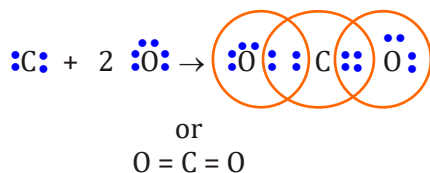


NCERT QUESTIONS WITH SOLUTIONS

1. What would be the electron dot structure of carbon dioxide which has formula CO_2 ?

Ans. In carbon dioxide molecule, the two oxygen atoms are bonded on either side with carbon atom by double bonds. Thus, there are 2 double bonds in CO_2 . Carbon share its two electrons in the formation of a double bond with one oxygen atom and another two electrons with another oxygen atom.

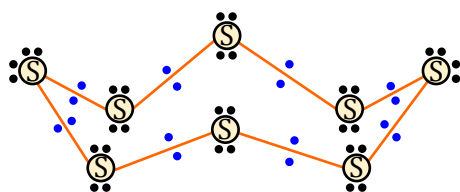
In this process, both the oxygen atoms and the carbon atom acquire the stable electronic configuration of the noble gas neon. The formation of CO_2 molecule is shown below.



Valencies of C and O are 4 and 2 respectively.

2. What would be the electron dot structure of a molecule of sulphur which is made up of eight atoms of sulphur?

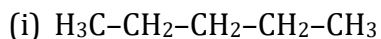
Ans. The eight atoms of sulphur are joined together in the form of a puckered ring (crown shape).



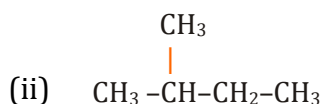
Electron dot structure of sulphur

3. How many structural isomers can you draw for pentane?

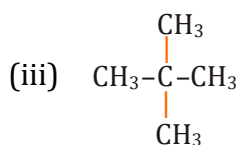
Ans. Pentane (C_5H_{12}) (3 isomers)



Pentane or n-pentane



2-Methylbutane or iso-pentane



2,2-Dimethylpropane or neo-pentane

4. What are the two properties of carbon which led to the huge number of carbon compounds we see around us?

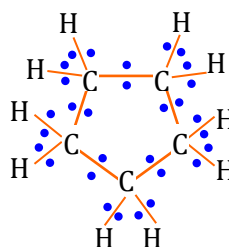
Ans. (i) Catenation

(ii) Tetravalency

5. What will be the formula and electron dot structure of cyclopentane?

Ans. Cyclopentane (C_5H_{10})

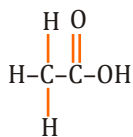
Electron dot structure



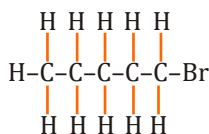
6. Draw the structure for the following compounds:

- (i) Ethanoic acid (ii) Bromopentane
(iii) Butanone (iv) Hexanal

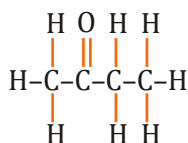
Ans. (i) Ethanoic acid(CH_3COOH)



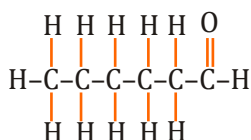
(ii) Bromopentane($\text{C}_5\text{H}_{11}\text{Br}$)



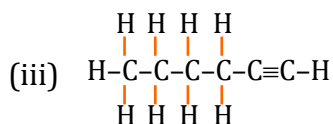
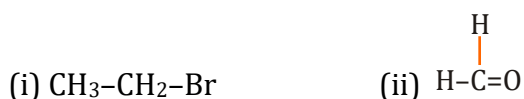
(iii) Butanone($\text{CH}_3\text{COC}_2\text{H}_5$)



(iv) Hexanal($\text{C}_5\text{H}_{11}\text{CHO}$)



7. How would you name the following compounds?



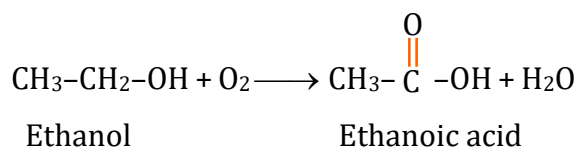
Ans. (i) Bromoethane

(ii) Methanal

(iii) Hexyne

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

Ans. The reaction showing the conversion of ethanol to ethanoic acid can be shown as:



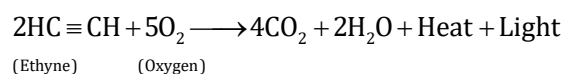
A molecule of ethanol contains one oxygen alone while that of ethanoic acid contains two oxygen atoms.

Since oxidation involves addition of oxygen therefore, conversion of ethanol to ethanoic acid is an oxidation reaction.

Alternatively, a molecule of ethanol contains six hydrogen atoms while that of ethanoic acid contains four hydrogen atoms since oxidation involves removal of hydrogen, therefore conversion of ethanol to ethanoic acid is an oxidation reaction.

9. A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used?

Ans. Ethyne is an unsaturated hydrocarbon, therefore, combustion of ethyne in air produces a yellow flame with black smoke due to the presence of unburnt carbon in it. Due to this incomplete combustion heat produced is also low and a high temperature usually needed for welding cannot be attained. That is why mixture of ethyne and oxygen is used:



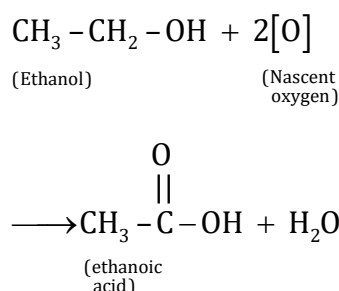
10. How would you distinguish experimentally between an alcohol and a carboxylic acid?

Ans. Sodium bicarbonate test

Take a small amount of each compound in a test tube and add to it an aqueous solution of NaHCO_3 . The compound which produces brisk effervescence due to the evolution of CO_2 must be a carboxylic acid.

11. What are oxidising agents?

Ans. Oxidising agents are substances which are capable of adding oxygen to other substances, for examples, both alkaline potassium permanganate and acidified potassium dichromate can convert ethanol to ethanoic acid.



12. Would you be able to check if water is hard by using a detergent?

Ans. No, because no scum formation takes place when detergent is added to hard water.

13. People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?

Ans. On addition of soap in water, formation of micelle takes place in which soap is attracted both by the oily dirt and water. Due to this, emulsion of oil in water is formed. To wash away the loosened dirt particle in form of micelles from the surface of cloth, agitation is required.

14. Ethane, with the molecular formula C_2H_6 has

- (1) 6 covalent bonds
- (2) 7 covalent bonds
- (3) 8 covalent bonds
- (4) 9 covalent bonds

Ans. (2)

15. Butanone is a four-carbon compound with the functional group,

- (1) carboxylic acid
- (2) aldehyde
- (3) ketone
- (4) alcohol

Ans. (3)

16. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that

- (1) the food is not cooked completely.
- (2) the fuel is not burning completely.
- (3) the fuel is wet.
- (4) the fuel is burning completely.

Ans. (2)

17. Explain the nature of the covalent bond using the bond formation in CH_3Cl .

Ans. Atomic number of C, H and Cl are 6, 1 and 17 respectively.

Their electronic configurations are

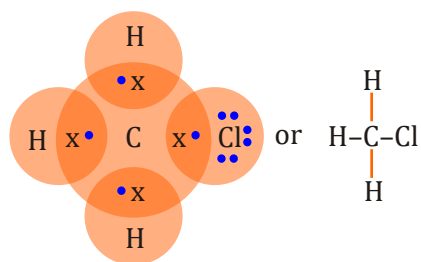
Carbon – 2, 4

Hydrogen – 1

Chlorine – 2, 8, 7

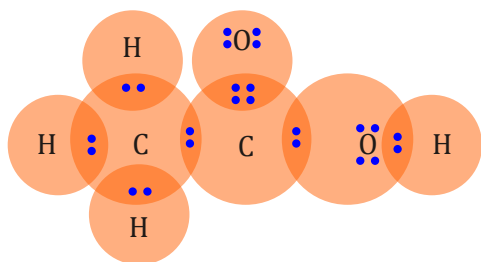
As C need 4 electrons to complete its octet, H needs 1 electron to complete its duplet and Cl needs 1 electron to complete its octet.

So, C share its 4 electron, one electron each with 3 H atom and 1 electron with Cl atom. Thus chloromethane contains 3 C – H and one C–Cl covalent bond.

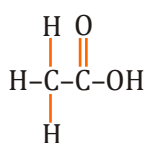


18. Draw the electron dot structure of

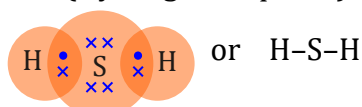
(a) Ethanoic acid



or

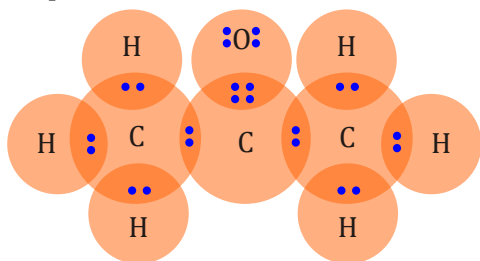


(b) H_2S (Hydrogen sulphide)

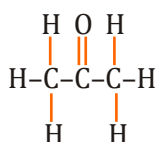


or $\text{H}-\text{S}-\text{H}$

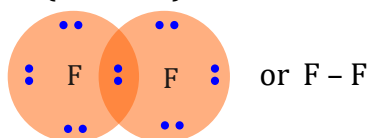
(c) Propanone



or



(d) F_2 (Fluorine)



or $\text{F}-\text{F}$

19. What is homologous series? Explain with an example.

Ans. A family of organic compounds having the same functional group, similar chemical properties and the successive members of which differ by a CH_2 group or 14 mass units.

For example, CH_3OH (methanol)

$\text{CH}_3\text{CH}_2\text{OH}$ (ethanol)

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (propanol)

They constitute homologous series of alcohols. Because they have same functional group, differ by $-\text{CH}_2/14$ mass unit and have similar chemical properties.

20. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

Property	Ethanol	Ethanoic acid
Melting point	156 K	290 K
Action on litmus	No action	Turns blue litmus into red
Reaction with NaHCO_3 solution	No reaction	Effervescence due to the formation of CO_2

21. Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents like ethanol also?

Ans. A molecule of soap has two dissimilar ends. At one end is the hydrocarbon chain which is water repellent. At the other end carboxylate anion is present which is water soluble end. When soap is dissolved in water, many molecules come together and form a group called micelle, these micelles are formed because their hydrocarbon chains come together and the polar ends are projected outward. Micelle formation in ethanol will not occur because the hydrocarbon chain end of the soap will also dissolve in ethanol.

22. Why are carbon and its compounds used as fuels for most applications?

Ans. When carbon is heated in presence of excess of air or oxygen, it forms carbon dioxide. During its formation, a large amount of heat and light are released. Further, once ignited, carbon and its compounds keep on burning without needing additional heat energy.

23. Explain the formation of scum when hard water is treated with soap.

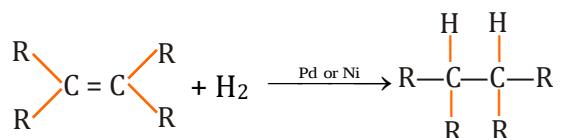
Ans. Hard water contains calcium and magnesium ions. When soap comes in contact with hard water, these ions form calcium and magnesium salts of fatty acids which are insoluble in water. These calcium or magnesium salts precipitate out in the form of scum.

