

When alcohol is heated, temperature rises up until it reaches upto 78°C. From there onward, even the heating process goes on but the temperature remains constant. This is the boiling point of alcohol. It is to be noted that temperatures does not change during the boiling process.

Short Answer Question

Q.1 Differentiate between saturated and unsaturated hydrocarbons.

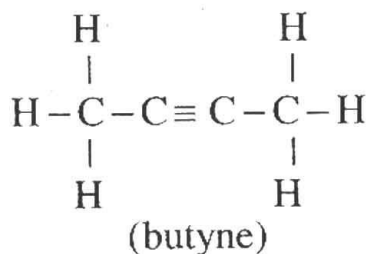
Ans.

Saturated Hydrocarbons	Unsaturated Hydrocarbons
The hydrocarbons in which all the four valencies of carbon atoms are fully satisfied (saturated) by single bond with other carbon atoms and hydrogen atoms are called saturated hydrocarbons	The hydrocarbons in which two carbon atoms are linked by a double or a triple bond are called unsaturated hydrocarbons
They are also called alkanes	They are also called alkenes and alkynes.
The general formula of saturated hydrocarbon is C_nH_{2n+2}	The general formula of alkenes is C_nH_{2n} and alkynes is C_nH_{2n-2}
Examples CH_4 , C_2H_6 , C_3H_8	Examples C_2H_4 , C_2H_2

Q.2 A compound consisting of four carbon atoms has a triple bond in it. How many hydrogen atoms are present it?

Ans. There is six hydrogen atoms is presented in a compound containing the four carbon atoms has a triple bond in it.

Example

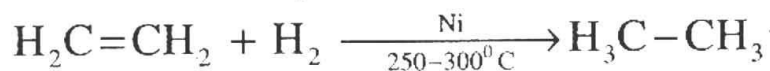


Q.3 Why the alkanes are called paraffin?

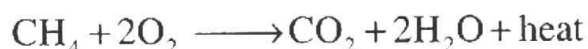
Ans. Alkanes are saturated hydrocarbons. In these compounds all the bonds of carbon atoms are single that mean valencies of carbon atoms are fully satisfied (saturated) therefore they are least reactive. That is the reason alkanes are called paraffin's.

Q.4 What do you know about hydrogenation of alkenes?

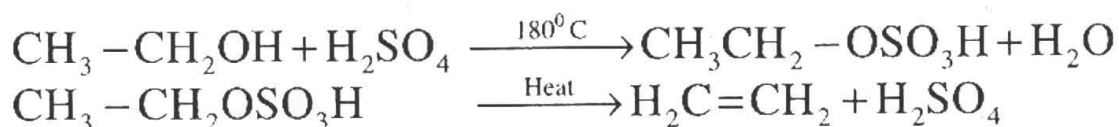
Ans. Hydrogenation means addition to an unsaturated hydrocarbon in presence of a catalyst (Ni, Pt) to form saturated compound.

**Q.5 Why the alkanes are used as fuel?**

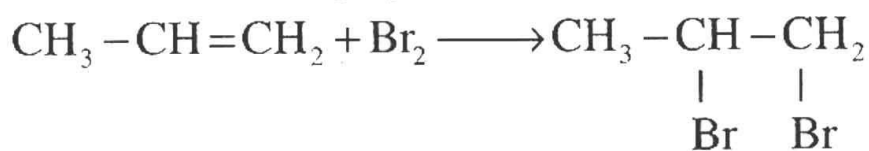
Ans. Alkanes burn in the presence of excess of air or oxygen to produce a lot of heat, carbon dioxide and water. This reaction is take place in automobile, combustion engines, domestic heaters and cooking appliances. It is highly exothermic reaction and because of its alkanes are used as fuel.

**Q.6 How can you prepare ethene from alcohol.**

Ans. Ethene is prepared by heating a mixture of ethanol and excess of cone sulphuric acid at 180°C in first step ethyl hydrogen sulphate is formed which decomposes on heating to produce ethane which is collected over water.

**Q7. Indentify propene from propane with a chemical test.**

Ans. Pass the two gases through bromine water separately. Propene will decolourise reddish brown colour of bromine but propane cannot. Reaction is



reddish-brown in colour

Colourless

Q.8 Why alkenes are called olefins?

