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ -\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	$-\text{CH}_2-\text{CH}_3$
3	Propyl	$-\text{C}_3\text{H}_7$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ -\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$-\text{CH}_2-\text{CH}_2-\text{CH}_3$

4	Butyl	$-\text{C}_4\text{H}_9$	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ -\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$	$-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$
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32. The letter 'n' - (normal) denotes a **straight chain of carbon atoms** in a given molecule.
33. The letter **-iso** indicates a **branch of alkyl group** on the **second carbon atom** from the **end of the straight chain of carbon atoms**.
34. All organic compounds are broadly classified in two parts (i) **Alkyl group** or the **hydrocarbon skeleton** (ii) **the Functional group**.
35. An alkyl group maintains its identity during a chemical reaction whereas the atoms or the group of atoms attached to the alkyl group which takes part in the chemical reaction is called as the **functional group**.
36. **The functional groups are**

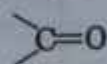
(a) Alcohol



(b) Aldehyde



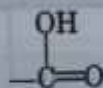
(c) Ketone



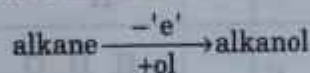
(d) Ether



(e) Carboxylic acid



37. If $-\text{OH}$ is the reactive or the functional group present in the molecule of an alkane, then such compounds are said to belong to **alcoholic group**.
38. The general formula of alcohol is $\text{C}_n\text{H}_{2n+1}\text{OH}$ (where n = number of carbon atoms).
39. In IUPAC alcohols are named as **alkanols**.

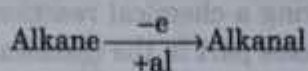


40. The names and the formulae of the first five members of alcohol are given below in the table.

Alkane	IUPAC name	Molecular formula	Structural formula	Condensed formula
Methane	Methanol	CH_3OH	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{H} \end{array}$	CH_3-OH
Ethane	Ethanol	$\text{C}_2\text{H}_5\text{OH}$	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2\text{OH}$
Propane	Propanol	$\text{C}_3\text{H}_7\text{OH}$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2-\text{CH}_2\text{OH}$
Butane	Butanol	$\text{C}_4\text{H}_9\text{OH}$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2\text{OH}$

Pentane	Pentanol	$C_5H_{11}OH$	$ \begin{array}{ccccccc} & H & H & H & H & H & \\ & & & & & & \\ H & -C & -C & -C & -C & -C & -OH \\ & & & & & & \\ & H & H & H & H & H & \end{array} $	$CH_3-CH_2-CH_2-CH_2-CH_2OH$
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41. (i) The compounds belonging to **aldehydic group** have $\begin{array}{c} O \\ || \\ -C-H \end{array}$ group as the functional group of compounds of alkanes.
- (ii) The general formula for **aldehyde** series is $C_nH_{2n+1}CHO$.
- (iii) Aldehydes are named as **alkanal**



42. The general formula for **aldehyde** is $C_nH_{2n+1}CHO$. (where n = number of carbon atoms).
For the **first member** the value of ' n ' must be taken as zero i.e., the fourth of valency of carbon should be satisfied by hydrogen.
43. The names and the formulae of the first four members of aldehyde group are given below in the table.

Alkane	IUPAC name	Molecular formula	Structural formula	Condensed formula
Methane	Methanal	HCHO	$ \begin{array}{c} O \\ \\ H-C-H \end{array} $	H-CHO
Ethane	Ethanal	CH_3CHO	$ \begin{array}{c} H & O \\ & \\ H-C & -C-H \\ \\ H \end{array} $	CH_3-CHO
Propane	Propanal	C_2H_5CHO	$ \begin{array}{c} H & H & O \\ & & \\ H-C & -C & -C-H \\ & & \\ H & H & \end{array} $	CH_3-CH_2-CHO
Butane	Butanal	C_3H_7CHO	$ \begin{array}{c} H & H & H & O \\ & & & \\ H-C & -C & -C & -C-H \\ & & & \\ H & H & H & \end{array} $	$CH_3-CH_2-CH_2-CHO$

44. (i) The compounds belonging to ketonic group have $\begin{array}{c} O \\ || \\ >C=O \end{array}$ group as the functional group of compounds of alkanes.
- (ii) The general formula for ketone series is $C_nH_{2n+1}-\begin{array}{c} O \\ || \\ C \end{array}-C_nH_{2n+1}$ (where n = number of carbon atoms), $R-\begin{array}{c} O \\ || \\ C \end{array}-R$, $R-\begin{array}{c} O \\ || \\ C \end{array}-R'$ (where R and R' are alkyl groups)
- (iii) Ketones are named as alkanones.
- (iv) The simplest ketone is propan-2-one having formula $CH_3-\begin{array}{c} O \\ || \\ C \end{array}-CH_3$ and butan-2-one having formula

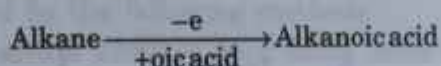


Propan-2-one is commonly called Acetone.

45. (i) The compounds belonging to ether group have —O— group as the functional group of compounds of alkanes.
- (ii) The general formula for ether series is $\text{C}_n\text{H}_{2n+1}\text{—O—C}_n\text{H}_{2n+1}$ (where n = no. of carbon atoms), R—O—R , R—O—R' (where R and R' are alkyl groups)
- (iii) Ethers are named as alkoxy alkane. Oxy part is given to the smaller alkyl group whereas higher alkyl group forms alkanes (The parent chain).
- (iv) The simplest ether is methoxy methane having formula $\text{CH}_3\text{—O—CH}_3$.

46. The compounds belonging to **carboxylic acid group** have $\text{—}\overset{\text{O}}{\parallel}\text{C—OH}$ as the functional group of compounds of alkanes.

47. Carboxylic acids are named as **alkanoic acids**.



48. The general formula of **alkanoic acid** is $\text{C}_n\text{H}_{2n+1}\text{COOH}$ (where n = number of carbon atoms). For the **first member** the value of ' n ' must be taken as zero i.e. the fourth valency of carbon atoms must be satisfied by hydrogen.
49. The names and the formulae of the first four members of carboxylic acid series are given below in the table.

Alkane	IUPAC name	Molecular formula	Structural formula	Condensed formula
Methane	Methanoic acid	HCOOH	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H—C—OH} \end{array}$	H—COOH
Ethane	Ethanoic acid	CH_3COOH	$\begin{array}{c} \text{H} \quad \text{O} \\ \quad \parallel \\ \text{H—C—C—OH} \\ \\ \text{H} \end{array}$	$\text{CH}_3\text{—COOH}$
Propane	Propanoic acid	$\text{C}_2\text{H}_5\text{COOH}$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \parallel \\ \text{H—C—C—C—OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	$\text{CH}_3\text{—CH}_2\text{—COOH}$
Butane	Butanoic acid	$\text{C}_3\text{H}_7\text{COOH}$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \quad \parallel \\ \text{H—C—C—C—C—OH} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—COOH}$

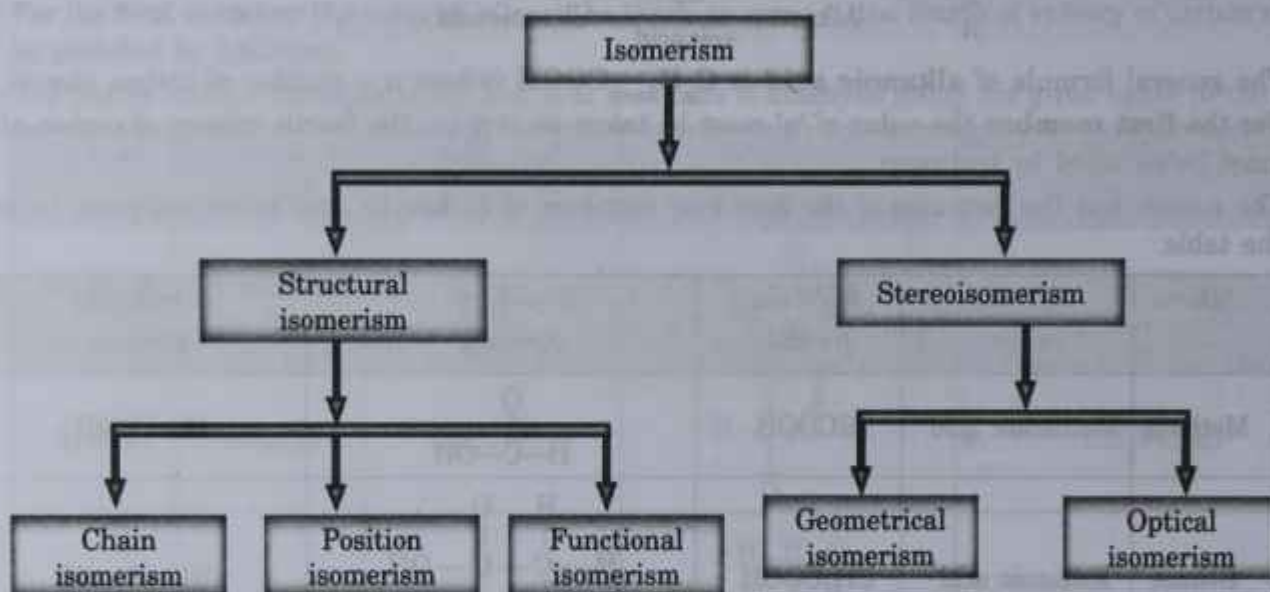
50. The compounds having same molecular formula but different structural formula are referred to as **isomers** and the phenomenon as **isomerism**.

