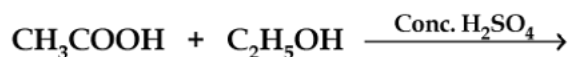


- Q20.** A vegetable oil contains two double bonds in its molecule. How many moles of hydrogen gas are required for complete hydrogenation of one mole of oil?
- Q21.** Name the substance used for oxidation of ethanol and the compound formed on oxidation
- Q22.** Name the product other than water formed on burning ethanol in air.
- Q23.** Name the organic compound which can be produced by fermentation of sugar and is a constituent of beer.
- Q24.** What is meant by saponification?
- Q25.** Complete the reaction:



- Q26.** Which alcohol is used in cough syrups and tonics?
- Q27.** Which gas will be evolved if sodium bicarbonate is added to a solution of tartaric acid?
- Q28.** What is denatured alcohol?
- Q29.** Complete the following equation:
- $$\text{CH}_3\text{CH}_2\text{OH} + \text{Na} \longrightarrow$$
- Q30.** An organic compound A of the formula $\text{C}_2\text{H}_4\text{O}_2$ turns blue litmus red and gives brisk effervescence with NaHCO_3 . Identify and give chemical reaction.

Q31. What is the effect of drinking methanol?

Q32. What is vinegar?

Q33. What happens when soap solution in a test tube is shaken with

(a) soft water

(b) hard water

Q34. Give one advantage of detergent over soap.

Q35. How would you name the following compounds?

(a) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$

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

(c) $\text{CH}_3\text{CH}_2\text{CHO}$

(d) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$

Q36. Allotropy is a property shown by which class of substances: elements, compounds or mixtures? Give one example of allotropy.

Q37. Write the structural formula of two isomers of *n*-pentane C_5H_{12} .

Q38. Explain why carbon generally forms compounds by covalent bonds.

Q39. Classify the following as alkane, alkene and alkyne:



Q40. Write a chemical equation to represent the following:

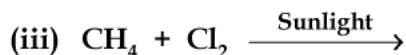
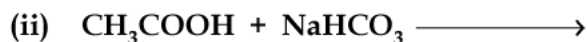
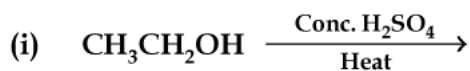
(a) Combustion of alcohol

(b) Dehydration of alcohol

Q41. What happens when hydrogen gas is passed through mustard oil in presence of nickel? Mention one difference between physical property of mustard oil and the product so obtained.

- Q42.** Give reasons for the following:
- Ethanol is used in the preparation of tincture iodine.
 - Ethanoic acid is used in the preparation of pickles.
- Q43.** Acetic acid reacts with ethyl alcohol in the presence of conc. H_2SO_4 producing a sweet smelling compound. For the reaction (a) name the main product, (b) write the chemical equation.
- Q44.** What is meant by denatured alcohol? What is the need to denature alcohol?
- Q45.** Explain why soaps are not effective cleansing agents in hard water.
- Q46.** Write chemical test to distinguish between ethanol and ethanoic acid.
- Q47.** Specify any three rules of nomenclature of organic compounds.
- Q48.** Give two examples of covalent compounds which you have studied. State any four properties in which covalent compounds differ from ionic compounds.
- Q49.** (a) What is a functional group in a carbon compound? Identify the functional group present in CH_3COOH and $\text{C}_2\text{H}_5\text{OH}$.
 (b) State the principle on which the cleansing action of a soap is based.
- Q50.** (a) Give a chemical test to distinguish between saturated and unsaturated hydrocarbons.
 (b) (i) Name the products formed when ethanol burns in air.
 (ii) What two forms of energy are liberated on burning alcohol?
 (c) Why is the reaction between methane and chlorine considered a substitution reaction?
- Q51.** Describe along with chemical equations, what happens when
- Ethene reacts with bromine water.
 - Ethanol burns in air.
 - Ethanoic acid reacts with ethanol in presence of sulphuric acid.
- Q52.** An organic compound X is an essential constituent of wine and beer. X is responsible for intoxication caused by these drinks. Oxidation of X yields an organic acid Y which is present in vinegar. Name the compounds X and Y and write their structural formulae.
- Q53.** What happens when ethanol reacts with (a) sodium (b) alkaline potassium permanganate solution? Write the necessary chemical equations for the reactions involved in the above cases.
- Q54.** (a) What are esters? How are they formed? (b) Write two uses of esters.
- Q55.** Complete the following reactions and name the main products formed in each case:
- $\text{CH}_3\text{COOH} + \text{NaOH} \longrightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
 - $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \longrightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
 - $$\begin{array}{c} \text{CH}_3 \quad \quad \quad \text{CH}_3 \\ \diagdown \quad \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \quad \quad \diagdown \\ \text{CH}_3 \quad \quad \quad \text{CH}_3 \end{array} + \text{H}_2 \xrightarrow[\text{Catalyst}]{\text{Ni}}$$
- Q56.** (a) Name the compound CH_3COOH and identify its functional group.
 (b) Give a chemical test to identify this compound.
 (c) Name the gas evolved when this compound acts on solid sodium carbonate. How would you identify this gas?

