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CHEMISTRY

Class 10th (KPK)

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UNIT 11
ORGANIC CHHEMISTRY
SHORT QUESTIONS

Q1. Define functional group? Give example of functional groups containing oxygen.

Ans: Functional group:

A functional group is an atom or group of atoms attached with R that is responsible for the specific properties of an organic compound.

Explanation: A functional group is the active part of an organic compound. Most of the organic compounds consist of two parts i.e.

i. The hydrocarbon part which is an alkyl group/

ii. The functional group part.

For example:

In methanol (CH_3-OH),-CH_3 is the alkyl group (R) while –OH is the functional group part.

Example of functional groups containing oxygen:

Examples:

The functional groups containing oxygen are given in the table below:

Functional group	**Name of the classes**	**Examples**	**Name of compound**
-OH	Alcohols	CH_3-OH	Methyl alcohol
-CHO	Aldehydes	CH_3-CHO	Ethanal
-CO-	Ketones	CH_3-CO-CH_3	Propanone
-COOH	Carboxylic acids	CH_3-COOH	Ethanoic acid
-O-R	Ether	CH_3-O-CH_3	Di methyl ether

Q2. How can we obtain the organic compounds from natural sources?

Ans:

Q3. What are cycloalkanes?

Ans: Cyclic alkanes:

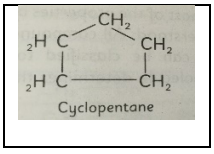
“The type of alkanes in which the carbon atoms are arranged in cyclic form are called cyclic alkanes or cyclo-alkanes**.**

General formula:

Cycloalkanes have two less hydrogen atoms than in corresponding alkanes.

These have the general formula similar to alkenes i.e. C_nH_{n2}

Examples:

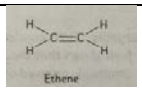
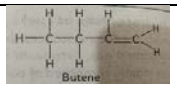
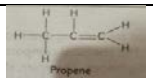


Q4. Write down examples of three unsaturated hydrocarbons with structural and condensed formulae?

Ans: Unsaturated hydrocarbons:

“The hydrocarbons containing at least one carbon-carbon double or triple bond are called unsaturated hydrocarbons”.

Examples of unsaturated hydrocarbons:

Examples	Structural formulae	condensed formulae
1. Ethene		$CH_2 = CH_2$
2. Propene		$CH_2 = CHCH_3$
3. Butene		$CH_2 = CHCH_2CH3$

Q5. Define hydrocarbons, and briefly discuss their importance?

Ans: Hydrocarbons:

The compounds of carbon and hydrogen are called hydrocarbons".

Classification of hydrocarbons: Hydrocarbons are classified into two main groups:

Saturated hydrocarbons (alkanes)

Unsaturated hydrocarbons (alkenes and alkyne)

Importance of hydrocarbons:

Hydrocarbons are most important natural resources. They are used as electric and heat energy because they produce a large amount of heat when burned. Hydrocarbons are the main constituents of petroleum and natural gas. The gasoline that serves as fuel for automobiles consists of hydrocarbons. Natural gas mainly consists of methane and ethane and is used for heating and cooking purposes. Beside fuel hydrocarbons are also used as fragrances, detergents, medicines and many other things.

Q6. How alkyl radicals are formed. Discuss with examples.

Ans: Alkyl radical/group:

"A radical or group of atoms obtained by removing one hydrogen atom from an alkane is called alkyl group".

General formula: The general formula of alkyl radical is C_nH_{2n+1}, where n is the number of carbon atoms i.e. 1,2,3,4 etc

General Symbol: Alkyl radical are denoted by a general symbol-R.

Naming an alkyl radical: Alkyl radicals are named by replacing-ane of corresponding alkane by-yl.

Examples:

Number of C-atoms	Name of alkane	formula (C_nH_{2n+2})	Name of Alkyl Radical	formula (C_nH_{2n+1})
1	Methane	CH_4	Methyl	CH_3
2	Ethane	C_2H_5	Ethyl	C_2H_5
3	Propane	C_3H_8	Propyl	C_3H_7
4	Butane	C_4H_{10}	Butyl	C_4H_9

5	Pentane	C_5H_{12}	Pentyl	C_5H_{11}

Q7. List some uses of organic compounds.

