Chapter - (Carbon And Its Compounds)

Topic - 1 (Carbon and its Properties, Homologous Series and IUPAC Names)

Very Short Answer Type Questions

Q.1. What is a homologous series of carbon compounds?

Q.2. Write the next homologue of each of the following: (i) C_2H_4, (ii) C_4H_9COOH

Q.3. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n}.

Q.4. Write the name and molecular formula of the first member of the homologous series of alkynes.

Q.5. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n-2}.

Q.6. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n+2}.

Q.7. Molecular formula of a hydrocarbon is C_3H_8. Draw its complete structure and write its name.

Q.8. Write next two members of the homologous series: C_2H_6, C_3H_8.

Q.9. Which of the following belong to the same homologous series? C_3H_8, C_4H_8, C_4H_6, C_3H_6.

Q.10. Write the two succeeding members of the following homologous series: C_2H_6, C_3H_8.

Q.11. What is the difference between two consecutive members in a homologous series in alkanes in term of:

(i) Molecular mass,

(ii) Number of atoms of elements.

Q.12. The molecular formula of 'A' is $C_{10}H_{18}$ and 'B' is $C_{18}H_{36}$. Name the homologous series to which they belong.

Q.13. Name the following compounds:

(i) CH_3-CH_2-OH, (ii) CH_3-$\overset{\overset{H}{|}}{C}$ = O

Q.14. Which element exhibits the property of catenation to maximum extent and why?

Q.15. Write the name and molecular formula of the fourth member of alkane series.

Q.16. Select saturated hydrocarbons from the followings: C_3H_6; C_5H_{10}; C_4H_{10}; C_6H_{14}; C_2H_4

Q.17. Write the name and structure of an alcohol with three carbon atoms in its molecule.

Q.18. Write the name and structure of an alcohol with four carbon atoms in its molecule.

Q.19. Write the name and structure of an aldehyde with four carbon atoms in its molecule.

Q.20. Name the process of converting vegetable oil to vegetable ghee.

Q.21. Write the number of covalent bonds in the molecule of Ethane.

Q.22. Write the number of covalent bonds in the molecule of Propane, C_3H_8

Q.23. Name the process by which unsaturated fats are changed to saturated fats.

Q.24. Write the name of each of the following functional groups: (a) -OH (b) –C(=O)-

Q.25. Write the number of covalent bonds in the molecules of butane C_4H_{10}.

Q.26. Mention the percentage of carbon in earth's crust.

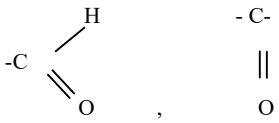
Q.27. Name the functional group present in CH_3COCH_3 and state the name of this compound.

Q.28. Name a functional group present in (i) CH_3CHO, (ii) $C_2H5COOH$.

Q.29. Write the molecular formula of the following: (i) Hexane, (ii) Benzene

Q.30. Write the formula of functional group: (i) Aldehyde, (ii) Alcohol

Q.31. Given below are the formulae of some functional groups:



Write the name of these functional groups

Short Answer Type Questions – I

Q.1. Write molecular, electronic and structural formulae of ethene.

Q.2. What is a covalent bond? What type of bond exists in (i) CCI_4, (ii) $CaCl_2$?

Q.3. Why is it not easy for carbon to take part in the formation of ionic compounds?

Q.4. (i) What is a functional group?

(ii) State two properties of carbon which lead to huge number of carbon compounds we see around us.

Q.5. List two differences between saturated and unsaturated hydrocarbons.

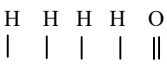
Q.6. Differentiate between addition reactions and substitution reactions shown by hydrocarbons.

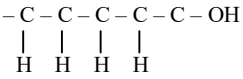
Q.7. (i) Write the name of the following compounds:

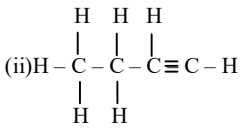
(a) HCOOH, (b) $CH_3COCH_2CH_3$.

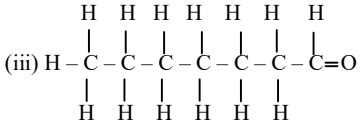
(ii) Explain why carbon generally forms compound by covalent bonds.