Q57. (a) Complete the following equations:



(b) Write the names of the following:



(c) Draw the electron dot structure of ethene (C_2H_4).

Q58. Give schematic representation of the cleansing action of soap in different steps.

Q59. (a) Why does carbon form compounds mainly by covalent bonding?

(b) Why do covalent compounds have low melting and boiling points?

(c) What is an ester? Describe an activity to form an ester.

Q60. (a) What is a homologous series of compounds? List any two characteristics of a homologous series.

(b) (i) What would be observed on adding a 5% solution of alkaline potassium permanganate solution drop by drop to some warm alcohol taken in a test tube?

(ii) Write the name of the compound formed during the chemical reaction.

(c) How would you distinguish experimentally between an alcohol and a carboxylic acid on the basis of a chemical property?

Q61. (a) Why does carbon form compounds mainly by covalent bonding?

(b) List any two reasons for carbon forming a very large number of compounds.

(c) An organic acid X is a liquid which often freezes during winter time in cold countries, has the formula, $\text{C}_2\text{H}_4\text{O}_2$. On warming with ethanol in the presence of a few drops of concentrated sulphuric acid, a compound Y with a sweet smell is formed.

(i) Identify X and Y.

(ii) Write a chemical equation for the reaction involved.

Q62. (a) Give reasons for the following:

(i) Unsaturated hydrocarbons show addition reaction.

(ii) Conversion of ethanol to ethanoic acid is an oxidation reaction.

(iii) Alcohol supplied for industrial purpose is mixed with copper sulphate.

(b) Write chemical equation to represent the preparation of ethane from ethanol.

(c) State the role of concentrated sulphuric acid in an esterification reaction.

Q63. (a) What is a homologous series? State any two characteristics of a homologous series.

(b) (i) How are carboxylic acids different from mineral acids from the ionization point of view?

(ii) Describe an activity to find out how ethanoic acid reacts with sodium carbonate. Name the gas evolved. How can it be tested?

- S1.** Carbon is found in the atmosphere and earth's crust. In the atmosphere, it is found as CO_2 and in the earth's crust it is found as minerals like carbonates.
The percentage of carbon in the air is 0.03% and in the earth's crust, it is present to the extent of 0.02%.
- S2.** Carbon tetrachloride is a covalent compound. Such compounds do not produce ions. Therefore, carbon tetrachloride is not a good conductor of electricity.
- S3.** Butyne (C_4H_6).
- S4.** The two features are: Catenation and tetravalency.
- S5.** Silicon also exhibits the property of catenation. Compounds of silicon are not stable.
- S6.** (a) Ketonic group (b) Carboxylic group
- S7.** Fourth member is pentene (C_5H_{10}).
- S8.** (a) Alcoholic group. (b) Carboxylic acid group.
- S9.** Alcohols – OH, carboxylic acids – COOH.
- S10.** $\text{C}_2\text{H}_6\text{O}$ and CH_4O having difference in molecular formula equal to $-\text{CH}_2$ belong to the same homologous series of alcohols ($\text{C}_2\text{H}_5\text{OH}$ and CH_3OH).
- S11.** Propene and butene.
- S12.** C_3H_6 and C_4H_8 differing in molecular formula by $-\text{CH}_2$ belong to the same homologous series.
- S13.** The property of carbon to link with other carbon atom forming straight chain, branched chain or ring compounds is called catenation.
- S14.** $\text{C}_3\text{H}_{2 \times 3 + 1}\text{OH}$ i.e., $\text{C}_3\text{H}_7\text{OH}$.
- S15.** Carboxylic acids contain two oxygen atoms in their molecules. Therefore, $\text{C}_2\text{H}_4\text{O}_2$ and $\text{C}_3\text{H}_6\text{O}_2$ are carboxylic acids.
- S16.** Colour of bromine is discharged.
- S17.** Bromine.
- S18.** Hydrogenation in the presence of nickel.
- S19.** Combustion of acetylene with oxygen is an exothermic process. A lot of heat is evolved in the reaction which is used for welding.
- S20.** 2 moles.
- S21.** Alkaline KMnO_4 or acidified $\text{K}_2\text{Cr}_2\text{O}_7$ is used for the oxidation of ethanol. Ethanoic acid is formed on oxidation.
- S22.** Carbon dioxide.
- S23.** Ethanol ($\text{C}_2\text{H}_5\text{OH}$).

