

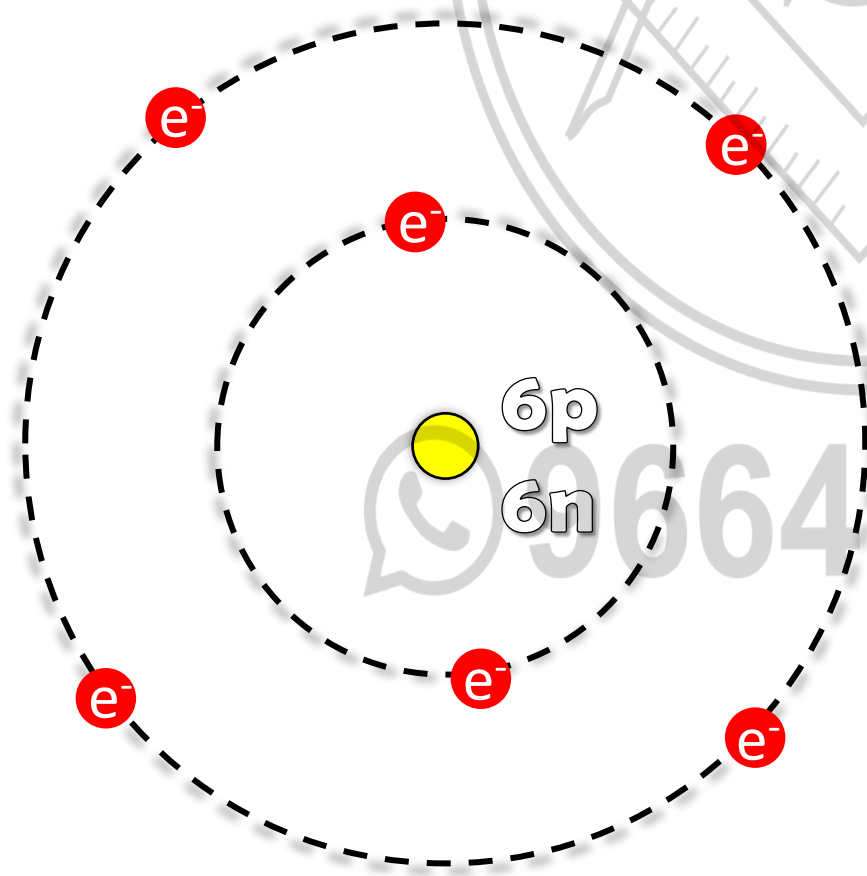
Chapter 9

CARBON

COMPOUNDS

- By Sai Sir

C A R B O N → **C**



Atomic Number (Z) = 6

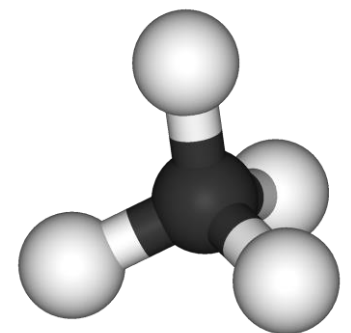
Atomic Mass (A) = 12

Electronic Configuration = (2,4)

Valency = 4

Group = 14

Period = 2

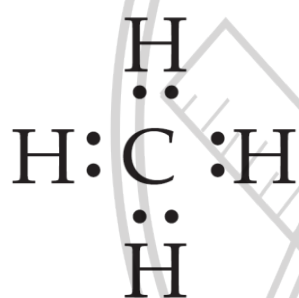


1. Match the pairs.

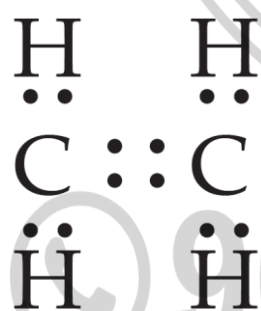
Group 'A'	Group 'B'
C_2H_6	Saturated hydrocarbon
C_2H_2	Triple bond
CH_4O	Molecular formula of an alcohol
C_3H_6	Unsaturated hydrocarbon

2. Draw an electron dot structure of the following molecules. (Without showing the circles)

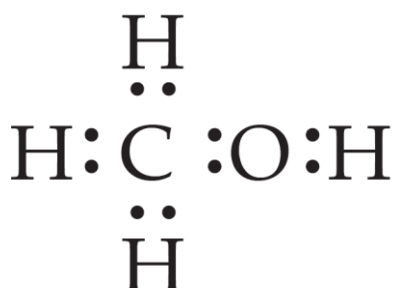
a. Methane - molecular formula - CH_4



b. Ethane - molecular formula - C_2H_4



c. Methanol - molecular formula - CH_3OH

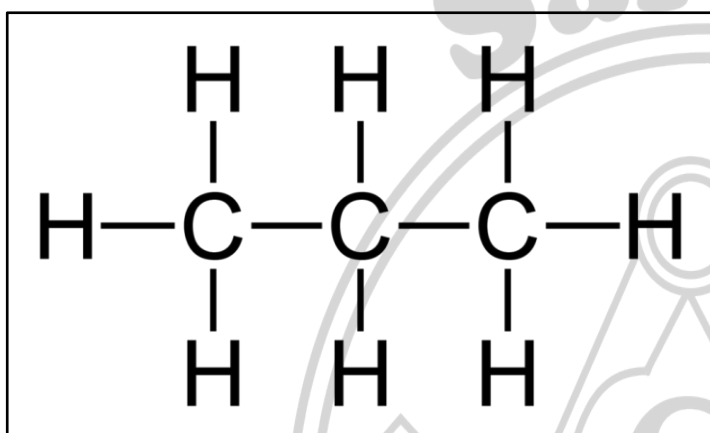


d. Water - molecular formula - H_2O

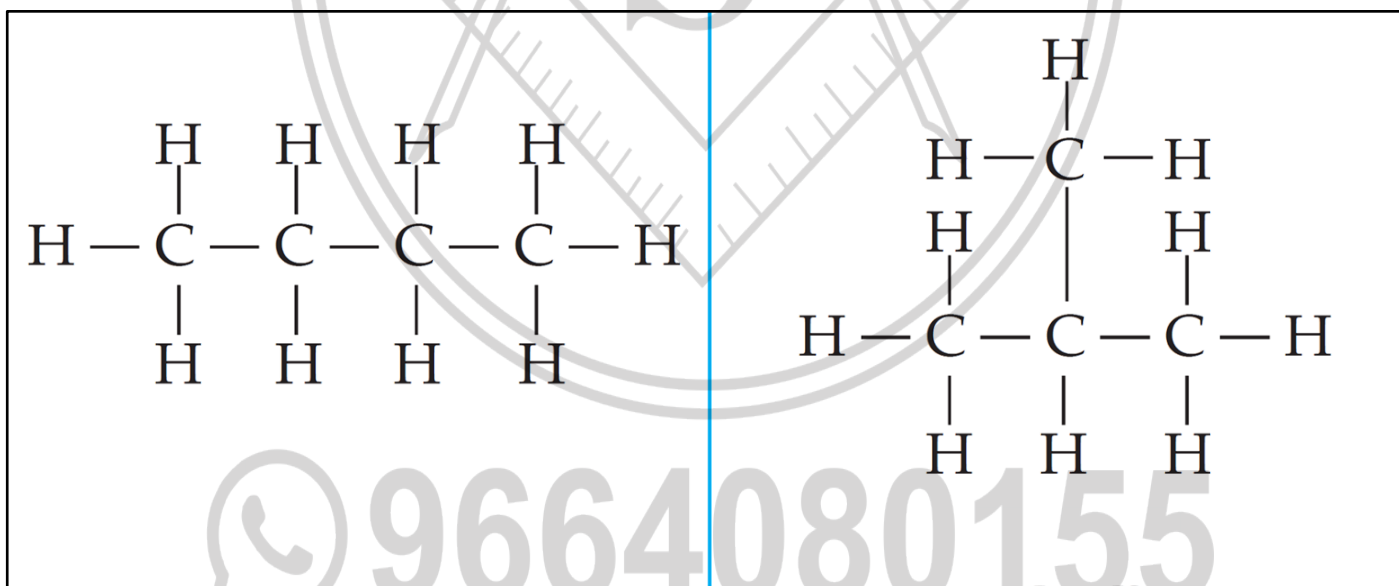


3. Draw all possible structural formulae of compounds from their molecular formula given below.

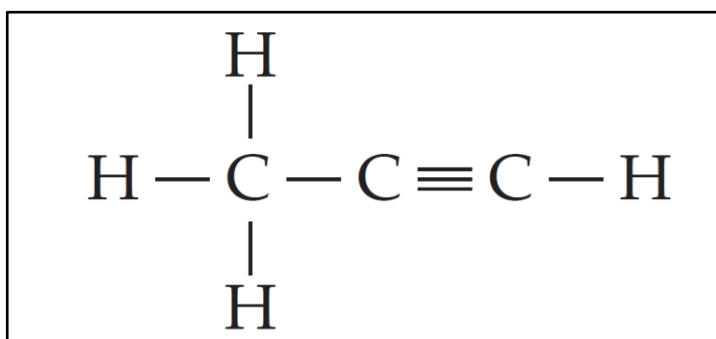
a. C_3H_8



b. C_4H_{10}



c. C_3H_4

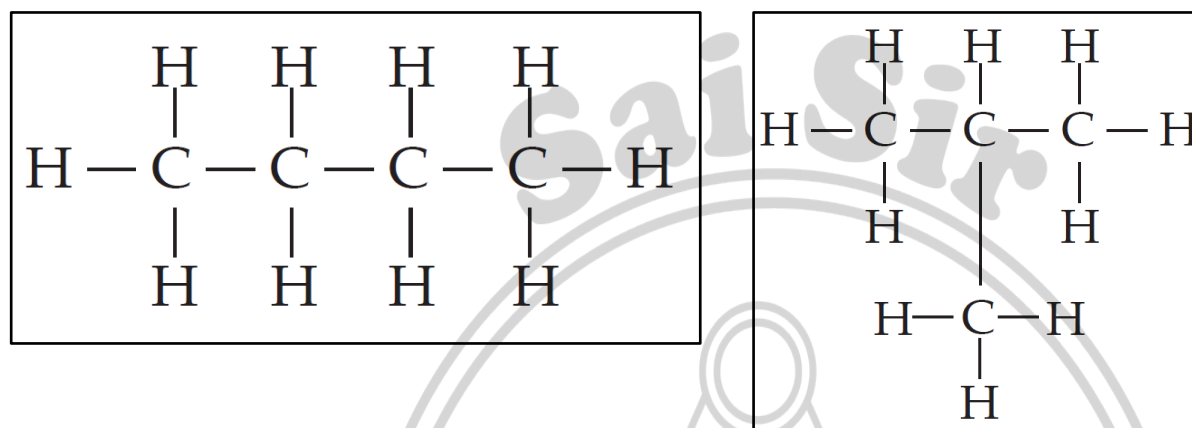


4. Explain the following terms with example.

a. Structural isomerism

The phenomenon where compounds have different structural formulae but the same molecular formula is called structural isomerism.

e.g., Structural formula of compound C_4H_{10}



b. Covalent bond

The chemical bond formed by sharing of two valence electrons between two atoms is called a covalent bond.

e.g., Covalent bond is formed between oxygen and each of the hydrogen in a water molecule (H_2O). Each of the covalent bonds contains two electrons – one from a hydrogen atom and one from the oxygen atom. Both atoms share the electrons.



c. Hetero atom in a carbon compound

The atoms of elements such as halogens, oxygen, nitrogen, and sulfur substitute one or more hydrogen atoms in the hydrocarbon chain, thereby satisfying the tetravalency of carbon.