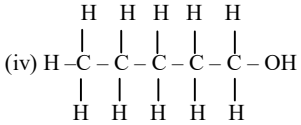
Q.8. Write the name of the following compounds:



(i) 

(ii) 

(iii) 

(iv) 

Short Answer Type Questions – II

Q.1. What are covalent compounds? Why are they different from ionic compounds? List their three characteristics.

Q.2. Draw the structures of the following compounds and identify the functional group present in them:

(i) Butanoic acid

(ii) Bromopropane

(iii) Butyne

Q.3. What is meant by isomers? Draw the structure of two isomers of butane, C_4H_{10}. Explain why we cannot have isomers of first three members of alkane series.

Q.4. Write the molecular formula of the following compounds and draw their electron- dot structures:

(i) Ethane (ii) Ethene (iii) Ethyne

Q.5. Write the name and structural formula of the compound formed when ethanol is heated at 443k temperature with excess of conc. H_2SO_4. What is the role of conc. H_2SO_4 in this reaction? Also give the chemical equation for the reaction.

Q.6. What is meant by homologous series of carbon compounds? Write the general formula of (i) alkenes, and (ii) alkynes. Draw the structure of the first member of each series to show the bonding between the two carbon atoms.

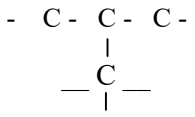
Q.7. What is homologous series of carbon compounds? Write the molecular formula of two consecutive members of homologous series of aldehydes. State which part of these compounds determines their (i) physical and (ii) chemical properties.

Q.8. State the meaning of functional group in a carbon compound. Write the functional group present in (i) ethanol, and (ii) ethanoic acid and also draw their structures.

Q.9. State the meaning of the functional group in an organic compound. Write the formula of the functional group present in alcohols, aldehydes ketones and carboxylic acids.

Q.10. Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen can take place. Stating the essential conditions required for an addition reaction to occur, write the chemical equation giving the name of the reactant and the product of such a reaction.

Q.11. Carbon has the unique property to form bonds with other atoms of carbon.



(Fig. A)

(i) Name the characteristic property of carbon as depicted in the fig. A

(ii) Give reason for this unique property of carbon.

(iii) Draw the structure of cyclohexane.

Q.12. Name and draw the chain structure and dot structure of first two alkanes.

Q.13. Write the names of the following:

(i) $CH_3CH_2 – C = CH$

(ii) CH_3CH_2OH

(iii) CH_3COCH_3.

Q.14. (a) List four characteristics of homologous series.

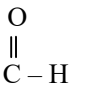
(b) Draw the electron dot structure of carbon dioxide.

Q.15. (i) Identify, from the following, the hydrocarbons that can undergo addition reactions:

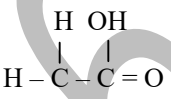
C_3H_4, C_2H_6, CH_4, C_2H_4. Justify your answer.

(ii) Write the name of the homologous series to which they belong to.

Q.16. (i) Define the term functional group. Identify the functional group present in



(a)



(b)

(ii) What happens when 5% alkaline $KMnO_4$ solution is added drop by drop to warm ethanol taken in a test-tube? State the role of alkaline $KMnO_4$ solution in this reaction.

Q.17. An aldehyde as well as a ketone can be represented by the same molecular formula, say C_3H_6O. Write their structures and name them. State the relation between the two in the language of science.

Q.18. Explain the following:

(i) CH3COOH is a weak acid

(ii) Propene undergoes addition reaction

(iii) The gas stoves have inlets for air.

Q.19. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed.

Q.20. What is meant by functional group in carbon compounds? Write in tabular form the structural formula and the functional group present in the following compounds:

(i) Ethanol

(ii) Ethanoic acid

Q.21. Why is homologous series of carbon compounds so called? Write the chemical formula of two consecutive members of any homologous series and state the part of these compounds that determines their (i) physical and (ii) chemical properties.

Q.22. A carboxylic acid (molecular formula $C_2H_4O_2$) reacts with an alcohol in the presence of an acid catalyst to form a compound 'X'. The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid $C_2H_4O_2$. Write the name and structure of (i) carboxylic acid, (ii) alcohol and (iii) the compound 'X'.

Long Answer Type Questions

Q.1. (i) Define the term 'isomers'.

(ii) Draw two possible isomers of the compound with molecular formula C_3H_6O and write their names.