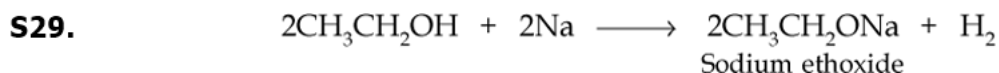
S24. Hydrolysis of an ester to produce an alcohol and a carboxylic acid in the presence of an acid or base is called saponification.



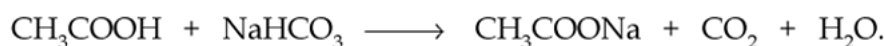
S26. Ethanol ($\text{C}_2\text{H}_5\text{OH}$).

S27. Carbon dioxide.

S28. Alcohol which has been made unfit for drinking either by mixing a small amount of methanol or by the addition of a dye, is called denatured alcohol.



S30. The compound A is CH_3COOH , ethanoic acid.



S31. It causes the protoplasm to be coagulated causing death. It also affects the optic nerve causing blindness.

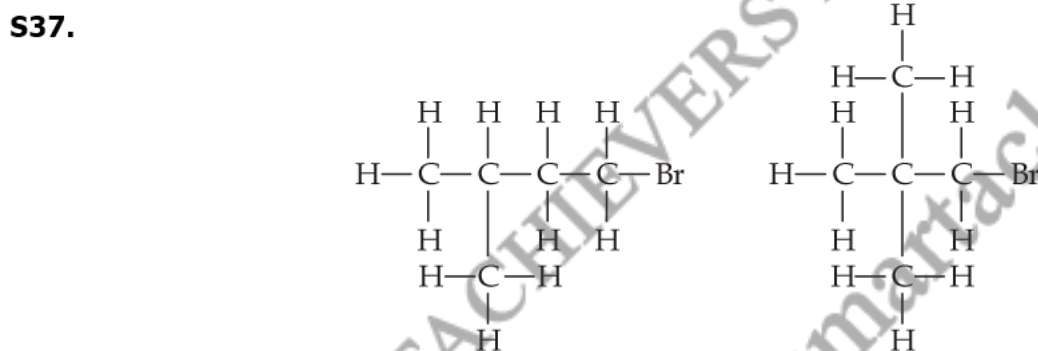
S32. 5-8% solution of acetic acid in water is called vinegar.

- S33.** (a) We obtain lot of foam with soft water.
(b) We obtain a curdy precipitate (scum) with hard water.

S34. Detergent can work with hard water whereas soap cannot.

- S35.** (a) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ Butene
(b) $\text{CH}_3\text{CH}_2\text{CH}_2-\text{C}(\text{CH}_3)_2-\text{CH}_3$ 2, 2-Dimethylpentane
(c) $\text{CH}_3\text{CH}_2\text{CHO}$ Propanal
(d) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ 2-Propanol

S36. Allotropy is shown by elements. Carbon exists in the allotropic forms: Diamond, graphite, fullerene, etc.



S38. Carbon has 4 electrons in the valency shell. To complete its octet, it either needs to gain 4 electrons or lose 4 electrons to the other atom. Both these processes are improbable. It requires a lot of energy to remove four electrons from an atom. Similarly, it becomes difficult for the nucleus to hold 4 extra electrons added. Therefore, carbon completes its octet by sharing four electrons with other atoms. Thus, carbon generally forms compounds by covalent bonds.

