

Assignments in Science Class X

Topic: - CARBON AND ITS COMPOUNDS

IMPORTANT NOTES

- 1. Covalent bond or Molecular bond or Homopolar bond:** A chemical bond formed between two non-metallic elements by the mutual sharing of one or more electron pairs is called *covalent bond*.
- 2. Covalency:** The number of electron pairs which an atom of an element mutually shares with another atom or atoms of the same or different elements, so as to acquire a stable configuration like noble gases, is called *covalency*.
- 3. Properties of covalent (molecular) compound :**
 - A. They have low melting point and boiling point.
 - B. They have low density, *i.e.*, their density is generally less than that of water.
 - C. They are gaseous or volatile liquids or soft solids.
 - D. They are insoluble in water, but soluble in organic solvents.
 - E. They are generally bad conductors of electricity.
- 4.** Diamond is the purest crystalline form of carbon which is the hardest naturally occurring substance.
- 5.** Other pure crystalline forms of carbon are graphite and fullerenes. In Buckminsterfullerene, each molecule has 60 atoms arranged in hexagons and pentagons.
- 6. Organic Chemistry:** The branch of chemistry dealing with carbon compounds other than carbon monoxide, carbon dioxide and carbonates is called organic chemistry.
- 7. Catenation:** The property of carbon atoms to link with other carbon atoms or the atoms of other elements with single, double or triple covalent bonds, so as to form large number of compounds is called catenation.
- 8. Saturated organic compounds:** Organic compounds in which all the four valencies of carbon atoms are satisfied by single covalent bonds, are called saturated organic compounds.
- 9. Unsaturated organic compounds:** Organic compounds, in which a double or a triple bond exists between two carbon atoms in a carbon chain, are called unsaturated organic compounds.
- 10. Hydrocarbons:** Organic compounds which contain only carbon and hydrogen atoms are called hydrocarbons.
- 11. Straight chain hydrocarbons:** Hydrocarbons, in which all the carbon atoms are linked to one another in a straight chain by a single covalent bond are called straight chain hydrocarbons.
- 12. Branched chain hydrocarbons:** Hydrocarbons, in which one or more carbon atoms are attached to the main straight chain of carbon atoms by a single covalent bond, are called branched chain hydrocarbons.
- 13. Isomerism:** The phenomenon due to which there can exist two or more organic compounds, with different physical and chemical properties, due to the difference in arrangement of carbon atoms in their structure, but have same chemical formula is called isomerism.