24. What change will you observe if you test soap with litmus paper (red and blue)?

Ans. Soap is alkaline in nature therefore, turns red litmus blue and no effect on blue litmus.

25. What is hydrogenation? What is its industrial application?

Ans. Unsaturated hydrocarbons add hydrogen in the presence of palladium or nickel. This reaction is called hydrogenation.



This reaction is industrially used in the conversion of vegetable oils into vegetable ghee.

26. Which of the following hydrocarbons undergo addition reactions?

C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4

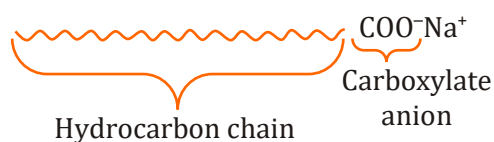
Ans. C_3H_6 and C_2H_2 because they are unsaturated hydrocarbons compounds.

27. Give a test that can be used to differentiate between butter and cooking oil.

Ans. As cooking oil contains unsaturated hydrocarbons it will undergo addition reaction whereas butter contains saturated hydrocarbons so it will not give addition reaction (hydrogenation) thus hydrogenation reaction can be used.

28. Explain the mechanism of the cleansing action of soaps.

Ans. A molecule of soap has two dissimilar ends. At one end is the hydrocarbon chain, which is water repellent and the other end is carboxylate anion which is polar end.

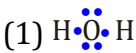
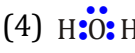
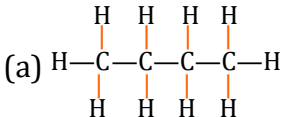
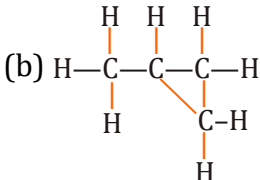
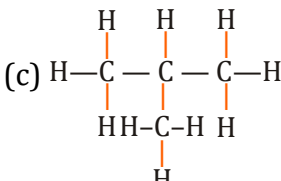
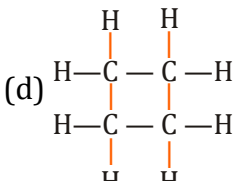


When soap is dissolved in water, many molecules come together and form a group called micelle. These micelles are formed because their hydrocarbon chains come together and the polar ends are projected outward.

When a cloth with a spot of oil is soaked into a soap solution, soap dissolves tiny oil droplets by the hydrophobic end in the middle of the micelle. Due to the outer polar ends, these micelles dissolve in water and are washed away. In this way cloth gets cleaned.

EXERCISE-01**Multiple choice questions**

1. Which one of the following properties is not generally exhibited by ionic compounds?
(1) Solubility in water
(2) High melting and boiling points
(3) Electrical conductivity in molten state
(4) Electrical conductivity in solid state
2. Carbon exists in the atmosphere in the form of
(1) carbon monoxide only
(2) carbon monoxide in trace amount and carbon dioxide
(3) carbon dioxide only
(4) coal
3. The number of C-H bonds in ethane (C_2H_6) molecule are
(1) Four (2) Six
(3) Eight (4) Ten
4. Which of the following statements are usually correct for carbon compounds?
These
(a) are good conductors of electricity.
(b) are poor conductors of electricity.
(c) have strong forces of attraction between their molecules.
(d) do not have strong forces of attraction between their molecules.
(1) (a) and (c)
(2) (b) and (c)
(3) (a) and (d)
(4) (b) and (d)
5. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of
(1) Helium (2) Neon
(3) Argon (4) Krypton
6. A covalent bond is formed when
(1) combining atoms share the electron pairs.
(2) combining atoms are attracted by each other.
(3) the ions of the combining atoms are attracted by electrostatic force of attraction.
(4) one atom donates a pair of electrons to another atom.
7. Which of the following statement is correct?
(1) Covalent compounds have strong bonds within the molecules but weak inter molecular forces of attraction.
(2) Covalent compounds have weak bonds within the molecules but strong intermolecular forces of attraction.
(3) Covalent compounds have weak bonds within the molecules and weak intermolecular forces of attraction.
(4) Covalent compounds have strong bond within the molecules and strong intermolecular forces of attraction.

8. Which of the following has the highest boiling point?
 (1) $(\text{CH}_3)_4\text{C}$
 (2) $(\text{CH}_3)_2\text{CHCH}_3$
 (3) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
 (4) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
9. Which of the following is the correct representation of electron dot structure of oxygen?
 (1)  (2) 
 (3)  (4) 
10. A molecule of ammonia (NH_3) has
 (1) only single bonds
 (2) only double bonds
 (3) only triple bonds
 (4) two double bonds and one single bond
11. Which of the following is the correct representation of electron dot structure of nitrogen?
 (1)  (2) 
 (3)  (4) 
12. The correct electron dot structure of a water molecule is
 (1)  (2) 
 (3)  (4) 
13. Graphite is a soft lubricant, extremely difficult to melt. The reason for this anomalous behaviour is that, graphite
 (1) has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds
 (2) is a non-crystalline substance
 (3) is an allotropic form of carbon
 (4) has only single bonds between carbon atoms
14. Buckminster fullerene is an allotropic form of
 (1) Phosphorus (2) Sulphur
 (3) Carbon (4) Tin
15. In graphite, carbon atoms are arranged in which pattern?
 (1) Pentagonal (2) Hexagonal
 (3) Trigonal (4) Tetragonal
16. Catenation is
 (1) formation of double bond between carbon atoms.
 (2) linking of carbon atoms with atoms of other elements.
 (3) indefinite linking of carbon atoms.
 (4) the formation of four covalent bonds by a carbon atom.
17. Which of the following are correct structural isomers of butane?
- (a) 
- (b) 
- (c) 
- (d) 
- (1) (a) and (c) (2) (b) and (d)
 (3) (a) and (b) (4) (c) and (d)

18. Which of the following compounds does not contain a multiple bond?

- (1) Ethane (2) Ethene
(3) Ethyne (4) Benzene

19. Which of the following is not a saturated hydrocarbon?

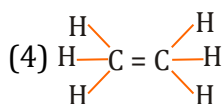
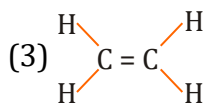
- (1) Cyclohexane (2) Benzene
(3) Butane (4) Isobutane

20. Which of the following has the shortest carbon-carbon bond length?

- (1) C_2H_2
(2) C_2H_4
(3) C_2H_6
(4) All have the same bond length.

21. Structural formula of ethyne is

- (1) $H-C \equiv C-CH_3$
(2) $H-C \equiv C-H$

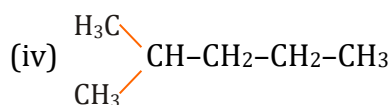
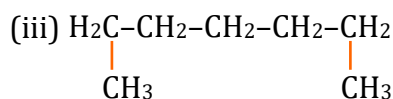


22. Identify the unsaturated compounds from the following.

- (a) Propane (b) Propene
(c) Propyne (d) Chloropropane
(1) (a) and (b) (2) (b) and (d)
(3) (c) and (d) (4) (b) and (c)

23. Which of the following is not a straight chain hydrocarbon?

- (i) $H_3C-CH_2-CH_2-CH_2-CH_2-CH_2-CH_3$
(ii) $H_3C-CH_2-CH_2-CH_2-CH_2-CH_2-CH_3$



- (1) (i) and (ii) (2) (ii) and (iii)
(3) Only (iii) (4) Only (iv)

24. Pentane has the molecular formula C_5H_{12} . It has

- (1) 5 covalent bonds
(2) 12 covalent bonds
(3) 16 covalent bonds
(4) 17 covalent bonds

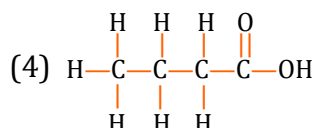
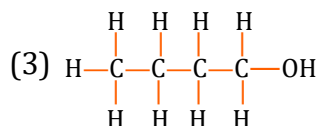
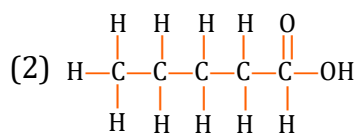
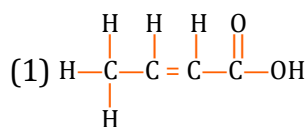
25. The functional group in methanol and methanal respectively are

- (1) $-OH$, $-CHO$ (2) $-CHO$, $-OH$
(3) $-OH$, $-COOH$ (4) $-CHO$, $-COOH$

26. In which of the following compounds, $-OH$ is the functional group?

- (1) Butanone (2) Butanol
(3) Butanoic acid (4) Butanal

27. The correct structural formula of butanoic acid is



- 28.** The heteroatoms present in $\text{CH}_3\text{-CH}_2\text{-O-CH}_2\text{-CH}_2\text{Cl}$ are
 (i) Oxygen (ii) Carbon
 (iii) Hydrogen (iv) Chlorine
 (1) (i) and (ii) (2) (ii) and (iii)
 (3) (iii) and (iv) (4) (i) and (iv)
- 29.** Members of homologous series differ by
 (1) $-\text{CH}_2$ (2) $-\text{CH}_4$
 (3) $-\text{CH}_3$ (4) $-\text{C}_2\text{H}_5$
- 30.** Which of the following does not belong to the same homologous series?
 (1) CH_4 (2) C_2H_6
 (3) C_3H_8 (4) C_4H_8
- 31.** The first member of alkane homologous series is
 (1) ethyne (2) ethene
 (3) propyne (4) methane
- 32.** The correct structural formula of propanoic acid is
- (1) $\begin{array}{c} \text{H} & \text{H} & \text{H} \\ | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | & | & | \\ \text{H} & \text{H} & \text{H} \end{array}$
- (2) $\begin{array}{c} \text{H} & \text{H} & \text{O} \\ | & | & || \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | & | & \\ \text{H} & \text{H} & \end{array}$
- (3) $\begin{array}{c} \text{H} & \text{H} & \text{O} \\ | & | & || \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{OH} \\ & & \end{array}$
- (4) $\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{O} \\ | & | & | & || \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | & | & | & \\ \text{H} & \text{H} & \text{H} & \end{array}$
- 33.** The name of the compound $\text{CH}_3\text{-CH}_2\text{-CHO}$ is
 (1) propanal (2) propanone
 (3) ethanol (4) ethanal
- 34.** Ethanol on combustion gives
 (1) CO_2 and water
 (2) acetaldehyde
 (3) acetic acid
 (4) acetone
- 35.** Dilute alkaline KMnO_4 solution is
 (1) an oxidising agent
 (2) a reducing agent
 (3) a bleaching agent
 (4) a drying agent
- 36.** In this reaction, alkaline KMnO_4 behaves as
- $$\text{CH}_3\text{-CH}_2\text{-OH} \xrightarrow[\text{Heat}]{\text{Alkaline KMnO}_4} \text{CH}_3\text{-COOH}$$
- (1) reducing agent
 (2) oxidising agent
 (3) catalyst
 (4) dehydrating agent
- 37.** Which of the following type of reaction occurs when a hydrocarbon has a double bond?
 (1) Substitution reaction
 (2) Addition reaction
 (3) Photolysis
 (4) None of these
- 38.** Which of the following hydrocarbons undergo addition reactions?
 (i) C_2H_6 (ii) C_3H_8
 (iii) C_3H_6 (iv) C_2H_2
 Select the correct alternative.
 (1) Only (i)
 (2) (ii) and (iii)
 (3) (iii) and (iv)
 (4) Only (iv)