Isomers of Butane

Common name	IUPAC name	Molecular formula	Structural formula	Condensed formula
<i>n</i> -Butane	Butane	C_4H_{10}	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H—C—C—C—C—H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—CH}_3$

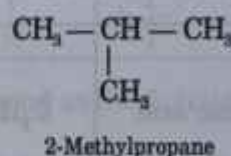
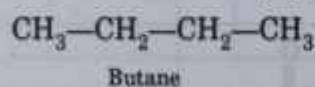
<i>iso</i> -Butane	2-Methylpropane	C_4H_{10}	$ \begin{array}{ccccc} & H & H & H & \\ & & & & \\ H & - C & - C & - C & - H \\ & & & & \\ & H & C & H & \\ & & & & \\ & & H & & \end{array} $	$ \begin{array}{c} CH_3 - CH - CH_3 \\ \\ CH_3 \end{array} $
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51. The two isomers differ either in their spatial arrangement of atoms or the groups of atoms or the structure. The difference in structure gives rise to structural isomerism whereas the different spatial arrangement of atoms or groups of atoms gives rise to stereoisomerism.



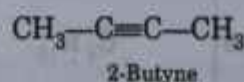
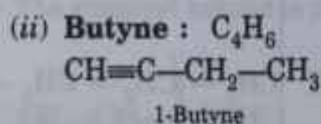
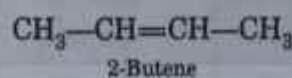
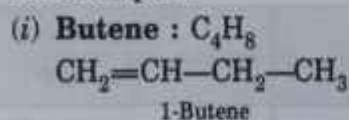
(a) **Chain isomerism** : The compounds having the same molecular formula but have different arrangement of carbon atoms in main chain or parent chain is called as chain isomerism.

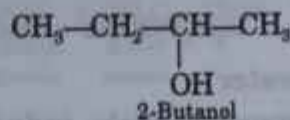
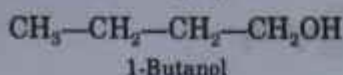
Molecular formula : C_4H_{10}



Alkanes only exhibit chain isomerism due to the absence of multiple bonds or functional groups.

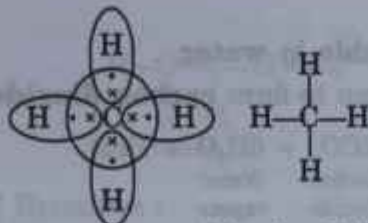
(b) **Position isomerism** : The compounds having the same molecular formula but different positions of multiple bonds (double bond or triple bond) or the functional group is called as position isomerism. For example :



(iii) **Butanol** : C_4H_9OH 

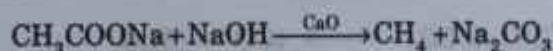
52. **Methane** is the **simplest hydrocarbon**. It is commonly called as **Marsh gas**.

53. The four valency of one Carbon atom is satisfied by four Hydrogen atoms by a single covalent bond.



54. Generally, Methane is prepared by the following methods :

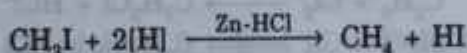
(a) By **decarboxylation** of **Sodium acetate** with **soda lime** ($\text{NaOH} + \text{CaO}$).



(b) By reaction of **Aluminium carbide** with **water**.



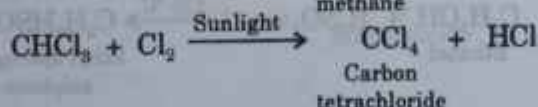
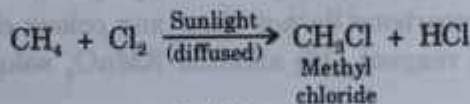
(c) By the **reduction** of **Methyl iodide** or **Iodomethane**.



Methane obtained is **collected over water** as it is **insoluble in water**.

55. Methane is a **colourless, odourless gas** which is **insoluble in water**. Methane is **lighter than air** and it contributes towards **Greenhouse effect**.

56. As Methane is a **saturated hydrocarbon** therefore it undergoes only **substitution reaction**.



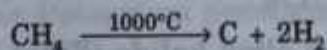
57. Methane burns in **free supply of air** or **oxygen** with **pale blue flame**.



However in **insufficient supply of air** it gives **carbon monoxide** and **water vapour**.



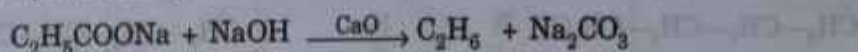
58. Methane **breaks down** into its **elements** when **heated to 1000°C** in the **absence of air** (**Pyrolysis**).



Methane is used :

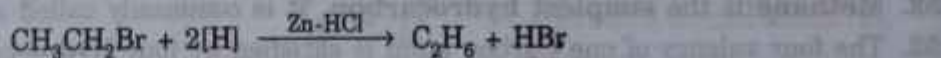
- (i) as a fuel because it has high calorific value.
- (ii) in the preparation of methyl alcohol, formaldehyde and methyl chloride.
- (iii) Methane is a greenhouse gas. Along with carbon dioxide, water vapour, Nitrous oxide etc. Methane also contributes towards global warming. Greenhouse gases greatly affect the temperature of the earth.

59. In laboratory, **Ethane** is prepared by the reaction of **soda lime** with **Sodium propionate**.



It is collected **over water**.

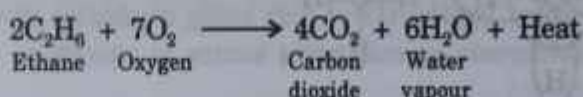
60. Ethane can also be prepared by the **reduction** of **Ethyl bromide** or **Bromoethane**



61. Ethane is a **colourless** and **odourless** gas.

62. Ethane is **slightly heavier** than air and is **insoluble** in **water**.

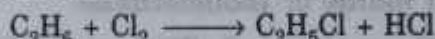
63. Ethane **burns** in **sufficient supply** of air or oxygen to form **carbon dioxide** and **water vapour**.



64. Ethane burns in **insufficient supply** of air or oxygen to form **Carbon monoxide** and **Water vapour**.



65. Ethane is a **saturated hydrocarbon** therefore it undergoes **substitution reaction**.



66. Alkanes or saturated hydrocarbons do not show any colour change with bromine solution in carbon tetrachloride and Baeyer's reagent (1% alkaline KMnO_4 solution).

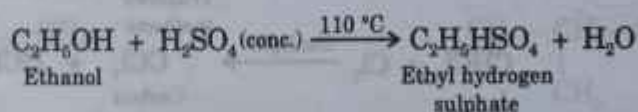
Ethane is used :

(i) as a fuel.

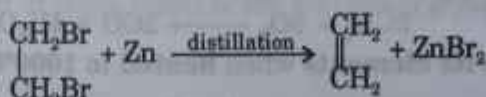
(ii) in the preparation of ethyl bromide, acetaldehyde and acetic acid.

67. Ethene or Ethylene is the first member of alkene series. The formula of Ethene is $\text{CH}_2 = \text{CH}_2$.

68. (i) It is obtained by **dehydration of Ethanol**, i.e., Ethyl alcohol.



(ii) The **dehalogenation** of 1, 2-dibromoethane.

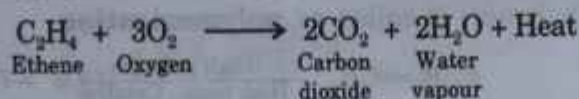


(iii) The **dehydrohalogenation** of alkyl halide (**Ethyl bromide**)



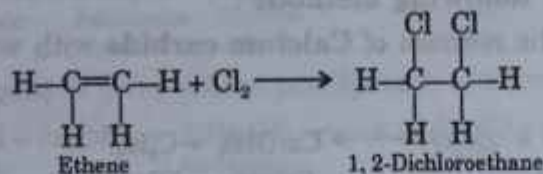
69. It is a **colourless** gas having characteristic smell. It is **insoluble** in **water** and **slightly lighter** than **air**.

70. Ethene burns in **sufficient supply of air or oxygen** with **pale blue flame**.



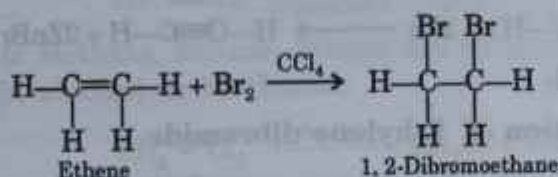
71. As Ethene is an **unsaturated hydrocarbon** therefore it readily undergoes **addition reaction**.