14. **Homologous series:** A group of members of the same class of organic compounds, which differ from each other by a $-\text{CH}_2$ group, when arranged in the ascending order of molecular mass, is called a homologous series.
15. **Homologous:** The members of the same class of organic compounds, when arranged in the ascending order of molecular mass, such that they differ by 14 amu or a $-\text{CH}_2$ group are called homologous.
16. **Alkanes (saturated hydrocarbons):** Compounds of carbon and hydrogen, in which all the valencies of carbon atoms are satisfied by single covalent bonds are called saturated hydrocarbons or alkanes. General formula for alkanes is $\text{C}_n\text{H}_{2n+2}$ where 'n' stands for number of carbon atoms.
17. **Alkenes:** A homologous series of unsaturated hydrocarbons, characterised by the presence of General formula for alkenes is C_nH_{2n} where n stands for the number of carbon atoms in the carbon chain double covalent bond ($-\text{C}=\text{C}-$) in the straight chain of carbon atoms, are called alkenes..
18. **Alkynes:** A homologous series of unsaturated hydrocarbons, characterised by the presence of triple covalent bond ($-\text{C}\equiv\text{C}-$) in the straight chain of carbon atoms are called alkynes. General formula for alkynes is $\text{C}_n\text{H}_{2n-2}$, where 'n' stands for the number of carbon atoms in the carbon chain.
19. **Functional group** in an organic compound, is an atom or group of atoms bonded together in such a unique fashion, that it is usually the site of chemical reactivity of an organic compound.
20. **Alcohols** are carbon compounds containing $-\text{OH}$ group attached to the carbon atom of an alkyl chain. IUPAC name of alcohols is alkanols and general formula is $\text{C}_n\text{H}_{2n+1}\text{OH}$.
21. **Aldehydes** are carbon compounds containing $-\text{CHO}$ group attached to the carbon atom of an alkyl chain. IUPAC name of aldehydes is alkanals and general formula is $\text{C}_n\text{H}_{2n+1}\text{CHO}$.
22. **Ketones** are compounds containing $\text{>C}=\text{O}$ group, in which the carbon atom of $\text{>C}=\text{O}$ are attached to two carbon atoms. IUPAC name of ketone is alkanone, and general formula is $\text{R}-\overset{\parallel}{\text{C}}-\text{R}'$ where R and R' stand for the same or different alkyl radicals, having the general formula $\text{C}_n\text{H}_{2n+1}$.
23. **Carboxylic acids** are compounds of carbon containing $-\text{COOH}$ group attached to the carbon atom of an alkyl chain. IUPAC name of carboxylic acids is alkanolic acids and general formula is $\text{R}-\text{COOH}$ where R stands for alkyl radical having the general formula $\text{C}_n\text{H}_{2n+1}$.
24. **Halo alkanes:** Halogen compounds of alkanes, obtained by replacing a hydrogen atom of an alkane with an atom of a halogen are called halo alkanes. General formula of halo alkanes is $\text{R}-\text{X}$ where 'R' stands for alkyl radical and 'X' stands for halogen atom.
25. All allotropic forms of carbon as well as organic compounds burn in air/oxygen to form carbon dioxide and water (in the form of steam), with the release of a large amount of energy.
26. The process of rapid burning of carbon or its compounds in air/oxygen, with the release of a large amount of energy and formation of carbon dioxide and water is called combustion.
27. Coal and petroleum are formed when organic matter (plants and animals) got buried deep inside the earth and then decomposed by anaerobic bacteria.
28. A reaction which proceeds with the breaking of double or triple covalent bonds in organic compounds, so as to form new organic compounds having single covalent bond, is called **addition reaction**.
29. The conversion of unsaturated vegetable oil into saturated vegetable oil by the absorption of hydrogen in the presence of finely divided nickel is called **hydrogenation of oils**.

30. A chemical reaction in which hydrogen atoms in a saturated hydrocarbon are replaced by the atoms of some other elements is called **substitution reaction**.
31. Ethanol (i) is a colourless and inflammable liquid, (ii) is miscible in water in all proportions, (iii) has a boiling point of 78.2°C and freezing point of -118°C and (iv) is a bad conductor of electricity.
32. Ethanol reacts with sodium and potassium to form their respective ethoxides and hydrogen gas.
33. Ethanol gets dehydrated to ethene when heated with conc. sulphuric acid at 443 K (170°C).
34. **Methylated spirit** is ethanol in which a small amount of methanol is mixed. This makes it unfit for drinking purposes, but is extensively used in paints and varnish industry.
35. Pure ethanoic acid is a corrosive colourless liquid having strong smell like that of vinegar.
36. A chemical reaction between ethanoic acid and any alcohol to form an acetate of the alcohol (commonly called as ester), which is a sweet smelling product, is called **esterification**.
37. The process by which an ester gets hydrolysed in the presence of sodium hydroxide to form the constituent alcohol and sodium salt of alkanolic acid is called **saponification**.
38. **Soap** is a sodium salt of long chain carboxylic acids (fatty acids), which has cleansing action in water.
39. Synthetic detergents (soapless soaps) are either sodium salts of long chain benzene sulphonate acid or sodium salt of long chain alkyl hydrogen sulphate, which show cleansing properties in water.
40. The process of breaking down of bigger droplets of oil or grease into smaller droplets is called **emulsification** and the substance used to do so is called **emulsifier**.
41. The long chain of hydrocarbon in soap/ detergent is repelled by water molecules and is called **hydrophobic**. However, it is attracted by oil or grease molecules.
42. Sodium ions, forming the short ionic part in soap/detergent are attracted by water molecules and is called **hydrophilic**. However, it is repelled by oil or grease molecules.
43. The colloidal particles of soap suspended in water form clusters, which are commonly called **soap micelles**.
44. Soap loses its cleansing action in hard water and forms a sticky scum.
45. Synthetic detergents lather even in hard water and hence can be used for cleaning.