(iii) Give the electron dot structures of the above two compounds.

Q.2. Expalin the following reactions with one example for each giving relevant chemical equations:

(i) Hydrogenation reaction,

(ii) Oxidation reaction,

(iii) Substitution reaction,

(iv) Combustion reaction,

(v) Saponification reaction.

Q.3. Give two examples of covalent compounds which you have studied. State any four properties in which covalent compounds differ from ionic compounds.

Q.4. (a) Draw the structure for the following compounds:

(i) 2-Bromopentane, (ii) 2-methyl propane, (iii) Butanal (iv) 1-Hexyne.

(b) Draw the electron dot structure for ethanoic acid.

Q.5. Describe the following chemical properties of carbon compounds briefly and give one chemical reaction for each:

(i) Combustion

(ii) Addition

(iii) Substitution

(iv) Esterification

(v) Oxidation

Q.6. (i) Give a chemical test to distinguish between saturated and unsaturated hydrocarbon.

(ii) Name the products formed when ethane burns in air. Write the balanced chemical equation for the reaction showing the types of energies liberated.

(iii) Why is reaction between methane and chlorine in the presence of sunlight considered a substitution reaction?

Q.7. (a) State any three physical properties of carbon compounds.

(b) Carbon is a versatile element. Justify this statement.

Q.8. Explain why carbon forms compounds mainly by covalent bonds. Explain in brief two main reasons for carbon forming a large number of compounds. Why does carbon form strong bonds with most other elements?

OR

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

Q.9. Elements forming ionic compounds attain noble gas electronic configuration by either gaining or losing electrons from their valence shells. Explain giving reason why carbon cannot attain such a configuration in this manner to form its compounds. Name the type of bonds formed in ionic compounds and in the compounds formed by carbon. Also explain with reason why carbon compounds are generally poor conductors of electricity.

OR

Elements forming ionic compounds attain noble gas configuration by either gaining or losing electrons from their outermost shells. Give reason to explain why carbon cannot attain noble gas configuration in this manner to form its compounds. Name the type of bonds formed in ionic compounds and in the compounds formed by carbon. Also give reason why carbon compounds are generally poor conductors of electricity.

Q.10. List two reasons for carbon forming a large number of compounds. Name the type of bonding found in most of its compounds. Why does carbon form compounds mainly by this kind of bonding. Give reason why the carbon compounds:

(i) Generally have low melting and boiling points.

(ii) Do not conduct electricity in molten state.

Q.11. State the reason why carbon can neither form C^{4+} cations nor C^{4-} anions but forms covalent compound. Also state the reason to explain why covalent compounds:

(i) are bad conductors of electricity.

(ii) have low melting and boiling points.

Topic - 2 (Carbon Compounds, Soap and Detergents)

Very Short Answer Type Questions

Q.1. Name the simplest ketone.

Q.2. What is the common name of CH_3COOH?

Q.3. Name the products formed when ethanoic acid reacts with a sodium hydrogen carbonate.

Q.4. An organic compound burns with a sooty flame. Is it saturated or unsaturated compound? Justify.

Q.5. Draw the electron dot structure of nitrogen molecule.

Q.6. Why is pure ethanoic acid called glacial ethanoic acid (or glacial acetic acid)?

Q.7. In an organic compound, which part largely determine its physical and chemical properties?

Q.8. What happens when methane is burnt in air?

Q.9. What happens when bromine water is added to ethane gas?

Q.10. Complete the following reaction: $CH_3COOH + NaHCO_3 \rightarrow$

Q.11. Write the chemical equations for the conversion of ethanol to ethanoic acid in the presence of $KMnO_4$.

Short Answer Type Questions – I

Q.1. What is meant by saponification? Give an example.

Q.2. (i) What is vinegar? Give its uses.

(ii) Why does carbon form compounds having low melting and boiling points?

Q.3. Give a chemical test to distinguish between butter and cooking oil.

Q.4. List any four differences between soaps and detergents.

Q.5. (a) Complete the following reactions:

(i) $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} \ldots\ldots + HCl$

(ii) $CH_3CH_2OH \xrightarrow[H_2SO_4]{Hot.Conc} \ldots\ldots + H_2O$

(b) How is scum formed? .