S39. Alkane: CH_4 , C_2H_6 ; Alkene: C_2H_4 ; Alkyne: C_2H_2 , C_3H_4 .

- S40.** (a) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \longrightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
(b) $\text{C}_2\text{H}_5\text{OH} \xrightarrow[443\text{ K}]{\text{Conc. H}_2\text{SO}_4} \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$

S41. Mustard oil changes into solid fat upon hydrogenation in presence of nickel.

Physical difference between mustard oil and the product fat is while the former is a liquid and the latter is a solid.

- S42.** (a) Iodine dissolves in ethanol. Thus, ethanol is used as a solvent in the preparation of tincture iodine.
(b) Ethanoic acid kills bacteria. Therefore it is used in the preparation of pickles as a preservative.

- S43.** (a) The main product in the reaction is ethyl acetate or ethyl ethanoate.
(b) The chemical reaction involved is:



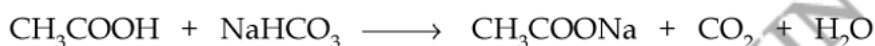
S44. Potable alcohol (alcoholic beverages) is costly. Government levies high excise duty on the sale of drinking alcohol. But alcohol meant to be used in industries is cheap. To prevent the misuse of industrial alcohol for drinking purposes, alcohol is denatured. That is it is made unfit for drinking. This can be done either by mixing methanol to ethanol or adding some dye to it.

S45. Hard water contains hydrogencarbonates, chlorides and sulphates of calcium and magnesium. These salts react with soap to form scum (precipitate). For example



The scum formed hinders the cleansing action of soap.

S46. Take samples of ethanol and ethanoic acid separately in two test tubes. Add a pinch of solid sodium hydrogencarbonate in the two test tubes. Reaction takes place and CO_2 gas comes out in the test tube containing ethanoic acid



No reaction takes place in the tube containing ethanol.

- S47.** (a) Count the number of carbon atoms in the compound and give it the base name accordingly.
(b) Identify the functional groups in the compound and name the compound by adding the prefix or suffix to the base name.
(c) If there are only carbon-carbon single bonds, the ending in the base name will be 'ane'. If there are double or triple bonds, the ending in the base name will be 'ene' and 'yne' respectively.

S48. Ethanol and Ethanoic acid are examples of covalent compounds.

Difference in properties of covalent and ionic compounds:

- (a) Covalent compounds are formed by sharing of electrons while ionic compounds are obtained by transference of electrons.
(b) Covalent compounds do not conduct electricity while ionic compounds do.
(c) There are weaker intermolecular forces in covalent compounds compared to ionic compounds.
(d) Covalent compounds possess lower melting and boiling points compared to ionic compounds.
- S49.** (a) An atom or a group of atoms which determine the chemical properties of a compound is called functional group. Functional groups present in CH_3COOH and $\text{C}_2\text{H}_5\text{OH}$ are carboxylic group and alcoholic group.
(b) Soap forms a micelle which traps the oily dirt. The micelle containing the dirt is washed away with water.

S50. (a) Saturated and unsaturated hydrocarbons can be distinguished by adding bromine water. Brown colour of bromine disappears with unsaturated hydrocarbon because of addition reaction. There is no change in the colour of bromine water when it acts on saturated hydrocarbon.

(b) (i) Carbon dioxide and water are formed when ethanol burns in air.



(ii) Heat and light are evolved in the above reaction

(c) $\text{CH}_4 + \text{Cl}_2 \longrightarrow \text{CH}_3\text{Cl} + \text{HCl}$

Chlorine substitutes for hydrogen in methane forming chloromethane. Therefore, it is a substitution reaction.