Ans: Uses of organic compounds: The things we use in our daily life are mostly organic compounds such as the food we eat, the clothes we wear etc.

Our dependence on organic compounds is increasing day by day. It has changed our life style.

1: **Uses of as food**: The food we eat in our daily life such as milk,meat,egg,vegetables etc. consists of carbohydrates,proteins,vitamins,fats etc. Which are all organic compounds.

2: Uses as clothing: The clothes we wear are made up of fibres.These fibers are either natural such as cotton, silk, wool etc or synthetic fibers such as nylon, polyester and acrylic etc. All these are organic compounds.

3: Uses as medicine: Most of the medicines that we use are organic compounds. These are naturally synthesized from plants and are used as medicines. Most of the lifesaving drugs such as antibiotics, anti-inflammatory, anti-malarial etc. are synthesized in the laboratory.

4: Uses as fuel: The fuels which we use, such as petrol, diesel oil, compressed natural gas (CNG), coal and natural gas are organic compounds.

5: Uses as chemical materials: The chemicals that we use such as rubber, paper, ink, plastic, fibers, fertilizers, pesticides, insecticides, cosmetics, paints, detergents etc. are all organic compounds.

6: Uses as life molecules: Thousands of organic molecules are taking part in our body functions. There are four main groups of organic molecules that are carbohydrates, proteins, lipids and nucleic acid that combine to build cells and their parts. These molecules are called life molecules.

Q8: Give the general formula of the following homologues series?

Ans:

a. Alkanes	C_nH_{2n+2}
b. Alkenes	C_nH_{2n}
c. Alkynes	C_nH_{2n-2}

Q9. Why organic compounds are volatile in nature?

Ans: Organic compounds are volatile due to the following reason.

Reason: Volatile are those substances which easily evaporate and change into gaseous state at relatively low temperature. The volatility of a substance depends upon the strength of intermolecular attractive forces. Weaker the intermolecular attractive force more volatile will be the substance and vice versa.

Since organic compounds have generally weak inter molecular forces due to their nonpolar nature that is why organic compounds are volatile in nature.

Q10. The chemical properties of a homologous series are always the same?

Ana: The chemical properties of a homologous series are always the same due to the following reason:

Reason: The chemical properties of a homologous series depend on the functional group because it is the functional group which takes an active part in a chemical reaction.

As all the members (homologues) of a homologous series have the same functional group that is why chemical properties of a homologous series are always the same.

LONG QUESTONS

Q1.List the different characteristics of organic compounds.

Ans: Characteristic properties of organic compounds:

Organic compounds have the following general properties:

i. Origin: The main source of organic compounds is plants and animals.

ii. Composition: Carbon is an essential component of all organic compounds. However, beside carbon they also contain hydrogen as essential part. They may also contain some other elements like sulphur, nitrogen, oxygen and halogen.

iii. Thermal instability: Many organic compounds are thermally unstable and decompose to simple substances on heating. This property is of great commercial importance e.g. as in the cracking of petroleum.

iv. Low melting points and boiling points: Organic compounds have generally low melting points and boiling points due to weak intermolecular forces. They can be easily broken down and are generally volatile in nature.

v. Bonding: Organic compounds are generally covalent in nature.

vi. Solubility: As most of the organic compounds are non-polar therefore, they are soluble in non-polar solvent like benzene, acetone, and ether and less soluble or insoluble in polar solvents like water.

vii. Electrical conductivity: Most of the covalent compounds are non-polar therefore, poor conductors of electricity in molten or solution form.

viii. In flammability: Most of the organic compounds are inflammable. They burn out to give carbon dioxide, water vapours and energy.

ix. Reactivity: The reactions of organic compounds are much slower than the inorganic compounds.

x. Isomerism: The compounds having same molecular formula but different structures are called isomers and this phenomenon is called isomerism. Isomerism is common in most organic compounds. For example, butane has two isomers n-butane and iso-butane both have the molecular formula C_4H_{10} but they have different structures.

b. Which of these is not an unsaturated molecule?

i. C_6H_6 ii. C_6H_6 iii. C_8H_{18} iv. C_3H_6

c. **Define destructive distillation of coal. Name the different types of products obtained by the destructive distillation of coal.**

Ans: Destructive distillation:

The heating of a compound in the absence of air is called destructive distillation.