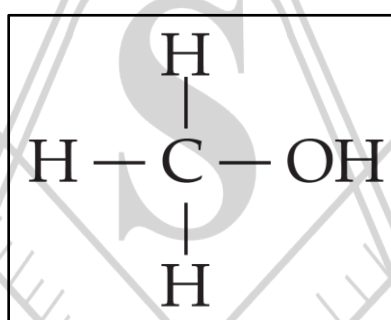
The atom of the element that substitutes for hydrogen is referred to as a hetero atom.

e.g., CH_3Cl . In this example, one hydrogen atom in methane CH_4 is replaced by chlorine atom. So, Cl is a heteroatom.

d. Functional group

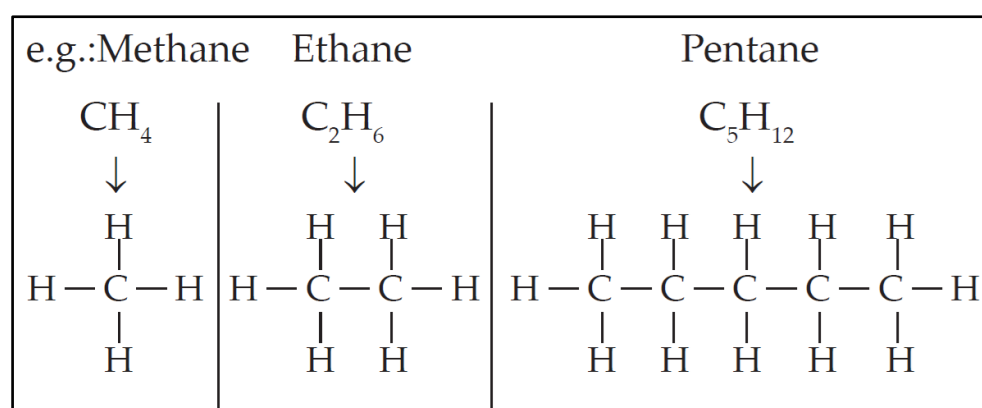
The hetero atom or group of hetero atoms present in a compound that imparts specific chemical properties, regardless of the length and nature of the carbon chain, is called a functional group.

For example, the alcohol functional group is represented by (-OH). Any hydrocarbon with -OH substituent is an alcohol. Such as methanol (CH_3OH).



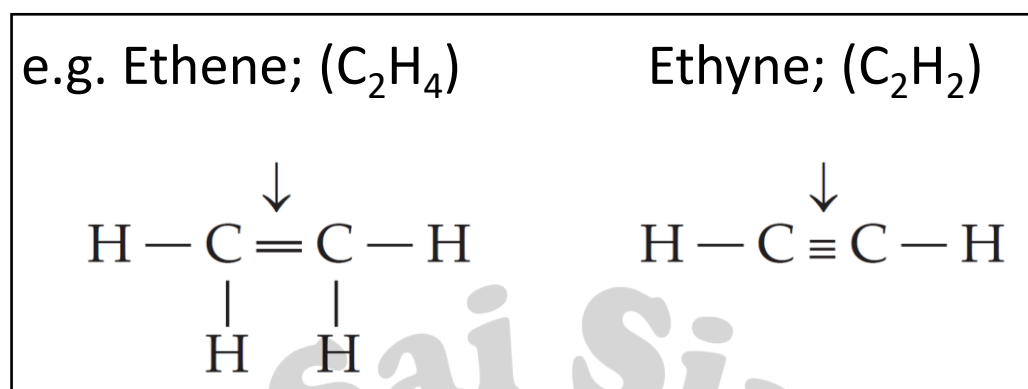
e. Alkane

Alkanes are chemical compounds composed of carbon and hydrogen atoms, which is why they are referred to as hydrocarbons. The chemical structure of alkanes exclusively consists of single covalent bonds. Because they contain only single bonds, each carbon atom is saturated with hydrogen atoms. As a result, alkanes are commonly referred to as saturated hydrocarbons.



f. Unsaturated hydrocarbons

Hydrocarbons in which carbon atoms are linked to each other by double or triple bonds are known as unsaturated hydrocarbons.



g. Homopolymer

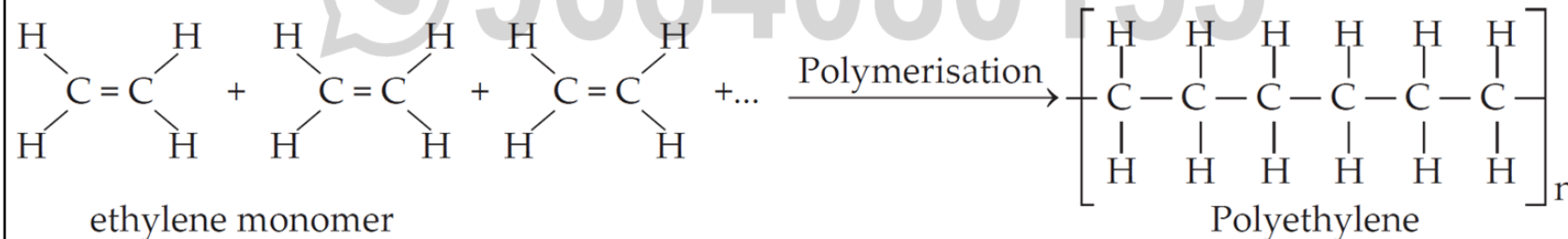
When the polymers are formed by repetition of single monomer. These are called homopolymer. e.g., Polyvinyl Chloride (PVC)

h. Monomer

A macromolecule formed by regular repetition of a small unit is called polymer. The small unit that repeats regularly to form a polymer is called monomer.

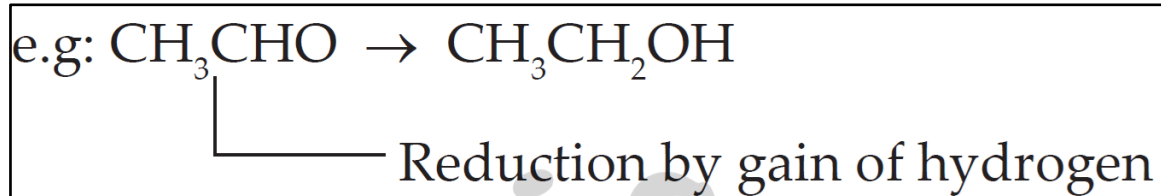
e.g., Vinyl chloride polymerizes into polyvinyl chloride (PVC). Glucose polymerises into starch, cellulose, laminarin and glucans.

Synthesis of polyethylene is as follows:



i. Reduction

Reduction is the type of reaction in which loss of oxygen and gain of hydrogen occurs. In terms of electron transfer, we can define reduction reactions as the type of reactions where gain of electrons takes place.



j. Oxidant:

Substances that can give oxygen to other substances are called oxidants or oxidizing agents. e.g., Potassium permanganate or potassium dichromate are commonly used as oxidizing agents.

5. Write the IUPAC names of the following structural formulae.



Butane



Propan-2-ol



Propanoic acid



Ethanamine



Ethanal



Butanone

6. Identify the type of the following reaction of carbon compounds.



Oxidation reaction



Combustion reaction



Addition reaction



Substitution reaction



Dehydration reaction



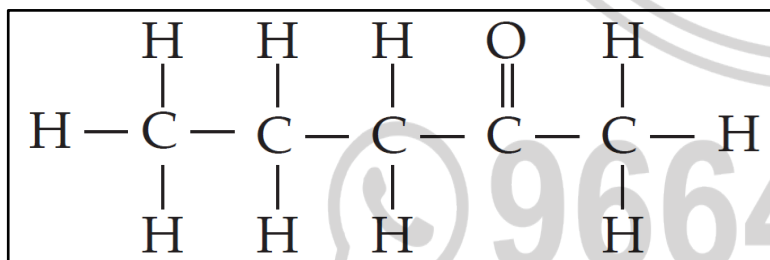
Neutralization reaction



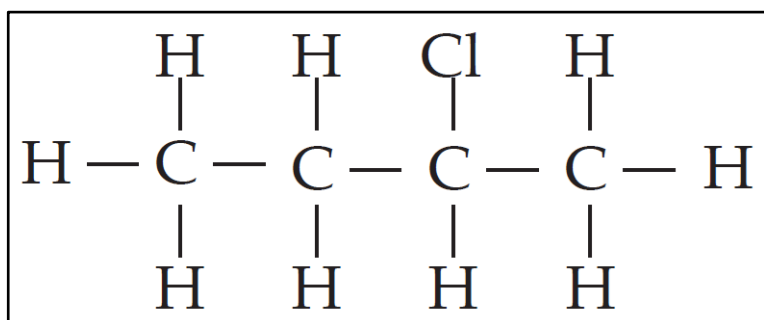
Esterification reaction

7. Write structural formulae for the following IUPAC names.

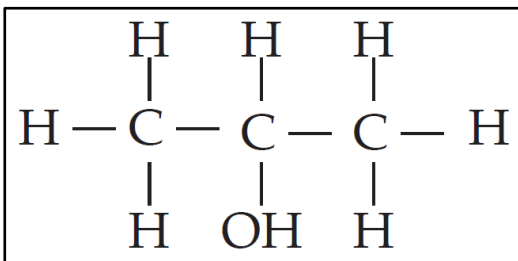
a. pentan-2-one



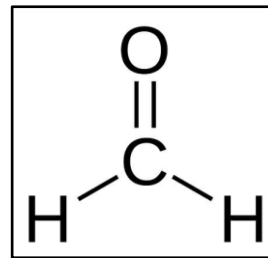
b. 2-chlorobutane



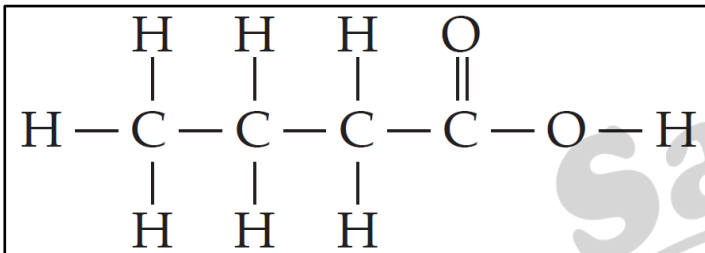
c. propan - 2- ol



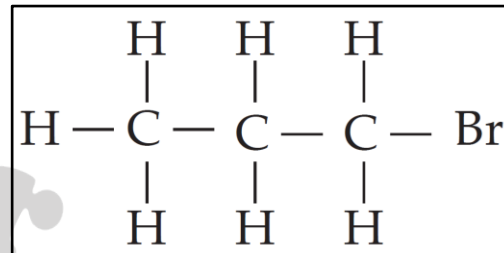
d. methanal



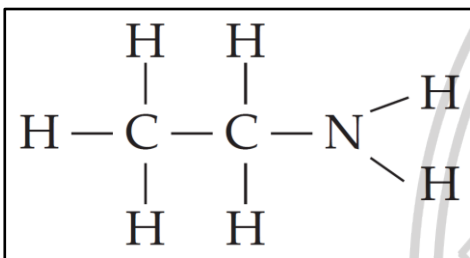
e. butanoic acid



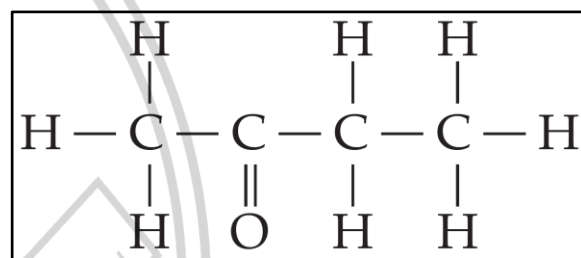
f. 1- bromopropane



g. ethanamine



h. butanone



8. Write answers as directed.

a. What causes the existence of very large number of carbon compound ?