(a) **Addition of Chlorine :**

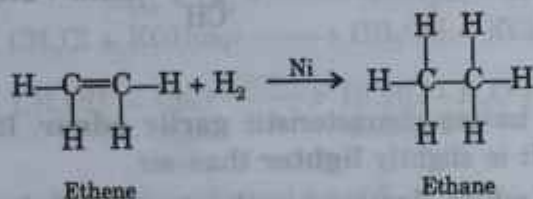


(b) **Addition of Bromine :**

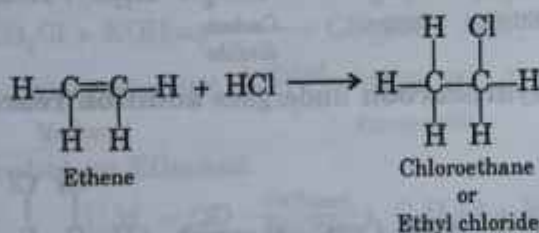
Ethene decolourises **Bromine solution in Carbon tetrachloride**. This reaction detects the **presence of unsaturation** in a given hydrocarbon.



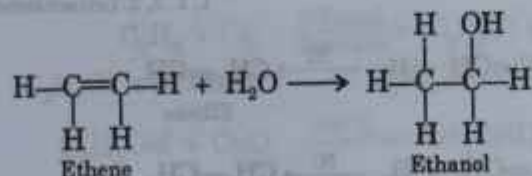
(c) **Catalytic hydrogenation :** Hydrogen is added to **ethene** in the presence of **Nickel** to give **ethane**.



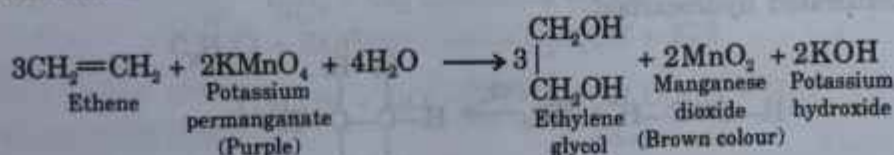
(d) **Addition of HCl :**



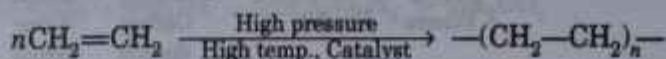
(e) **Addition of water :**



72. Ethene when passed through **alkaline Potassium permanganate solution**, it **decolourises** the **purple colour solution**.



73. Ethene polymerizes to give polythene. The process in which the smaller units (monomer) combine to form a bigger unit (polymer) is called as **polymerization**.

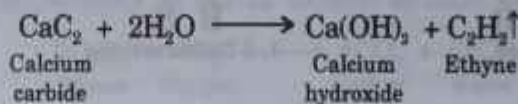


74. Ethene is used for the manufacture of **glycol, acetaldehyde and polyethene**.

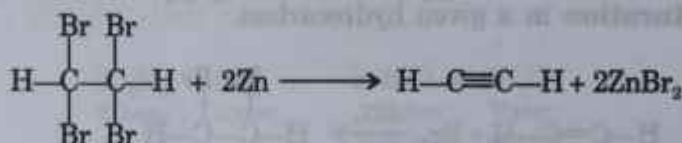
75. Ethyne or Acetylene is the first member of **alkyne** homologous series.

76. Preparation of Acetylene by following methods :

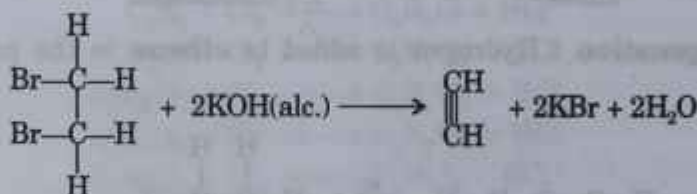
(a) Acetylene is produced by the reaction of **Calcium carbide** with **water**. The gas thus obtained is collected **over water**.



(b) It can also be prepared by the **dehalogenation** of **1, 1, 2, 2-Tetrabromoethane** with **Zinc dust**.

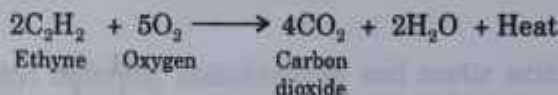


(c) By the **dehydrohalogenation** of **Ethylene dibromide**.



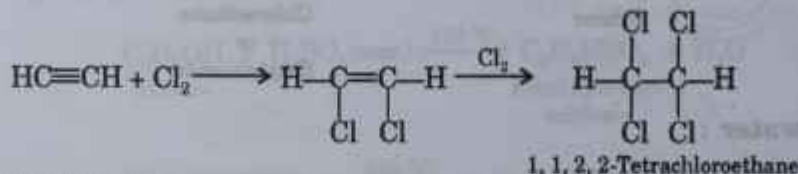
77. Acetylene is a **colourless gas** having characteristic **garlic odour**. It is **insoluble** in **water** but **soluble** in **organic solvents**. It is slightly **lighter** than air.

78. Acetylene burns with **brilliant white flame** when the **supply of air** is in **excess**.

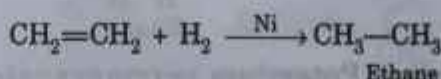
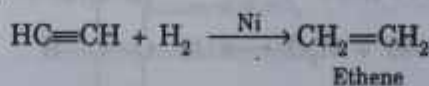


79. Ethyne being **unsaturated hydrocarbon** undergoes **addition reaction**.

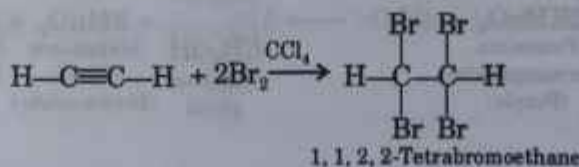
(a) **Addition of Chlorine** :



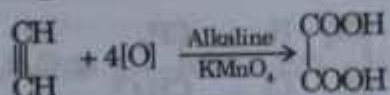
(b) **Addition of Hydrogen** :



(c) **Addition of Bromine** : Ethyne decolorizes Bromine solution in carbon tetrachloride. Showing that it is unsaturated hydrocarbon.

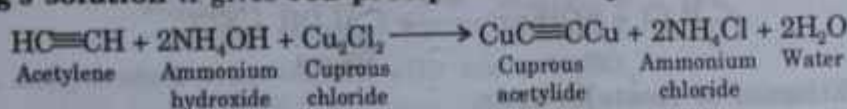


80. Ethyne decolorizes Baeyer's reagent. (1% alkaline KMnO_4 solution)

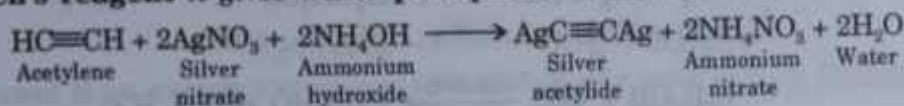


81. Acetylene reacts with Fehling's solution and Tollen's reagent.

(a) With Fehling's solution it gives red precipitate of Cuprous acetylide.



(b) With Tollen's reagent it gives white precipitate of Silver acetylide.



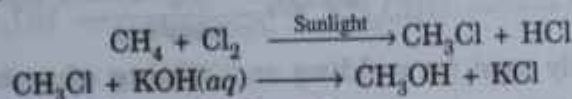
These two reactions distinguish Ethyne from Ethene.

82. Ethyne polymerises to give Benzene.

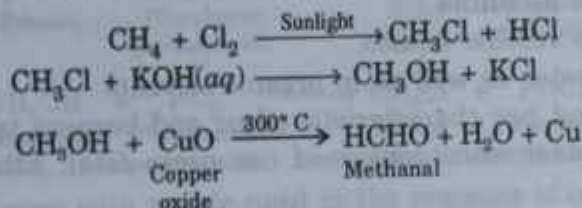


83. Important conversions of Methane, Ethane, Ethene and Ethyne.

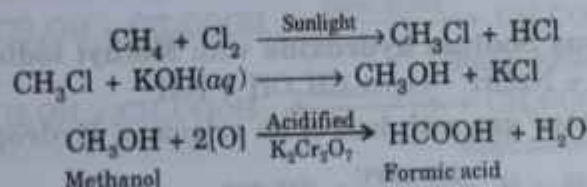
(a) Methane to Methyl alcohol or Methanol.



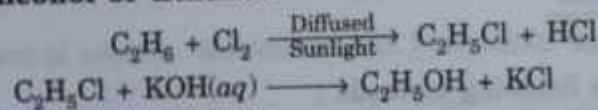
(b) Methane to Formaldehyde or Methanal.



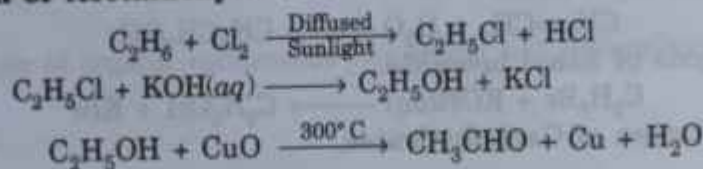
(c) Methane to Methanoic acid or Formic acid.



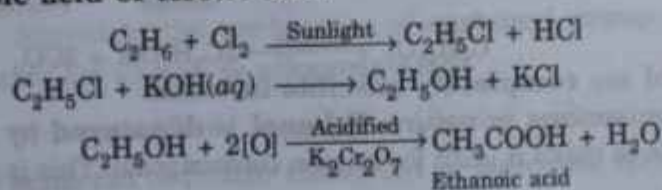
(d) Ethane to Ethyl alcohol or Ethanol.