VERY SHORT ANSWER QUESTIONS

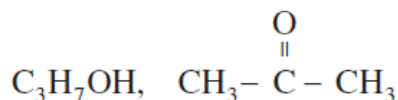
IMPORTANT QUESTIONS

1. What would be the electron dot structure of a molecule of sulphur which is made up of 8 atoms of sulphur?
2. Carbon, Group (14) element in the Periodic Table, is known to form compounds with many elements. Write an example of a compound formed with:
 - (a) chlorine (Group 17 of Periodic Table)
 - (b) oxygen (Group 16 of Periodic Table)
3. What is general formula of alkanolic acid? Give the name of any alkanolic acid.
4. What do you understand by the term catenation?
5. Which of the following will give addition reaction and why? C_4H_{10} ; C_2H_6 ; CH_4 ; C_3H_8 .
6. What is rectified spirit?
7. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write a balanced chemical equation of the reaction involved.

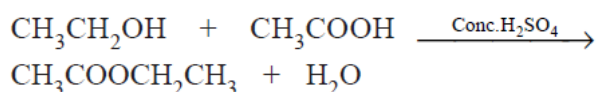
QUESTIONS FROM CBSE EXAMINATION PAPERS

1. Write the next higher homologue of the following:
 - (i) C_3H_6
 - (ii) C_5H_8

- Draw the structure of the simplest ketone.
- Write the name and structure of an aldehyde with 4 carbon atoms.
- Name the products obtained on complete combustion of ethanol.
- Draw the electron dot structure of ethane (C₂H₆).
- “Saturated hydrocarbons burn with a blue flame while unsaturated hydrocarbons burn with a sooty flame”. Why?
- Draw the structure of pentanal (C₄H₉CHO).
- Name the functional group present in each of the following compounds.



- Draw the structure of ethene molecule (C₂H₄).
- Name the functional group present in propanal (C₃H₆O).
- Name the fourth (4th) member of alkene series.
- How ethanoic acid got its name as glacial acetic acid?
- Name the type of reaction represented by the following equation:



- Give reason for the following observation:
The element carbon forms a very large number of compounds.

- Draw the structure of ethanol molecule.
- Write the names of the functional groups in:

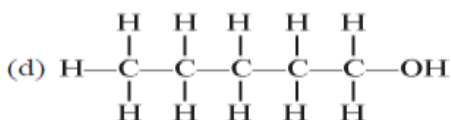
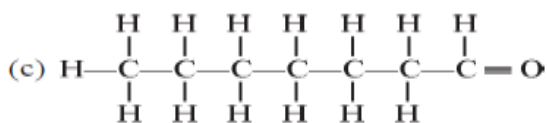
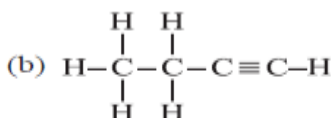
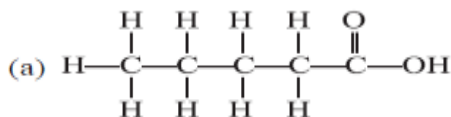


- Draw the structure of CH₃COOH molecule.
- What is meant by a saturated hydrocarbon?
- Write a chemical equation to represent the reaction of ethanol with acidified solution of potassium dichromate.
- Why does carbon form compounds mainly by covalent bonding?
- Why are covalent compounds generally poor conductors of electricity?
- What is a functional group in a carbon compound? Identify the functional group present in CH₃COOH and C₂H₅OH.
- What is the difference in the molecular formula of any two consecutive members of a homologous series of organic compounds?
- Give a chemical test to distinguish between saturated and unsaturated hydrocarbons.
- (i) What would be observed on adding a 5% solution of alkaline potassium permanganate solution drop by drop to some warm ethanol taken in a test tube? (ii) Write the name of the compound formed during the chemical reaction.
- Give reason for the following: Formalin is used for preserving biological specimens.
- Name the functional group present in propanone (acetone).
- How are the molecules of aldehydes and ketones structurally different?
- What is denatured alcohol?
- Name the element other than carbon that constitute carbohydrates.
- Name the product formed besides soap that is obtained during saponification process.