- 39.** Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of
- (1) addition reaction
 - (2) substitution reaction
 - (3) displacement reaction
 - (4) oxidation reaction
- 40.** Chlorine reacts with saturated hydrocarbons at room temperature in the
- (1) absence of sunlight.
 - (2) presence of sunlight.
 - (3) presence of water.
 - (4) presence of hydrochloric acid.
- 41.** The reaction
 $2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \longrightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$
 suggests that ethanol is
- (1) acidic in nature.
 - (2) basic in nature.
 - (3) amphoteric.
 - (4) neutral.
- 42.** Which of the following substance is added to denatured ethanol?
- (1) Methanol
 - (2) Benzene
 - (3) Water
 - (4) Poison
- 43.** Carboxylic acids are obtained from alcohols by
- (1) oxidation
 - (2) reduction
 - (3) hydrolysis
 - (4) pyrolysis
- 44.** Ethanol reacts with sodium and forms two products. These are
- (1) sodium ethanoate and hydrogen
 - (2) sodium ethanoate and oxygen
 - (3) sodium ethoxide and hydrogen
 - (4) sodium ethoxide and oxygen
- 45.** Which out of the following has smell similar to that of vinegar?
- (1) Methanol
 - (2) Ethanol
 - (3) Ethanoic acid
 - (4) Formic acid
- 46.** Vinegar is a
- (1) 5-8% solution of acetic acid in water.
 - (2) 25-30% solution of acetic acid in water.
 - (3) 40-45% solution of acetic acid in water.
 - (4) 45-50% solution of acetic acid in water.
- 47.** Which of the following will give a pleasant smell of ester when heated with ethanol and a small quantity of concentrated sulphuric acid?
- (1) CH_3COOH
 - (2) $\text{CH}_3\text{CH}_2\text{OH}$
 - (3) CH_3OH
 - (4) CH_3CHO
- 48.** Read the following reactions
- (i) $\text{CH}_3\text{COONa} + \text{NaOH} \xrightarrow{\text{CaO}} \text{CH}_4 + \text{Na}_2\text{CO}_3$
 - (ii) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{Acid}} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
 - (iii) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$
 - (iv) $2\text{CH}_3\text{COOH} + 2\text{Na} \longrightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$
- Which of the above represent(s) esterification reaction?
- (1) Only (i)
 - (2) Only (ii)
 - (3) (i) and (iii)
 - (4) (ii) and (iv)
- 49.** Mineral acids are stronger acids than carboxylic acids because
- (i) mineral acids are partially ionised.
 - (ii) mineral acids are completely ionised.
 - (iii) carboxylic acids are partially ionised.
 - (iv) carboxylic acids are completely ionised.
- Select the correct alternative.
- (1) (i) and (iii)
 - (2) (ii) and (iii)
 - (3) (i) and (iv)
 - (4) (ii) and (iv)

50. In the soap micelles

- (1) the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.
- (2) the ionic end of soap is in the interior of the cluster and the carbon chain is out of the cluster.
- (3) both ionic end and carbon chain are in the interior of the cluster.
- (4) both ionic end and carbon chain are on the exterior of the cluster.

51. Which among the following are unsaturated hydrocarbons?

- (i) $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_3$
- (ii) $\text{H}_3\text{C}-\text{C}\equiv\text{C}-\text{CH}_3$
- (iii) $\begin{array}{c} \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
- (iv) $\begin{array}{c} \text{H}_3\text{C}-\text{CH}=\text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$

- (1) (i) and (iii)
- (2) (ii) and (iii)
- (3) (iii) and (iv)
- (4) (ii) and (iv)

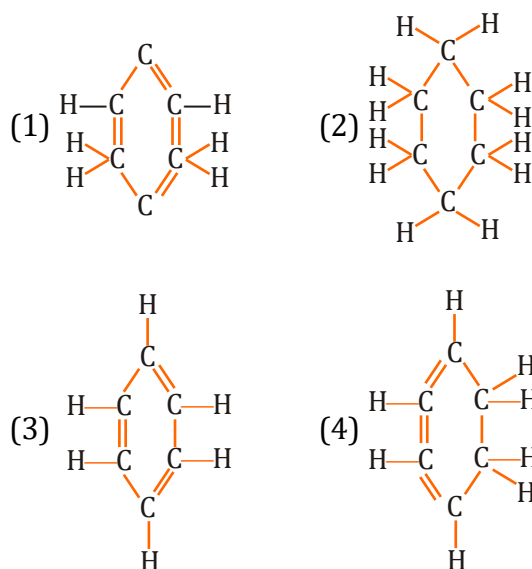
52. An example of soap is

- (1) CH_3COONa
- (2) CH_3ONa
- (3) $\text{C}_{17}\text{H}_{35}\text{COONa}$
- (4) $\text{C}_{17}\text{H}_{35}\text{COOC}_2\text{H}_5$

53. The soap molecule has a

- (1) hydrophilic head and a hydrophobic tail.
- (2) hydrophobic head and a hydrophilic tail.
- (3) hydrophobic head and a hydrophobic tail.
- (4) hydrophilic head and a hydrophilic tail.

54. Structural formula of benzene is



55. Which of the following represents saponification reaction?

- (1) $\text{CH}_3\text{COONa} + \text{NaOH} \xrightarrow{\text{CaO}} \text{CH}_4 + \text{Na}_2\text{CO}_3$
- (2) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{conc. H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
- (3) $2\text{CH}_3\text{COOH} + 2\text{Na} \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$
- (4) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$

True or False

1. Covalent compounds are usually water soluble.
2. Covalent compounds have generally low melting and boiling points than ionic compounds.
3. Diamond and graphite are good conductors of electricity.
4. The compound having the molecular formula C_4H_{10} does not show isomerism.
5. Alkenes and alkynes are unsaturated compounds.
6. Each family is characterised by functional group which is an atom or group of atoms.
7. Methane belongs to the homologous series of alkanes.
8. Ethanol is oxidised by alkaline $KMnO_4$ to oxalic acid.
9. Vanaspati ghee is obtained by the hydrogenation of vegetable oil.
10. Methane undergoes substitution reaction.
11. The reaction of ethanol with conc. H_2SO_4 gives ethane.
12. Ethanol is highly poisonous as compared to methanol.
13. Ethanoic acid and ethanol can be distinguished by litmus test as well as by sodium bicarbonate test.
14. Methanol is safe to be used for drinking purpose.
15. Carboxylic acids react with alcohols to form esters.
16. 5% Ethanoic acid solution is bactericidal.
17. On cooling at 289.6 K, ethanol turns in ice-like crystals.

18. Soaps are water soluble while detergents are water insoluble.
19. Detergents give scum with hard water.
20. The polar end in soap is called hydrophilic end.

Fill in the blanks

Directions: Complete the paragraph below by choosing the words from the word box in the spaces provided.

micelles emulsion potassium
carbon-chain
ionic-end sulphonate sodium
scum
calcium hard-water outward
magnesium

Soap is a ____ or ____ salt of long-chain carboxylic acid. A soap molecule consists of two parts: a long hydrocarbon part and a short ionic part. The ____ (hydrophilic) of soap dissolves in water while the ____ (hydrophobic) dissolves in oil. The soap molecules, thus form structures called ____ where one end of the molecules is towards the oil droplet while the ionic end faces _____. This forms _____ in water. The soap micelle thus helps in dissolving the dirt in water and we can wash our clothes clean. Soaps are not suitable to be used for washing clothes with _____. _____ and _____ ions present in hard water, combine with the soap forming insoluble sticky grey precipitate called _____. This results in the wastage of soap. Detergents are generally ammonium or _____ salts of long chain carboxylic acids. Detergents do not make scum in hard water.

1. Match the column

Column-I	Column-II
(A) Hydrogenation reaction	(i) $\text{CH}_3\text{CH}_2\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
(B) Substitution reaction	(ii) $\text{CH}_3\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{H}^+} \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$
(C) Neutralisation reaction	(iii) $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni}} \text{CH}_3 - \text{CH}_3$
(D) Esterification reaction	(iv) $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$
(E) Combustion reaction	(v) $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$

Put appropriate number in column-II

Column-I	Column-II
(A)	(iii)
(B)	_____
(C)	_____
(D)	_____
(E)	_____

2. Direction: Match the functional group with their formulae and examples.

Column-I	Column-II	Column-III
(1) Alcohol	(a) $\begin{array}{c} -\text{C}- \\ \\ \text{O} \end{array}$	(i) Propanal
(2) Aldehyde	(b) $\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{OH} \end{array}$	(ii) Propanone
(3) Ketone	(c) $\begin{array}{c} \text{H} \\ / \\ -\text{C} \\ \backslash \\ \text{O} \end{array}$	(iii) Propanol
(4) Carboxylic acid	(d) $-\text{OH}$	(iv) Propanoic acid

Put the appropriate letter and number in column B and column C.

Column-I	Column-II	Column-III
(1)	(d)	(iii)
(2)	_____	_____
(3)	_____	_____
(4)	_____	_____

Chemical Equation Worksheet:

Directions: Write the balanced chemical equation underneath each reaction description and answer the questions:

1. Methane burns readily in air.

- Q. Which type of flame is produced on burning methane?

2. Ethanol is heated with alkaline potassium permanganate solution.

- Q. Why is this reaction called an oxidation reaction?

3. Solutions of sodium hydroxide and acetic acid are mixed.

- Q. If equal volumes of equal molar solutions of acetic acid and sodium hydroxide are mixed, will the solution pH be > 7 , 7 or < 7 ?

4. Methane reacts with chlorine in the presence of sunlight.

- Q. What is the name of this reaction?

5. Reaction of ethanol with sodium.

- Q. Which gas is produced in this reaction?

6. Reaction of sodium carbonate with ethanoic acid.

- Q. Which gas is produced in this reaction?

7. Reaction of sodium hydrogen carbonate with ethanoic acid.

- Q. Why is this reaction used as a test of carboxylic acid?

8. Hydrogenation of ethene.

- Q. What is the special name of this reaction?

Electron dot structures:

Whenever a non-metal combines with another non-metal, sharing of electron takes place between their atoms and a covalent bond is formed. A covalent bond can also be formed between two atoms of the same non-metal. The shared electrons are counted with both the atoms due to which each atom in the resulting molecule gets an inert gas electron arrangement of 8 electrons (or 2-electrons) in the outermost shell.

Example: H_2 molecule



Draw the electron dot structures for the following molecules.