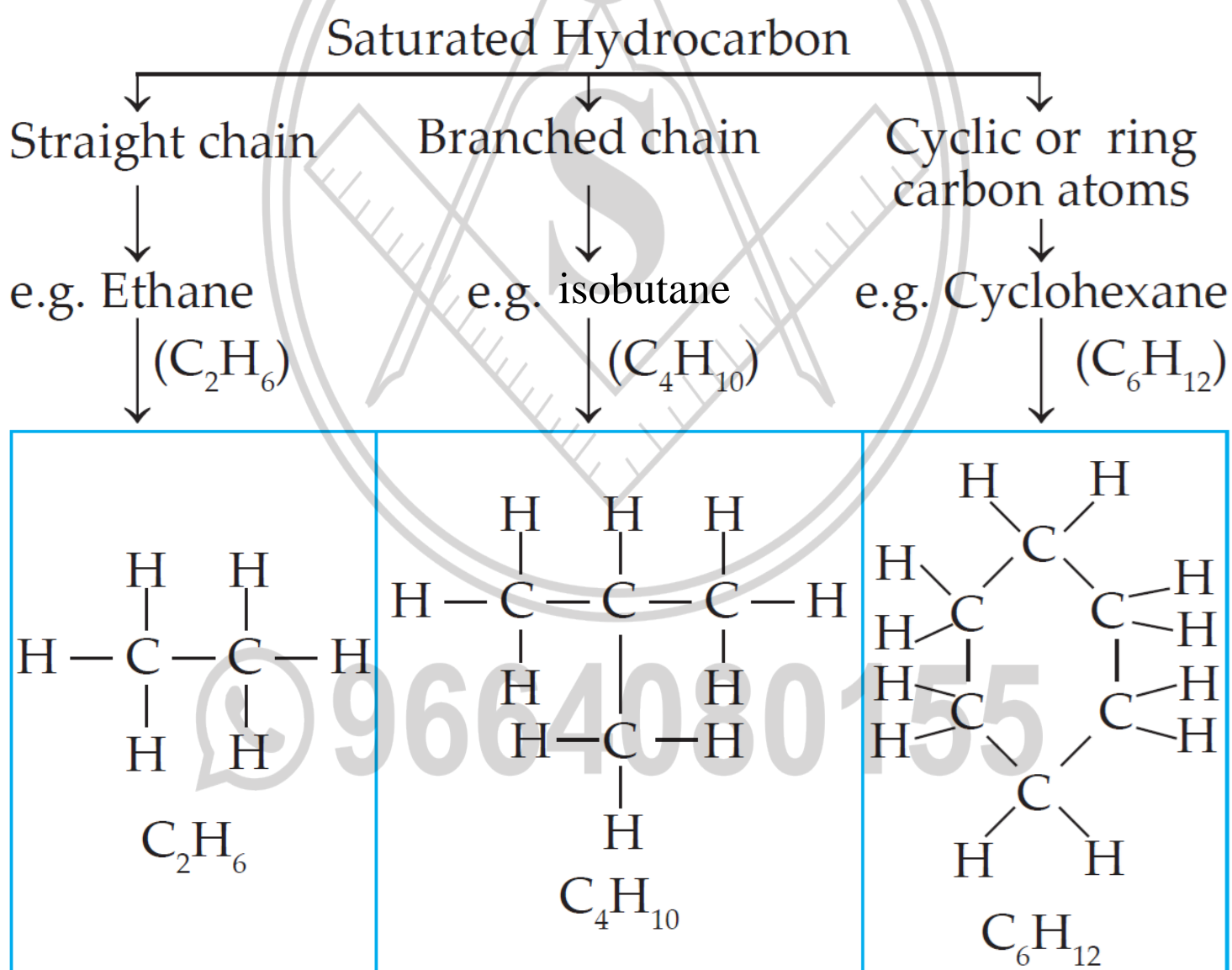
The following reasons cause the existence of very large number of carbon compounds:

- i. Carbon's unique ability to form strong covalent bonds with other carbon atoms results in the creation of large molecules, a property known as catenation. Carbon compounds can have open chains (straight or branched) or closed chain structures (rings) due to the strength and stability of covalent bonds between carbon atoms.

- ii. Carbon atoms can form one, two, or three covalent bonds, known as single, double, and triple bonds. This versatility in bond formation leads to a wide variety of carbon compounds.
- iii. Being tetravalent one carbon atom can form bonds with four other atoms (carbon or any other). This results in formation of many compounds.

b. Saturated hydrocarbons are classified into three types. Write these names giving one example each.

Hydrocarbons in which the carbon atoms are linked to each other only by single bonds (C – C) are known as saturated hydrocarbons.

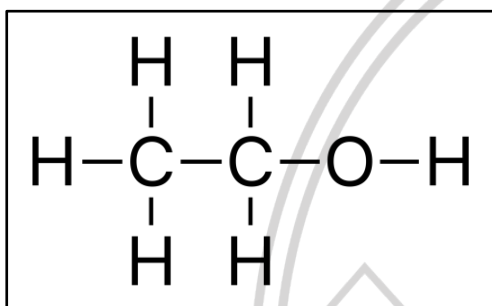


- c. Give any four functional groups containing oxygen as the heteroatom in it. Write name and structural formula of one example each.

Four functional groups containing oxygen as the heteroatom in it are as follows:

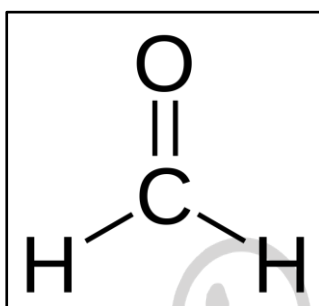
- i. **Alcohols:** The functional group, which is present in alcohol, is -OH. In IUPAC nomenclature, the suffix for alcohol is -ol.

Example: Ethanol ($\text{CH}_3\text{-CH}_2\text{-OH}$)



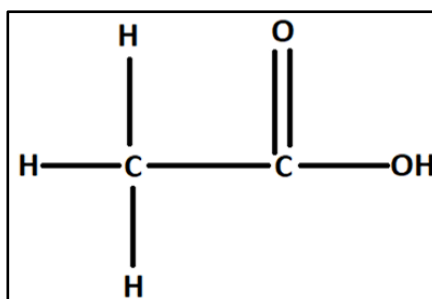
- ii. **Aldehydes:** The functional group, which is present in an aldehyde, is -CHO. In IUPAC nomenclature, the suffix for aldehyde is -al.

Example: Formaldehyde (HCHO)



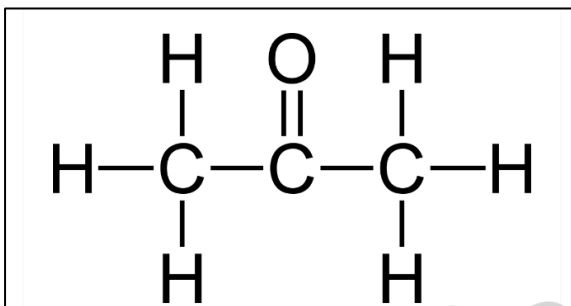
- iii. **Carboxylic acid:** The functional group present in a carboxylic acid is -COOH. In IUPAC nomenclature, the suffix for carboxylic acid is -oic acid.

Example: Ethanoic acid
(CH_3COOH)



iv. **Ketone**: The functional group present in a ketone is $\left(\begin{array}{c} \text{O} \\ || \\ -\text{C}- \end{array} \right)$. In IUPAC nomenclature, the suffix for ketone is -one.

Example: Propanone ($\text{CH}_3\text{-CO-CH}_3$)

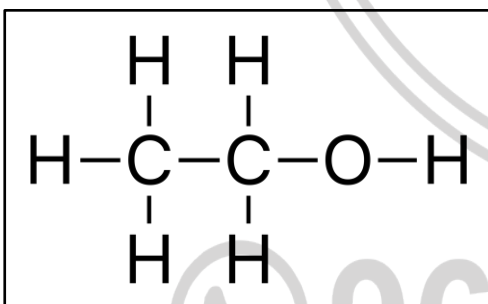


d. Give names of three functional groups containing three different hetero atoms. Write name and structural formula of one example each.

Three functional groups containing three different heteroatoms in it are as follows:

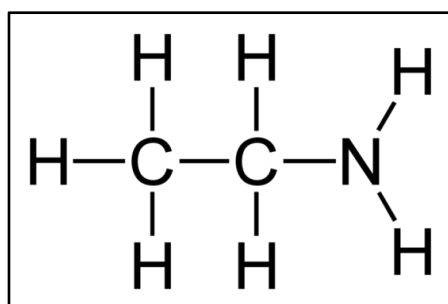
i. **Alcohol**: Alcohol contains the hetero atom oxygen. The functional group, which is present in alcohol, is -OH.

Example: Ethanol ($\text{CH}_3\text{-CH}_2\text{-OH}$)



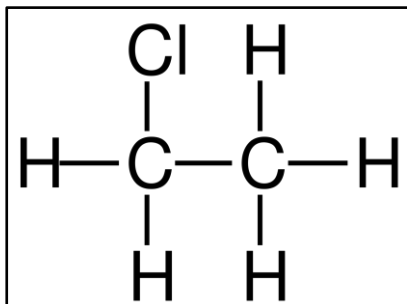
ii. **Amine**: Amine contains the hetero atom Nitrogen. The functional group, which is present in amine, is -NH_2 .

Example: Ethanamine ($\text{CH}_3\text{-CH}_2\text{-NH}_2$)



- iii. **Halo**: Halo functional group contains halogen (chlorine, bromine, iodine) as the hetero atom.

Example: Chloroethane ($\text{CH}_3\text{-CH}_2\text{-Cl}$)



- e. Give names of three natural polymers. Write the place of their occurrence and names of monomers from which they are formed.

A macromolecule formed by the regular repetition of a small unit is called a polymer. This small repeating unit is known as a monomer. Many structures in living organisms are composed of natural polymers.