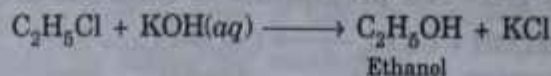
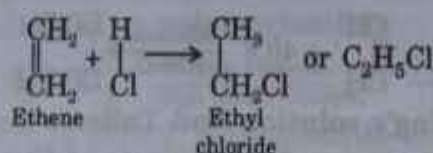
(e) Ethane to Ethanal or Acetaldehyde



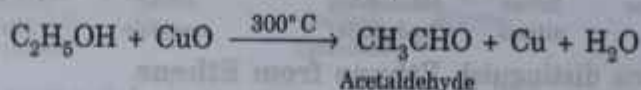
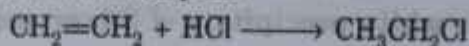
(f) Ethane to Ethanoic acid or Acetic acid.



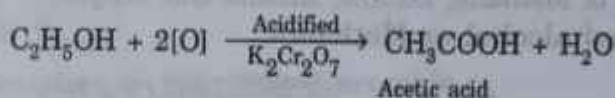
(g) Ethene to Ethanol or Ethyl alcohol.



(h) Ethene to Ethanal or Acetaldehyde.



(i) Ethene to Ethanoic acid or Acetic acid.



84. Oxyacetylene flame is widely used for **welding** and **cutting of metals**. Ethyne is also used for artificial ripening of fruits.

85. (a) **Physical properties of alcohols :**

- (i) They are inflammable volatile liquids.
- (ii) They are soluble in water as well as in organic solvents
- (iii) They are colourless and has characteristic odour and burning taste.
- (iv) They are toxic. Methanol when consumed can prove fatal. Ethanol can damage liver and kidney.

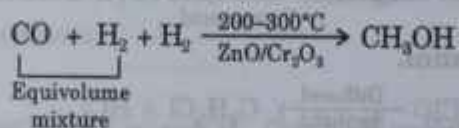
(b) Methyl alcohol or Methanol is commonly called as **wood spirit**.

It is prepared by :

(i) By reaction of **aqueous Sodium hydroxide** with **Methyl iodide**.



(ii) By the reaction of **water gas** with half of its volume of **Hydrogen**.



86. Ethanol is prepared by the following methods :

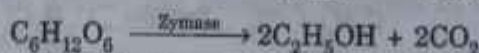
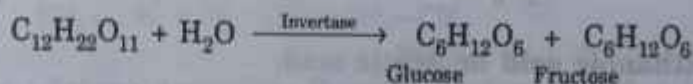
(i) **By the hydration of Ethene.**



(ii) **By the hydrolysis of Ethyl bromide.**



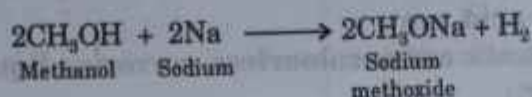
(iii) **By the fermentation of Carbohydrates.**



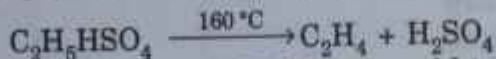
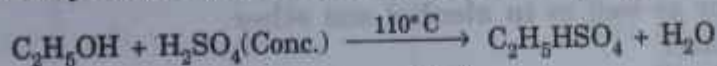
87. Methanol and ethanol are **completely miscible in water**.

Methanol is **highly poisonous** in nature. Ethanol is **denatured** by adding **Methanol**, **Copper sulphate** and **Pyridine** to make it unfit for human consumption. This is called as **Spurious Alcohol** (**Denatured Alcohol**).

88. Both Methanol and Ethanol react with metal Sodium to liberate a colourless gas which burns with a popping sound.



89. (a) Ethanol gets dehydrated when reacted with conc. H_2SO_4 .



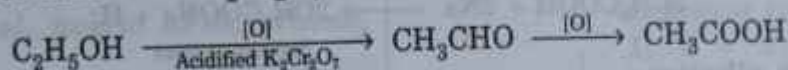
(b) When Ethanol is in excess it combines with Sulphuric acid to form Diethyl ether at 140°C .



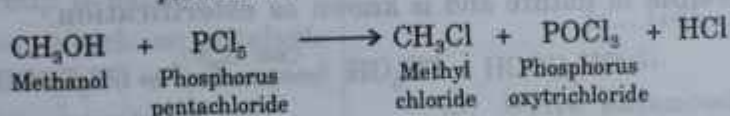
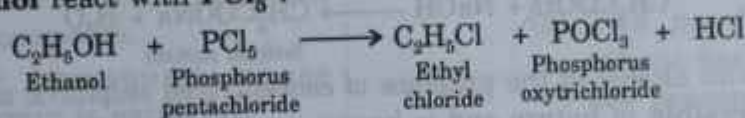
(c) Combustion of ethanol :



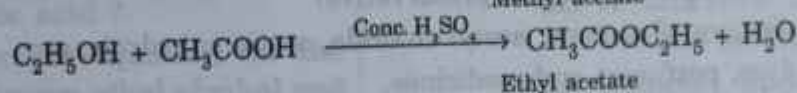
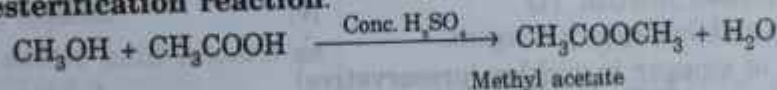
(d) Oxidation of ethanol with $\text{K}_2\text{Cr}_2\text{O}_7$ (preparation of acetic acid from ethanol) :



90. Ethanol and Methanol react with PCl_5 :



91. Methanol and Ethanol react with acetic acid in the presence of conc. H_2SO_4 to form an ester. This reaction is called as esterification reaction.



92. (a) Methyl alcohol is used

- (i) as a solvent
- (ii) in the manufacture of organic compounds like formaldehyde
- (iii) as an antifreeze

(b) Ethyl alcohol is used

- (i) as a drink
- (ii) in the manufacture of organic compounds like acetic acid, chloroform, etc.
- (iii) as a solvent.

93. Carboxylic acids are acidic compounds having one or more carboxylic group $\text{—}\overset{\text{O}}{\parallel}\text{C—OH}$.

94. The name carboxyl is derived by the combination of carbonyl group and the hydroxyl group.

95. In IUPAC carboxylic acids are named as alkanonic acid.



96. Aliphatic carboxylic acids can be further classified as mono, di, tri carboxylic acids depending upon the number of carboxylic acid groups present in their respective molecules.

97. Acetic acid or ethanoic acid is an **aliphatic monocarboxylic acid**.
98. It is the main constituent of **vinegar**.
99. Physical properties of acetic acid are :
- At ordinary temperature, acetic acid is **colourless, corrosive liquid with sharp penetrating (pungent irritating) odour**.
 - It has **sour taste**.
 - Below 16.5°C , it **solidifies into a glassy mass or ice like crystals** and hence called as **glacial acetic acid**.
 - It is **soluble in water** as well as in **alcohol and ether**.
 - It is **heavier than water**.

100. The chemical properties of carboxylic acid due to $\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{OH} \end{array}$ in their molecules.

(i) Acidic nature :



Being acidic in nature acetic acid turns blue litmus red.

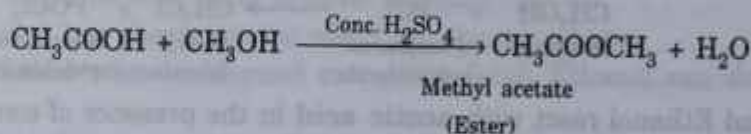
(ii) Reaction with metals :



(iii) Reaction with alkalis :



(iv) When heated with alcohol in the presence of concentrated sulphuric acid it forms an **ester**. The reaction is **reversible** in nature and is known as **esterification**.



101. Acetic acid is used

- as a solvent and laboratory reagent.
- in the form of vinegar in pickles (preservative)
- in the manufacture of acetone, acetyl chloride, acetic anhydride, etc.
- for making dyes, perfumes and medicines.

PREVIOUS YEARS' QUESTIONS

2012

Q1. State one observation for the following:

Bromine vapours are passed into a solution of ethyne in carbon tetrachloride.

[1]

Ans. Reddish brown coloured Bromine gets decolorized.

Q2. Some word/words are missing in the following statements. You are required to rewrite the statements in the correct form using the appropriate word/words :

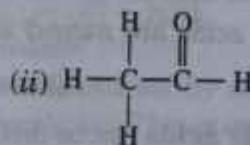
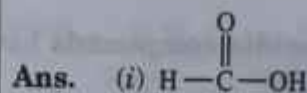
Ethyl alcohol is dehydrated by sulphuric acid at a temperature of about 170°C . [1]

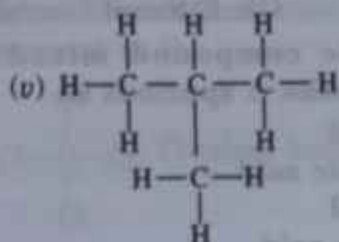
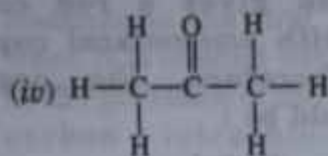
Ans. Ethyl alcohol is dehydrated by concentrated sulphuric acid at a temperature of about 170°C .