- | | |
|-------------|----------------------|
| 1. Chlorine | 2. Hydrogen chloride |
| 3. Methane | 4. Carbon dioxide |
| 5. Ammonia | 6. Water |
| 7. Oxygen | 8. Ethane |
| 9. Nitrogen | 10. Ethyne |

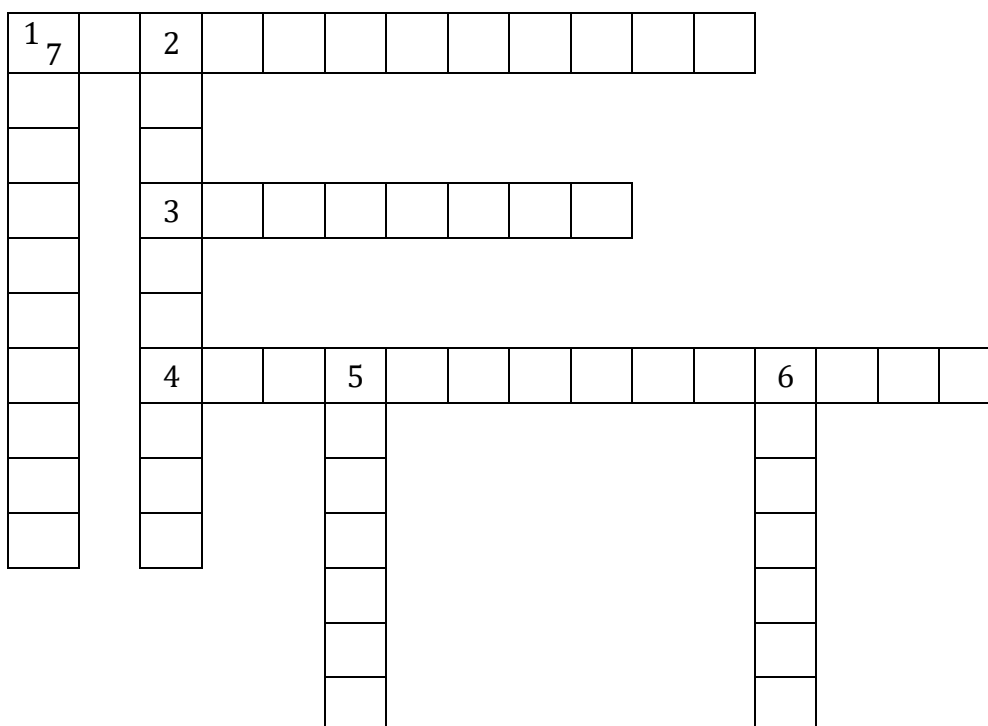
Vocabulary Quiz:**Direction:** Match the word (or group of words) on the left with the definition on the right.

Column-I		Column-II	
(a)	Allotropes	(i)	An atom or a group of atoms which makes a carbon compound reactive and decides its properties.
(b)	Fullerenes	(ii)	The unique ability of carbon to form bonds with other atoms
(c)	Catenation	(iii)	Sodium salts of sulphonic acids.
(d)	Saturated compound	(iv)	The forms of an element which compounds have Similar properties.
(e)	Unsaturated compound	(v)	A reaction of an alcohol with compound carboxylic acid in the presence of concentrated sulphuric acid to form a sweet smelling compound.
(f)	Heteroatom	(vi)	Sodium or potassium salt of higher fatty acids.
(g)	Covalent bonds	(vii)	A new allotrope of carbon.
(h)	Functional group	(viii)	Compounds of carbon having group double and triple bonds between their carbon atoms.
(i)	Homologous series	(ix)	The hydrolysis of an ester in the presence of an alkali sodium salt of the acid.
(j)	Vinegar	(x)	Bonds which are formed by the sharing of electrons between two atoms so that both can achieve a completely filled outermost shell.
(k)	Esterification	(xi)	A series of compounds in which the same functional group solution in water.
(l)	Saponification	(xii)	Compounds of carbon which are linked by only single bonds between the carbon atom.
(m)	Soaps	(xiii)	A spherical aggregate of soap molecules in the soap solution in water.
(n)	Detergents	(xiv)	In carbon compounds, element replacing hydrogen (halogens, oxygen, nitrogen and sulphur) is referred to as a _____.
(o)	Micelle	(xv)	5-8% solution of acetic acid in water.

Put appropriate number in column-II

Column-I	Column-II	Column-I	Column-II
(a)	(iv)	(b)	_____
(c)	_____	(d)	_____
(e)	_____	(f)	_____
(g)	_____	(h)	_____
(i)	_____	(j)	_____
(k)	_____	(l)	_____
(m)	_____	(n)	_____
(o)	_____		

Crossword puzzle

**Across**

1. Bond which is formed via mutual sharing of electrons between atoms.
3. _____ reaction is used in hydrogenation of vegetable oils.
4. Alkaline KMnO_4 oxidises ethanol to ethanoic acid. It acts as an _____.

Down

2. A mysterious force which produce organic compounds.
5. Tetrahedral arrangement of carbon present in this allotrope of carbon.
6. Ice like crystals of acetic acid when it is cooled at 289.6 K.
7. Uncontrolled oxidation in which organic compounds burnt and get oxidised to CO_2 and H_2O .

ANSWER KEY

Multiple choice questions

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	4	2	2	4	2	1	1	3	1	1	4	3	1	3	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	1	1	2	1	2	4	4	3	1	2	4	4	1	4
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	4	2	1	1	1	2	2	3	1	2	1	1	1	3	3
Question	46	47	48	49	50	51	52	53	54	55					
Answer	1	1	2	2	1	4	3	1	3	4					

True or False

- | | | | | |
|-----------|-----------|-----------|-----------|----------|
| 1. False | 2. True | 3. False | 4. False | 5. True |
| 6. True | 7. True | 8. False | 9. True | 10. True |
| 11. False | 12. False | 13. True | 14. False | 15. True |
| 16. True | 17. False | 18. False | 19. False | 20. True |

Fill in the blanks

Sodium, Potassium, Ionic end, Carbon chain, Micelles, Outward, Emulsion, Hard water, Calcium, Magnesium, Scum, Sulphonate.

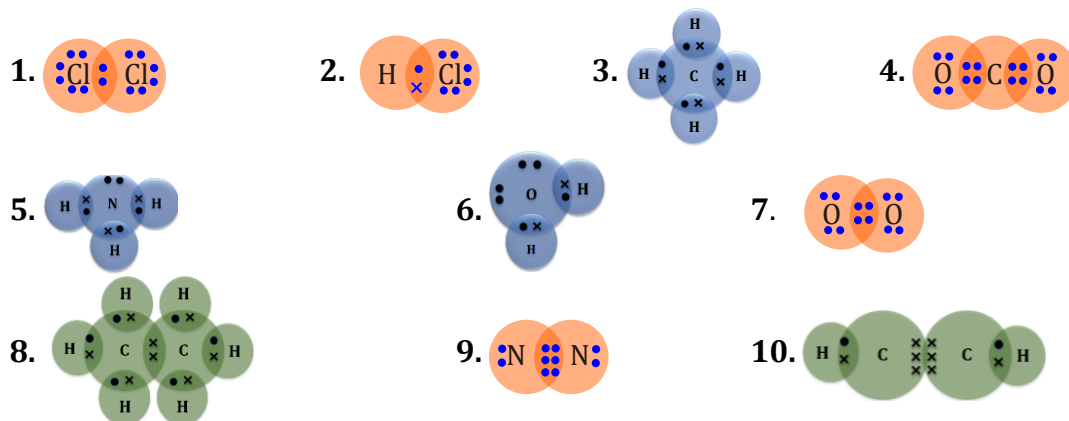
Match the following

- (a) → iii ; (b) → v ; (c) → iv ; (d) → ii ; (e) → i
- (1) → d, iii ; (2) → c, i ; (3) → a, ii ; (4) → b, iv

Chemical equations worksheet

- $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$, blue and non-sooty.
- $\text{C}_2\text{H}_5\text{OH} + 2[\text{O}] \xrightarrow{\text{Alk. KMnO}_4} \text{CH}_3\text{COOH} + \text{H}_2\text{O}$ because addition of oxygen is taking place.
- $\text{NaOH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$, more than 7.
- $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$, substitution reaction.
- $2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \rightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$, hydrogen.
- $\text{Na}_2\text{CO}_3 + 2\text{CH}_3\text{COOH} \rightarrow 2\text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$, carbon dioxide.
- $\text{NaHCO}_3 + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$, because carbon dioxide gas is produced in this reaction which can be easily identified.
- $\text{C}_2\text{H}_4 + \text{H}_2 \xrightarrow{\text{Ni/Pd}} \text{C}_2\text{H}_6$, addition reaction.

Electron dot structures



Vocabulary quiz

(a) → iv ; (b) → vii ; (c) → ii ; (d) → xii ; (e) → viii ;
 (f) → xiv ; (g) → x ; (h) → i ; (i) → xi ; (j) → xv ;
 (k) → v ; (l) → ix ; (m) → vi ; (n) → iii ; (o) → xiii

Crossword puzzle

¹ C ₇	O	² V	A	L	E	N	T	B	O	N	D
O		I									
M		T									
B		³ A	D	D	I	T	I	O	N		
U		L									
S		F									
T		⁴ O	X	I	⁵ D	I	Z	I	N	G	A
I		R			I					⁶ G	E
O		C			A					A	N
N		E			M					C	T
					O					I	
					N					A	
					D					L	

EXERCISE-02**Very short answer type questions**

1. Name an allotrope of carbon which has 60 carbon atoms.
2. Define isomerism.
3. Which of the following open chain compounds can have a double bond?
 C_2H_6 , C_3H_8 , C_2H_2 , C_4H_{10} , C_3H_6
4. Give difference between straight chain and branched chain compound.
5. The molecular formula of a compound is C_2H_6O . Name its homologous series.
6. Give the name and structural formula of one homologue of $HCOOH$.
7. Write the name and molecular formula of alcohol derived from butane.
8. What is combustion?
9. What is the nature of substances that produce a flame?
10. What is the composition of natural gas used for cooking?
11. An organic compound burns with a sooty flame. Is it saturated or unsaturated compound?
12. What type of reactions are given by alkanes?
13. Why does hard water not produce foam with soap easily?
14. Name the hydrophobic and hydrophilic ends of a soap.
15. What is a detergent?

Short answer type questions

1. Draw the electron dot structure of O_2 and N_2 molecules.
2. In electron dot structure, the valence shell electrons are represented by crosses or dots.
(a) The atomic number of chlorine is 17. Write its electronic configuration
(b) Draw the electron dot structure of chlorine molecule.
3. Hydrogen and chlorine react to form hydrochloric acid. Will they form an ionic or covalent bond?
4. Catenation is the ability of an atom to form bonds with other atoms of the same element. It is exhibited by both carbon and silicon. Compare the ability of catenation of the two elements. Give reasons.
5. Write the structural formulae of all the isomers of hexane.
6. Name any four-substance obtained from organic compounds which are used in our daily life.
7. How many electrons a carbon atom shares with other carbon atom in the formation of ethyne molecule?
8. Give examples of covalent compounds which contain
(a) one unshared pair of electrons
(b) two unshared pairs of electrons.

9. Ethane, Ethene, Ethanoic acid, Ethyne, Ethanol from the box given above, name:

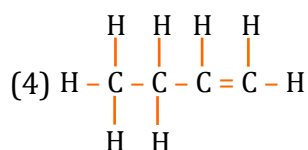
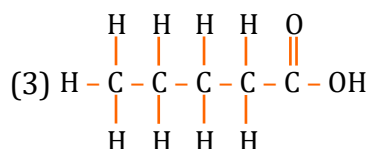
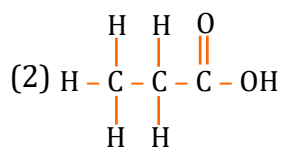
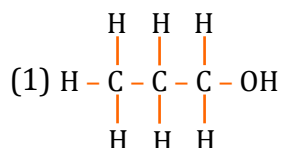
- The compound with -OH as a part of its structure.
- The compound with -COOH as a part of its structure.

10. What is meant by the term functional group?

11. Name the functional group present in:

- $\text{CH}_3\text{CH}_2\text{OH}$ and (ii) HCOOH .