Destructive distillation of coal:

The process in which coal is heated in the absence of air is called destructive distillation of coal.

Products of destructive distillation of coal:

During this process, the coal is converted into coal gas, coke and coal tar and ammmonical liquior, which are the sources of other organic compounds.

Q2. What is catenation?

Ans: Catenation:

The self-linking ability of carbon atoms to covalently bond with other carbon atom to form straight chain, branched chain and rings is called catenation.

b. How does catenation contribution to the diversity of organic compound?

Ans: Catenation contribute to the diversity of organic compound by allowing carbon atoms to bond together in many possible arrangement .Due to catenation variety of molecules with different structures including chains and rings of many shapes and sizes are formed which have different properties.
Examples:

Q3. What information about a compound is provided by structural formula?

Ans: Structural formula:

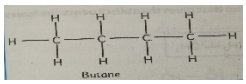
Structural formula of a compound is the arrangement of different atoms of various elements around the carbon atoms present in a molecule of a compound.

Importance:

A structural formula shows number and types of atoms present in a molecule and also shows the bonding arrangement of the atoms.

In structural formula, all the bonds are shown with their exact number. Single bonds are represented by a single line between the bonded atoms.

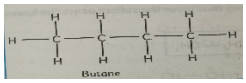
Example: Structural formula of butane C_4H_{10},



b. How are structural formula used in organic chemistry?

Ans: structural formula have particular importance in the study of organic chemistry. They show the arrangement of atoms in the molecules as far as which atoms are bonded to which and whether single, double, or triple bonds are used.

For example, the molecular formula C_4H_{10} does not tell which atoms are bonded to which other atoms but structural formula shows all arrangement. For example:



Q4. (A). what do term saturated and unsaturated mean when applied to hydrocarbons?

Ans: Hydrocarbons:

The compounds of carbon and hydrogen are called hydrocarbons".

Classification of hydrocarbons: Hydrocarbons are classified into two main groups:

i. Saturated hydrocarbons (alkanes)
ii. Unsaturated hydrocarbons (alkenes and alkynes)

i. Saturated hydrocarbons: "The hydrocarbons which contain all carbon-carbon single bonds are called saturated hydrocarbons or alkanes".

General formula: They have the general formula of C_nH_{2n+2}, where n is the number of carbon atoms.

Examples:

Methane (CH_4), Ethane (C_2H_6), propane (C_3H_8) and butane (C_4H_{10}) etc are the examples of saturated hydrocarbons.

ii. Unsaturated hydrocarbons: "The hydrocarbons containing at least one carbon-carbon double or triple bond are called unsaturated hydrocarbons". They are further classified to:

a. Alkenes: "The hydrocarbons which contain at least one carbon-carbon double bond are called alkenes".

General formula: They have the general formula of C_nH_{2n}, where n is the number of carbon atoms.

Example:

Ethene (C_2H_4), propene (C_3H_6), Butene (C_4H_8) and pentene (C_5H_{10}) are the examples of alkanes.

b. Alkyne: The hydrocarbons which contain at least on carbon─carbon triple bonds are called alkynes."

General formula: They have the general formula of C_nH_{2n-2}, where n is the number of carbon atoms.

Examples: Ethyne (C_2H_2), propyne (C_3H_4), butyne (C_4H_6), and pentyne (C_5H_8) etc are the examples of alkynes.

b. What other meanings do these term have in chemistry?

Ans: Saturated:

In chemistry term saturated also refer to chemical solutions. A solution which can't dissolve more solute is called saturated solution.