Polymer	Name of the monomer	Occurrence
Polysaccharide	Glucose	Starch
Proteins	Alpha amino acids	Muscles, hair, enzyme, skin, egg.
DNA	Nucleotide (deoxyribose-phosphate)	Chromosomes of organisms

- f. What is meant by vinegar and gasohol? What are their uses ?

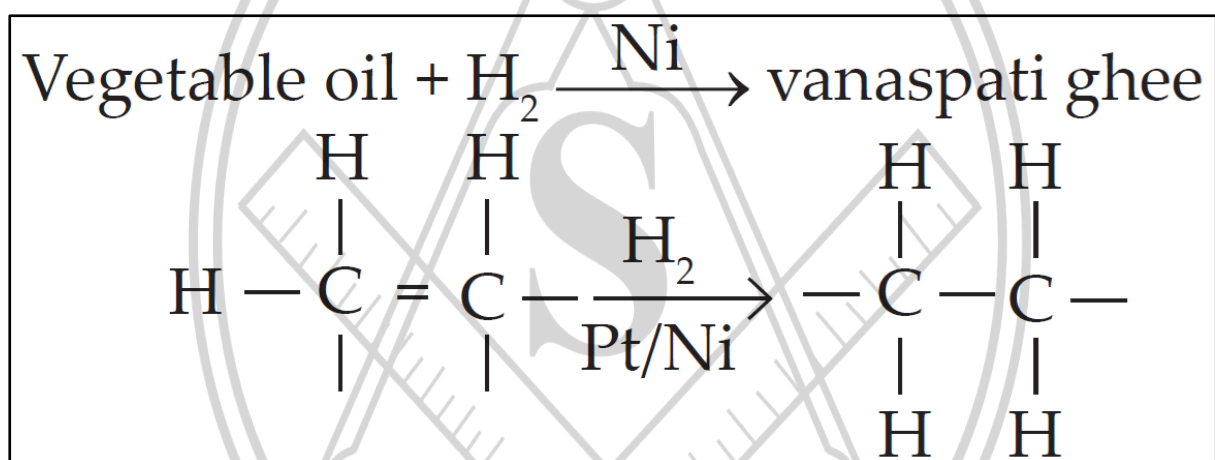
- Vinegar is a 5-8 % aqueous solution of acetic acid.
- Vinegar has various uses, such as a cooking ingredient, preservative for pickles and food storage, fermentation, and medicinal purposes.

- ii. Gasohol: Ethanol is a clean fuel. Therefore, it is used as an additive to increase the efficiency of petrol. Such a fuel is called gasohol.
- iii. Uses: It is used as a fuel.

g. What is a catalyst ? Write any one reaction which is brought about by use of catalyst ?

Catalyst: A substance which increases the rate of reaction without causing any disturbance is called a catalyst.

Vegetable oils are converted into vanaspati ghee by passing hydrogen in presence of nickel as catalyst.



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INTEXT QUESTIONS

1. What are the types of compounds?

Organic and Inorganic compounds.

2. Objects in everyday use such as foodstuff, fibers, paper, medicines, wood, fuels, are made of various compounds. Which constituent elements are common in these compounds?

All these materials are composed of organic compounds, with carbon being the common element in their composition.

3. To which group in the periodic table does the element carbon belongs ? Write down the electronic configuration of carbon and deduce the valency of carbon.

Carbon belongs to group 14 of the Periodic table. Its atomic number is 6. Electronic configuration is (2, 4) and valency of carbon is 4.

4. What is meant by a chemical bond?

A chemical bond is the force that holds atoms together in a molecule or compound, typically involving the sharing or transfer of electrons.

5. What is the number of chemical bonds that an atom of an element forms called?

The number of chemical bonds that an atom of an element forms is called its valency.

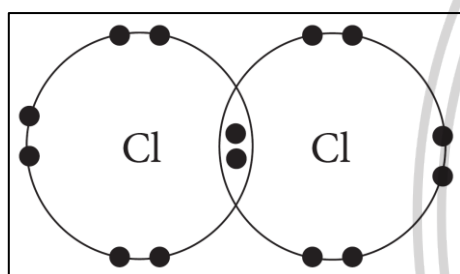
6. What are the two important types of chemical bonds?

The two important types of chemical bond are Ionic or Electrovalent bond and Covalent bond.

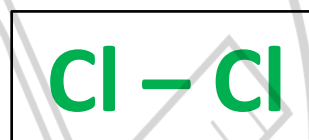
7. Atomic number of chlorine is 17. What is the number of electron in the valence shell of chlorine?

Atomic Number of Chlorine is 17, Electronic configuration in 2, 8, 7. Therefore, number of electrons in valence shell is 7.

8. Molecular formula of chlorine is Cl_2 . Draw electron-dot and line structure of a chlorine molecule.

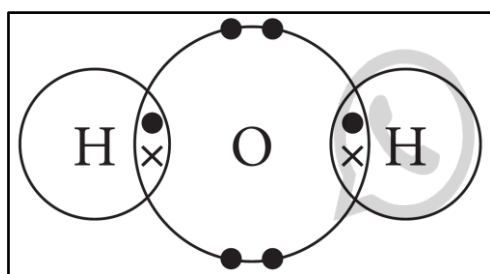


Electron dot structure



Line structure

9. The molecular formula of water is H_2O . Draw electron-dot and line structures for this triatomic molecule. (Use dots for electron of oxygen atom and crosses for electrons of hydrogen atoms.)

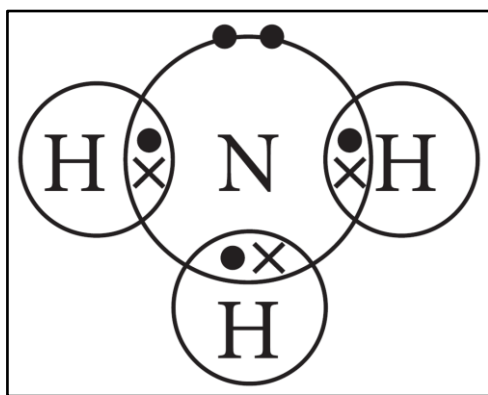


Electron dot structure

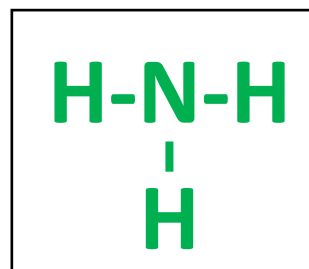


Line structure

10. The molecular formula of ammonia is NH_3 . Draw electron-dot and line structures for ammonia molecule.

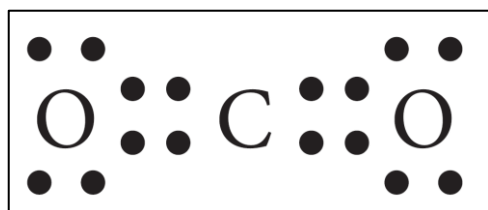


Electron dot structure



Line structure

11. The molecular formula of carbon dioxide is CO_2 . Draw the electron-dot structure (without showing circle) and line structure for CO_2 .



Electron dot structure

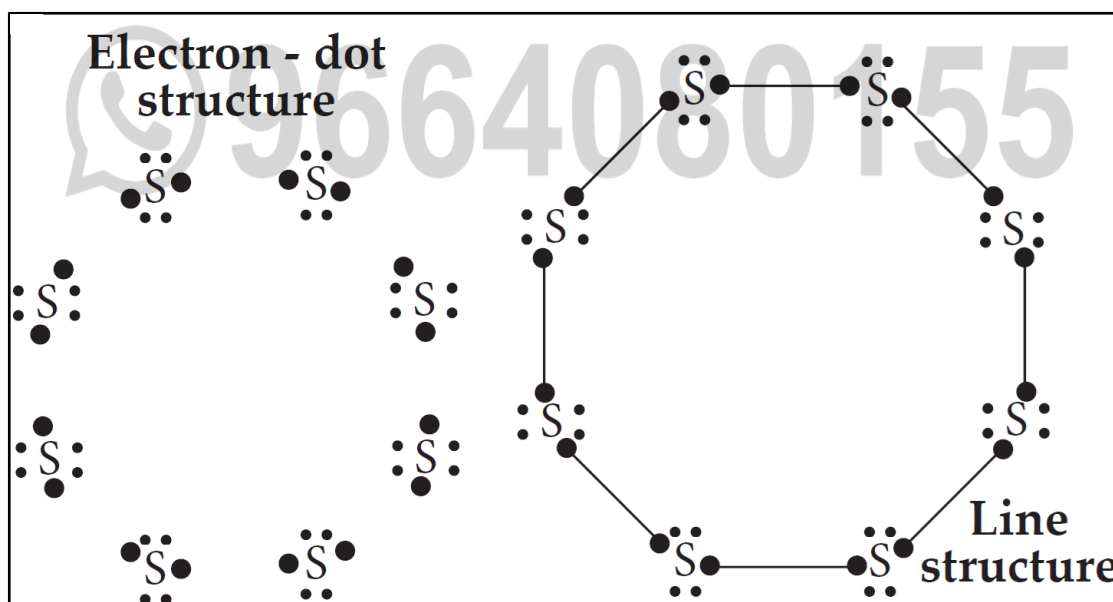


Line structure

12. With which bond C atom in CO_2 is bonded to each of the O atoms?

As carbon and oxygen share valence electrons and fulfill their valency, the bond formed is covalent bond.

13. The molecular formula of sulphur is S_8 in which eight sulphur atoms are bonded to each other to form one ring. Draw an electron-dot structure for S_8 without showing the circles.



14. Hydrogen peroxide decomposes on its own by the following reaction



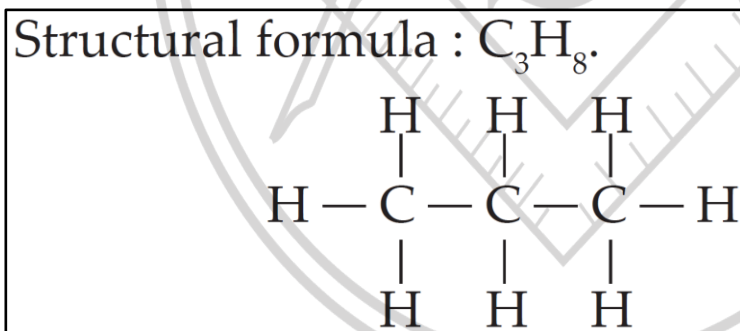
From this, what will be your inference about the strength of O-O covalent bond?

In hydrogen peroxide (H_2O_2), the O – O covalent bond is weak.

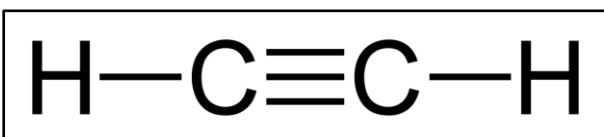
Tell from the above example whether oxygen has catenation power or not.

Oxygen has only a little catenation power because the O–O bond is very weak.

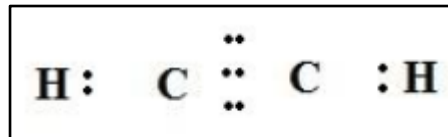
15. Molecular formula of propane is C_3H_8 . From this draw its structural formula.