12. Identify and name the functional groups present in the following compounds –



13. Name the functional groups present in the following compounds –

- $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
- $\text{CH}_3\text{CH}_2\text{OH}$

14. What is meant by homologous series? Give its three important characteristics.

15. The molecular formula of a hydrocarbon is C_5H_{10} . Name its homologous series.

16. Write the general formulae of the following homologous series.

- Alkane
- Alkene
- Alkyne

17. Write structural formulae of the following compounds.

- Ethyl alcohol
- Ethanal
- Propionic acid
- Butanone

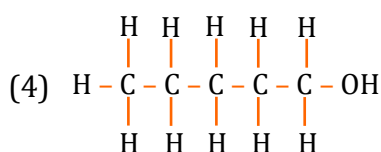
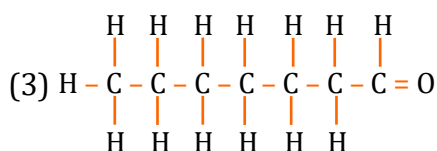
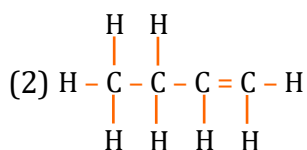
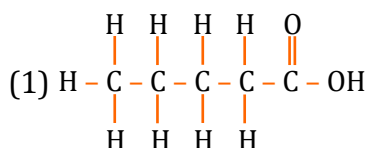
18. What is the IUPAC name of fourth member of alcohol series? Draw its two structural isomers.

19. Give the common and IUPAC names of the following alcohols:

- CH_3OH
- $\text{CH}_3\text{CH}_2\text{OH}$
- $\text{CH}_3\text{CHOHCH}_3$

20. Identify the functional group in $\text{CH}_3\text{CH}_2\text{OH}$. Give IUPAC name of the compound.

21. Write the names of the following compounds –

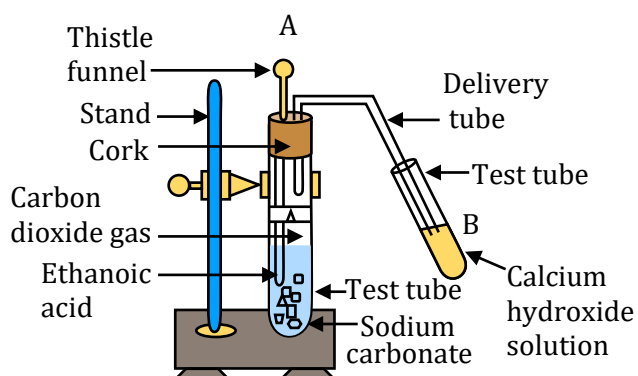


22. How do alcohols differ structurally from alkanes?
23. Ethanol can be oxidised to ethanoic acid. Write the equation involved in the reaction.
24. Name the oxidising agent which can oxidise:
(i) Ethanol to ethanal
(ii) Ethanol to ethanoic acid.
25. How is ethene prepared from ethanol? Give the reaction involved in it.
26. "Intake of small quantity of methanol can be lethal". Comment.
27. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved.
28. Ethene is formed when ethanol at 443 K is heated with excess of concentrated sulphuric acid. What is the role of sulphuric acid in this reaction? Write the balanced chemical equation of this reaction.
29. How would you distinguish experimentally between an alcohol and a carboxylic acid?
30. A neutral organic compound 'A' having molecular formula C_2H_6O , undergoes oxidation with acidified potassium permanganate to give an acidic compound 'B'. The organic compound 'A' reacts with compound 'B' on warming and in the presence of concentrated sulphuric acid to form a sweet-smelling substance 'C'. Identify A, B and C.
31. An organic compound 'A' having molecular formula $C_2H_4O_2$ turns blue litmus red and gives brisk effervescence with sodium hydrogen carbonate. Give the name and formula of 'A'.
32. What happens when (Give equations of the chemical reaction)
(i) Ethanoic acid is warmed with methanol in presence of concentrated sulphuric acid?
(ii) A pinch of sodium hydrogen carbonate is added to ethanoic acid?
(iii) Ethanol is oxidised with acidified potassium dichromate?
33. A compound X is formed by the reaction of a carboxylic acid $C_2H_4O_2$ and an alcohol in presence of a few drops of H_2SO_4 . The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of (a) carboxylic acid, (b) alcohol and (c) the compound X. Also write the reaction.
34. What is the role of metal or reagents written on arrows in the given chemical reactions?
- (a)
- $$\begin{array}{c}
 \text{CH}_3 \quad \quad \text{CH}_3 \\
 \diagdown \quad \diagup \\
 \text{C} = \text{C} \\
 \diagup \quad \diagdown \\
 \text{CH}_3 \quad \quad \text{CH}_3
 \end{array}
 + \text{H}_2$$
- $$\xrightarrow{\text{Ni}}
 \begin{array}{c}
 \text{CH}_3 \quad \text{CH}_3 \\
 | \quad | \\
 \text{CH}_3 - \text{C} - \text{C} - \text{CH}_3 \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- (b) $\text{CH}_3\text{COOH} + \text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
- (c) $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{Heat}]{\text{Alk. KMnO}_4} \text{CH}_3\text{COOH}$
35. Why detergents are better cleansing agents than soaps? Explain.

Long answer type questions

1. What is covalent bond? Draw electron dot structure for the following:
 - (i) Methane
 - (ii) Carbon dioxide
 - (iii) Ammonia
 - (iv) Water
2. Answer the following questions:
 - (a) What are hydrocarbons? Give examples.
 - (b) Give the structural differences between saturated and unsaturated hydrocarbons with two examples each.
 - (c) What is a functional group? Give examples of four different functional groups.
3. Which properties of carbon make it a versatile element. Discuss its bonding in saturated and unsaturated hydrocarbon.
4. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail.
5. Explain the given reactions with the examples -
 - (a) Hydrogenation reaction
 - (b) Oxidation reaction
 - (c) Substitution reaction
 - (d) Combustion reaction
6.
 - (i) What are alcohols? What is functional group?
 - (ii) Write names and formulae of first four members of alcohols family.
 - (iii) How does the second member of alcohol family react with
 - (a) Sodium metal
 - (b) Ethanoic acid?
7. What are harmful effects of drinking alcohol?
8. Discuss briefly two physical and three chemical properties of ethanol.
9. Discuss briefly the physical and chemical properties of ethanoic acid.
10. List three physical and two chemical properties on the basis of which ethanol and ethanoic acid can be differentiated.
11. A salt X is formed and a gas is evolved when ethanoic acid reacts with sodium hydrogen carbonate. Name the salt X and the gas evolved. Describe an activity and draw the diagram of the apparatus to prove that the evolved gas is the one which you have named. Also write chemical equation of the reaction involved.
12. Esters are sweet-smelling substances and are used in making perfumes. Suggest some activity and the reaction involved for the preparation of an ester with well labelled diagram.
13. A compound C (molecular formula, $C_2H_4O_2$) reacts with Na-metal to form a compound R and evolves a gas which burns with a pop sound. Compound C on treatment with an alcohol A in presence of an acid forms a sweet smelling compound S (molecular formula, $C_3H_6O_2$). On addition of NaOH to C, it also gives R and water. S on treatment with NaOH solution gives back R and A. Identify C, R, A, S and write down the reactions involved.

14. Look at figure and answer the following questions



- (a) What change would you observe in the calcium hydroxide solution taken in tube B?
- (b) Write the reaction involved in test tube A and B respectively.
- (c) If ethanol is given instead of ethanoic acid, would you expect the same change?
- (d) How can a solution of lime water be prepared in the laboratory?
15. How would you bring about the following conversions? Name the process and write the reaction involved.
- (a) Ethanol to ethene
- (b) Propanol to propanoic acid.
16. Give chemical test to detect the presence of
- (i) ethanol
- (ii) ethanoic acid
- (iii) ester.
17. An organic compound A on heating with concentrated H_2SO_4 forms a compound B which on addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO_2 and 3 moles of H_2O . Identify the compounds A, B and C and write the chemical equations of the reactions involved.
18. Answer the following questions:
- (a) Write the formula and draw electron dot structure of carbon tetrachloride.
- (b) What is saponification? Write the reaction involved in this process.
19. What are soaps and synthetic detergents? How do they differ? Discuss their cleaning actions.
20. Write short note on:
- (i) Catenation
- (ii) Glacial acetic acid
- (iii) Power alcohol
- (vi) Saponification

Exercise-01 Solutions

Multiple Choice Questions

1. Option (4)

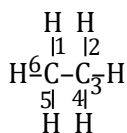
For conduction of electricity, ions need to be in a state where they can flow but in solid state, ions are bounded by strong electrostatic forces of attraction, hence they are not free to move or flow.

2. Option (2)

Carbon dioxide (CO_2) is present in atmosphere due to complete combustion of carbon compounds, similarly their incomplete combustion produces poisonous gas CO i.e. carbon monoxide and both are present in our atmosphere.

3. Option (2)

C_2H_6 can be drawn as hence 6(C-H) bonds all present.



4. Option (4)

Carbon compounds (covalent compounds) are poor conductor of electricity because the bond (covalent) here does not lead to the formation of free ions and for being a conductor, presence of free ions is must.

Carbon compounds are covalent compounds and covalent bonds are considered weak so we can say that carbon compounds do not have strong forces of attraction between their molecules.

5. Option (2)

E.C of carbon is 2,4

If it shares 4 electron with 4 hydrogen atoms its E.C will become $2(4 + 4) \Rightarrow 2,8$ and this is the E.C of Neon gas (at. no = 10) $\rightarrow 2,8$

6. Option (1)

Sharing of electron leads to the formation of covalent bond.

7. Option (1)

Actually covalent compounds are formed through sharing of electron which do not lead to the formation of ions hence electrostatic force of attraction (Which are present between charged particles) are absent hence covalent bonds are considered weak.

8. Option (3)

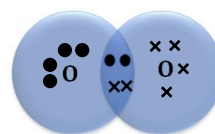
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ has highest boiling point.

9. Option (1)

Since oxygen forms covalent molecule by sharing of two electrons.

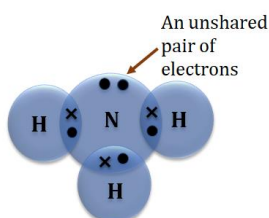
E.C of oxygen $\rightarrow 2,6$

Since 2 more electrons are needed so each atom share two electrons by mode of sharing.

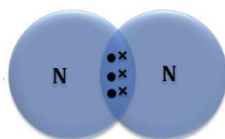


10. Option (1)

Since a nitrogen needs 3 more electron to complete its octet it does by sharing three of its electrons with three hydrogen atom as shown below.

**11. Option (4)**

Each nitrogen will share 3 valence electron with another nitrogen atom.

**12. Option (3)**

Two hydrogen atoms will share their each valence electron with one oxygen atoms.

13. Option (1)

Structure of graphite enables it to behave like a lubricant.

14. Option (3)

Diamond graphite and fullerenes are 3 allotropes of carbon.

15. Option (2)

Each carbon atom is bonded to 3 other carbon atom in a 6 - membered ring structure.

16. Option (3)

Self linking of carbon atoms to form indefinite long chains due to small size.

17. Option (1)

(a) n-butane and (c) isobutane are structural isomer of butane. (b) and (d) are cycloalkanes which have different molecular formulas.

18. Option (1)

Since ethane is a saturated compounds and it contains only single bonds.

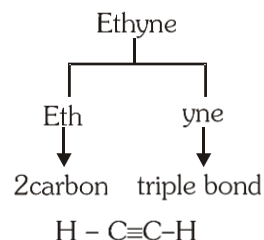
19. Option (2)

Because it contains double bond in aromatic compound like benzene.

20. Option (1)

$$\text{No. of bond} \propto \frac{1}{\text{bond length}}$$

Since C_2H_2 contain 3 bonds, thus its bond length is shortest.