Ans. alkenes are called olefins. Because first members of alkenes form oily products when react with halogens.

Q.9 Why alkane can't be oxidized with KMnO_4 solution?

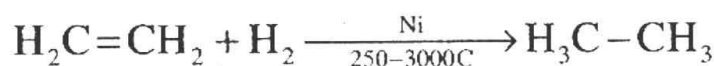
Ans. Alkanes are saturated hydrocarbons. They are least reactive at high temperatures that are why alkenes can't be oxidized with KMnO_4 solution.

Q.10 What are addition reactions? Explain with an example

Ans. Addition of substance to an unsaturated hydrocarbon is called addition reaction.

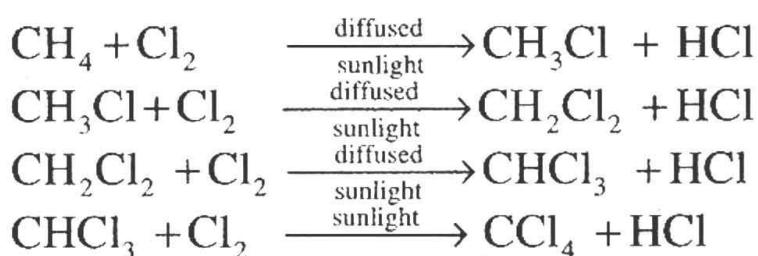
Example:

Addition of hydrogen to an unsaturated hydrocarbon in the presence of catalyst (Ni, Pt).



Q.11 Justify that alkanes give substitution reactions.

Ans. A reaction in which one or hydrogen atoms of a saturated compound are replaced with some other atoms is called a substitution reaction these reactions are characteristic property of alkanes. For example in diffused sunlight alkanes react fairly with halogens. In these reactions at each step one hydrogen atom is substituted by halogen atom.



Q.12 Both alkenes and alkynes are unsaturated hydrocarbons. State the one most significant difference between them.

Ans. Alkynes have greater carbon to hydrogen ratio. So they give smokier flames but alkanes and alkenes do not.

Q.13 Write the molecular, dot and cross and structural formula of ethyne

Ans. (i) Molecular formula of ethynes C_2H_2

(ii) Structural formula $\text{H}-\text{C}\equiv\text{C}-\text{H}$

(iii) Cross and dot formula $\text{H}\times\bullet\text{C}\begin{array}{c}\times\bullet\\\bullet\times\\\times\bullet\end{array}\text{C}\bullet\times\text{H}$

Q.14 Why hydrocarbons are soluble in organic solvents?

Ans. Hydrocarbons are soluble in organic solvents because they are non polar.

Q.15 Give the physical properties of alkanes.

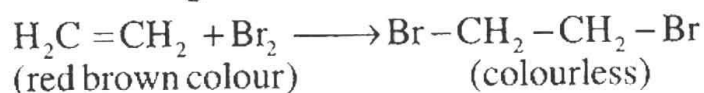
Ans.

- (i) Alkanes are non-polar, therefore they insoluble in water but soluble in organic solvents
- (ii) The density of alkanes increases gradually with the increases of molecular size.
- (iii) The alkanes become more viscous as their molecular size increase

(iv) Alkanes become less flammable i.e. difficult to burn with the increase of molecular sizes.

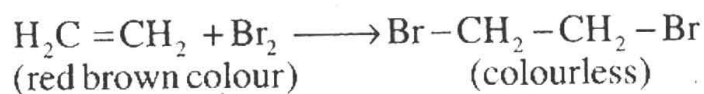
Q.16 How can you identify ethane from ethene?

Ans. When bromine water is added to ethane in an inert solvent like carbon tetrachloride, its colour is discharged at once.



Q.17 Why colour of bromine water discharges on addition of ether in it?

Ans. Because in the reaction double bond of ethane is converted into single bond by addition of a molecule of bromine



Q.18 State one important use of each:

(i) Ethene (ii) Acetylene (iii) Chloroform (iv) Carbon tetrachloride

Ans.

(i) Ethene

It is used for manufacturing of polythene.