16. The molecular formula of ethyne is C_2H_2 . From this draw its structural formula and electron - dot structure.



Structural
formula

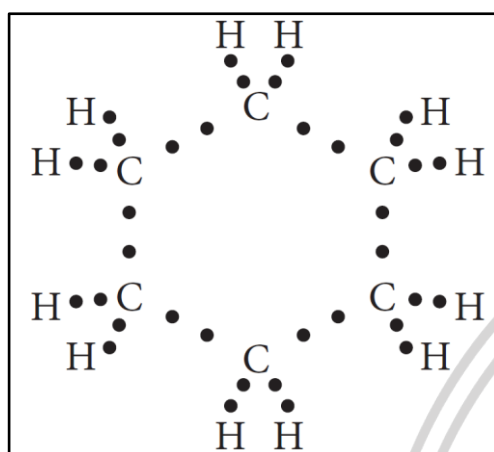


Electron dot
structure

17. How many bonds have to be there in between the two carbon atoms in ethyne so as to satisfy their tetravalency?

Three covalent bonds have to be there in between the two carbon atoms in ethyne so as to satisfy their tetravalency.

18. Draw electron-dot structure of cyclohexane.



19. Fill in the gaps in the tables of homologous series.

(a) Homologous Series of Alkanes

Name	Molecular formula	Condensed Structural formula	Number of carbon atoms	Number of -CH ₂ - units	Boiling point °C
Methane	CH ₄	CH ₄	1	1	- 162
Ethane	C ₂ H ₆	CH ₃ -CH ₃	2	2	- 88.5
Propane	C ₃ H ₈	CH ₃ -CH ₂ -CH ₃	3	3	- 42
Butane	C ₄ H ₁₀	CH ₃ -CH ₂ -CH ₂ -CH ₃	<u>4</u>	<u>4</u>	0
Pentane	C ₅ H ₁₂	CH ₃ -CH ₂ -CH ₂ -CH ₂ -CH ₃	<u>5</u>	<u>5</u>	36
Hexane	C ₆ H ₁₄	CH ₃ -CH ₂ -CH ₂ -CH ₂ -CH ₂ -CH ₃	<u>6</u>	<u>6</u>	69

(b) Homologous Series of Alcohols

Name	Molecular formula	Condensed Structural formula	Number of carbon atoms	Number of -CH ₂ - units	Boiling point °C
Methanol	CH ₄ O	CH ₃ -OH	1	1	63
Ethanol	C ₂ H ₆ O	CH ₃ -CH ₂ -OH	2	2	78
Propanol	C ₃ H ₈ O	CH ₃ -CH ₂ -CH ₂ -OH	<u>3</u>	<u>3</u>	97
Butanol	C ₄ H ₁₀ O	CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH	<u>4</u>	<u>4</u>	118

Name	Molecular formula	Condensed Structural formula	Number of carbon atoms	Number of -CH ₂ - units	Boiling point °C
Ethene	C ₂ H ₄	CH ₂ =CH ₂	2	0	-102
Propene	C ₃ H ₆	CH ₃ -CH=CH ₂	3	1	-48
1-Butene	C ₄ H ₈	CH ₃ -CH ₂ -CH=CH ₂	<u>4</u>	<u>2</u>	-6.5
1-Pentene	C ₅ H ₁₀	CH ₃ -CH ₂ -CH ₂ -CH=CH ₂	<u>5</u>	<u>3</u>	30

20. By how many -CH₂- (methylene) units do the formulae of the first two members of homologous series of alkanes, methane (CH₄) and ethane (C₂H₆) differ? Similarly, by how many -CH₂- units do the neighboring members ethane (C₂H₆) and propane (C₃H₈) differ from each other?

Methane and ethane differ by one -CH₂- unit. Also, ethane and propane differ by one -CH₂- unit.

21. How many methylene units are more in the formula of the fourth member than the third members of the homologous series of alcohols?

One methylene unit (-CH₂-) is more in the formula of the fourth member than the third member of the homologous series of alcohol.

22. How many methylene units are less in the formula of the second member than the third member of the homologous series of alkenes?

One methylene unit (-CH₂-) is less in the formula of the second member than the third member of the homologous series of alkenes.

23. Inspect the molecular formulae of the members of alkene series.

Do you find any relationship, in the number of carbon atoms and the number of hydrogen atoms in the molecular formulae?

- i. In the alkene series, first member is ethene whose molecular formula is C_2H_4 .
- ii. Next is propene C_3H_6 , then butene C_4H_8 .
- iii. We can see from the molecular formula that if number of carbon atoms increases by '1', then number of hydrogen atoms increases by '2'

24. If the number of carbon atoms in the molecular formulae of alkenes is denoted by 'n' what will be the number of hydrogen atom?

General formula of alkenes is C_nH_{2n} . Thus, if the number of carbon atoms in molecular formulae of alkenes is denoted by 'n' the number of hydrogen atoms will be '2n'.

When the value of 'n' is '2'. We get the molecular formula of the first member of this series as $C_2H_{2 \times 2}$, that is, C_2H_4 . When the value of 'n' is '3', the molecular formula of the second member of the alkene series is obtained as $C_3H_{2 \times 3}$, that is, C_3H_6 .

25. Write down structural formulae of the first four members of the various homologous series formed by making use of the functional groups.

i. Halo – X (Cl, Br, I)

Structural formula	IUPAC Name
CH ₃ -Cl	chloromethane
CH ₃ -CH ₂ -Cl	chloroethane
CH ₃ -CH ₂ -CH ₂ -Cl	1-chloropropane
CH ₃ -CH ₂ -CH ₂ -CH ₂ -Cl	1-chlorobutane

ii. Alcohol

Structural formula	IUPAC Name
CH ₃ -OH	methanol
CH ₃ -CH ₂ -OH	ethanol
CH ₃ -CH ₂ -CH ₂ -OH	1-propanol
CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH	1-butanol

iii. Aldehyde

Structural formula	IUPAC Name
HCHO	methanal
CH ₃ -CHO	ethanal
CH ₃ -CH ₂ -CHO	propanal
CH ₃ -CH ₂ -CH ₂ -CHO	butanal

iv. Ketone

Structural formula	IUPAC Name
CH ₃ -CO-CH ₃	propanone
CH ₃ -CH ₂ -CO-CH ₃	butanone
CH ₃ -CH ₂ -CH ₂ -CO-CH ₃	2-pentanone
CH ₃ -CH ₂ -CH ₂ -CH ₂ -CO-CH ₃	2-hexanone

v. Carboxylic acid

Structural formula	IUPAC Name
HCOOH	methanoic acid
CH ₃ -COOH	ethanoic acid
CH ₃ -CH ₂ -COOH	propanoic acid
CH ₃ -CH ₂ -CH ₂ -COOH	butanoic acid

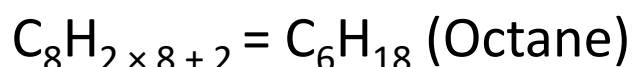
vi. Amines

Structural formula	IUPAC Name
CH ₃ -NH ₂	methanamine
CH ₃ -CH ₂ -NH ₂	ethanamine
CH ₃ -CH ₂ -CH ₂ -NH ₂	propanamine
CH ₃ -CH ₂ -CH ₂ -CH ₂ -NH ₂	butanamine

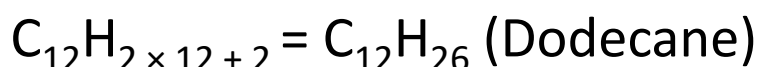
26. General formula of the homologous series of alkanes is C_nH_{2n+2} .

Write down the molecular formula of the 8th and 12th member using this.

$$n = 8$$



$$n = 12$$

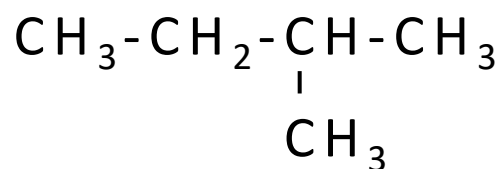


27. Draw three structural formulae having molecular formula C_5H_{12} .

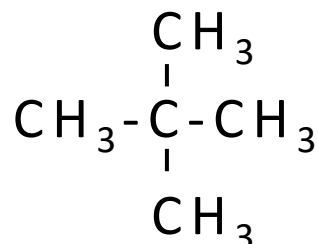
i. n-pentane



ii. isopentane

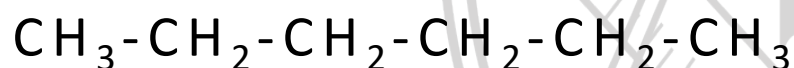


iii. neopentane

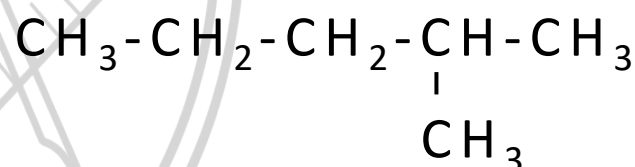


28. Draw all the possible structural formulae having molecular formula C_6H_{14} . Give names to all the isomers. Which difficulties were faced by you while naming?

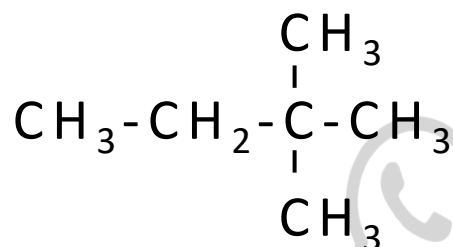
i. n-hexane



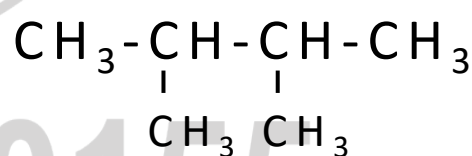
ii. isohexane



iii. neohexane



iii. 2,2-dimethylbutane



Difficulty - It is not possible to give common names to all compounds.

As the time progressed, the carbon compounds became very large in number and their common names caused confusion. A need was felt to have a logical system acceptable to all for naming the carbon compounds.

29. Complete the table by writing their IUPAC names in the third column.

Sr. No.	Common name	Structural formula	IUPAC Name
1.	ethylene	$\text{CH}_2 = \text{CH}_2$	Ethene
2.	acetylene	$\text{HC} \equiv \text{CH}$	Ethyne
3.	acetic acid	$\text{CH}_3 - \text{COOH}$	Ethanoic acid
4.	methyl alcohol	$\text{CH}_3 - \text{OH}$	Methanol
5.	ethyl alcohol	$\text{CH}_3 - \text{CH}_2 - \text{OH}$	Ethanol
6.	acetaldehyde	$\text{CH}_3 - \text{CHO}$	Ethanal
7.	acetone	$\text{CH}_3 - \text{CO} - \text{CH}_3$	Propanone
8.	ethyl methyl ketone	$\text{CH}_3 - \text{CO} - \text{CH}_2 - \text{CH}_3$	Butanone
9.	ethyl amine	$\text{CH}_3 - \text{CH}_2 - \text{NH}_2$	Ethanamine
10.	n-propyl chloride	$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Cl}$	1-Chloropropane

30. Which is the component of biogas that makes it useful as fuel?

Methane present in biogas makes it useful as fuel.