21. Option (2)**22. Option (4)**

ene → Stands for double bond
yne → Stands for triple bond

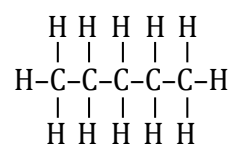
> Unsaturated compounds

23. Option (4)

Since two carbons are attached to the terminal carbon.

24. Option (3)

Draw the structure



16 covalent bonds

4 Carbon - Carbon bonds

12 Carbon - Hydrogen bonds.

25. Option (1)

Since methanol has suffix (ol) which means hydroxyl group i.e.(OH) and methanal has suffix (al) which means aldehyde group i.e. (CHO)

26. Option (2)

The suffix used for (OH) group is (ol)

27. **Option (4)**
It should contain 4 carbon with COOH group.
28. **Option (4)**
Heteroatoms are the atoms of other elements that are present in carbon – hydrogen chain.
Here O and Cl are heteroatoms.
29. **Option (1)**
A Homologous series of compounds in which each member differs from the next/previous by $-\text{CH}_2$ or 14 mass units.
30. **Option (4)**

$$\text{CH}_4 \xrightarrow{+\text{CH}_2} \text{C}_2\text{H}_6 \xrightarrow{+\text{CH}_2} \text{C}_3\text{H}_8 \xrightarrow{+\text{CH}_2} \text{C}_4\text{H}_{10}$$
31. **Option (4)**
The first member contain only one carbon hence it is methane (CH_4)
32. **Option (2)**
Since propanoic acid should contain 3 carbon including a COOH group.
 $\text{H}_3\text{C} - \text{CH}_2 - \text{COOH}$
33. **Option (1)**
 $\text{CH}_3 - \text{CH}_2 - \text{CHO}$
word root $\rightarrow$ Prop (3 carbon)
Suffix $\rightarrow$ al (CHO) $\rightarrow$ Propanal
34. **Option (1)**
Carbon compounds on combustion give CO_2 , water, heat and light.
35. **Option (1)**
 KMnO_4 is a strong oxidizing agent which means it has tendency to take electrons from the chemicals. It dissolves in water to give purple solution taste and is odourless. The manganese is in +7 oxidation state.
36. **Option (2)**
Alkaline KMnO_4 acts as oxidising agent as it oxidises ethanol to form ethanoic acid. Two H-atoms are replaced by an atom of oxygen making oxidation of ethanol.
37. **Option (2)**
Addition reaction is a characteristic reaction of alkene and alkynes (ie compound containing double bond and triple bond)
38. **Option (3)**
Only unsaturated hydrocarbons undergo addition reaction. Among the given compounds only C_3H_6 (Propyne) and C_2H_2 (acetylene) are unsaturated hydrocarbons.
39. **Option (1)**
Oils are unsaturated compounds, and addition reaction is a property of unsaturated compounds in which they are converted into saturated compounds like Vanaspati ghee.
40. **Option (2)**
The reaction is a substitution reaction carried out in the presence of sun light.

$$\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$$
Methane Chloromethane
41. **Option (1)**
Presence of free (H^+) ions suggest that compound is acidic in nature.
The reaction

$$2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \longrightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$$
42. **Option (1)**
Methanol, pyridine added to make alcohol denatured.
43. **Option (1)**
This is known as oxidation reaction in which oxygen is added to the compound.
44. **Option (3)**

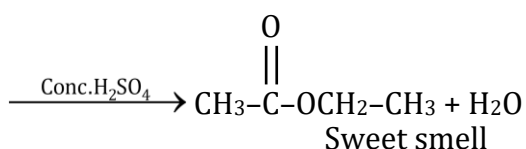
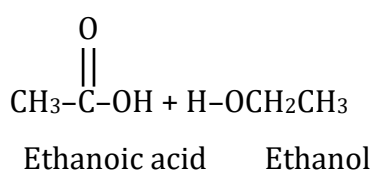
$$2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \rightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$$
(Ethanol) Sodium ethoxide Hydrogen

45. **Option (3)**

Vinegar is a liquid having acetic acid and water as its mixture, so, ethanoic acid is the other name of acetic acid.

46. **Option (1)**

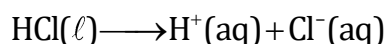
Vinegar acid is an solution of acetic acid. Vinegar typically contains 5-8% acetic acid by volume.

47. **Option (1)**48. **Option (2)**

The formation of sweet smelling substance by the reaction of ethanol ($\text{C}_2\text{H}_5\text{-OH}$) with ethanoic acid (CH_3COOH) to form a ester sweet smelling substance is called esterification.

49. **Option (2)**

Mineral acids ionised / dissociate completely



Carboxylic acids ionised / dissociate incompletely/ partially

50. **Option (1)**

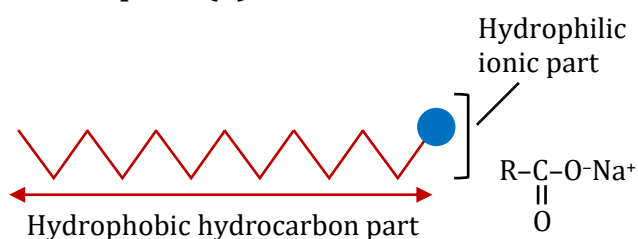
The ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster

51. **Option (4)**

Unsaturated compounds contain double and triple bonds.

52. **Option (3)**

Soap is salt of a fatty acid. Fats and oils are composed of triglycerides, three molecules of fatty acid are attached to a single molecule of glycerol.

53. **Option (1)**54. **Option (3)**

The formula of benzene is C_6H_6 with alternate double bonds.

55. **Option (4)**

Ester when hydrolysed in presence of alkali result in the formation of soap.

True or False1. **False**

Covalent compounds are soluble in non-polar solvents but water is polar.

2. **True**

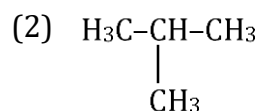
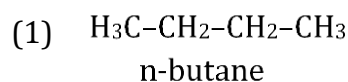
Because they are held together by weak covalent bonds.

3. **False**

Graphite has free electron, so, it is a good conductor of electricity. But diamond does not have free electrons, so it is a bad conductor of electricity.

4. **False**

Butane can show isomerism



- | | |
|--|---|
| <p>5. True
Compounds containing double and triple bonds are called unsaturated compounds
Eg. Alkene (C=C), alkynes (C≡C)</p> <p>6. True
The atom or group of atom that determine the chemical property of a compound are called functional groups
Eg. OH, CHO, CO, COOH</p> <p>7. True
Methane is the first member of homologous series of alkane (CH₄).</p> <p>8. False
Ethanol is oxidised to ethanoic acid.</p> <p>9. True
Double/ triple bond of unsaturated hydrocarbon (i.e. vegetable oil) is converted to saturated (Vanaspati ghee) by hydrogenation.</p> <p>10. True
Substitution reaction is a characteristics property of alkanes i.e Methane.</p> <p>11. False
Ethanol on reaction with conc. H₂SO₄ gives ethene by removing a water molecule.
C₂H₅OH + conc.H₂SO₄
 $\xrightarrow{\text{dehydration}} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$</p> <p>12. False
Methanol is highly toxic and unfit for consumption. Infact it is added to ethanol in order to make it denatured. Consumption of methanol can damage optic nerves and even cause blindness.</p> | <p>13. True
Ethanoic acid and ethanol can be distinguished by litmus test as well as sodium bicarbonate test.
Ethanoic acid turns blue litmus red whereas ethanol cannot. Also , ethanoic acid on reaction with sodium bicarbonate releases CO₂ (g) but ethanol cannot.</p> <p>14. False
Methanol causes death, blindness.</p> <p>15. True
The reaction is known as esterification.
 $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \longrightarrow$ $\text{CH}_3-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{OC}_2\text{H}_5 + \text{H}_2\text{O}$</p> <p>16. True
5% Ethanoic acid kills bacteria hence it is bactericidal.</p> <p>17. False
Not ethanol but ethanoic acid turns in ice-like crystals, called glacial acetic acid.</p> <p>18. False
Soaps do not dissolve in hard water.</p> <p>19. False
Soaps form scum with hard water.</p> <p>20. True
The polar end is soluble in water hence is called hydrophilic end.</p> |
|--|---|

1. Fullerene $\rightarrow$ C_{60} is the formula.
2. Isomerism $\rightarrow$ The Property of a compound to exist in more than one form with same molecular formula but different structured formula.
 - (i) $CH_3 - CH_2 - CH_2 - CH_3$ (n-Butane)
 - (ii) $CH_3 - \underset{\substack{| \\ CH_3}}{CH} - CH_3$ iso-Butane
3. C_3H_6 (propene) $CH_3-CH=CH_2$
Contains one double bond.
4. Straight chain compound will have more m.p. or b.p then branched chain compound.
5. The molecular formula C_2H_6O can be re-written as C_2H_5OH , So it belongs to homologous series of alcohols.

Name $\rightarrow$ CH_3COOH Ethanoic acid

↑

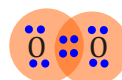
Formula

- 6.
7. $C_4H_9OH \rightarrow$ Butanol
8. Combustion $\rightarrow$ The burning of a substance in excess of air or oxygen to release CO_2 / water/ heat and light is called combustion.
9. Gaseous substance or solid or liquid substance that vapourise on heating.
10. Methane (major component), propane, butane.
11. Saturated hydrocarbons will generally give a clean flame while unsaturated carbon compounds will give a yellow flame with lots of black smoke. This result in a sooty deposit.

Name → CH₃COOH Ethanoic acid
 ↑
Formula

12. Substitution reactions are given by alkanes whereas unsaturated hydrocarbon like alkene and alkyne and undergo addition reaction. Alkanes give substitution reaction
$$\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$$
13. Because hard water contains, carbonates and chlorides of calcium and magnesium.
14. Ionic end is hydrophilic and hydrocarbon chain is hydrophobic in nature.
15. Sodium or potassium salt of long chain benzene sulphonic acids are called detergent.

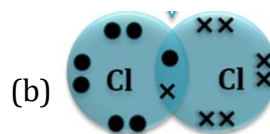
1. Electron dot structure of O_2 molecule



Electron dot structure of N₂ molecule



2. (a) At. no. = 17, E.C. K L M
2 8 7



3. Covalent bond will be formed.
Because both are non-metal and sharing of electron will take place
4. The ability to show catenation is more in carbon than silicon. This is due to the reason that carbon – carbon bonds are stronger (350KJ/mol) than silicon – Silicon bonds (200KJ/mol). This is due to the reason that size of carbon is small.

5. Isomers of hexane.

(a) n-hexane. $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$

(b) $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_3$

2-Methyl Pentane

(c) $\text{H}_3\text{C}-\text{CH}_2-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{CH}_3$

3-Methyl Pentane

(d) $\text{H}_3\text{C}-\underset{\text{CH}_3}{\text{CH}}-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_3$

2, 3- Dimethyl Butane

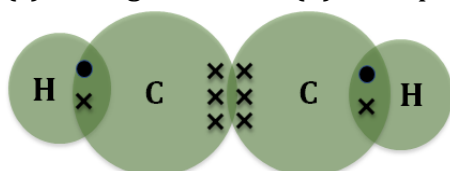
(e) $\text{H}_3\text{C}-\text{CH}_2-\underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}}-\text{CH}_3$

2, 2- Dimethyl Butane

6. Four substances are

- (a) Books (b) Soaps
(c) Detergents (d) Newspapers

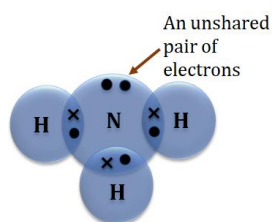
7.