(ii) Acetylene

It is used to prepare alcohols acetaldehyde and acids

(iii) Chloroform

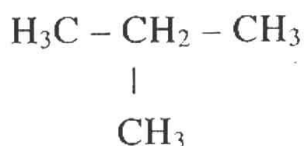
It is used as a solvent for rubber, waxes and used for anaesthesia.

(iv) Carbon tetrachloride

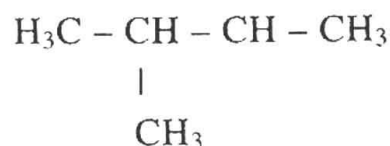
It is used an industrial solvent and in dry cleaning

Q.19 Give the structural formula of isobutane and isopentane.

Ans. (a) Isobutene



(b) Isopentane



Q.20 Why hydrocarbons are considered as parent organic compounds?

Ans. Because mostly organic compounds are derived from hydrocarbons by the replacement of one or more hydrogen atoms by other atoms or group of atoms that why hydrocarbons are considered as a parent organic compounds.

Q.21 What is the difference between a straight and a branched chain hydrocarbons

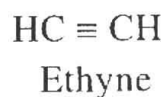
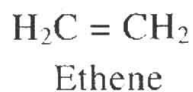
Ans.

Straight Chain Hydrocarbons	Branched Chain Hydrocarbons
Straight chain hydrocarbons straight chain compound are these in which carbon atoms link with each other through a single, double or triple bond forming a straight chain.	Branched chain compounds are these in which there is a branch along a straight chain
Example: $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ n-butane	Example: $\begin{array}{c} \text{H}_3\text{C} - \text{CH}_2 - \text{CH}_3 \\ \\ \text{CH}_3 \\ \text{Isobutane} \end{array}$

Q.22 Define unsaturated hydrocarbons? Give example.

Ans. The hydrocarbons in which two carbon atoms are linked by a double or a triple bond are called unsaturated hydrocarbons

Example:



Q.23 What do you mean by halogenations? Give the reaction of methane with chlorine in bright sunlight.

Ans. Halogenation means addition of halogen like chlorine or bromine to unsaturated hydrocarbons. In bright sunlight, the reaction of with chlorine is explosive and carbon is deposited.



Q24. Why alkenes are reactive?

Ans. Alkenes are very reactive compounds because the electrons of the double bond are easily available for reaction. The compounds have tendency to react readily by adding other atoms to become saturated compounds.

(iv) Alkanes become less flammable as their sizes increase.

Q.16 How can you identify alkanes?

Ans. When bromine water is added to an alkane, its colour changes from brown to colourless.

Organic compounds are identified from hydrocarbons by the number of carbon atoms or group of atoms that they contain.



Alkanes are a member of series

Q.17 Why colour change occurs in Hydrocarbons?

Ans. Because in the addition of a molecule of bromine to an alkane, the brown colour of bromine water is decolourised.

Compounds are these in which the carbon atoms are arranged along a straight chain or a branched chain.

When colour of bromine water is decolourised, it is called a saturated hydrocarbon.

Q.18 State the structure of ethane.

(i) Ethane

Ans.

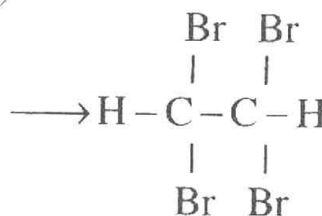
(i) Ethane

It is

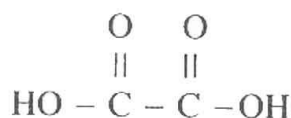
(ii) Alkane

It is a triple bond.

(iii) Alkyne



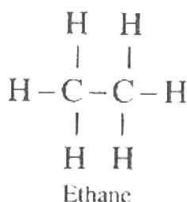
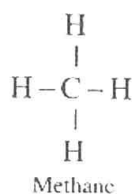
is it an acid?



Alkanes. Give its general formula?

Alkanes are hydrocarbons in which the carbon atoms are connected by only single covalent bond.

Examples:



The general formula of alkanes is $\text{C}_n\text{H}_{2n+2}$

Q.30 What are hydrocarbons?

Ans. Hydrocarbons are organic compounds of carbon and hydrogen elements. They are alkanes, alkenes and alkynes.

Q.31 What are aliphatic hydrocarbons?

Ans. These are the compounds in which the first and the last carbon are not directly joined to each other. These may be straight or branched.