Q.6. (i) What would be observed on adding a 5% alkaline potassium permanganate drop by drop to some warm ethanol taken in a test – tube ?

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

Q.7. (i) Describe the mechanism of cleansing action of soaps.

(ii) Why do soaps not work in hard water?

Q.8. (i) An organic compound 'X" reacts with sodium metal to form sodium ethoxide and a gas 'Y". Identify 'X' and 'Y".

(ii) What happens when ethanol is heated at 443 K with conc. H_2SO_4?

Q.9. An organic acid 'X" is a liquid which often freezes during winter time in cold countries. It has molecular formula $C_2H_4O_2$. On warming with ethanol in the presence of a few drops of conc. H_2SO_4 A compound Y eith a sweet smell is formed.

(i) Identify 'X" and 'Y".

(ii) Write chemical equations for the reactions involved.

Q.10. (i) What is a catalyst? Write the chemical equation to represent the hydrogenation of ethane.

(ii) Which of the following compounds belong to the same homologous series? C_2H_6, $C_2H_6O_2$, C_2H_6O, C_4H_{10}.

Short Answer Type Questions – II

Q.1. What is an oxidising agent? What happens when an oxidising agent is added to propanol? Explain with the help of a chemical equation.

Q.2. Write the molecular, electronic and structural formulae of ethyne.

OR

Draw the electron dot structure of ethyne and also draw its structural formula.

Q.3. What is meant by hydrogenation? With the help of a chemical equation, explain the role of this reaction in industry.

OR

What is hydrogenation? What is its industrial application?

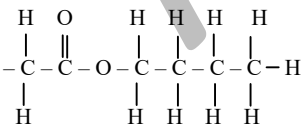
Q.4. (i) Differentiate between alkanes and alkenes. Name and draw the structure of one member of each.

(ii) Alkanes generally burn with clean flame. Why?

Q.5. Explain why it is difficult to wash clothes with soap when water is hard. How do detergents help in overcoming this problem?

Q.6. The structural formula of an ester is:

(iii)



Write the structural formula of the acid and the alcohol from which it might be prepared. Name the process of formation of ester.

Q.7. Write three different chemical reactions showing the conversion of ethanoic acid to sodium ethanoate. Write balanced chemical equation in each case. Write the name of the reactants and the products other than ethanoic acid and sodium ethanoate in each case.

Q.8. When ethanol reacts with ethanoic acid in the presence of conc. H_2SO_4, a substance with fruity smell is produced. Answer the following:

(i) State the class of compounds to which the fruity smelling compounds belong. Write the chemical equation for the reaction and write the chemical name of the product formed.

(ii) State the role of conc. H_2SO_4.

Q.9. Name the compound formed when ethanol is heated in excess of conc. Sulphuric acid at 443 K. Also write the chemical equation of the reaction stating the role of conc. sulphuric acid in it. What would happen if hydrogen is added to the product of this reaction in the presence of catalysts such as palladium or nickel?

Q.10. Write the name and molecular formula of an organic compound having its name suffixed with 'ol' and having two carbon atoms in its molecule. Write balanced chemical equation to indicate what happens when this compound is heated with excess conc. H_2SO_4 and the name of main product formed. Also state the role of conc. H_2SO_4 in the reaction.

Q.11. An organic compound 'P' is a constituent of wine. 'P' on reacting with acidified $K_2Cr_2O_7$ forms another compound 'Q'. When a piece of sodium is added to 'Q' a gas 'R' evolves which burns with a pop sound. Identify P, Q and R and write the chemical equations of the reactions involved.

Q.12. Write chemical equation of the reaction of ethanoic acid with the following:

(i) Sodium

(ii) Sodium hydroxide

(iii) Ethanol.

Write the name of one main product of each reaction.

Q.13. On dropping a small piece of sodium in a test – tube containing carbon compound 'X' with molecular formula C_2H_6O, a brisk effervescence is observed and a gas 'Y' is produced. On bringing a burning splinter at the month of the test – tube the gas evolved burns with a pop sound. Identify 'X' and 'Y'. Also write the chemical equation for the reaction. Write the name and structure of the product formed, when you heat 'X' with excess conc. Sulphuric acid.