Q3. Give the structural formula for the following :

- Methanoic acid
- Ethanal
- Ethyne
- Acetone
- 2-methyl propane.

[5]





Q4. From the following organic compounds given below, choose one compound in each case which relates to the description [i] to [iv] :

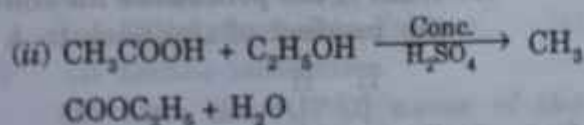
[Ethyne, ethanol, acetic acid, ethene, methane]

- (a) (i) An unsaturated hydrocarbon used for welding purposes.
 (ii) An organic compound whose functional group is carboxyl.
 (iii) A hydrocarbon which on catalytic hydrogenation gives a saturated hydrocarbon.
 (iv) An organic compound used as a thermometric liquid. [4]

- (b) (i) Why is pure acetic acid known as glacial acetic acid?
 (ii) Give a chemical equation for the reaction between ethyl alcohol and acetic acid. [2]

Ans.(a) (i) Ethyne/Ethene
 (ii) Acetic acid
 (iii) Ethene/Ethyne
 (iv) Ethanol

- (b) (i) On cooling forms crystalline mass resembling ice.



2011

Q1. (a) Choose the correct word/phrase from within the brackets to complete the following sentences:

(i) The catalyst used for conversion of ethene to ethane is commonly.....(nickel/iron/cobalt).

(ii) When acetaldehyde is oxidized with acidified potassium dichromate, it forms....(ester/ethanol/acetic acid).

(iii) Ethanoic acid reacts with ethanol in presence of concentrated H_2SO_4 , so as to form a compound and water. The chemical reaction which takes place is called...

(dehydration/hydrogenation/esterification).

(iv) Write the equation for the reaction taking place between 1, 2 - dibromoethane and alcoholic potassium hydroxide.

(v) The product formed when ethene gas reacts with water in the presence of sulphuric acid is....(ethanol/ethanal/ethanoic acid). [5]

(b) Write balanced chemical equations for the following:

(i) Monochloro ethane is hydrolysed with aqueous KOH.

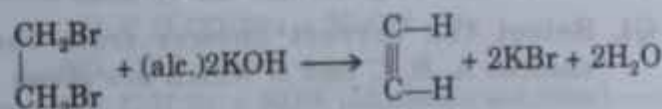
(ii) A mixture of sodalime and sodium acetate is heated.

(iii) Ethanol under high pressure and low temperature is treated with acidified potassium dichromate.

(iv) Water is added to calcium carbide.

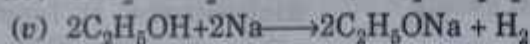
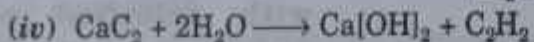
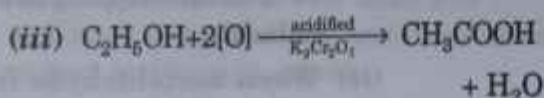
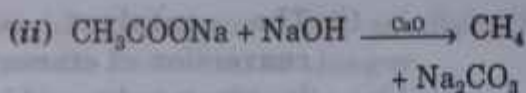
(v) Ethanol reacts with sodium at room temperature. [5]

Ans. (a) (i) Nickel (ii) Acetic acid
 (iii) Esterification
 (iv)



(v) Ethanol

(b) (i) $\text{C}_2\text{H}_5\text{Cl} + (\text{aq.}) \text{KOH} \longrightarrow \text{C}_2\text{H}_5\text{OH} + \text{KCl}$



Q2. (a) Give reasons as to why

(i) almost 90% of all known compounds are organic in nature.

(ii) it is dangerous to burn methane in an insufficient supply of air. [2]

(b) Choose the correct answer from the options given below :

(i) The functional group present in acetic acid is :

- (A) Ketonic $>\text{C}=\text{O}$
 (B) Hydroxyl - OH
 (C) Aldehydic - CHO
 (D) Carboxyl - COOH

(ii) The unsaturated hydrocarbons undergo :

- (A) a substitution reaction
 (B) an oxidation reaction
 (C) an addition reaction
 (D) none of the above

(iii) The number of C-H bonds in ethane molecule are :

- (A) Four (B) Six
 (C) Eight (D) Ten [3]

Ans. (a) (i) Organic compounds contain carbon atom which is tetravalent and has the unique property of catenation, isomerism and presence of multiple bonds.

(ii) On burning methane in insufficient supply of air, it will produce carbon monoxide which is highly poisonous.

(b) (i) D (ii) C (iii) B

2010

Q1. Select the correct answer from the choices A, B, C and D which are given [2]

Write only the letter corresponding to the correct answer.

(i) An organic compound undergoes addition reactions and gives a red colour precipitate with ammoniacal cuprous chloride. Therefore, the organic compound could be :

- (A) Ethane (B) Ethene
 (C) Ethyne (D) Ethanol

(ii) The organic compound mixed with ethanol to make it spurious is:

- (A) Methanol
 (B) Methanoic acid
 (C) Methanal
 (D) Ethanoic acid [2]

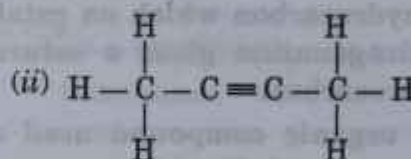
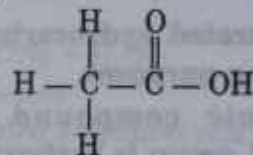
Ans. (i) C, (ii) A

Q2. Draw the structural formula for each of the following :

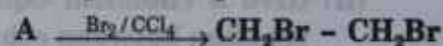
(i) Ethanoic acid

(ii) But-2-yne [2]

Ans. (i)



Q3. Compound A is bubbled through bromine dissolved in carbon tetrachloride and the product is $\text{CH}_2\text{Br}-\text{CH}_2\text{Br}$.



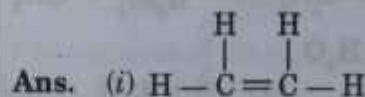
(i) Draw the structural formula of A.

(ii) What type of reaction has A undergone ?

(iii) What is your observation ?

(iv) Name (not formula) the compound formed when steam reacts with A in the presence of phosphoric acid.

(v) What is the procedure for converting the product of (iv) back to A ? [5]



(ii) Addition reaction

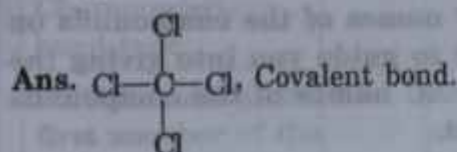
(iii) Reddish brown bromine solution decolorizes

(iv) Ethanol

(v) Dehydration of ethanol by conc. H_2SO_4

2009

Q1. Methane is the first member of alkane, when it is treated with excess of chlorine in the presence of diffused sunlight forms carbon tetrachloride. Draw the appropriate structural formula of carbon tetrachloride and state the type of bond present in it. [2]



Q2. Fill in the blanks with the correct words from the brackets.

Generally ionic compounds exist in (i) _____ (solid / liquid / gas) state. Melting and boiling points of covalent compounds are generally (ii) _____ (low / high). The general formula for alkane is (iii) _____ (C_nH_{2n} / $\text{C}_n\text{H}_{2n-2}$ / $\text{C}_n\text{H}_{2n+2}$). For alkynes the general formula is (iv) _____ (C_nH_{2n} / $\text{C}_n\text{H}_{2n-2}$ / $\text{C}_n\text{H}_{2n+2}$). [4]

Ans. (i) solid (ii) low
(iii) $\text{C}_n\text{H}_{2n+2}$ (iv) $\text{C}_n\text{H}_{2n-2}$

Q3. (a) Give chemical equation for

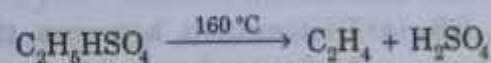
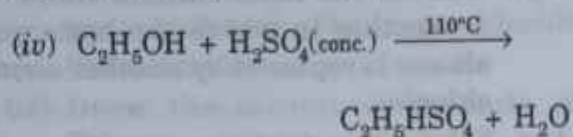
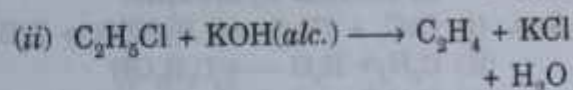
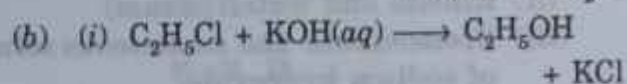
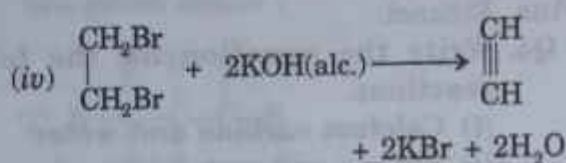
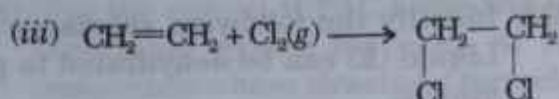
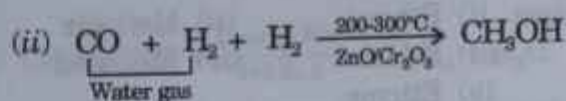
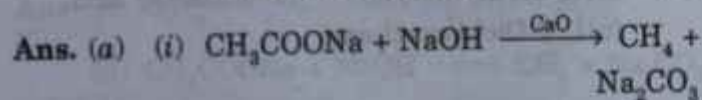
- The laboratory preparation of methane from sodium acetate.
- The industrial preparation of methanol from water gas.
- The reaction of one mole of ethene with one mole of chlorine gas.
- The preparation of ethyne from 1, 2-dibromoethane. [4]

(b) State how the following conversions can be carried out.