Examples: $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
(n-butane)

$\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_3$
|
 CH_3 (isobutane)

Q.32 Give a few uses of methane?

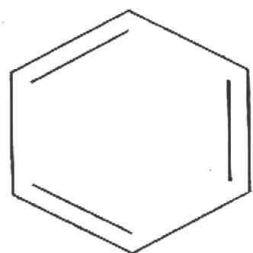
Ans. i. Natural gas is chiefly methane is used as domestic fuel.

ii. Compressed natural gas (CNG) is used as automobile fuel.

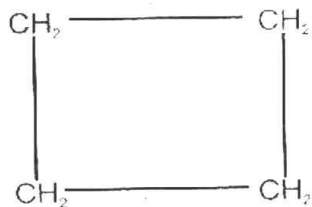
Q.33 What are Cyclic hydrocarbons?

Ans. Compounds having ring of carbon atoms in their molecule are called closed chain or cyclic hydrocarbons.

Examples:



(Benzene)



(Cyclobutane)

Q.34 What are alkenes? Give its general formula?

Ans. Alkenes are unsaturated hydrocarbons having double bond between two carbon atoms the

General formula:

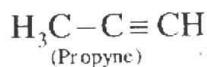
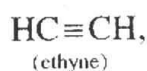


Example: $\text{H}_2\text{C} = \text{CH}_2$ (Ethene)

Q.35 What are alkynes? Give its general formula?

Ans. The hydrocarbon in which two carbon atoms are linked by a triple bond are called alkynes.

Example:



Q.36 Write the sources of alkanes?

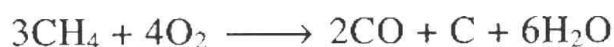
Ans.

- i) The main sources of alkanes are petroleum and natural gas.
- ii) Methane forms about 85% of Natural gas.
- iii) Fuel gases obtained from coal gas contain alkanes in small amount.

Q.37 Why the burning of alkanes require sufficient supply of oxygen?

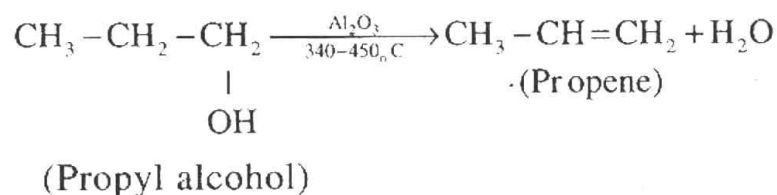
Ans. Because in the limited supply of oxygen there is incomplete combustion. As a result carbon monoxide is produced that creates suffocation and causes death. As shown in chemical reaction equation.

Chemical Equation:

**Q.38 How can you prepare propene from propyl alcohol?**

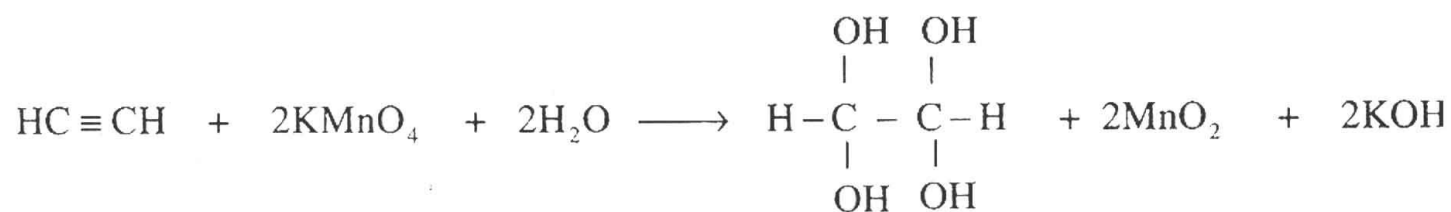
Ans. Dehydration of Alcohols: Alcohols when dehydrated in the presence of a catalyst give alkene. The best procedure is to pass vapours of alcohol over heated alumina.

Chemical Equation:

**Q.39 Give a test to identify unsaturation of an organic compound.**

Ans. Oxidation with KMnO_4 : When unsaturated compounds oxidized with KMnO_4 the pink colour discharged.

