

**1. What is organic chemistry?**

**Solution:**

Organic chemistry can be defined as a branch of chemistry, which is concerned with the study of carbon compounds, especially which are found in living things along with its properties, functions and its reactions combined with other elements.

**2. What is Isomerism?**

**Solution:**

Isomerism can be defined as the compounds with the same molecular formula but different structural formulae.

For example: Butane and Isobutane. Here the molecular formula of both Butane and Isobutane is  $C_4H_{10}$  and both differ in their structural formulae.

There are two primary types of isomerism: Structural Isomerism and Stereoisomerism.

**3. Define Hydrocarbons?**

**Solution:**

The compounds which are generally composed of carbon and hydrogen atoms are defined as the Hydrocarbons. Methane ( $CH_4$ ), Ethane ( $C_2H_6$ ), Propane ( $C_3H_8$ ), Butane ( $C_4H_{10}$ ) are examples of hydrocarbons.

**4. What is a homologous series?**

**Solution:**

The series of compounds with the same general formula, fixed set of functional groups, with similar chemical and physical properties are termed as the Homologous series.

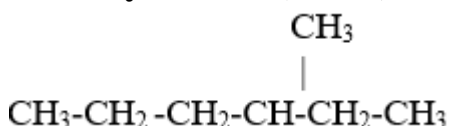
These series usually differ in the length of a carbon chain. For example--Ethane, butane, methane, propane, etc. are all part of the alkane homologous series.

**5. Write the structural formula for the given compounds.**

- 3- Methylhexane
- 4-Methyl-2-butyne
- 2-Butene
- 2- Butyne
- 3,3-Dimethyl hexane

**Solution:**

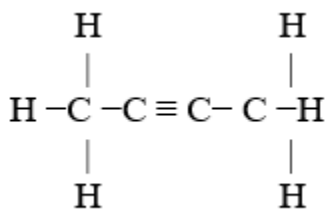
- 3-Methylhexane ( $C_7H_{16}$ )



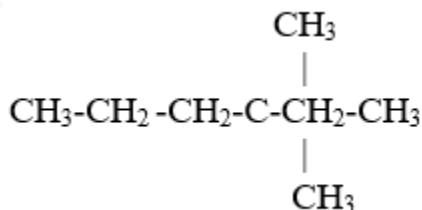
- **4-Methyl-2-butyne ( $C_6H_{10}$ )**  
 $CH_3C \equiv CCH(CH_3)_2$

- **2-Butene ( $C_4H_8$ )**  
 $CH_3 - CH = CH - CH_3$

- **2- Butyne ( $C_4H_6$ )**



- **3,3-Dimethyl hexane ( $C_8H_{18}$ )**



## 6. Define addition reactions with an example?

### Solution:

The chemical reaction in which two or more atoms are added to the double or the triple bond atoms to obtain a saturated product. This process is termed as the additional reaction.

For example:  $C_2H_4 + Cl_2 \rightarrow C_2H_4Cl_2$

Ethene + chlorine  $\rightarrow$  1,2-dichloroethane or ethylene dichloride

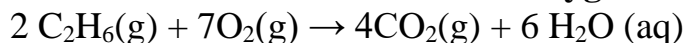
## 7. Write the balanced chemical equations for the following reactions:

- When ethane reacts with chlorine.
- When ethane gas is treated with HCl.
- When ethane is burnt in excess of oxygen.

### Solution:

- When ethane reacts with chlorine.  
 $C_2H_6(g) + Cl_2(g) \rightarrow C_2H_5Cl(g) + HCl(g)$
- When ethane gas is treated with HCl.  
 $C_2H_6(g) + HCl(g) \rightarrow C_2H_5Cl(g) + H_2(g)$

- **When ethane is burnt in excess of oxygen.**

**8. Why is methane (CH<sub>4</sub>) called a greenhouse gas?****Solution:**

Gases that trap heat in the atmosphere are called greenhouse gases. Among all other greenhouse gases, methane is called one of the most potent or the most important because it has an ability to absorb the maximum amount of heat in Earth's atmosphere.

**9. What are the harmful effects of ethanol on the human body?****Solution:**

Ethanol, also called ethyl alcohol. It is a chemical compound with the chemical formula C<sub>2</sub>H<sub>5</sub>OH. It is a volatile, flammable and colorless liquid used as an organic solvent in many alcoholic beverages, chemical and cosmetics industries. The harmful effects of ethanol on the human body include:

1. Drowsiness.
2. Coagulation of protoplasm.
3. Slows down the metabolism.
4. Depresses the central nervous system.
5. In extreme conditions, it can also lead to death.

**10. What is glacial acetic acid?****Solution:**

Glacial acetic acid is also called solid acetic acid. It is anhydrous or water free and a pure form of acetic acid.

**11. What are the physical and chemical properties of alcohol?****Solution:****Physical properties of alcohol**

1. They are toxic.
2. They are colourless liquids.
3. Inflammable volatile liquids.
4. Has a faint odour with burning taste.
5. Soluble both in water and organic solvents.

**Chemical properties of alcohol**

1. Alcohols undergo dehydration (removal of a molecule of water) to form alkenes
2. Alcohols undergo oxidation to produce aldehydes and ketones only in the presence of an oxidizing agent.