Unsaturated:

A solution which can dissolve further amount of solute to form a saturated solution is called Unsaturated solution.

c. Classify alkenes, alkanes, alkynes, and aromatic hydrocarbons as either saturated or unsaturated.

Ans: Alkanes: The hydrocarbons which contain all carbon-carbon single bonds are called saturated hydrocarbons. As alkanes contain all C-C singles bonds so alkanes are saturated hydrocarbons.

Unsaturated hydrocarbons: The hydrocarbons containing at least one carbon-carbon double or triple bond are called unsaturated hydrocarbons. Alkenes and alkynes contain double and triple bonds and aromatic hydrocarbons contain alternate single and double bonds. So, alkenes, alkynes and aromatic hydrocarbons are unsaturated.

Q5. Can you explain the term homologous series?

Ans: Homologous series :(Homo = same, logos = properties). "A serried of organic compounds having same chemical properties but each member differs from the adjacent member by methylene group (-CH_2-) is called homologous series while each member of homologous series is called homologue".

Properties of homologous series:

i. They have the same general formula.
ii. They have the same functional group.
iii. They have same chemical properties.
iv. Each member of homologous series differs from adjacent member by –CH_2- group.
v. They have the same general methods of preparations.

Examples:

There are seven homologous series of the organic compounds they are hydrocarbons, alcohols, carboxylic acids, carbonyl compounds (aldehydes and ketones), ethers, amines and alkyl halides.

b. How straight chain hydrocarbons are named.

Naming of alkanes (nomenclature): "The naming of alkanes under certain rules is called nomenclature".

Rules for naming alkanes (straight chain): Simple straight chain alkanes can be named by the following rules:

i. Count the number of carbon atoms in the formula of alkanes.
ii. Give prefixes meth for 1, eth for 2, prop for 3, but for 4 carbon atoms respectively etc.
iii. Add suffix-ane to the corresponding prefix. Thus, the full name of simple straight chain alkane is obtained.

Examples:

Chemical formula (C_nH_{2n+2})	Number of C-atoms	Greek numerals (Prefixes)	Full Name
CH_4	1	Meth-	Methane
C_2H_5	2	Eth-	Ethane
C_3H_8	3	Prop-	Propane
C_4H_{10}	4	But-	Butane
C_5H_{12}	5	Pent-	Pentane
C_3H_{14}	6	Hex-	Hexane
C_7H_{16}	7	Hept-	Heptane
C_8H_{18}	8	Oct-	Octane
C_9H_{20}	9	Non-	Nonage
$C_{10}H_{22}$	10	Dec-	Decane

C. name the straight chain alkane with the molecular formula C_8H_{18}.

Ans: As the number of carbon atom is eight and the prefix Greek numerals oct is used for 8. So, the name of given compound **C_8H_{18}** is octane.

TOPIC WISE QUESTIONS

Q1.What is vital force theory? Why it was rejected?

Ans: Vital force theory:

According to this theory organic compounds cannot be prepared in laboratory. They are only prepared in the bodies of living organisms under the influence of a supernatural force called vital force.

For example:

Urea (from urine), tartaric acid (from grapes), citric acid (from lemon) and sucrose (from cane sugar) are organic compounds.

Rejection of vital force theory:

In 1828, a German chemist Friedrich Wohler prepared an organic compound (urea) in the laboratory by heating ammonium connate and rejected the vital force theory.

Ammonium cynate is obtained by heating solid ammonium chloride with solid potassium cynate.

$NH_4CI_{(s)} + KCNO_{(s)} \rightarrow NH_4CNO_{(s)} + KCI_{(s)}$

$NH_4CNO_{(s)} \rightarrow H_2NCONH_2$ (urea)

Q2. Define organic compounds and organic chemistry?

Ans: Organic compounds:

“The compounds of carbon and hydrogen called hydrocarbons and their derivatives are called organic compounds”.

Composition of organic compounds:

All organic compounds contain carbon and hydrogen as an essential ingredient beside these elements they may also contain halogens, sulphur, oxygen, nitrogen.

Derivatives of hydrocarbon:

When hydrogen atom of hydrocarbon is replaced by an atom or group of atoms then the resulting compound will be the derivate of that hydrocarbon.