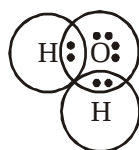
Shared pair of electrons

Three electrons shared by each carbon atom.

8. (a) Ammonia NH_3

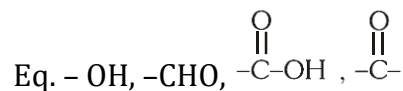


(b) H_2O water



9. (i) Ethanol
(ii) Ethanoic acid

10. Functional group - An atom or group of atom that largely determines the property of an organic compound is known as functional group.



11. (i) Hydroxyl group $\rightarrow \text{OH} \rightarrow$ alcohol

(ii) $\text{HCOOH} \rightarrow$ Carboxylic group

12. (1) Hydroxyl group - Alcohol

(2) Carboxylic group

(3) Carboxylic group

(4) Double bond

13. (1) Ketone group

(2) Carboxylic group

(3) Aldehyde group

(4) Hydroxyl group

14. The series of compounds containing same functional group where each successive member difference $(-\text{CH}_2)$ group is called homologous series.

Important characteristics

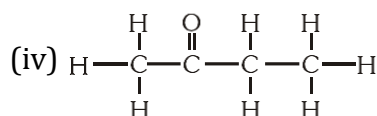
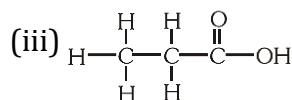
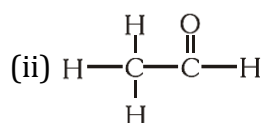
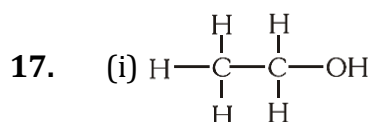
1. All members of a series can be prepared by same method.
2. All members of series show similar chemical properties.
3. All members of series have same general formula.

15. It belongs to homologous series of alkenes.

16. (i) $\text{C}_n\text{H}_{2n+2}$

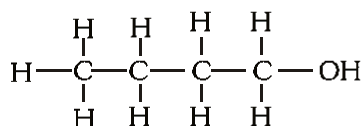
(ii) C_nH_{2n}

(iii) $\text{C}_n\text{H}_{2n-2}$

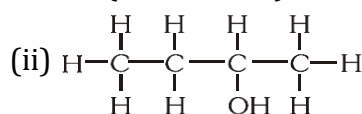


18. Name - Butanol

(i) Isomers



(Butan-1-ol)



(Butan-2-ol)

19. (i)

CH_3OH $\left\{ \begin{array}{l} \text{Common name} \rightarrow \text{Methyl alcohol} \\ \text{IUPAC} \rightarrow \text{Methanol} \end{array} \right.$

(ii)

$\text{CH}_3\text{CH}_2\text{OH}$ $\left\{ \begin{array}{l} \text{Common name} \rightarrow \text{ethyl alcohol} \\ \text{IUPAC} \rightarrow \text{Ethanol} \end{array} \right.$

(iii)

$\text{CH}_3\text{CHOHCH}_3$ $\left\{ \begin{array}{l} \text{Common name} \rightarrow \text{Isopropyl alcohol} \\ \text{IUPAC} \rightarrow \text{2-propanol} \end{array} \right.$

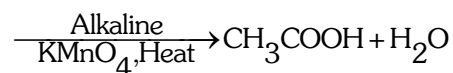
20. Functional group $\rightarrow$ Hydroxyl group $\rightarrow$ OH $\rightarrow$ alcohol.

IUPAC name $\rightarrow$ ethanol

21. (1) Pentanoic acid (2) Butene
(3) Heptanal (4) Pentanol

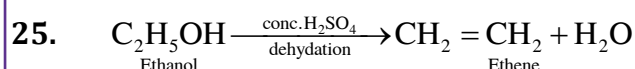
22. One hydrogen atom of alkane when replaced by a (-OH) group, it is known as alcohol.

23. $\text{C}_2\text{H}_5\text{OH}$



24. (i) CrO_3 in acetic acid solution.

(ii) Alkaline KMnO_4 / acidified $\text{K}_2\text{Cr}_2\text{O}_7$

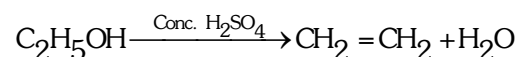


26. Methanol i.e. CH_3OH is believed to cause coagulation of protoplasm of cell, thus leading to death also, it can damage/optic nerve causing permanent blindness.



Ethanol Sodium ethoxide

28. Role of sulphuric acid $\rightarrow$ Sulphuric acid acts as a dehydrating agent and remove a molecule of water.



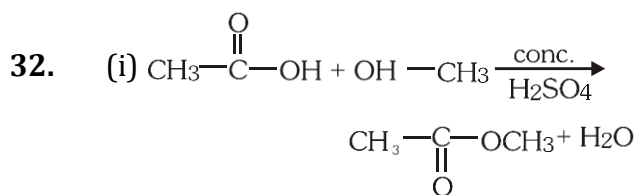
29. Carboxylic acid will turn blue litmus red but alcohol will not do so, also carboxylic acid when react with a metal carbonate or metal hydrogen carbonate will lead to the formation of salt, CO_2 and H_2O but ethanol will not do so.

30. A $\rightarrow \text{C}_2\text{H}_5\text{OH} \rightarrow$ ethanol

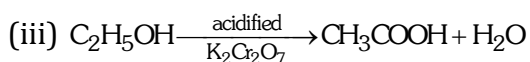
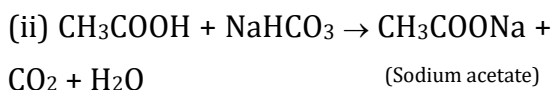
B $\rightarrow \text{CH}_3\text{COOH} \rightarrow$ ethanoic acid

C $\rightarrow \text{CH}_3-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{OCH}_2\text{CH}_3 \rightarrow$ ester

31. A $\rightarrow$ Name $\left\{ \begin{array}{l} \text{ethanoic acid} \\ \text{formula} \rightarrow \text{CH}_3\text{COOH} \end{array} \right.$



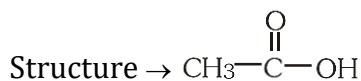
Methyl acetate



33. (a) Carboxylic acid

name $\rightarrow \text{CH}_3\text{COOH}$

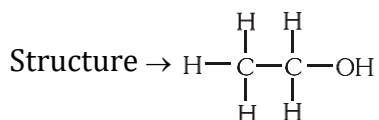
Ethanoic acid



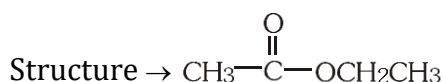
(b) Alcohol

name $\rightarrow \text{CH}_3\text{CH}_2\text{OH}$

Ethanol



(c) Compound x

name $\rightarrow$ ester

Ethyl Ethanoate

34. (a) Catalyst, to speed up the rate of reaction

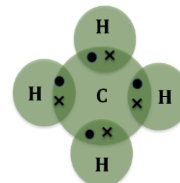
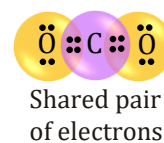
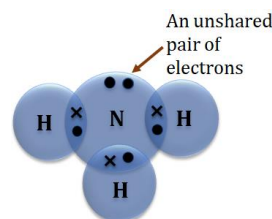
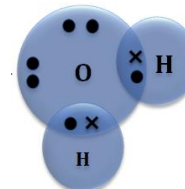
(b) Dehydrating agent, to remove a molecule of water

(c) Oxidising agent, to add oxygen to ethanol.

35. Detergents are better cleansing agent than soaps because it can work well even with hard water while soap do not.

Long answer type questions

1. Covalent bond $\rightarrow$ A bond linkage formed by mutual sharing of electrons is known as covalent bond.

Electron dot structure(i) Methane (CH_4)(ii) Carbon dioxide (CO_2)(iii) Ammonia (NH_3)(iv) Water (H_2O)

2. (a) The compounds of carbon that contain only hydrogen are called hydrocarbon.

Eg $\rightarrow \text{CH}_4, \text{C}_2\text{H}_6$

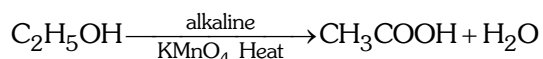
(b) Saturated compounds have single bonds between (C-C)

Eq $\rightarrow \text{CH}_4, \text{C}_2\text{H}_6$ Unsaturated compound have double/ triple bonds between (C=C), (C $\equiv$ C)Eq $\rightarrow \text{C}_2\text{H}_4, \text{C}_2\text{H}_2$

(c) Functional group → An atom or group of atoms that largely determines the chemical proportion of an organic compound. Eg. → OH, CHO, CO, COOH 3. Versatile nature of carbon is due to (i) Catenation The exceptional property of carbon to form long chain of compounds by linking to another carbon atom is called catenation. – Catenation is also known as self-linkage. – Carbon exhibits this property due to its tendency to form strong carbon – carbon (C–C) bond, they have high bond dissociation energy i.e. 355 KJ/mol. – Carbon can link to indefinite no of other carbon atoms thus leading to the formation of large no. of carbon compounds. (ii) Tetravalency – This is another reason for the formation of such large no. of compound. – A carbon can form four covalent bonds not only with carbon but also with sulphur, oxygen, Nitrogen, which leads to formation of large no. of compound.	(iii) Tendency to form multiple bonds – Due to its small size carbon can form multiple bonds which leads to the formation of so many different carbon compounds. (iv) Isomerism – The property of compounds showing same molecular formula but different structured formula is called isomerism and the property exhibited by the compound are called isomers. <u>Bonding of carbon in saturated compounds</u> → Here Carbon shows single bond (by sharing) a single pair of electron. <u>Bonding of carbon in unsaturated compounds</u> → Here carbon can share 2 pair of electron leading to formation of double bond and also by sharing 3 pair of electron leading to the formation of triple bond. 4. Hydrogenation reaction/ addition reaction Here compounds containing double or triple bonds i.e. vegetable oils are converted into single bonds by addition of hydrogen in the presence of a catalyst i.e Ni or Palladium(Pd). $\underset{\text{Ethene}}{\text{CH}_2 = \text{CH}_2} + \text{H}_2 \xrightarrow[\text{Heat}]{\text{Ni/Pd}} \underset{\text{Ethane}}{\text{CH}_3 - \text{CH}_3}$ 5. (a) Hydrogenation reaction Addition of hydrogen to a unsaturated compound i.e. vegetable oil so that it gets converted into saturated compound i.e. vegetable ghee in the presence of catalyst (Ni) is called hydrogenation reaction. $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow[\text{Heat}]{\text{Ni}} \text{CH}_3 - \text{CH}_3$
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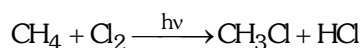
(b) Oxidation reaction

Addition of oxygen in a limited or controlled way using an oxidising agent is called oxidation reaction



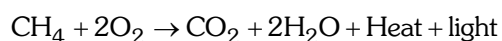
(c) Substitution reaction

The characteristic reaction of alkane in which a hydrogen atom is replaced by some other heteroatom like Cl, Br is called Substitution reaction.



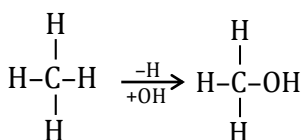
(d) Combustion reaction

The burning in the presence of O_2 /air to form CO_2 , H_2O heat and light is called combustion.