31. Which product is formed by the combustion of elemental carbon?

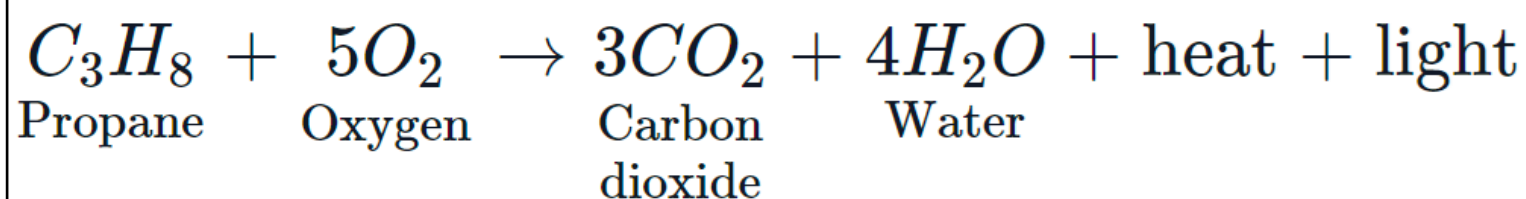
Carbon dioxide is formed by the combustion of elemental carbon.

32. Is the biogas combustion reaction endothermic or exothermic

It is an exothermic reaction.

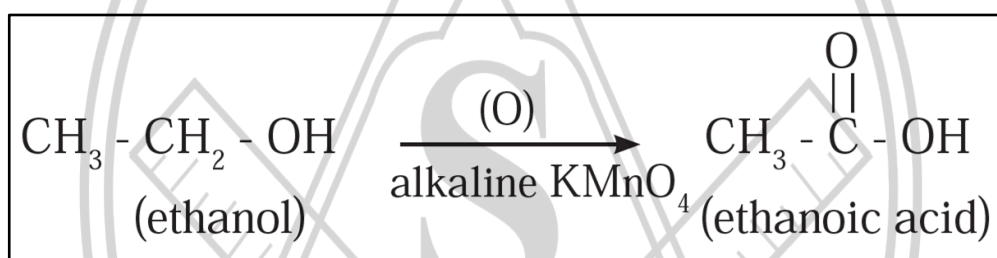
33. Propane (C_3H_8) is one of the combustible component of L.P.G. Write down the reaction for complete combustion of Propane (C_3H_8).

The combustion reaction of propane is as follows :



34. How is the transformation of ethanol into ethanoic acid an oxidation reaction?

Ethanol gets converted into ethanoic acid by taking up oxygen released by potassium permanganate in the reaction mixture. Since, this reaction involves addition of oxygen to ethanol, it is an oxidation reaction. The chemical equation for the above reaction is as follows:

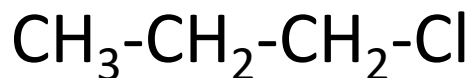


35. Which of the substances contain a multiple bond?

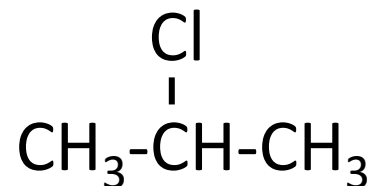
Name	Molecular Formula	Number of C=C double bonds	Will it decolourize I_2 ?
Stearic acid	$C_{17}H_{35}COOH$	0	yes / <u>no</u>
Oleic acid	$C_{17}H_{33}COOH$	1	<u>yes</u> / no
Palmitic acid	$C_{15}H_{31}COOH$	0	yes / <u>no</u>
Linoleic acid	$C_{17}H_{31}COOH$	2	<u>yes</u> / no

36. In the chlorination, substitution reaction of propane two isomeric products containing one chlorine atom are obtained. Draw their structural formulae and give their IUPAC names.

In the chlorination of propane, two isomeric products containing one chlorine atom are obtained. The two possible isomers are 1-chloropropane and 2-chloropropane.



IUPAC Name: 1-chloropropane



IUPAC Name: 2-chloropropane

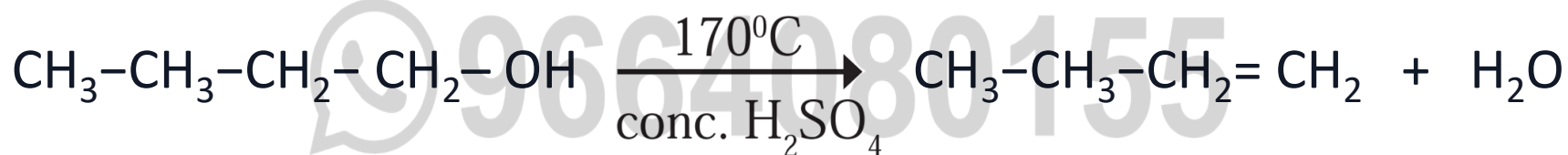
37. Explain by writing a reaction, what will happen when pieces of sodium metal are put in n-propyl alcohol.

Sodium metal reacts with n-propyl alcohol to give sodium propoxide and hydrogen gas.



38. Explain by writing a reaction, which product will be formed on heating n-butyl alcohol with concentrated sulphuric acid.

On heating n-butyl alcohol with concentrated sulphuric acid, the product formed are butene and water.



39. Which one of ethanoic acid and hydrochloric acid is stronger?

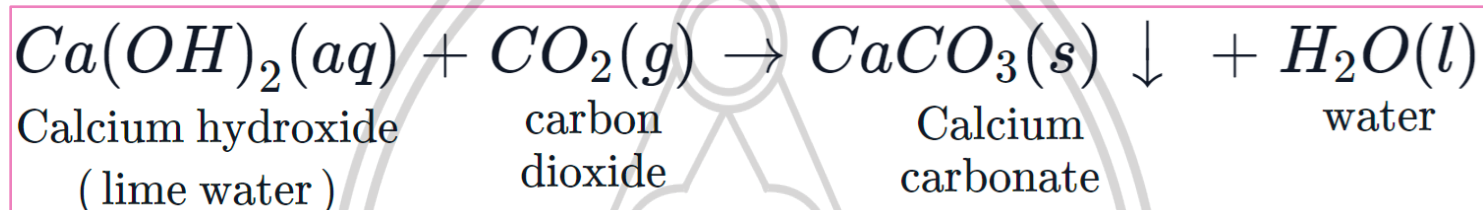
Hydrochloric acid is stronger than ethanoic acid

40. Which indicator paper out of blue litmus paper and pH paper is useful to distinguish between ethanoic acid and hydrochloric acid?

Since both are acids having different strengths, pH paper is useful to distinguish between the ethanoic acid and hydrochloric acid.

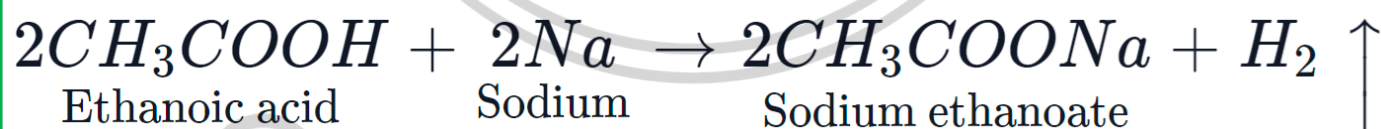
41. Explain with reaction why does the lime water turn milky.

The CO_2 gas reacts with lime water to produce a white precipitate of calcium carbonate. Therefore, lime water turns milky. The reaction can be represented as :



42. Explain the reaction that would take place when a piece of sodium metal is dropped in ethanoic acid.

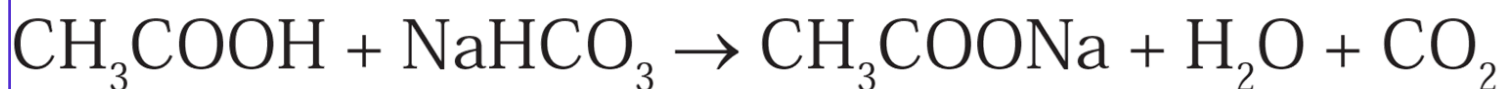
When a piece of sodium metal is dropped in ethanoic acid, sodium acetate and hydrogen gas is formed.



43. Two test tubes contain two colourless liquids ethanol and ethanoic acid. Explain by writing reaction which chemical test you would perform to tell which substance is present in which test tube.

Ethanol and ethanoic acid can be distinguished using sodium bicarbonate or sodium carbonate.

- i. The compound which produces brisk effervescence of carbon dioxide, on reacting with sodium bicarbonate is ethanoic acid.



- ii. The other compounds which does not react with sodium bicarbonate to give effervescence is ethanol.

44. When fat is heated with sodium hydroxide solution, soap and glycerin are formed. Which functional groups might be present in fat and glycerin?

The functional group carboxylic acid (-COOH) is present in fat whereas the functional group hydroxyl group (-OH) is present in glycerin.

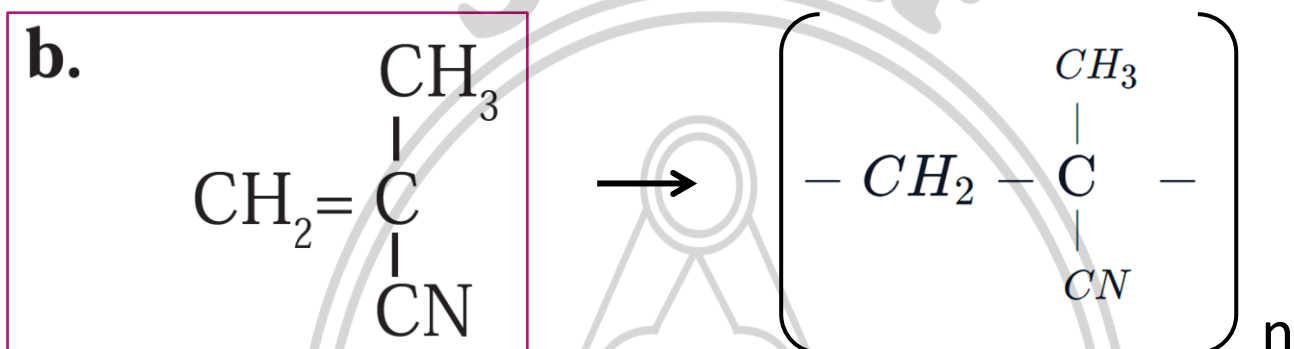
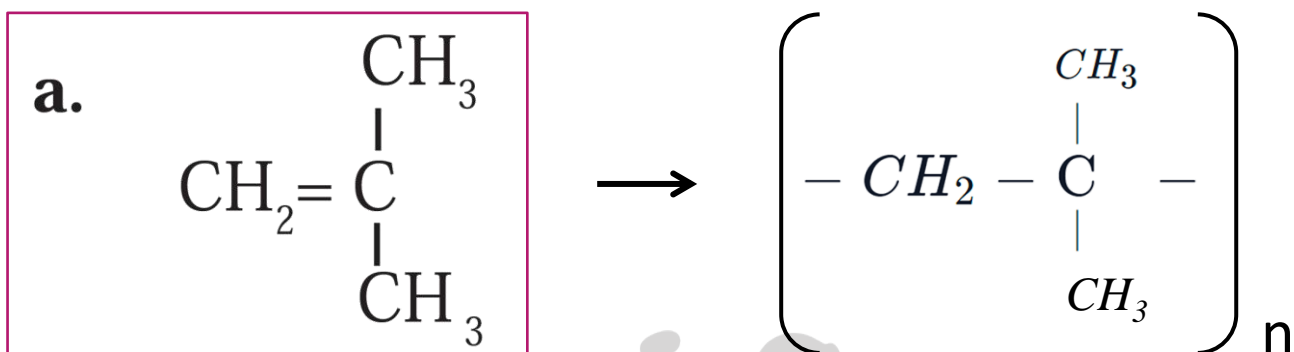
45. What are the chemical names of the nutrients that we get from the food stuffs namely cereals, pulses and meat?