For example:

If we remove one H from ethane C_2H_6 then ethyl group (C_2H_5) is obtained thus ethyl alcohol(C_2H_5OH), ethyl chloride (C_2H_5CI), ethyl bromide (C_2H_5Br) are the examples of derivatives of ethane.

Organic chemistry:

“The branch of chemistry which deals with the study of hydrocarbons and their derivatives is called organic chemistry”. For example in this branch we study about alkanes like methane, alcohols like ethyl alcohol etc.

Q3. Define molecular, structural, condenced and dot and cross formula?

Ans: Molecular formula:

The formula which represents the actual number of atoms in one molecule of organic compound is called the molecular formula.

Example:

The molecular formula of propane is C_3H_8, and butane is$C_4H_{10,}$

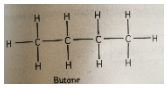
It shows that propane consists of three carbon and eight hydrogen atoms and

Structural formula:

The structural formula a compound is the arrangement of different atoms of various elements around the carbon atoms present in a molecule of a compound.

Example:

Structural formula of butane is.



Condensed formula:

The condensed formula of a molecule is the formula where the groups of atoms are shown in order as they appear in the structural formula with no bonds or dashes.

Example:

Hexane has six carbon and fourteen hydrogen atoms with molecular formula of C_6H_{14}. The condensed formula of hexane is $CH_3(CH_2)_4CH_3$.

Dot and cross formula:

A structural formula in which electrons are shown as dots and cross between various atoms in one molecule of a compound are called dot and cross formula**.**

Example:

In methane molecule, the four electrons of carbon is represented by dots (●) and cross **(×)** is used to represent the electrons of four hydrogen atoms. The molecules of methane and of propane is shown below.

Q4. Explain the classification of organic compound?

Ans: Classification of Organic compound: On the basis of structure of carbon chain, organic compound are classified into the following two groups:

i. Open chain alkanes

ii. Cyclic alkanes

i. Open chain organic compound or aliphatic organic compound: "The type of organic compound which consist of open chain of carbon atoms are called open chain or aliphatic organic compound". Open chain organic compound are further classified into two types which are given below:

a. Straight chain organic compound s: "The type of open chain organic compound which contain straight chain of carbon in their molecules are called straight chain organic compound".

A carbon atom in straight chain organic compound is not directly bonded to more than two carbon atoms. They are commonly named as n-alkanes (normal-alkanes).

Examples:

Some examples of straight chain alkanes are given below:

CH_3-CH_2-CH_2-CH_3 (n-butane)

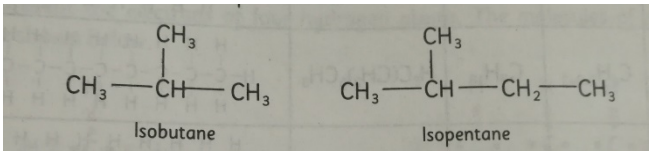
CH_3-CH_2-CH_2-CH_2- CH_3 (n-pentane)

CH_3-CH_2-CH_2-CH_2- CH_2-CH_3 (n-hexane)

b. Branched chain organic compound: "The type of open chain organic compound which do not contain straight chain of carbon in their molecules are called straight chain organic compound".

At least one carbon atom in branched chain alkanes is directly bonded to more than two carbon atoms. They are commonly named as iso-alkanes.

Examples:



ii. Cyclic alkanes: "The type of organic compound in which the carbon atoms are linked together to form a close chain structure

Are called cyclic alkanes or cyclo-alkanes".

These have the general formula similar to alkenes i.e. C_nH_{n2}

The closed chain alkanes are further divided into two groups. These are,

i. Homocyclic or Carbocyclic organic compound

ii. Heterocyclic organic compound

i. Homocyclic or Carbocyclic organic compound:

Organic compounds which are in close chain structure are called Homocyclic compounds. The ring is composed of only carbon atoms.

Homocyclicorganiccompound are further divided into two types.