6. Alcohols are carbon compounds that are formed by

(i) Replacement of a hydrogen by hydroxyl (OH) group

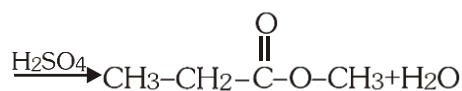
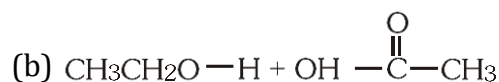
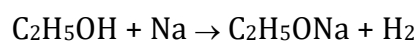


Methane Methanol

(ii) Functional group is (OH)

Names	Formula
Methanol	CH_3OH
Ethanol	$\text{CH}_3\text{CH}_2\text{OH}$
Propanol	$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
Butanol	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$

(iii) (a) with Sodium metal



7.

Harmful effects of drinking alcohol →

Small quantity of regular intake of dilute alcohol may cause a condition called drunkenness in which metabolic processes are slowed down and CNS is depressed which leads to lack of co-ordination. Small quantity of absolute alcohol (100% ethanol) can cause death. methanol cause coagulation of protoplasm of cell that lead to death or even damage blindspot i.e optic nerve causing permanent blindness.

8.

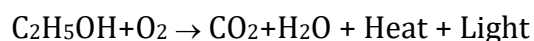
Physical properties of ethanol.

Solubility → It is soluble in water in all proportions due to formation of hydrogen bonds.

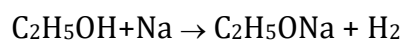
Boiling point → At 78.1°C it starts converting into vapours.

Chemical properties of ethanol.

1. Combustion – On burning in air i.e. in presence of oxygen ; CO_2 , H_2O , heat and light are released since carbon and hydrogen are oxidised to CO_2 and H_2O respectively



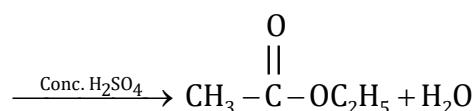
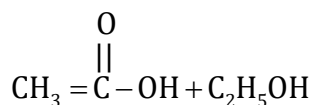
2. Reaction with sodium – A brisk effervescence is produced due to the formation of (H_2) gas.



This can be checked by pop sound test.

3. Reaction with Carboxylic acid -

ethanol forms sweet smelling substance on reacting with ethanoic acid $[\text{CH}_3\text{COOH}]$ in the presence of conc. H_2SO_4 .

**9. Physical properties**

- At ordinary temperature, ethanoic acid is a colourless liquid with a strong pungent smell and sour taste.
- Its boiling point is 391 K and its density at 273 K is 1.08 (heavier than water).
- It is miscible with water due to the formation of hydrogen bonds with water molecules.
- On cooling at 289.6 K, it turns in ice-like crystals, hence named as **glacial acetic acid**.
- It dissolves sulphur, iodine and many other organic compounds.
- It dimerises when dissolved in benzene.

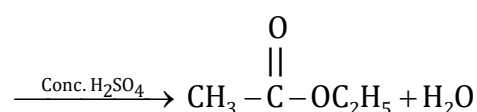
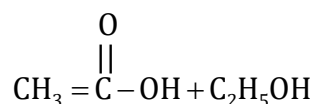
Chemical properties of ethanoic acid-

- (1) Acidic nature** – This can be proved by using a litmus paper Blue litmus paper turns to red.
- Carboxylic acids are weak acids because they do not ionised completely.

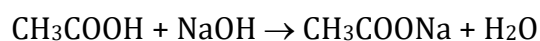


Acidic nature can also be proved by reaction of CH_3COOH with metal, metal carbonates and metal hydrogen carbonates.

- (2) Esterification** – Ethanoic acid reacts with ethanol to form sweet smelling substance known as ester.



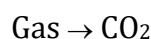
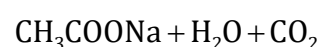
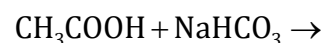
- (3) Neutralisation** : - Ethanoic acid reacts with sodium hydroxide to form sodium ethanoate and water.

**10. Difference between Ethanoic acid and Ethanol****(1) Physical properties :**

Ethanoic Acid		Ethanol	
(i)	It is sour in taste.	(i)	It has a burning taste.
(ii)	It has vinegar like smell.	(ii)	It has a burning taste
(iii)	It has moderate melting (290K) and boiling point (391K).	(iii)	It has very low melting point (156K) and low boiling point (351K)

(2) Chemical Properties :

Ethanoic Acid		Ethanol	
(i)	It turns blue litmus red.	(i)	It shows no affect on blue litmus
(ii)	Ethanoic acid reacts with sodium carbonate and results in evolution of CO_2	(ii)	Ethanol does not react with sodium carbonate

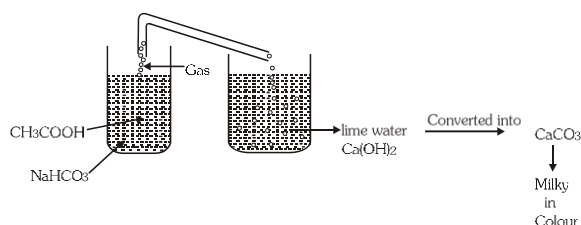
**11.**

Activity to prove that gas evolved is CO_2

Aim $\rightarrow$ To prove CO_2 is evolved.

Material required : Test tubes, Lime water, NaHCO_3 , CH_3COOH

Procedure



12. **Aim :** To study the esterification process using ethanol and acetic acid.

Method

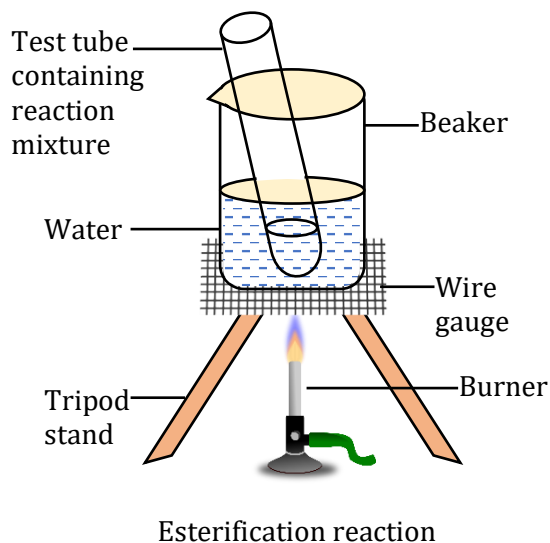
1. Take 2ml of ethanol in a test tube.
2. Add 2ml of ethanoic acid (acetic acid) in to it.
3. Add few drops of conc. H_2SO_4 .
4. Warm it in a beaker containing water.

Observation

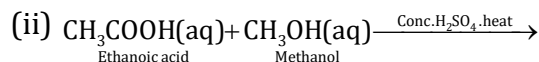
Pleasant fruity smelling compound (called ester) is formed.

Conclusion

Acetic acid reacts with alcohol in presence of conc. H_2SO_4 which act as a dehydrating agent to form ester.



13. (i) $2\text{CH}_3\text{COOH} + 2\text{Na} \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$
 $\text{C} \rightarrow \text{CH}_3\text{COOH} \rightarrow$ acetic acid

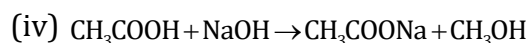


$\text{A} \rightarrow \text{CH}_3\text{OH} \rightarrow$ methanol

$\text{S} \rightarrow \text{CH}_3\text{COOCH}_3$

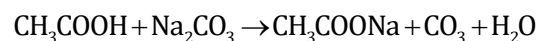


$\text{R} \rightarrow \text{CH}_3\text{COONa}$

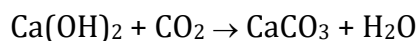


14. (a) It will turn milky

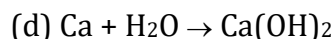
(b) Test tube A



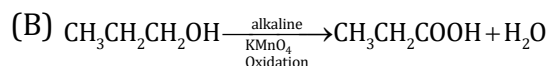
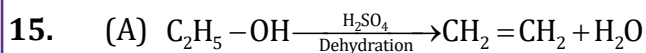
Test tube B



(c) No

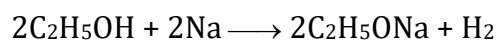


It can be prepared by dissolving calcium in water



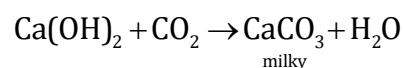
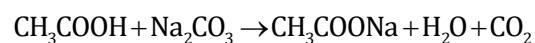
16. (i) **To Test the presence of ethanol -**

Ethanol reacts with sodium to evolve hydrogen gas which burns with pop sound.



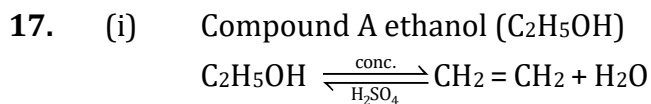
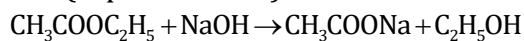
- (ii) **To test the presence ethanoic acid-**

On reacting with metal carbonate it forms CO_2 which turn lime water milky.



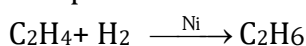
(iii) To test the presence of esters –

Esters reacts with alkali to form sodium salt and alcohol. (saponification)



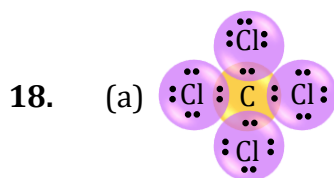
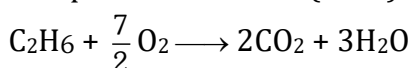
(A) (B)

(ii) Compound B - ethene (C_2H_4)



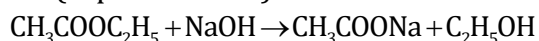
(B) (C)

(iii) Compound C - ethane (C_2H_6)



(b) The process of formation of salts is called saponification

Esters reacts with alkali to form sodium salt and alcohol. (saponification)



19. Soaps and detergents

Detergent : A substance capable of removing dirt and grease from any fabric or body is called detergent. They can be of two types, soaps and synthetic detergents.

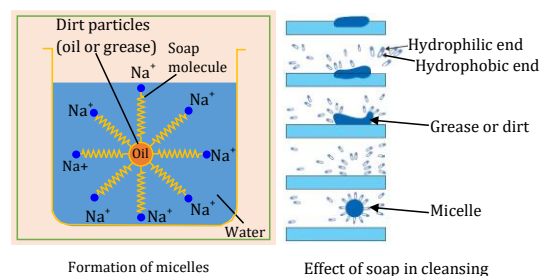
(i) Soap : A soap is the sodium or potassium salt of a long-chain fatty acids (carboxylic acid).

(ii) Synthetic detergents

Synthetic detergent differ from soaps in chemical composition. Synthetic detergents are sodium salts of long chain sulphonic acid. They are more efficient than soaps. They are usually used to make shampoos and products for cleaning clothes.

Cleansing action of soaps and detergents

The molecules of soap are sodium or potassium salts of long chain carboxylic acids. The ionic end of soap dissolves in water while the carbon chain dissolves in oil. The soap molecules, thus form structures called **micelles** where one end of the molecules is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelle thus helps in dissolving the dirt in water and we can wash out clothes clean.



20. (i) Catenation – The property of an element to link indefinitely to large no. of same element forming long chains.
- (ii) Glacial acetic acid → Crystals of ethanoic acid when heated forms pure acetic acid and on cooling looks like glacier that is known as glacial acetic acid
- (iii) Power alcohol – 20% alcohol + 80% petrol is known as power alcohol. It is used as a fuel.
- (iv) Saponification: It is the hydrolysis of an ester with NaOH or KOH to give alcohol and sodium or potassium salt of the acid.