Carbohydrates, fats and proteins

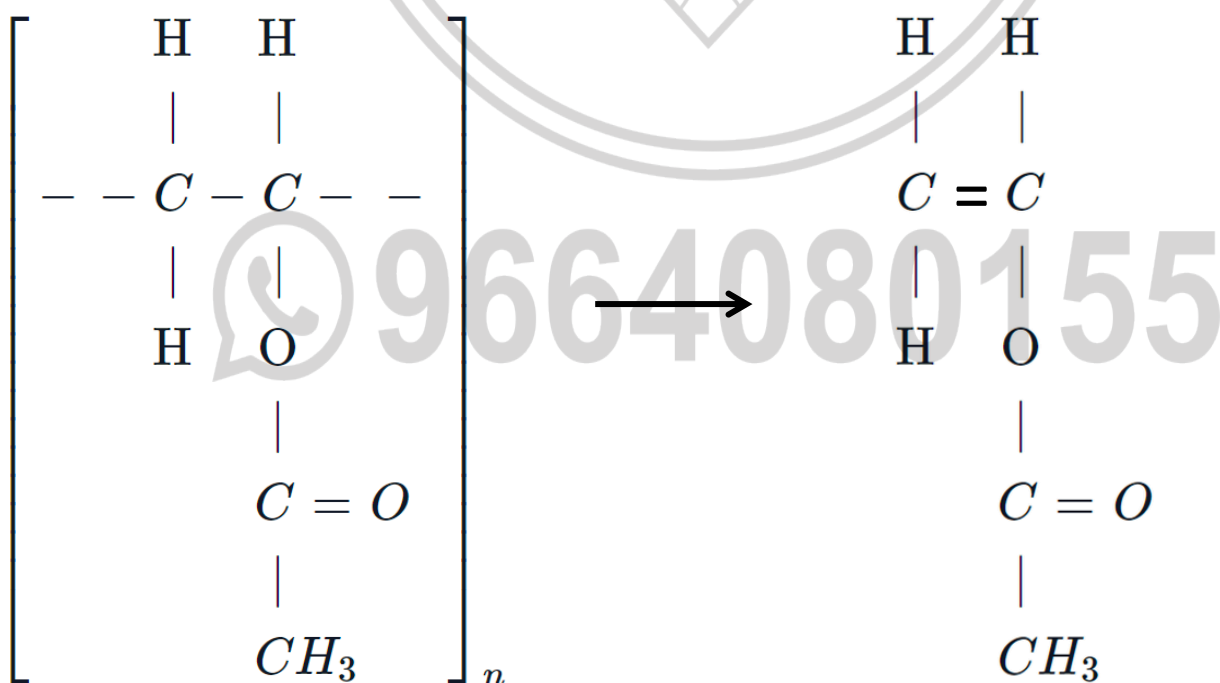
46. What are the chemical substances that make cloth, furniture and elastic objects?

The chemical substances that make cloth, furniture and elastic are cellulose and rubber.

47. Structural formulae of some monomers are given below. Write the structural formula of the homopolymer formed from them.



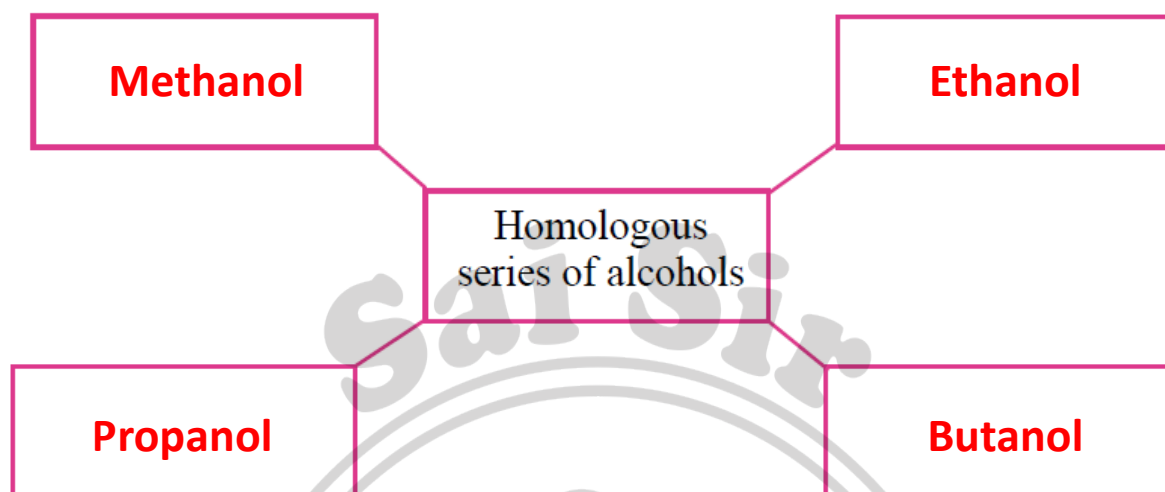
48. From the given structural formula of polyvinyl acetate, that is used in paints and glues, deduce the name and structural formula of the corresponding monomer.



**Monomer
(Vinyl acetate)**

Previous Year Questions

1. Write names of first four homologous series of alcohols:



2. Complete the following table:

Sr. No.	Common Name	Structural Formula	IUPAC Name
1.	Ethylene	$\text{CH}_2 = \text{CH}_2$	Ethene
2.	Acetic acid	CH_3COOH	Ethanoic acid
3.	Methyl alcohol	$\text{CH}_3\text{-OH}$	Methanol

3. Complete the following flowchart and write the general formula of alkane:



4. What is meant by Vinegar and Gasohol? What are their uses? –

Exercise Question 8-f

5. Answer the following questions:

a. Define Hydrocarbons.

The compounds which contain carbon and hydrogen as the only two elements are called hydrocarbons.

b. Name the types of Hydrocarbons.

a. Hydrocarbons in which the valencies of all the atoms are satisfied by single bonds are called saturated hydrocarbons. They are also called as 'alkanes'.

b. Hydrocarbons having a double bond or a triple bond between two carbon atoms are called unsaturated hydrocarbons. The unsaturated hydrocarbons containing a carbon-carbon double bond are called 'Alkenes'. The unsaturated hydrocarbons whose structures contain a carbon-carbon triple bond are called 'Alkynes'.

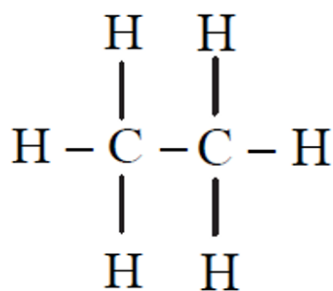
c. Name two carbon compounds used in day-to-day life.

Two carbon compounds used in daily life are ethanol and ethanoic acid.

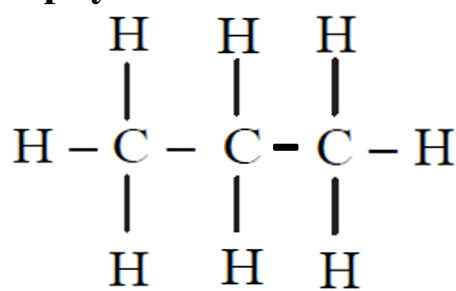
6. Complete the following table:

Straight chain of Carbon compounds	Structural formula	Molecular formula	Name
C	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$	CH ₄	Methane
C-C	on next page	<u>C₂H₆</u>	Ethane
C-C-C	on next page	C ₃ H ₈	<u>Propane</u>
C-C-C-C	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H} - \text{C} & - \text{C} & - \text{C} & - \text{C} - \text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$	<u>C₄H₁₀</u>	<u>Butane</u>

Ans: 2)

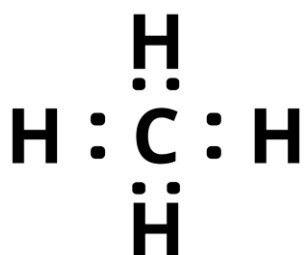


3)



7. Answer the following:

a. Draw the electron-dot structure of Methane.



b. Define Homologous series.

The series of compounds formed by joining the same functional group in the place of a particular hydrogen atom on the chains having sequentially increasing length is called homologous series.

c. Write the IUPAC names of the following:

i. $\text{CH}_3 - \text{CH}_2 - \text{COOH}$ - propanoic acid

ii. $\text{CH}_3 - \text{CHOH} - \text{CH}_3$ - propan-2-ol or 2-propanol

iii. $\text{CH}_3 - \text{CO} - \text{CH}_2 - \text{CH}_3$ - butanone

8. Saturated hydrocarbons are classified into three types. Write these names giving one example each. – Exercise Question 8-b

9. Answer the following questions.

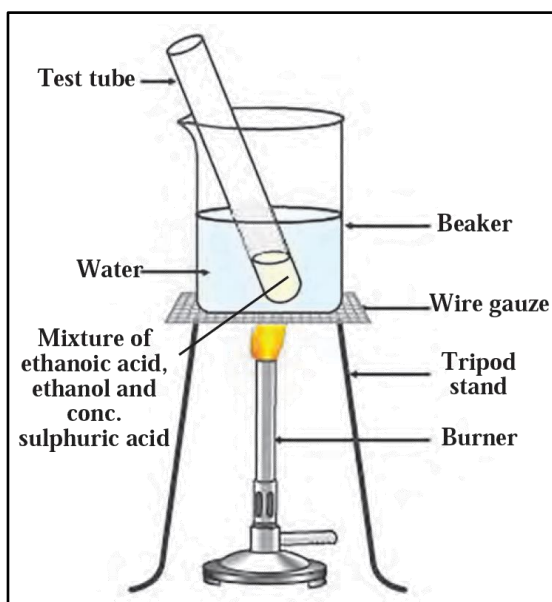
a. Draw neat labelled diagram of 'Esterification Reaction'

b. Write the molecular formula of ester.

c. Describe the characteristics of ester.

d. Write any two uses of ester.

a)



b) Esters have the general formula $R - COO - R'$



Molecular formula – $C_4H_8O_2$

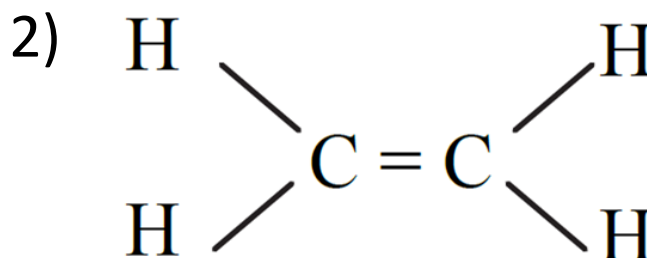
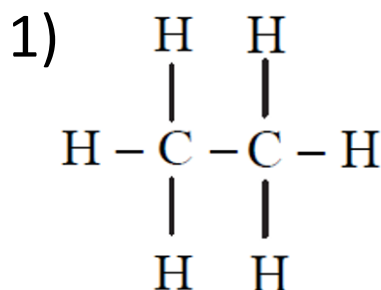
c) Esters have sweet odour. Majority of fruits owe their odour to a particular ester present in them.

d) Esters are used for making fragrances and flavouring agents. When an ester is reacted with the alkali sodium hydroxide, the corresponding alcohol and carboxylic acid (in the form of its sodium salt) are obtained back. This reaction is called saponification reaction, as it is used for preparation of soap from fats.