S51. (a) The brown colour of bromine disappears

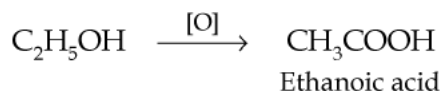


(b) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \longrightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$

(c) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \longrightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$

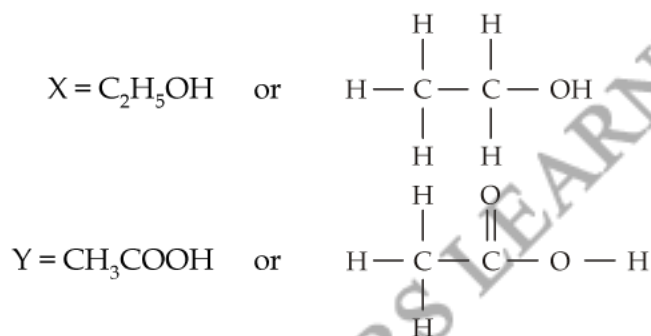
S52. Compound $\text{C}_2\text{H}_5\text{OH}$ ethanol is an essential constituent of wine and beer. It causes intoxication.

Oxidation of X yields ethanoic acid



Vinegar is 5-8% solution of ethanoic acid in water.

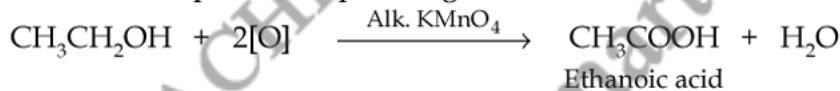
Thus,



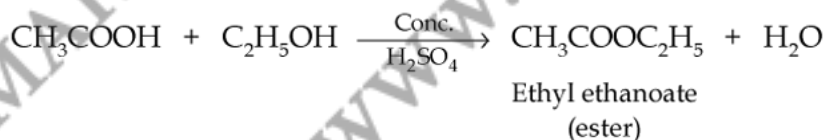
S53. (a) Reaction with sodium



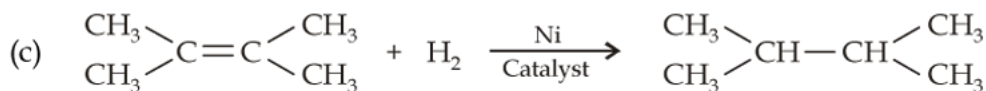
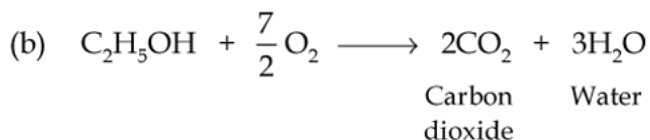
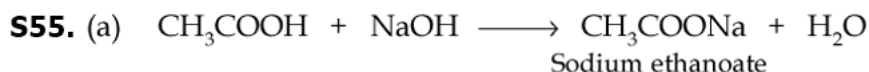
(b) Reaction with alkaline potassium permanganate



S54. (a) Compounds having the formula RCOOR' are called esters. Esters are formed by the combination of a carboxylic acid and an alcohol in the presence of concentrated sulphuric acid. For example,

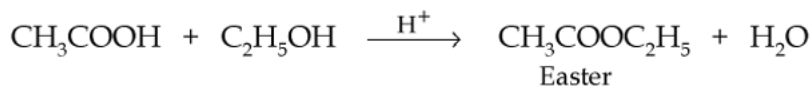


(b) **Uses of esters:** (i) In making perfumes. (ii) As flavouring agents.

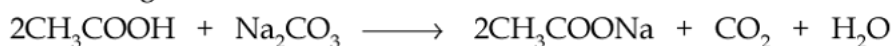


S56. (a) CH_3COOH is ethanoic acid. It contains the functional group carboxylic acid.

(b) Ethanoic acid reacts with ethanol in the presence of conc. H_2SO_4 , an ester is formed which has a fruity smell.



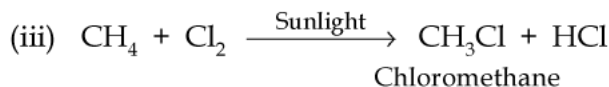
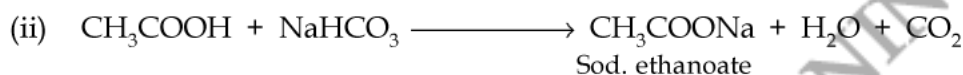
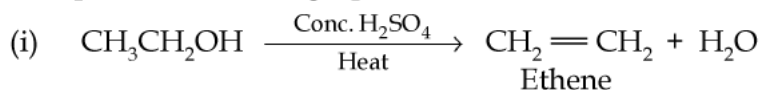
(c) Carbon dioxide gas is evolved when ethanoic acid acts on solid sodium carbonate.