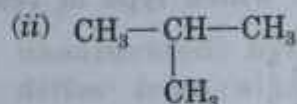
- Ethyl chloride to Ethyl alcohol
- Ethyl chloride to Ethene
- Ethene to Ethyl alcohol
- Ethyl alcohol to Ethene [4]

(c) (i) Define isomerism.

(ii) Give the IUPAC name of the isomer C_4H_{10} which has a branched chain. [2]



(c) (i) The compounds having the same molecular formula but different structural formula are called as isomers and the phenomenon is called as isomerism.



2-Methylpropane

2008

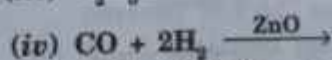
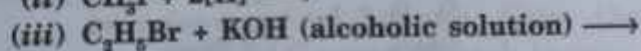
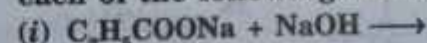
Q1. Select the correct answer from the choices A, B, C, D which are given :

The formation of 1, 2-dibromoethane from ethene and bromine is an example of [1]

- A : Substitution
B : Dehydration
C : Dehydrohalogenation
D : Addition

Ans. D or Addition.

Q2. Name the organic compound prepared by each of the following reactions : [5]



- Ans. (i) Ethane (ii) Methane
(iii) Ethene (iv) Methanol
(v) Ethyne

Q3. Identify the following substance : [1]
Liquid (E) can be dehydrated to produce ethene.

Ans. Ethanol.

Q4. Write the equation for the following reactions. [3]

- (i) Calcium carbide and water
(ii) Ethene and water (steam)
(iii) Bromoethane and an aqueous solution of sodium hydroxide.

- Ans. (i) $\text{CaC}_2 + 2\text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{C}_2\text{H}_2$
(ii) $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \longrightarrow \text{C}_2\text{H}_5\text{OH}$
(iii) $\text{C}_2\text{H}_5\text{Br} + \text{NaOH} \longrightarrow \text{C}_2\text{H}_5\text{OH} + \text{NaBr}$

Q5. What is the term defined below ? [1]

A reaction in which the hydrogen of an alkane is replaced by another element like chlorine.

Ans. Substitution reaction.

Q6. (a) Distinguish between the saturated hydrocarbon ethane and the unsaturated hydrocarbon ethene by drawing their structural formulae. [2]

(b) Addition reactions and substitution reactions are types of organic reactions. Which type of reaction is shown by :

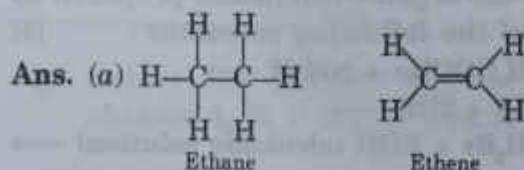
- (i) Ethane ?
(ii) Ethene ?

(c) (i) Write equation for the complete combustion of ethane.

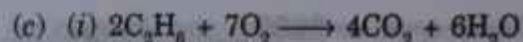
(ii) Using appropriate catalysts, ethane can be oxidized to an alcohol, an aldehyde and an acid. Name the alcohol, aldehyde and acid formed when ethane is oxidized. [4]

(d) (i) Why pure acetic acid is known as glacial acetic acid ?

(ii) What type of compound is formed by the reaction between acetic acid and an alcohol ? [2]



- (b) (i) Substitution reaction
(ii) Addition reaction.



(ii) Ethanol, Ethanal and Ethanoic acid

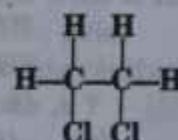
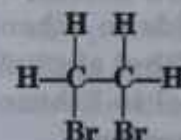
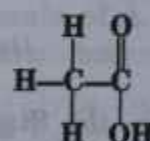
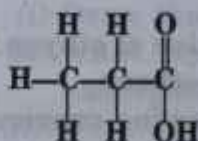
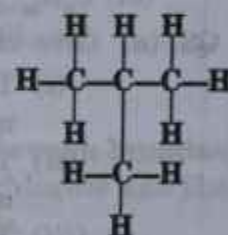
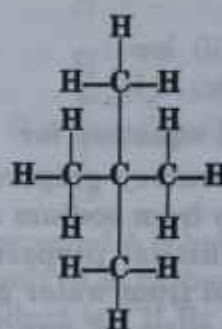
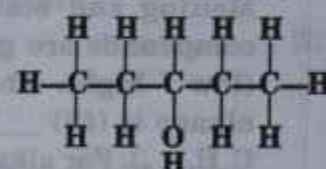
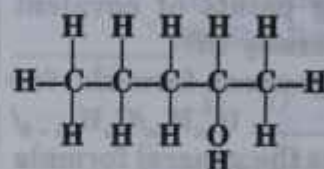
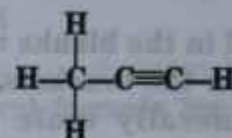
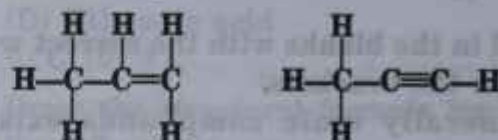
(d) (i) It solidifies to give ice like crystals.

(ii) Ester.

2007

Q1. Give the IUPAC names of the following compounds numbered (i) to (v).

The IUPAC names of the compounds on the left are to guide you into giving the correct IUPAC names of the compounds on the right.



- Ans. (i) Propyne (ii) Pentan-3-ol
(iii) 2-Methylpropane (iv) Ethanoic acid
(v) 1, 2-Dichloroethane

Q2. Copy and complete the following table which relates to three homologous series of hydrocarbons : [10]

General Formula	C_nH_{2n}	C_nH_{2n-2}	C_nH_{2n+2}
IUPAC name of the homologous series			
Characteristic bond type			Single bond
IUPAC name of the first member of the series			
Type of reaction with chlorine.		Addition	

Ans.

General Formula	C_nH_{2n}	C_nH_{2n-2}	C_nH_{2n+2}
IUPAC name of the homologous series	Alkene	Alkyne	Alkane
Characteristic bond type	Double bond	Triple bond	Single bond
IUPAC name of the first member of the series	Ethene	Ethyne	Methane
Type of reaction with chlorine	Addition	Addition	Substitution

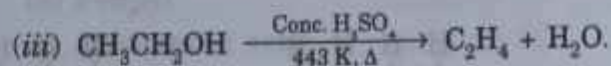
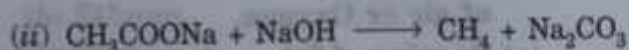
Q3. Name the type of chemical reaction by which C_2Br_6 can be prepared from ethane. [1]

Ans. Substitution reaction.

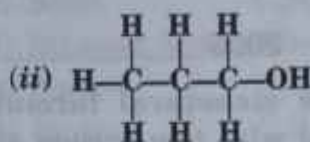
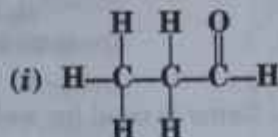
2006

Q1. Write balanced chemical equations for the following reactions :

- Ethane and oxygen in the presence of molybdenum oxide.
- Preparation of methane from anhydrous sodium ethanoate (Sodium acetate).
- Heating ethanol at 443 K (170°C) in the presence of concentrated sulphuric acid. [3]



Q2. (a) Give the correct IUPAC name and the functional group for each of the compounds whose structural formulae are given below : [3]



(b)(i) Write the equation for the preparation of carbon tetrachloride from Methane.

(ii) Draw the structural formula of Ethyne.

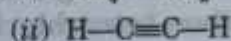
(iii) How is the structure of alkynes different from that of alkenes ? [3]

(c) Fill in the blanks with the correct words from the brackets :

- Alkenes are the (i) _____ (analogous/homologous) series of (ii) _____ (saturated/unsaturated) hydrocarbons. They differ from alkanes due to the presence of (iii) _____ (double/single) bonds. Alkenes mainly undergo (iv) _____ (addition/substitution) reactions. [4]

Ans. (a) (i) Propanal, Functional group - aldehyde.

(ii) Propanol, Functional group - alcohol.



(iii) Alkynes contain triple bond and alkenes have double bond.