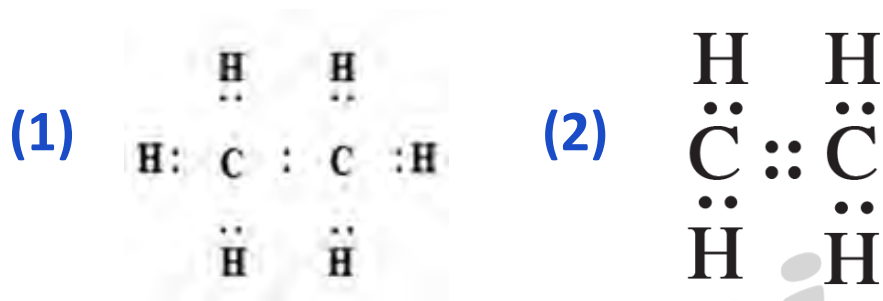
10. Identify saturated and unsaturated hydrocarbon from the given structural

formula:



- 1) Saturated. Since the carbon atoms are joined by a single bond.
- 2) Unsaturated. Since carbon atoms are joined by a double bond.

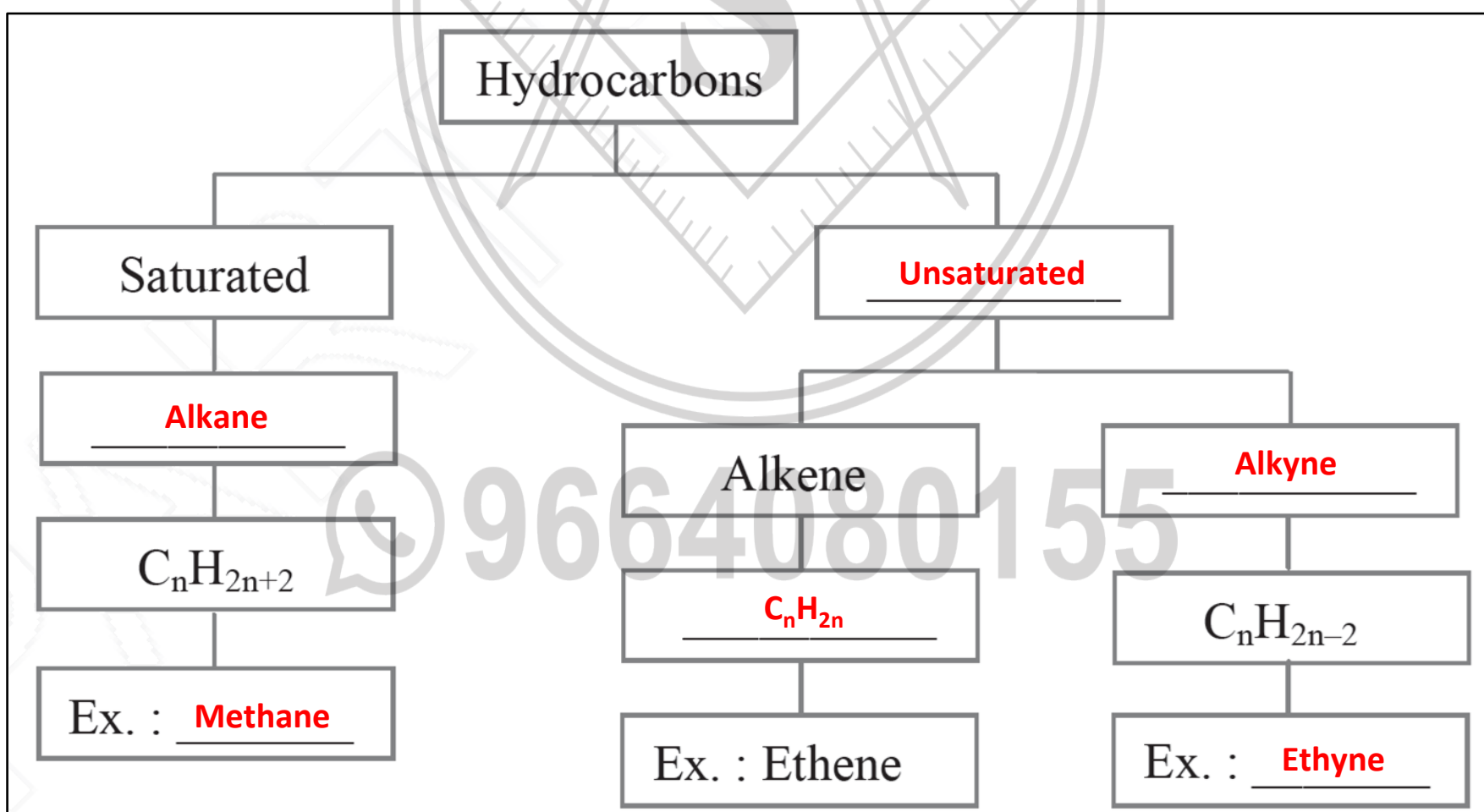
Draw electron dot structure for (1) and (2)



Define Homologous series.

The series of compounds formed by joining the same functional group in the place of a particular hydrogen atom on the chains having sequentially increasing length is called homologous series.

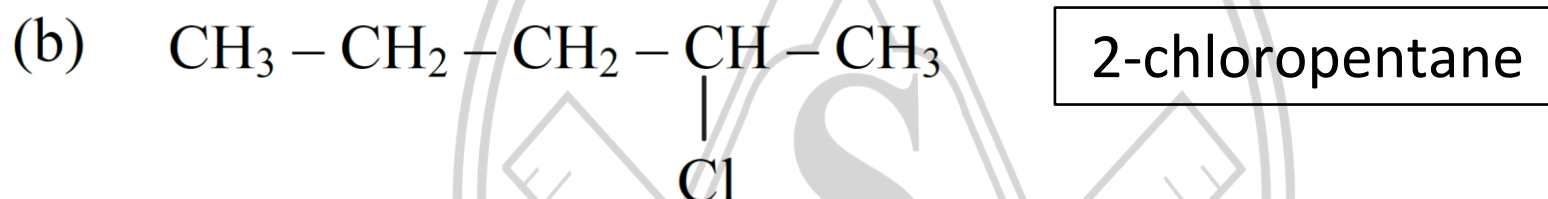
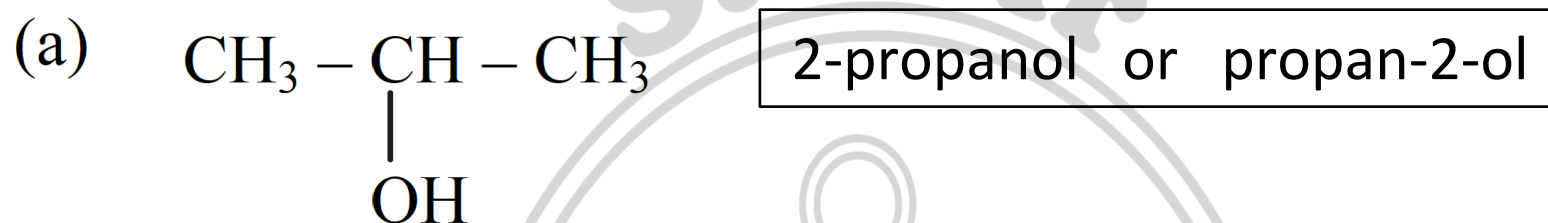
11. Complete the following flow chart:



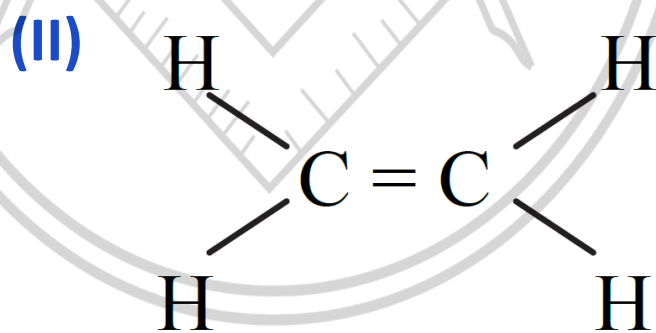
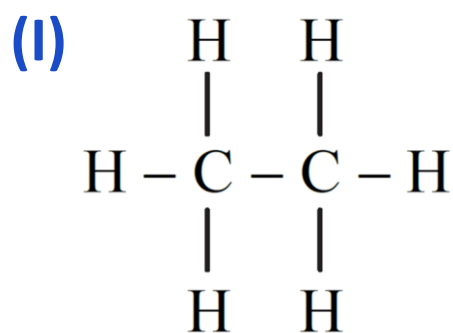
12. Complete the following table:

S.N.	Common Name	Structural Formula	IUPAC Name
1.	Ethylene	$\text{CH}_2 = \text{CH}_2$	<u>Ethene</u>
2.	Acetylene	<u>$\text{CH} \equiv \text{CH}$</u>	Ethyne
3.	Acetic acid	$\text{CH}_3 - \text{COOH}$	<u>Ethanoic acid</u>
4.	Methyl alcohol	<u>$\text{CH}_3 - \text{OH}$</u>	Methanol
5.	<u>Acetone</u>	$\text{CH}_3 - \text{CO} - \text{CH}_3$	Propane-2-one

13. Write the IUPAC names of the following structural formulae:



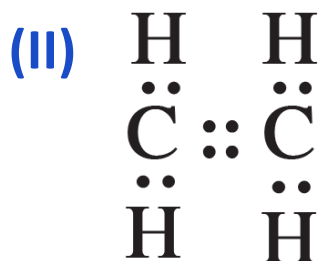
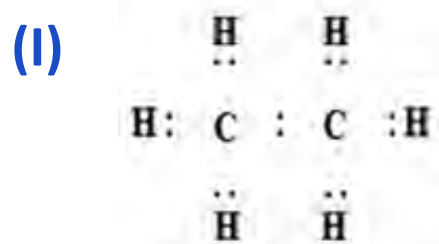
14. Observe and write the answers to the questions given below:



a. Write the names of compound I and II.

(I) Ethane (II) Ethene

b. Draw electron-dot structure for I and II.



c. Which one of the above structures is saturated compound and unsaturated compound?

- I. Saturated. Since the carbon atoms are joined by a single bond.
- II. Unsaturated. Since carbon atoms are joined by a double bond.