Carbon dioxide can be identified by passing through lime water which turns milky.



S57. (a) Complete the following equations:



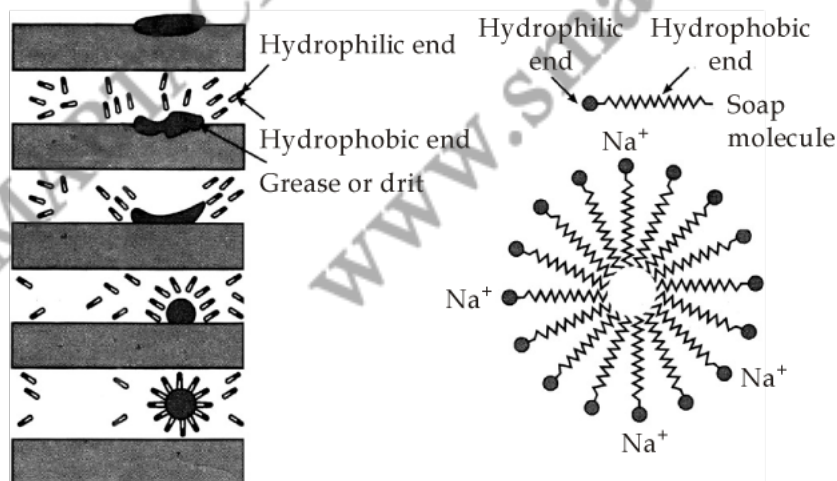
(b) (i) $\text{CH}_3\text{CH}_2\text{COOH}$ Propanoic acid

(ii) $\text{CH}_3\text{CH}_2\text{Br}$ Bromoethane

(c) Electron dot structure of ethene (C_2H_4).



S58. The figure shows the schematic representation of cleansing action of soap in two different ways



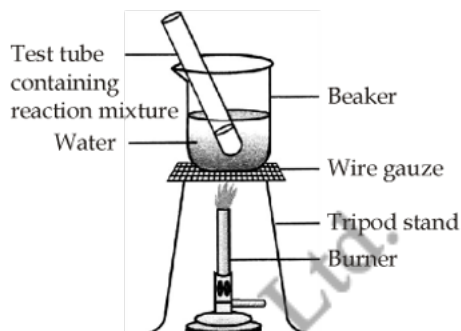
- S59.** (a) Carbon has 4 electrons in its valence shell. To attain stability, it should either gain 4 electrons or lose 4 electrons. It cannot lose 4 electrons as it involves a lot of energy. Also, it cannot gain 4 electrons because the nucleus cannot hold on to the extra electrons added. Therefore, to complete the octet, it shares four electrons with other atoms. That is why carbon forms compounds by covalent bonding.
- (b) Covalent compounds have covalent bonding in them. The bonds are formed by sharing of electrons. There are no ions in such compounds. There are weak forces of attraction between the molecules. So, they have low melting and boiling points.
- (c) An ester is a compound having the general formula RCOOR' where R and R' are alkyl groups. For example, ethyl ethanoate, $\text{CH}_3\text{COOC}_2\text{H}_5$ which is obtained by the combination of ethanoic acid with ethanol.

Activity to form an ester:

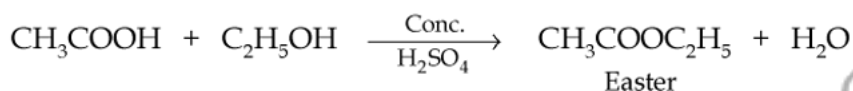
Materials required: Beaker, test tube, wire gauze, tripod stand, burner, ethanoic acid, ethanol.

Procedure:

1. Take 1 mL ethanol, 1 mL glacial acetic acid and a few drops of conc. H_2SO_4 in a clean and dry test tube.
2. Warm in a water bath for about 5 minutes as shown in figure.
3. Pour the contents of the test tube in a beaker containing about 50 mL of water and smell the resulting mixture



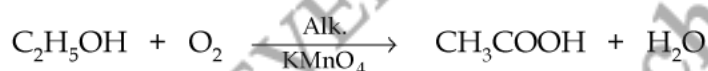
A sweet smell of the ester is noticed.



- S60.** (a) A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called homologous series.