(c) (i) homologous

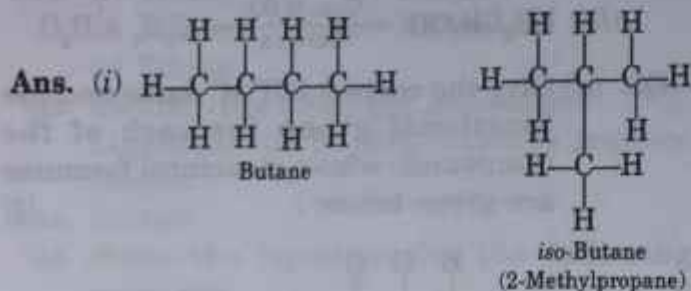
(ii) unsaturated

(iii) double

(iv) addition.

Q3. (i) Draw the structural formulae of the two isomers of butane. Give the correct IUPAC name of each isomer.

(ii) State one use of acetylene. [3]



(ii) Oxyacetylene flame is used for welding and cutting of metals.

2005

Q1. (a) Draw the structural formula of a compound with two carbon atoms in each of the following cases :

- An alkane with a carbon to carbon single bond.
- An alcohol containing two carbon atoms.
- An unsaturated hydrocarbon with a carbon to carbon triple bond. [3]

(b)

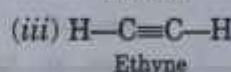
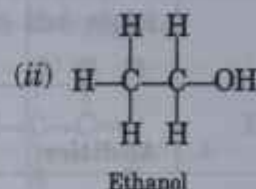
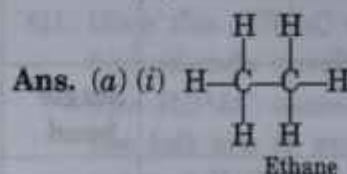
Ethane, Ethene, Ethanoic acid, Ethyne, Ethanol

From the box given above, name :

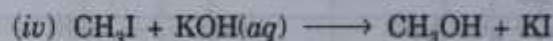
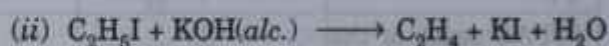
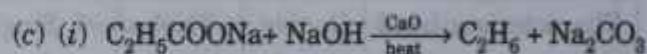
- The compound with $-OH$ as the part of its structure.
- The compound with $-COOH$ as the part of its structure.
- Homologue of homologous series with general formula C_nH_{2n} . [3]

(c) Write the equations for the following laboratory preparations :

- Ethane from sodium propionate
- Ethene from iodoethane
- Ethyne from calcium carbide
- Methanol from iodomethane [4]



- Ethanol
- Ethanoic acid
- Ethene.



Q2. Define catenation. [1]

Ans. The unique property on the part of carbon atom to link with each other so as to form long chain or ring structure is called as catenation.

IMPORTANT QUESTIONS

Q1. What will you observe when

- Ethene is passed through Bromine solution in Carbon tetrachloride ?
- Ethyne is passed through Fehling's solution ?
- Ethyne is passed through Tollen's reagent ?
- Sodium is dropped in Methanol ?
- Ethene is passed through alkaline Potassium permanganate solution ?

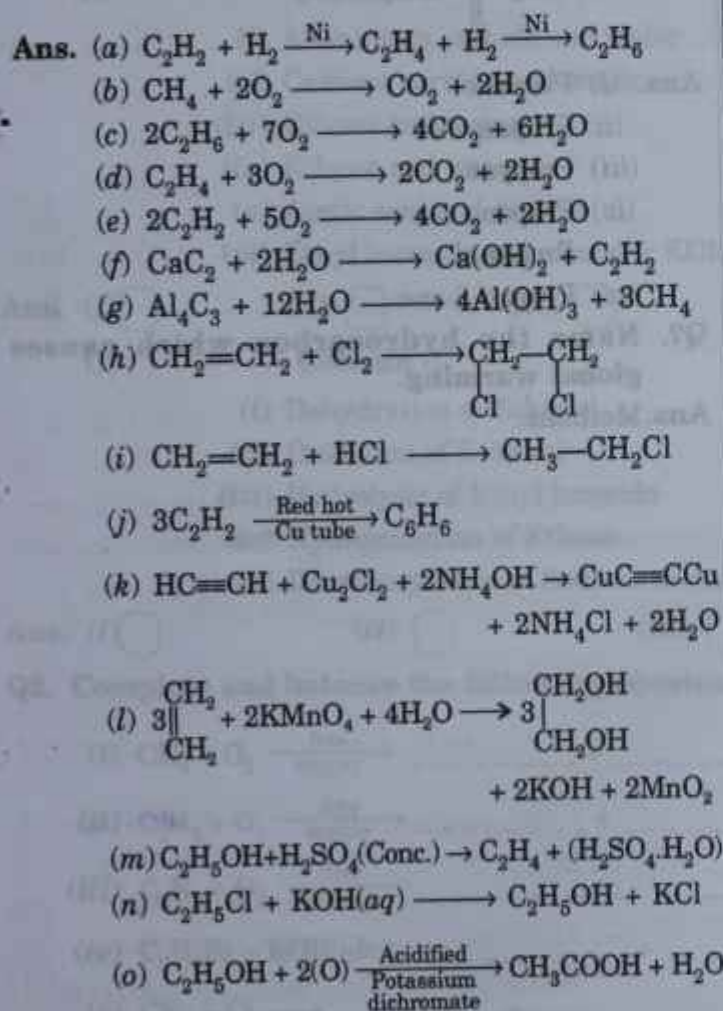
Ans. (a) Ethene decolourises Bromine solution.
(b) A red precipitate is formed.
(c) A white precipitate is formed.

- A colourless, odourless gas which burns with popping sound.
- The purple colour of Potassium permanganate gets decolourised.

Q2. Write balanced chemical equations :

- Addition of Hydrogen to Ethyne.
- Burning of Methane in sufficient supply of air.
- Burning of Ethane in sufficient supply of air.
- Burning of Ethene in sufficient supply of air or Oxygen.
- Burning of Ethyne in sufficient supply of air or Oxygen.

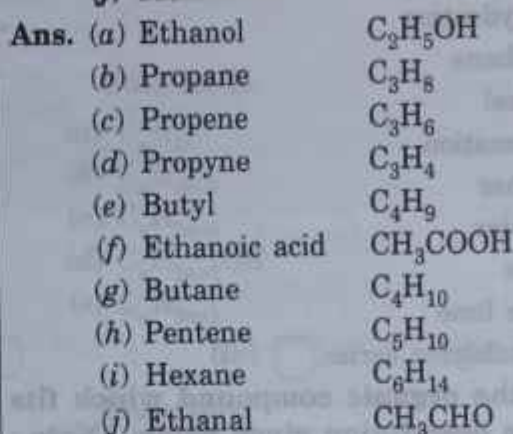
- (f) Calcium carbide is reacted with water.
 (g) Aluminium carbide is hydrolysed.
 (h) Chlorine is added to Ethene.
 (i) Hydrogen chloride is reacted with Ethene.
 (j) Acetylene is passed through red hot Copper tube.
 (k) Ethyne is passed through Fehling's solution.
 (l) Ethene is passed through alkaline Potassium permanganate solution.
 (m) Ethyl alcohol is dehydrated.
 (n) Ethyl chloride reacts with aqueous Potassium hydroxide.
 (o) Ethanol is oxidised with acidified Potassium dichromate.



Q3. Give the formula of the next higher homologue of :

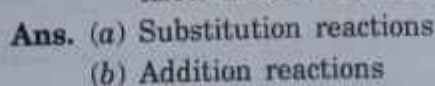
- (a) Methanol
 (b) Ethane
 (c) Ethene
 (d) Ethyne

- (e) Propyl
 (f) Methanoic acid
 (g) Propane
 (h) Butene
 (i) Pentane
 (j) Methanal



Q4. Name the following :

- (a) The type of reactions alkanes undergo.
 (b) The type of reactions alkenes undergo.
 (c) A simplest hydrocarbon.
 (d) The gas commonly called as marsh gas.
 (e) The solution which detects the presence of unsaturation in the given hydrocarbon.
 (f) The flame used for the welding and cutting of metals.
 (g) Process by which Ethene is obtained from Ethanol.
 (h) The hydrocarbon which contributes towards greenhouse effect.
 (i) The catalyst used during hydrogenation of alkene.
 (j) The property of Carbon by which it can link to each other in the form of long chain or ring structure.
 (k) The compounds having same molecular formula but different structural formula.
 (l) The chemist who prepared Urea.
 (m) First organic compound synthesized.
 (n) Mixture of Sodium hydroxide and Calcium oxide.
 (o) The series in which members are arranged in the increasing order of their molecular masses.



- (c) Methane
- (d) Methane
- (e) Bromine water in Carbon tetrachloride or Alkaline Potassium permanganate solution.
- (f) Oxyacetylene flame
- (g) Dehydration
- (h) Methane
- (i) Nickel
- (j) Catenation
- (k) Isomer
- (l) Wohler
- (m) Urea
- (n) Soda lime
- (o) Homologous series.