Q.14. When we take 1 ml ethanol and 1 ml ethanoic acid along with a few drops of concentrated sulphuric acid in a test – tube a sweet smelling substance is formed. Name the compound and give the balanced chemical equation for the reaction. What do we call the reverse reaction to give back alcohol and carboxylic acid which is used in the preparation of soap?

Q.15. With the help of an example, explain the process of hydrogenation. Mention the essential conditions for the reaction and state the change in physical property with the formation of the product.

Q.16. What is the difference between the molecules of soaps and detergents, chemically? Explain the cleasing action of soaps.

Q.17. Write the name and structural formula of the compound obtained when ethanol is heated at 443K with axcess of conc. H_2SO_4. Also write chemical equation for the reaction stating the role of conc. H_2SO_4 in it.

Q.18. What are esters? How they are prepared? List two uses of esters.

Q.19. Draw the electron dot structure of ethyne. A mixture of ethyne and oxygen is burnt for welding. In your opinion, why cannot we use a mixture of ethyne and air for this purpose.

Q.20. Write the chemical equations for the following chemical reactions and name the carbonic compound obtained.

(i) Reaction of acidified potassium dichromate solution with ethanol on heating.

(ii) Reaction of sodium metal with ethanol.

(iii) Reaction of concentrated sulphuric acid with ethanol at 443 K.

Q.21. A carboxylic acid (molecular formula $C_2H_4O_2$) reacts with an alcohol in the presence of an acid catalyst to form a compound 'X'. The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid. $C_2H_4O_2$. Write the name and structure of (i) carboxylic acid, (ii) alcohol and (iii) the compound 'X'.

Q.22. Name the oxidising agents used for the conversion of ethanol to ethanoic acid. Distinguish between ethanol and ethanoic acid on the basis of (i) litmus test, (ii) reaction with sodium carbonate.

Q.23. Complete the following equations:

(i) $CH_3COOC_2H_5 \xrightarrow{NaOH}$

(ii) $CH_3COOH + NaHCO_3 \longrightarrow$

(iii) $CH_4 + Cl_2 \xrightarrow{Sunlight}$

Q.24. How are the following products obtained from ethanol?

(i) Ethyl ethanoate (ii) Sodium ethoxide.

Q.25. An organic compound A of molecular formula C_2H_4 on reduction gives another compound B of molecular formula C_2H_6. B on reaction with chlorine in the presence of sunlight gives C of molecular formula C_2H_5Cl.

(i) Name the compounds A, B and C.

(ii) Write the chemical equation for the conversion of A to B and name the type of reactions.

Q.26. Two compounds 'A' and 'B' have the molecular formula C_3H_8 and C_3H_6 respectively. Which one of the two is most likely to show addition reactions? Justify your answer. Explain with the help of a chemical equation, how an addition reaction is useful in vegetable ghee industry.

Q.27. (i) Giva a chemical test to distinguish between saturated and unsaturated hydrocarbons.

(ii) Name the products formed when ethanol burns in air. List two forms of energy that are liberated on burning ethanol.

(iii) Why is the reaction between methane and chlorine considered a substitution reaction?

Q.28. An organic compound 'A' of molecular formula C_2H_6O on oxidation with dilute alkaline $KMnO_4$ solution gives an acid 'B' with the same number of carbon atoms. Compound 'A' is often used for sterilization of skin by doctors.

(i) Name the compounds 'A' and 'B'.

(ii) Write he chemical equation involved in the formation of 'B' from 'A'.

Q.29. (i) Write the chemical name and formula of vinegar.

(ii) Describe with a chemical equations what happens when sodium reacts with ethanol.

Q.30.(i) Write the chemical names of CH_3COCH_3, C_2H_5COOH.

(ii) What happens when acetic acid and ethanol react in presence of concentrated H_2SO_4? Write the reactions there in.

Q.31. Complete the following reactions:

(i) $CH_3CH_2OH \xrightarrow[KMnO_4 + Heat]{Alkaline} ?$

(ii) $2Na + 2CH_3CH_2OH \rightarrow ? + ?$

(iii) $CH_3COOH + CH_3CH_2OH \xrightarrow{acid} ?$

Q.32. With the help of a diagram. Explain cleansing action of soap.

OR

Explain the mechanism of cleaning action of soap.