Characteristics of homologous series:

- (i) The molecular formulae of any two successive members of a homologous series differ by $-\text{CH}_2$.
 - (ii) There is a regular gradation in physical properties of members of a homologous series.
- (b) (i) Pink colour of alkaline potassium permanganate disappears when it is added drop by drop to warm alcohol taken in a test tube till the reaction is complete and the whole of alcohol has been oxidised.
- (ii) The compound formed is ethanoic acid (CH_3COOH).



- (c) A brisk effervescence is obtained when sodium hydrogencarbonate is added to a carboxylic acid. No such effervescence is obtained with alcohol.

- S61.** (a) Carbon has 4 electrons in its valence shell. To attain stability, it should either gain 4 electrons or lose 4 electrons. It cannot lose 4 electrons as it involves a lot of energy. Also, it cannot gain 4 electrons because the nucleus cannot hold on to the extra electrons added. Therefore, to complete the octet, it shares four electrons with other atoms. That is why carbon forms compounds by covalent bonding.

- (b) Two reasons for forming a large number of compounds by carbon are:

Catenation: It is the property of carbon to link to other carbon atoms forming straight chain, branched chain and ring compounds.

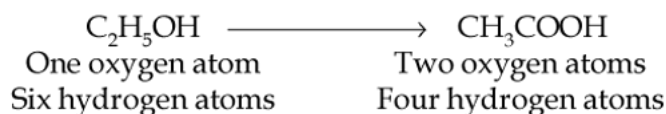
Tetravalency: Carbon has a valency of four. Also it can link to atoms other than hydrogen, like oxygen, nitrogen and halogens to form a wide variety of compounds.

- (c) Compound X is ethanoic acid CH_3COOH . It freezes at 290 K (17°C), the temperature during winter season. It has the molecular formula $\text{C}_2\text{H}_4\text{O}_2$. On warming with ethanol, it forms ethyl ethanoate having a sweet smell. Thus, Y is ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$).

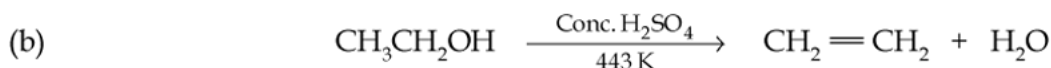
Chemical equation for the reaction is written as under:



- S62.** (a) (i) Unsaturated hydrocarbons show addition reactions. This is because unsaturated hydrocarbons contain double or triple bonds. Such compounds are unstable because the four valencies of carbon atoms are not satisfied by linking to four atoms. They complete the four valencies in addition reactions.
- (ii) In the conversion of ethanol to ethanoic acid, the number of oxygen atoms increases and the number of hydrogen atoms decreases. Hence, it is an oxidation reaction



- (iii) Alcohol supplied for industrial purposes is cheap. To prevent its use for human consumption, it is made unfit for drinking by adding a poisonous substance like copper sulphate.

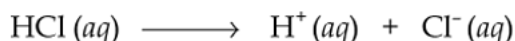


- (c) Concentrated sulphuric acid acts as a catalyst in the esterification reaction.

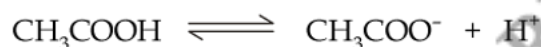
- S63.** (a) A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called homologous series.

Characteristics of homologous series:

- (i) The molecular formulae of any two successive members of a homologous series differ by $-\text{CH}_2$.
- (ii) There is a regular gradation in physical properties of members of a homologous series.
- (b) (i) Mineral acids are completely dissociated into H^+ ions. For example, hydrochloric acid is completely dissociated into H^+ and Cl^- ions.



On the other hand, carboxylic acids are only partially dissociated into H^+ ions. This can be represented as under:



Therefore, carboxylic acids are weaker compared to mineral acids.

- (ii) **Activity to find out how ethanoic acid reacts with sodium carbonate:**

Materials required: Two test tubes, thistle funnel, iron stand, cork, delivery tube, lime water $\text{Ca}(\text{OH})_2$, sodium carbonate, ethanoic acid.

Procedure:

- Set up the apparatus as shown in figure.
- Take a spatula full of sodium carbonate in a test tube and add 2 mL of dilute ethanoic acid. A brisk effervescence is observed.
- Pass the gas through freshly prepared lime water. We observe that lime water turns milky indicating that the gas evolved is carbon dioxide.