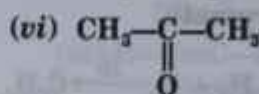
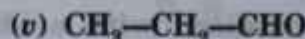
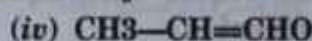
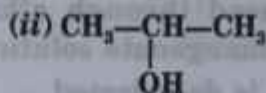
Q5. Name the organic compound which fits into the description given below. (Note : the name of the organic compound should not be repeated)

- (i) This gas contributes towards greenhouse effect.
- (ii) This gas does not decolorize bromine solution in carbon tetra chloride.
- (iii) This gas when mixed with oxygen produces a flame used for welding and cutting of metals.
- (iv) This gas decolorizes bromine solution in carbon tetra chloride.

(v) This liquid is major component of vinegar.

- Ans.** (i) Methane
(ii) Ethane
(iii) Ethyne
(iv) Ethene
(v) Acetic acid.

Q6. Give IUPAC names of the following :



- Ans.** (i) Propanol
(ii) Propan-2-ol
(iii) Propyne
(iv) Propene
(v) Propanal
(vi) Propan-2-one

Q7. Name the hydrocarbon which causes global warming.

Ans. Methane.

Let's Recall

Fill Your Answer in the Space Given for Each Question.

Q1. Match the following :

A. Column -I

- (i) Alkane
 (ii) Alkene
 (iii) Alkyne
 (iv) Alkyl
 (v) Alkanol

Column-II

- (a) C_nH_{2n}
 (b) C_nH_{2n-2}
 (c) C_nH_{2n+2}
 (d) $C_nH_{2n+1}OH$
 (e) C_nH_{2n+1}

Ans. (i) (ii) (iii) (iv) (v)

B. Column -I

- (i) Aluminium carbide and water
 (ii) Calcium carbide and water
 (iii) Ethene and water
 (iv) Ethyne and water
 (v) Acetic acid and alcohol
 (vi) Ethyl bromide and alcoholic KOH

Column-II

- (a) Ethyne
 (b) Ethanol
 (c) Ethanal
 (d) Ethene
 (e) Methane
 (f) Ester

Ans. (i) (ii) (iii) (iv) (v) (vi)

C. Column -I

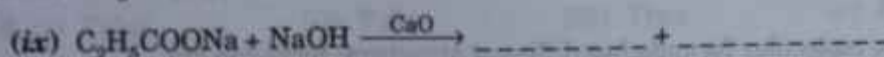
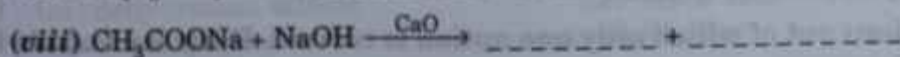
- (i) Dehydration of Ethanol
 (ii) Oxidation of Ethanal
 (iii) Hydrolysis of Ethyl bromide
 (iv) Hydrogenation of Ethene
 (v) Decarboxylation of Sodium acetate

Column-II

- (a) Methane
 (b) Ethane
 (c) Ethene
 (d) Ethanoic acid
 (e) Ethanol

Ans. (i) (ii) (iii) (iv) (v)

Q2. Complete and balance the following equations :

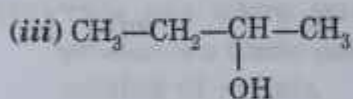
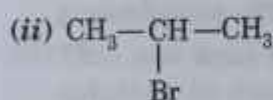




Q3. Complete the following table.

Name of reagent	Colour Change (If any) in		
	Ethane	Ethene	Ethyne
(i) Baeyer's reagent	-----	-----	-----
(ii) Fehling's solution	-----	-----	-----
(iii) Tollen's reagent	-----	-----	-----
(iv) Bromine solution in carbon tetrachloride	-----	-----	-----

Q4. Give the IUPAC names to the following compounds.



Q5. Fill in the blanks.

- (i) Alkanes are ----- hydrocarbons having general formula ----- and undergo ----- reactions.
- (ii) Alkenes are ----- hydrocarbons having general formula ----- and undergo ----- reactions.
- (iii) Ethanol on ----- with concentrated sulphuric acid gives -----
- (iv) The main constituent of vinegar is -----
- (v) Tollen's reagent is chemically -----
- (vi) ----- is a branched chain isomer of butane.
- (vii) But-1-ene and But-2-ene are the examples of ----- isomers.

Q6. State whether the following statements are True or False.

- (i) Ester is a compound formed by two carboxylic acids.
- (ii) Ethanol on dehydrogenation yield ethene.
- (iii) The major product of dehydrohalogenation of ethyl bromide is ethene.
- (iv) The addition product of ethene and water is ethanal.
- (v) The catalyst used during hydrogenation is nickel.

Q7. Each question has four options out of which only one option is correct. Dark the bubble for correct answer.

- (i) The compounds having same molecular formula but different structural formulae are
 (a) Isotopes (b) Isobars

(c) Monomers

(d) Isomers.

Ans. (a) (b) (c) (d)

(ii) In an organic compound, the group that maintains its identity in a chemical reaction is

(a) alkyl group

(b) functional group

(c) Both of these

(d) None of these.

Ans. (a) (b) (c) (d)

(iii) For deriving the formula of the first member of carboxylic acid the value of n (number of carbon atoms) is taken as

(a) 2

(b) 1

(c) 0

(d) 4

Ans. (a) (b) (c) (d)

(iv) The final oxidation product of an primary alcohol is

(a) aldehyde

(b) ketone

(c) carboxylic acid

(d) None of these.

Ans. (a) (b) (c) (d)

(v) Alkanes are commonly called as

(a) olefins

(b) paraffins

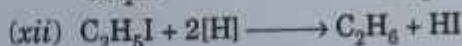
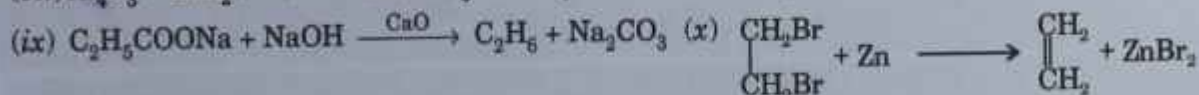
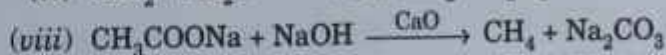
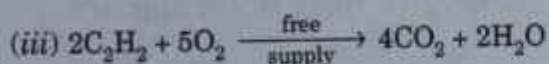
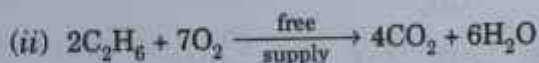
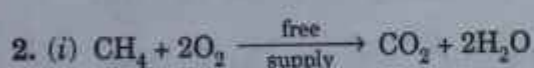
(c) esters

(d) None of these.

Ans. (a) (b) (c) (d)

ANSWERS

1. A(i) c (ii) a (iii) b (iv) e (v) d
 B(i) e (ii) a (iii) b (iv) c (v) f (vi) d
 C(i) c (ii) d (iii) e (iv) b (v) a



3. (i) no, decolourizes, decolourizes

(ii) no, no, red ppt.

(iii) no, no, white ppt.

(iv) no, decolourizes, decolourizes

4. (i) pentane (ii) 2-bromopropane (iii) butan-2-ol (iv) propene (v) propyne

5. (i) saturated, $\text{C}_n\text{H}_{2n+2}$, substitution (ii) unsaturated, C_nH_{2n} , addition

(iii) dehydration, ethene

(iv) acetic acid

(v) ammoniacal silver nitrate solution.

(vi) 2-methyl propane

(vii) Position

6. (i) False

(ii) False

(iii) True

(iv) False

(v) True

7. (i) d

(ii) a

(iii) c

(iv) c

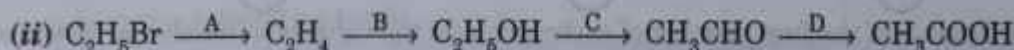
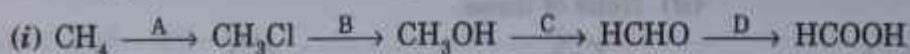
(v) b

SELF EVALUATION Test

Time : 30 Minutes

Marks : 25

Q1. Write only balanced chemical equations for the following conversions :



Q2. Give the structural formulae for the two isomers of Butane along with their IUPAC names.

Q3. How does the reaction of Ethene differ from that of Ethane and why?

Q4. What do you observe when

(i) Ethene is passed through Baeyer's reagent?

(ii) Ethyne is passed through Tollen's reagent?

(iii) Ethyne is passed through Fehling's solution?

(iv) Ethene is passed through Bromine solution in Carbon tetrachloride?

Q5. How will you convert Ethene to

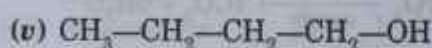
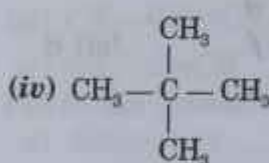
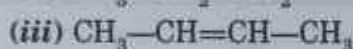
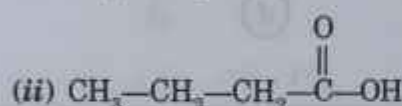
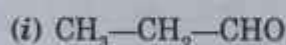
(i) Ethyl chloride?

(ii) Ethanol?

(iii) Ethanal?

(iv) Ethanoic acid?

Q6. Give the IUPAC names of the following compounds.



ANSWERS