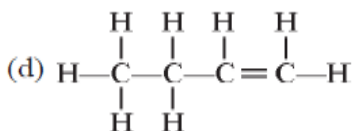
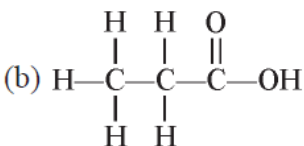
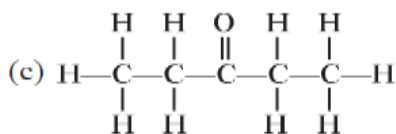
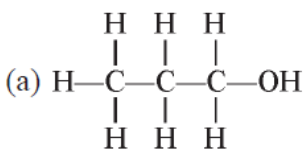
32. What happens when soap solution in a test tube is shaken with
 (i) soft water (ii) hard water?

SHORT ANSWER QUESTIONS IMPORTANT QUESTIONS

- In electron dot structure, the valence shell electrons are represented by crosses or dots.
 - The atomic number of chlorine is 17. Write its electronic configuration.
 - Draw the electron dot structure of chlorine molecule.
 Write the formula and draw electron dot structure of carbon tetrachloride.
- Draw the possible isomers of the compound with molecular formula C_3H_6O and also give their electron dot structures.
- 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.
- Write the names of the following compounds.



- Identify and name the functional groups present in the following compounds.



- Match the reactions given in Column (A) with the names given in Column (B).

| Column (A) | Column (B) |
|---|-------------------------------|
| (a) $\text{CH}_3\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{H}^+} \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$ | (i) Addition reaction |
| (b) $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni}} \text{CH}_3 - \text{CH}_3$ | (ii) Substitution reaction |
| (c) $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$ | (iii) Neutralisation reaction |
| (d) $\text{CH}_3\text{COOH} + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$ | (iv) Esterification reaction |

7. How would you bring about the following conversions? Name the process and write the reactions involved.
- (a) ethanol to ethane (b) Propanol to propanoic acid.
8. Intake of small quantity of methanol can be lethal. Comment.
9. Unsaturated hydrocarbons contain multiple bonds between the two C-atoms and show addition reactions. Give the test to distinguish ethane from ethene.
10. 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 balanced chemical equation of this reaction.
11. What is saponification? Write the reaction involved in this process.

QUESTIONS FROM CBSE EXAMINATION PAPERS

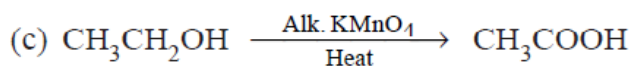
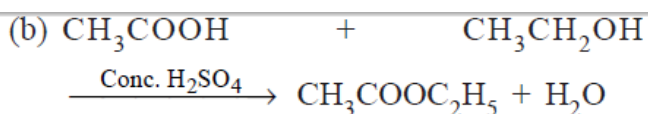
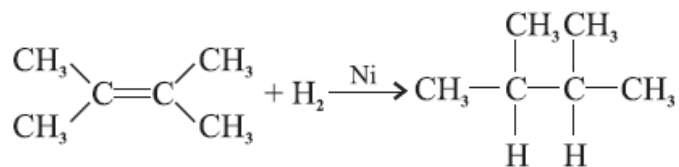
- What are isomers? Draw the structures of two isomers of butane (C_4H_{10}).
- What is a hydrogenation reaction? Write an equation to represent this reaction. How is the reaction useful in vegetable ghee industry?
- Write the name and molecular formula of an organic compound having its name suffixed with '–ol' and having two carbon atoms in the molecule. With the help of a balanced chemical equation indicate what happens when it is heated with excess of conc. H_2SO_4 .
- What happens when wood is burnt in a limited supply of oxygen? Name the residue left behind after the reaction and state two advantages of using this residue as a fuel over wood.
- Write the names and molecular formula of two organic compounds having functional group suffixed as '–oic acid'. With the help of a balanced chemical equation explain what happens when any one of them reacts with sodium hydroxide.
- What is a homologous series of substances? In an organic compound, which part largely determine its physical and chemical properties.
- (a) Give a chemical test to distinguish between ethanol and ethanoic acid.
(b) Name the product formed when an organic acid reacts with an alcohol in the presence of an acid catalyst. What is the name assigned to this type of reaction?
- (a) Write the name of the following: (i) $\text{CH}_3\text{CH}_2\text{COOH}$ (ii) $\text{CH}_3\text{CH}_2\text{Br}$ (b) Draw the electron dot structure of ethene.
- An organic acid 'X' is a liquid which often freezes during winter time in cold countries. It has the molecular formula, $\text{C}_2\text{H}_4\text{O}_2$. On warming it 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.
- State the principle on which the cleaning action of soap is based.
- Why are soaps ineffective in hard water?