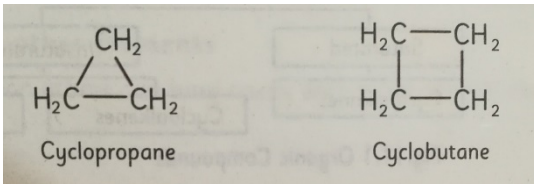
a. Ali-cyclic organic compound
b. Aromatic organic compound

a.Ali-cyclic organic compound:

The cyclic organic compound which is composed of only carbon atom is called Ali-cyclic organic compound.

These organic compounds have properties similar to open chain organic compound but differ in their structure and formulae.

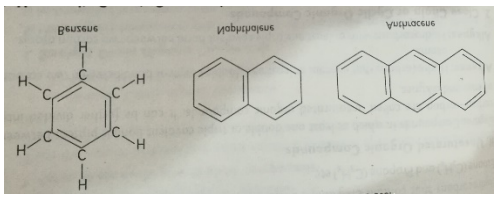
Example:



Aromatic organic compound:

The cyclic organic compound having alternate single and double bonds in its structure are known as aromatic organic compounds.

Examples:



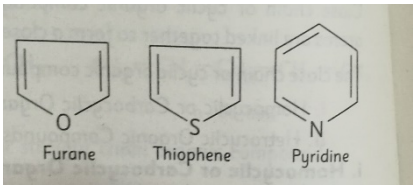
The important member of this class is benzene and the derivatives of benzene i.e. Naphthalene, Anthracene.

ii. Heterocyclic organic compound:

The organic compound which contain one or more atoms other than carbon such as sulphur, oxygen or nitrogen in the ring are called heterocyclic organic compound.

Example:

Examples are furan, thiophene and pyridine.



Q5. What are alkanes? Give examples.

Ans: Alkanes:

"The saturated hydrocarbons containing all carbon carbon single bonds are called alkanes or pyramids.

Reason of calling paraffin's: Paraffin is a Latin word meaning "little affinity". Since alkanes contain C-C and C-H single bonds, therefore they have little affinity towards chemical reactions that is why they are called paraffin's.

Reason of calling saturated hydrocarbons: Since in alkanes each carbon atom is bonded with four other atoms, therefore no further atom can be added to alkanes. Hence, they are called saturated hydrocarbons.

General formula: The general formula of alkanes is C_nH_{2n+2} where n is the number of carbon atoms e.g. if n=1 then the formula will be CH_4 which is called methane. Similarly, if n=2 then the formula will be C_2H_6 called ethane etc.

Example:

S. No.	Name of alkane	Chemical formula (C_nH_{2n+2})
1	Methane	CH_4
2	Ethane	C_2H_6
3	Propane	C_3H_8
4	Butane	C_4H_{10}
5	Pentane	C_5H_{12}

Q7. Describe the sources of organic compound?

Ans: Sources of organic compounds:

Sources of organic compounds may be natural or they may be prepared synthetically.

Natural sources of organic compounds: Coal, petroleum and natural gas are then main sources of large variety of organic compounds. They are called fossil fuels. Similarly, plants are also a source of organic compounds.

Formation of fossil fuels:

Coal, petroleum and natural gas are called fossil fuels because they are formed from the decay of plants and animals buried under ground. After a long period of time the plants and animals buried under ground. After a long period of time the plants and animals were changed to fossil fuels.

The detail of natural sources is given below:

i. Coal: Coal is a brown black solid mass and a major source of organic compounds.

Formation of coal: coal is formed from the remain of plants. Under the chemical and bacterial action on the remain of plants and trees, It is converted into peat. Peat under high temperature and pressure is converted into coal.

Coal as a source of organic compound:

Coal is a rich source of organic compounds. These organic compounds are obtained by the process of destructive distillation.

Destructive distillation of coal:

The process in which coal is heated in the absence of air is called destructive distillation of coal.

Products of destructive distillation of coal:

During this process, the coal is converted into coal gas, coke and coal tar and ammmonical liquior, which are the sources of other organic compounds.

