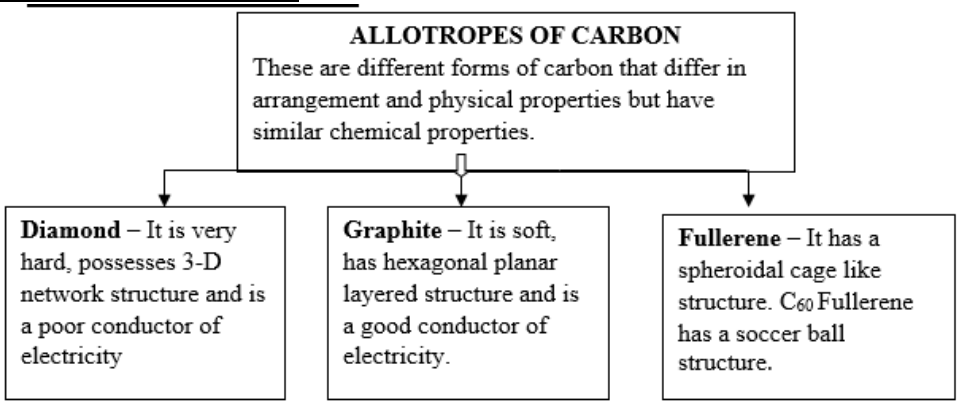
TERM 2

CHAPTER-4CARBON AND ITS COMPOUNDS

IMPORTANT POINTS

The chemical symbol of Carbon is C. Its atomic number is 6 and mass number is 12.It is a non-metallic element.

ALLOTROPES OF CARBON



VERSATILE NATURE OF CARBON

VERSATILE NATURE OF CARBON

Catenation: Self linking property of carbon atoms through covalent bonds to form a long chain and rings.

Tetravalency: Carbon has a valency of four. It has the tendency to form covalent bond.

ISOMERISM - The phenomenon in which a compound has the same molecular formula but different structures is called isomerism.

ISOMERS -The compounds which have the same molecular formula but different structuresand different properties are called isomers.
IUPAC – International Union of Pure and Applied Chemistry.

FUNCTIONAL GROUPS: Atoms or group of atoms responsible for the chemical properties of an organic compound.

ORGANIC COMPOUNDS

These are carbon compounds obtained from natural substances and occur within living systems. Carbon compounds, except for oxides of carbon, carbonate and hydrogen carbonate salts are studied under organic chemistry.

Hydrocarbons -Compounds containing carbon and hydrogen only

Unsaturated Hydrocarbons: Carbon compounds having double or triple bond between carbon atoms.

Alkenes are unsaturated hydrocarbons having double bond. Represented by general formula C_nH_{2n}

Alkynes are unsaturated hydrocarbons having triple bond. Represented by general formula C_nH_{2n-2}

Saturated Hydrocarbons: carbon compounds having single bond between the carbon atoms.

Alkanes are saturated hydrocarbons. Represented by general formula C_nH_{2n+2}

Saturated cyclic compounds.

E.g. cyclopropane, cyclobutane, cyclopentane, etc

Aromatic Hydrocarbons They are unsaturated cyclic hydrocarbon containing one or more benzene rings.

- In a hydrocarbon chain, one or more hydrogens can be replaced by some other element .In such compounds, the element replacing hydrogen is referred to as a **heteroatom**

Functional group	Symbol/for mula	Prefix/suffix	Compound name
Halo	-Cl, -Br, - I	Halo (prefix)	Haloalkane
Alcohol	-OH	-ol	Alkanol
Aldehyde	-CHO	-al	Alkanal
Ketone	- CO -	-one	Alkanone
Carboxylic acid	-COOH	-oic acid	Alkanoic acid

HOMOLOGOUS SERIES –A series of compounds having same functional group and similar chemical properties but differ by--CH_2 unit between two successive members.