Long Answer Type Questions

Q.1. (a) How will you bring about following reactions? Write the concerned chemical equations

(i) Ethanol to Ethene

(ii) Ethanol to Ethanoic acid

(b) Give one example with chemical equation for the following: reactions:

(i) Substitution reaction

(ii) Saponification reaction

(iii) Combustion reaction

Q.2. Write balanced chemical equation for the following:

(i) Methane is burned in sufficient air

(ii) Ethanol is treated with sodium

(iii) Ethanoic acid is reacted with sodium hydroxide

(iv) Ethanoic acid is treated with sodium carbonate.

(v) Ethanol is mixed with ethanoic acid in the presence of an acid.

Q.3. (a) Complete the following reactions:

(i) $CH_3CH_2OH \xrightarrow[Heat]{Conc.\ H_2SO_4}$

(ii) $CH_3COOH + KHCO_3 \xrightarrow{Sunlight}$

(iii) $CH_4 + Cl_2 \rightarrow$

(b) Write the name of the following:

(i) CH_3CH_2COOH,

(ii) $CH_3CH_2CH_2Br$.

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

Q.4. (a) Complete the following equations

(i) $nCH_2 = CH_2 \rightarrow$ ……

(ii) $CH_3\_COOH + NaHCO_3 \rightarrow$ ….. + ….. +

(b) What is the cause of hardness of water? Why soap does not form lather with hard water? Mention the disadvantage of cleaning clothes with soap in hard water?

Q.5. (i) Covalent compounds have low melting and boiling points". Justify this statement.

(ii) What is an ester? Describe an activity to form an ester in a school laboratory.

Q.6. What are micelles? Why does it form when soap is added to water? Will a micelle be formed in other solvents such as ethanol also? State briefly how the formation of micelles help to clean the clothes having oily sports.

OR

Why does micelle formation takes place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?

Q.7. Describe the addition reaction of carbon compounds with its application. State the function of catalyst in this reaction. How this reaction is different from a substitution reaction?

Q.8. (i) You have three unlabelled test – tubes containing ethanol, ethanoic acid and soap solution. Explain the method you would use to identify the compounds in different test tubes by chemical tests using litmus paper and sodium metal.

(ii) Give the reason of formation of scum when soaps are used with hard water.

Q.9. A carbon compound 'P' on heating with excess conc. H_2SO_4 forms another carbon compound 'Q' which on addition of hydrogen in the presence of nickel catalyst forms a saturated carbon compound 'R'. One molecule of 'R' on combustion forms two molecules of carbon dioxide and three molecules of water. Identify P, Q and R and write chemical equations for the reactions involved.

Q.10. Both soap and detergent are same type of salts. What is the difference between them? Describe in brief the cleansing action of soap. Why do soaps not form lather in hard water? List two problems that arise due to the use of detergents instead of soaps.

Q.11. An organic compound A is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound B.

(i) Identify the compound A.

(ii) Write the chemical equation for its reaction with ethanol.

(iii) Name the products formed.

(iv) Name the process involved in the reaction.

(v) How can we get back the compound A from B.

Q.12. Make the structure of methane by showing sharing of electrons between carbon and hydrogen atoms. How could you convert methane into chloroform by substitution reaction? Explain with the help of chemical reactions.

Q.13. An organic compound 'X' on heating with conc. H_2SO_4 forms a compound 'Y' which on addition on one molecule of hydrogen in the presence of nickel forms a compound 'Z'. One molecule of compound 'Z' on combustion forms two molecules of CO_2 and three molecules of H_2O. Identify giving reasons the compounds 'X', 'Y' and 'Z'. Write the chemical equations for all the chemical reactions involved.

Q.14.(i) Write the name of the following compound. CH_3CH_2COOH,C_6H_6

(ii) What is a homologous series? Write the formula of functional group of ketone and aldehyde.

(iii) What will happen if ethanol reacts with ethanoic acid, in the presence of an acid? Name the reactions. Write the chemical equation for this reaction.

Q.15. an organic compound 'A' is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. The compound reacts with ethanol in presence of an acid to form a sweet smelling compound 'B'.

(i) Identify the compound 'A'.

(ii) Write the chemical equation for its reaction with ethanol to form compound 'B'.

(iii) How can you get 'A' back from 'B'?

(iv) Name the process and write the corresponding chemical equation.

(v) Which gas is produced when compound 'A' reacts with washing soda? Write the chemical equation.