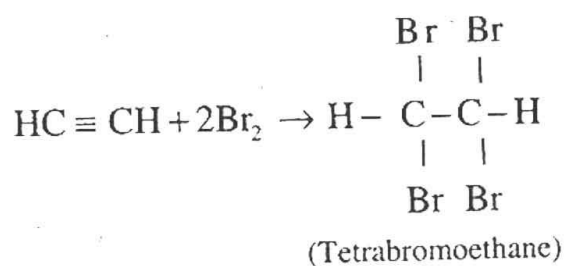
For Example:

i. Reaction with Alkene:**ii. Reaction with Alkyne:**

Q.40 How is tetrabromoethane prepared from acetylene.

Ans. Preparation of Tetrabromoethane from Acetylene: Tetrabromoethane can be prepared by the addition of halogens to the acetylenes what bromine water added to acetylene, red brown colour of bromine water is discharged rapidly due to formation of colourless tetrabromoethane.

Chemical Equation:



Q.41. What is difference between glycol and glyoxal?

Ans.	Glycol	Glyoxal
	1. The functional group in glycol is "hydroxyl group"	1. The functional group in glyoxal is $\begin{array}{c} \text{O} \\ \\ -\text{C}- \end{array}$ group.
	2. The formula of a glycol is $\begin{array}{cc} \text{H}_2\text{C} & - & \text{CH}_2 \\ & & \\ \text{OH} & & \text{OH} \end{array}$	2. The formula of a glyoxal is $\begin{array}{cc} \text{O} & \text{O} \\ & \\ \text{H}-\text{C} & - & \text{C}-\text{H} \end{array}$

Q.42 Why methane is known as marsh gas?

Ans. Methane as a Marsh Gas: Poke around with a stick in the muddy bottom of a pond or marsh. You may see bubbles coming out of the mud. These bubbles are the hydrocarbon gas methane, which is sometimes called 'marsh gas. If you collect the gas in a jam jar you can set fire to it.

Q.43 Which chemicals were produced by orchids to attract the insects for their pollination?

Ans. Orchids: Orchids are beautiful ornamental and colourful flowers. Some orchids produce alkanes to attract bees to pollinate their flowers.

Q.44 Why butane is used in portable torches and gas lighters?

Ans. Propane and butane burn with very hot flames and are sold as liquefied petroleum gas (LPG). They are kept as liquids under pressure, but they vapourize easily when the

pressure is released. Cylinders of butane are used in the homes. Butane is also used in portable torches and gas lighters.

Q.45 Give few physical properties of alkenes.

Ans.

- (i) The first member of alkenes is ethane. It is a colourless gas with pleasant odour.
- (ii) Alkenes are non-polar therefore; they are insoluble in water but soluble in organic solvent.
- (iii) The first member of the series ethane is slightly less dense than air.

Multiple Choice Questions

1. Which one of these hydrocarbon molecules would have no effect on an aqueous solution of bromine?

- (a) CH_4 (b) $\text{C}_{10}\text{H}_{20}$
- (c) C_2H_4 (d) C_2H_2

2. If an organic compound has 4 carbon atoms, all singly bonded, it will have the following characteristics except one

- (a) it will be saturated hydrocarbon
- (b) it will have 8 hydrogen atoms
- (c) its name will be n-butane.
- (d) it will be least reactive

3. The reduction of alkyl halides takes place in the presence of

- (a) Zn/HCl (b) Na/HCl
- (c) Mg/HCl (d) Cu/HCl

4. Halogenation of methane produces following valuable chemical compounds used as solvents except:

- (a) carbontetrachloride
- (b) chloroform
- (c) carbon black
- (d) chloromethane

5. Incomplete combustion of alkanes produces

- (a) carbon dioxide only
- (b) carbon monoxide only
- (c) carbon monoxide carbon black and water
- (d) carbon dioxide and carbon black

6. Alkenes are prepared from alcohols by a process called

- (a) dehydrogenation
- (b) dehalogenation
- (c) dehydration
- (d) dehydrohalogenation

7. Dehydrohalogenation takes place in the presence of

- (a) NaOH aqueous
- (b) alcoholic KOH
- (c) aqueous KOH
- (d) alcoholic NaOH

8. Oxidation of ethene with KMnO_4 produces

- (a) oxalic acid
- (b) glyoxal
- (c) ethene alcohol