SOME IMPORTANT ORGANIC COMPOUNDS

Ethanol.C_2H_5OH

Reaction with sodium

$2Na+2CH_3CH_2OH \rightarrow 2CH_3CH_2O^-Na^+ + H_2$

Dehydration reaction

$CH_3CH_2OH \xrightarrow{\text{Hot conc}H_2SO_4} CH_2{=}CH_2 + H_2O$

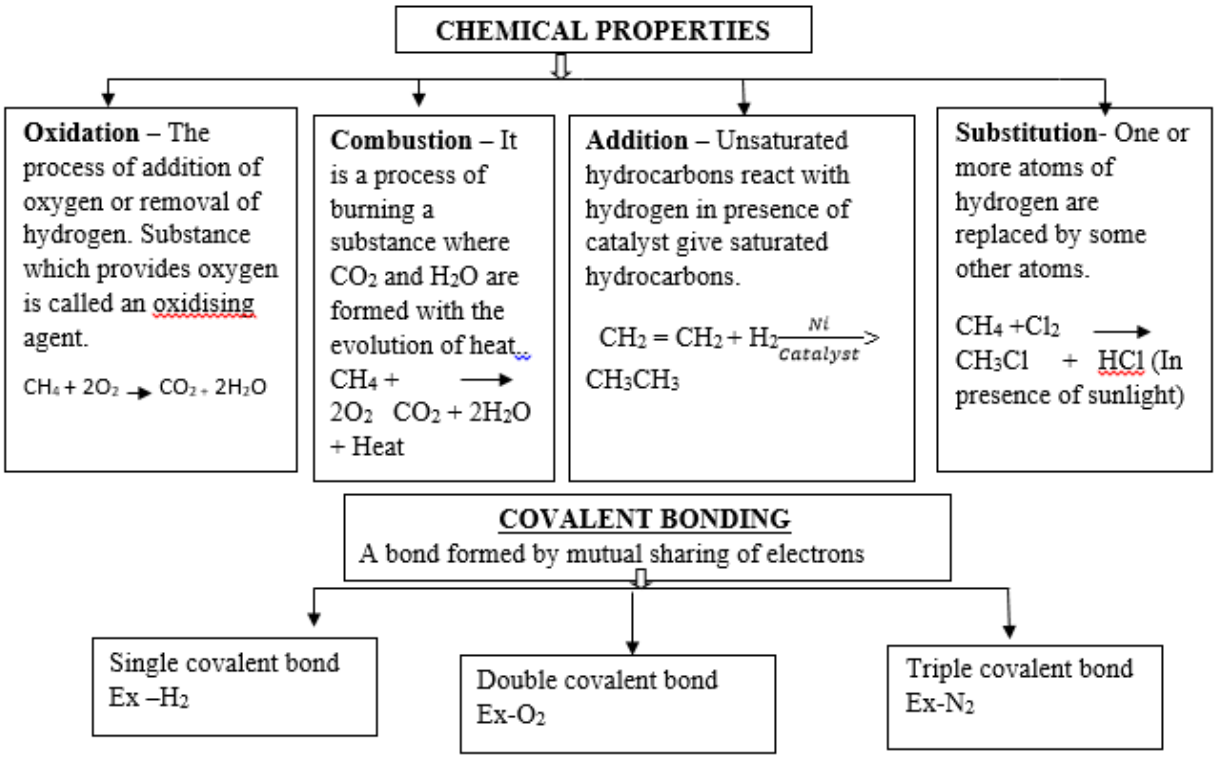
Ethanoic Acid, CH_3COOH

Esterification reaction-

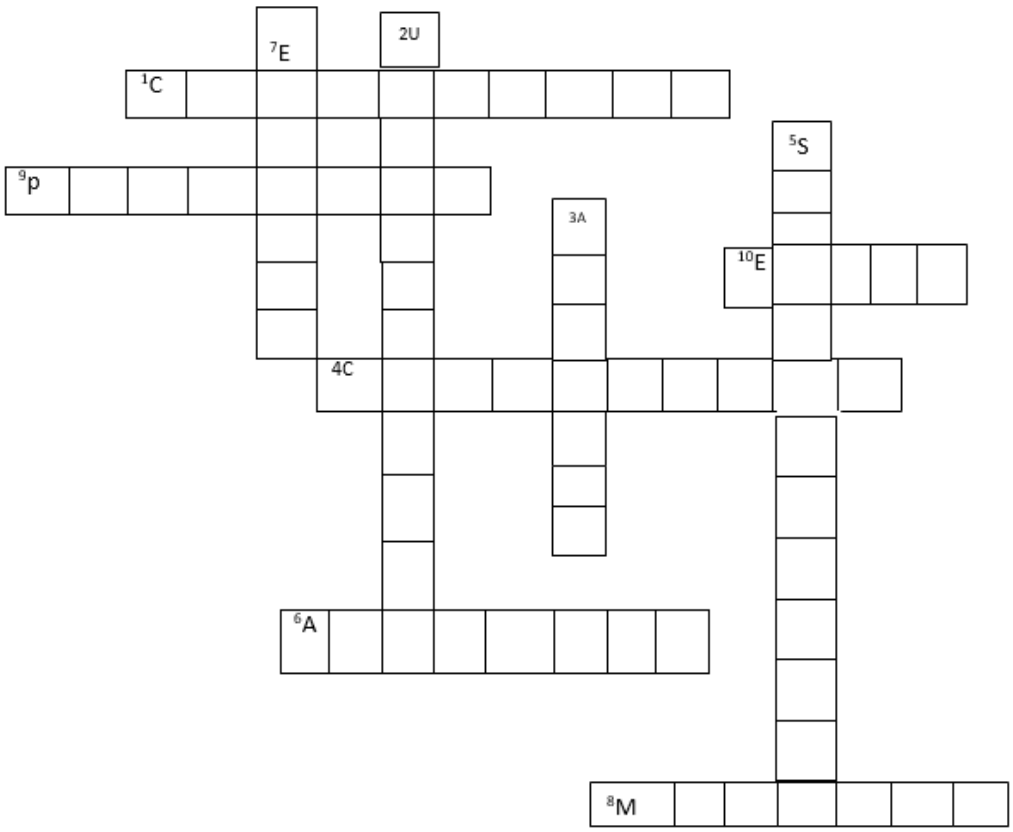
$CH_3COOH + C_2H_5OH \xrightarrow{H_2SO_4} CH_3COOC_2H_5 + H_2O$

Soaps-The reaction between an ester and hot base to give original alcohol and carboxylic acid back is called saponification reaction because this reaction is used in the preparation of soaps.