**12. What are the sources of alkanes alkynes and alcohols?**

**Solution:**

- The sources of alkanes are- Petroleum and other natural gas.
- The sources of alkynes are- Crude oil, Petroleum and natural gas.
- The sources of alcohols are- Natural sources including plant materials and volatile oils, cholesterol found in most animal tissues and egg yolks, retinol extracted from fish liver oils, etc,

**13. List out the uses of acetic acid?**

**Solution:**

Acetic acid ( $\text{CH}_3\text{COOH}$ ) is used as a solvent and as a chemical reagent for the production of a number of compounds such as:

1. In chemical laboratories.
2. Vinegar in cooking and baking industries.
3. In pharmaceutical and cosmetic industries.
4. In the production of dyes, perfumes, rubber from latex, etc.
5. In the Production of fibers, Varnishes and other packing materials.

**14. What are carboxylic acids? Give the general formula of carboxylic acids.**

**Solution:**

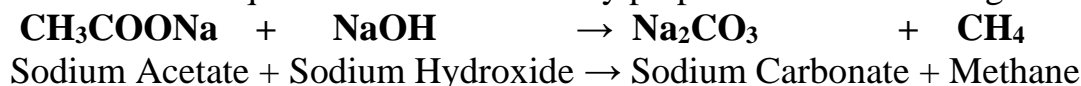
Carboxylic acids are organic compounds containing the carboxyl group ( $\text{COOH}$ ). The general formula of Carboxylic acid is  $\text{C}_n\text{H}_{(2n+1)}\text{COOH}$ .

**15. Explain in detail how methane ( $\text{CH}_4$ ) and ethane ( $\text{C}_2\text{H}_6$ ) are prepared in the laboratory?**

**Solution:**

**Preparation of methane:**

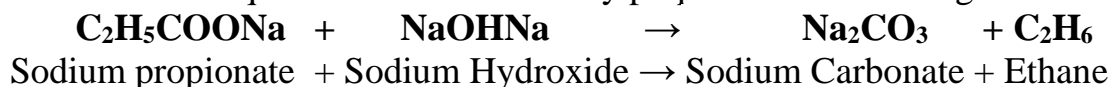
In a hard glass test tube the mixture of powdered sodium acetate and soda lime is taken and heated by fixing the test tube to the delivery tube. As the mixture in the test tube gets heated, the methane gas is produced and is collected by downward displacement of water. The chemical equation for the laboratory preparation of methane gas is:



**Preparation of ethane:**

In the boiling tube, the mixture of sodium propionate ( $\text{C}_2\text{H}_5\text{COONa}$  or  $\text{C}_3\text{H}_5\text{NaO}_2$ ) and soda lime is taken and heated by fixing the test tube to the delivery tube. As the mixture in the boiling tube gets heated, the ethane gas is produced and is collected by downward displacement of water.

The chemical equation for the laboratory preparation of ethane gas is:



### 16. What are the uses of ethene?

**Solution:**

The uses of ethane ( $\text{C}_2\text{H}_6$ ) are:

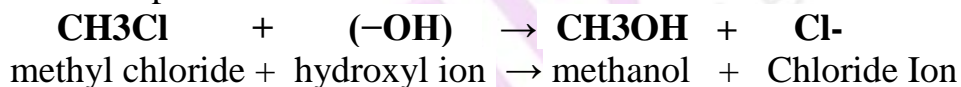
1. It is a good source of fuel.
2. It is also used as a refrigerant.
3. It is used as a component in natural gas.
4. It is used in the preparation of ethene, ethanol, and ethanol.
5. It forms ethyl chloride, which is used to make tetraethyllead.

### 17. Define substitution reaction with examples?

**Solution:**

A reaction in which one atom of a molecule or the functional group of one chemical compound is replaced or substituted by another atom or a group of atoms is called a substitution reaction. This reaction is also known as single displacement reaction or single substitution reaction.

For example:



### 18. Give the structure for the following compounds?

1. Prop-1-ene.
2. Ethanol.
3. 3-hexene.
4. Vinegar.
5. Acetone.

**Solution:**

1. Prop-1-ene -  $\text{CH}_3\text{-CH=CH}_2$
2. Ethanol -  $\text{C}_2\text{H}_5\text{OH}$
3. 3-hexene -  $\text{CH}_3\text{-CH}_2\text{-CH=CH-CH}_2\text{-CH}_3$
4. Vinegar -  $\text{CH}_3\text{COOH}$
5. Acetone -  $\text{C}_3\text{H}_6\text{O}$

### 19. What is pyrolysis or cracking? Explain with an example.

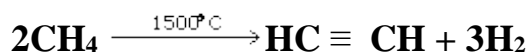
**Solution:**

Pyrolysis is the thermal decomposition of a compound in the absence of air is called Pyrolysis. When the thermal decomposition occurs in alkanes the process is termed cracking.

For example: Cracking of alkanes is the best example of pyrolysis and it is generally performed to convert alkanes into alkenes and shorter alkanes

When Alkanes are heated under a high temperature and in the absence of air, the alkanes are broken down into lower alkanes, alkenes and hydrogen.

The equation for Cracking of Alkanes is



**20. What happens when ethylene ( $\text{C}_2\text{H}_4$ ) is passed through the alkaline  $\text{KMnO}_4$  solution?**

**Solution:**

When ethylene gas is passed through an alkaline  $\text{KMnO}_4$  solution, it reacts with the cold Potassium permanganate solution and forms a very unstable compound called 1, 2-Ethenediol is formed by decolorization of the purple color of  $\text{KMnO}_4$ .

The equation is -  $\text{CH}_2 = \text{C}_2 + \text{H}-\text{O}-\text{H} + [\text{O}] \rightarrow \text{CH}_2(\text{OH}) - \text{CH}_2(\text{OH})$