Uses: Coal is a major source of organic compounds. It is used as a solid fuel.

ii.Petroleum:

Petroleum is the combination of two Latin words pet means rock, and oleum means oil.

Petroleum is also an important source of organic compounds. It may be defined as follows:

“A dark brown coloured and unpleasing smelling liquid that consists of mixture of various hydrocarbons, found in sedimentary rock of earth is called petroleum”.

It is also called rock oil, crude oil and liquid gold.

Composition of petroleum: Petroleum consists of hydrocarbons majority of which are open and cyclic alkanes and aromatic compounds.

Uses: After refining petroleum is used as a fuel in the form of petrol, diesel, kerosene etc. It is also used for the production of useful products like synthetic rubber, plastics and explosives etc.

iii. Natural gas: It is also a natural source of organic compounds. It may be defined as:

"A flammable gaseous mixture consisting of low molecular hydrocarbons found naturally inside earth is known as natural gas". It is usually found together with petroleum.

Composition: Natural gas consists of low boiling point hydrocarbons. These hydrocarbons are 85% methane and 15% ethane, propane and butane. It may also contain small amounts of hydrogen sulphide (H_2S), nitrogen (N_2) and (CO_2) which are often removed during refining process.

Uses: Natural gas is used as fuel for domestic as well as industrial purposes. It is also used as a fuel in automobiles as compressed natural gas (CNG). It is also used for the preparation of carbon black and also as a basic raw material in the preparation of fertilizers.

iv.Plants: Plants are the main source of organic compounds. These compounds are mainly protein, carbohydrates, vitamins, fats and oils. these compounds are obtained from plants in the form of leaves, stems, fruits, flowers**,** seed sand roots etc. these compounds are called **Natural products.**

v. Animals: Animals are also good source of organic compounds. Most organic compounds such as protein, carbohydrates, vitamins, fats, etc are obtained from animals in form of milk, meat, butter and egg etc

Synthetic sources: Organic compounds are also prepared in laboratory and industries. In earlier times it was thought that organic compounds cannot be prepared in laboratory (Vital force theory) but after the synthesis of urea (H_2NCOH_2) from inorganic compound this theory was rejected and a large number of organic compounds were prepared in the laboratory and industries.

Q8. What is functional group? Explain with examples.

Ans: Functional group:

A functional group is an atom or group of atoms attached with R that is responsible for the specific properties of an organic compound.

Explanation: A functional group is the active part of an organic compound. Most of the organic compounds consist of two parts i.e.

i. The hydrocarbon part which is an alkyl group/

ii. The functional group part.

For example:

In methanol (CH_3-OH),-CH_3 is the alkyl group (R) while –OH) is the functional group part.

Classification of functional groups: Functional groups can be classified into following types:

i. Functional groups containing Carbon, Hydrogen and Oxygen:

Organic compounds containing carbon**,** hydrogen and oxygen as a functional groups are alcohols (-OH) Carbonyl compound which may be aldehydes or ketones (C=O), ethers (-O-) and carboxylic acids (-COOH) and the derivatives such as esters, acid halides and acid amides.

Examples:

Functional group	**General formula**	**Name of the classes**	**Examples**	**Name of compound**
-OH	R-OH	Alcohols	CH_3-OH	Methyl alcohol
-CHO	R/H- CHO	Aldehydes	CH_3-CHO	Ethanal

-CO-	R-CO-R	Ketones	CH_3-CO-CH_3	Propanone
-COOH	R-COOH	Carboxylic acids	CH_3-COOH	Ethanoic acid
-O-R	R-O-R	Ether	CH_3-O-CH_3	Di methyl ether

ii. **Functional groups containing C, H and N:** functional groups containing carbon hydrogen and nitrogen are called amines. Functional group of amines is -NH_2. The general formula is R-NH_2. For examples methyl-amine (CH_3-NH_2)

iii. **Functional groups containing C,H and X:**

Functional groups containing carbon hydrogen and halogens are called alkyl halides. Functional group of alkyl halides is halogens represented by 'X'. The general formula is R-X. X may be F, Cl, Br, or I for examples methyl-chloride (CH_3-Cl)