Detergents are sodium salts of long chain sulphonic acids.



CROSSWORD



1. Self linking property of carbon
4. Acid having functional group –COOH
6 .Hydrogenation of vegetable oil is ---- reaction
8. Simplest hydrocarbon
9 IUPAC name of next higher homologous of ethanol
10. The substance used in making perfumes and flavoring agents

DOWN

2. Hydrocarbon burns in air with sooty flame.
3. The functional group present in methanol.
5. Chlorination of alkanes is -------- reaction
7. The active ingredient of all alcoholic drinks.

Question Bank

Answer the following questions.

Very short answer questions (1 mark)

1. Which of the following formulae represents a saturated hydrocarbon?

CnH2n, CnH2n-2, CnH2n+2, CnH2n+1

2. Draw the electron dot structure of Ethene .

Short answer question (2mark)

1. Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

2. What is meant by denatured alcohol? What is the need to denature alcohol?

Short answer question (3 mark)

1. An organic compound A of molecular formula C_2H_6O on heating with excess of conc.H_2SO_4 gives compound B of molecular formula C_2H_4 .Compound B on reduction gives compound C of molecular formula C_2H_6.

a) Name A, B and C.
b) Write the chemical equation for the conversion of A to B
c) What is the role of conc.H_2SO_4 in above equation? (HOTS)

VALUE BASED QUESTION

Meera and her mother were travelling in a CNG auto. The auto driver took the auto to the CNG filling station for filling the empty cylinder. Meera asked her mother about the gas used to fill the cylinder. Her mother replied that the gas used was CNG.CNG is used in place of petrol or diesel because it is cheaper, pollution free and eco-friendly.
Answer the following questions
a) What is the long form of CNG?
b) Name the main constituent of CNG.
c) What value have you leant after reading the text?

Long answer question (5 mark)

1. An organic compound with molecular formula $C_2H_4O_2$ produces brisk effervescence on addition of sodium carbonate /bicarbonate.

a .Identify the organic compound.
b. Name the gas evolved.
c. How will you test the gas evolved ?
d. Write the chemical equation for the above reaction.
e. List two important uses of the above compound (HOTS)
2 .a. List two reasons for carbon forming a large number of compounds.

b. Name the type of bonding found in most of the carbon compounds. Why does carbon form compounds mainly by this kind of bonding?

c. Give reason.

(i) Carbon compounds generally have low melting and boiling points.
(ii) Carbon compounds do not conduct electricity .

Multiple choice questions

1. Vinegar is a solution of
(a) 50% – 60% acetic acid in alcohol
(b) 5% – 8% acetic acid in alcohol

(c) 5% – 8% acetic acid in water
(d) 50% – 60% acetic acid in water

2. On adding $NaHCO_3$ to acetic acid, a gas is evolved which turns lime water milky due to formation of

(a) Calcium bicarbonate
(b) Calcium hydroxide
(c) Calcium carbonate
(d) Calcium acetate

3. Dilute acetic acid wasadded to the fourtest tubescontainingthe followingchemical.
i.KOH ii.$NaHCO_3$iii.K_2CO_3 iv. NaCI
Brisk effervescence wasobserved in test tubes
a)i &ii b) ii&iiic)i&ivd)ii&iii

4. Few drops ofethanoic acid was added to solidsodium carbonate .Theobservation madewasthat
a. Apungentsmellinggasevolvedb. Brownfumesevolved.c. Briskeffervescenceoccurred.d. Ahissingsound wasevolved

5 .2 ml pf acetic acid was added in drops to 5ml of water it was noticed that:
a. Apink and clear solution was formed.
b.Water formed a separate layer on the top of the acid.
c .A clear and homogenous solution was formed.
d. The acid formed a separate layer on the top of water

Practical based question (2 marks)

1.1mlglacialacetic acidand 1ml ofethanol aremixedtogetherin a test tube. Few drops of concentrated sulphuricacid is added in themixturearewarmed in a waterbath for5 min.
a.Name theresultant compound formed.
b.Represent the above changebya chemical equation .
c.What term is given to such areaction
d.Whatarethe special characteristics of the compound formed.

2. An organic compound with molecular formula $C_2H_4O_2$ produces brisk effervescence on addition of sodium carbonate /bicarbonate.
a .Identify the organic compound.
b. Name the gas evolved.