12. (a) Give a chemical test to identify the compound CH_3COOH .
 (b) Name the gas evolved when this compound acts on solid sodium carbonate. How would you identify this gas?
13. (a) (i) Name the products formed when ethanol burns in air. (ii) What two forms of energy are liberated on burning alcohol? (b) Why is the reaction between methane and chlorine considered as substitution reaction?
14. Give reasons for the following: (i) Oxidation of ethanol with CrO_3 produces ethanal while ethanol when oxidised with alkaline KMnO_4 produces ethanoic acid.
 (ii) Alcohol supplied for industrial purposes is mixed with copper sulphate.
15. Allotropy is a property shown by which class: substances, elements, compounds or mixtures? Give one example of allotropy.
16. What is meant by 'fermentation'? Write chemical equations for the two steps involved in preparing ethanol by the fermentation of molasses.

SHORT ANSWER QUESTIONS

IMPORTANT QUESTIONS

- Write the structural formulae of all the isomers of hexane.
- Write balanced equations for following reactions.
 - $\text{C}_3\text{H}_6 + \text{O}_2 \longrightarrow$
 - $\text{C}_2\text{H}_5\text{OH} + \text{H}_2\text{SO}_4 \longrightarrow$
 - $\text{CH}_3\text{COONa} + \text{HCl} \longrightarrow$
- Give three advantages of synthetic detergents.
- What is the role of metal or reagents written on arrows in the given chemical reactions?



- A compound X is formed by the reaction of a carboxylic acid $\text{C}_2\text{H}_4\text{O}_2$ 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.

QUESTIONS FROM CBSE EXAMINATION PAPERS

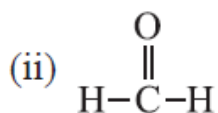
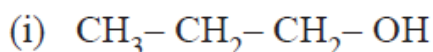
- An organic compound 'A' is an essential constituent of wine and beer. Oxidation of 'A' yields an organic acid 'B' which is present in vinegar. Name the compounds 'A' and 'B' and write their

structural formula. What happens when 'A' and 'B' react in the presence of an acid catalyst? Write the chemical equation of the reaction.

2. Give reasons for the following: (a) unsaturated hydrocarbons show addition reactions but not saturated hydrocarbons.

(b) Carbon only forms covalent compounds.

3. (a) Define the term functional group. Identify the functional group present in the following compounds:



(b) What will you observe on adding a 5% alkaline potassium permanganate solution drop by drop to some warm ethanol taken in a test tube? Write the name of the compound formed during the above chemical reaction.

4. (a) An organic compound A is widely used as a preservative in pickles and has a molecular formula $\text{C}_2\text{H}_4\text{O}_2$. This compound reacts with ethanol in the presence of a mineral acid to form a sweet smelling compound B.

(i) Identify the compound A. (ii) Which gas is produced when A reacts with sodium carbonate? Write the balanced chemical equation for the reaction involved.

(b) Write the names of: (i) $\text{CH}_3\text{CH}_2\text{Br}$ (ii) $\text{CH}_3-\text{CH}=\text{CH}_2$

5. (a) On dropping a small piece of sodium into an organic compound 'A' with molecular formula $\text{C}_2\text{H}_6\text{O}$ in a test tube a brisk effervescence is observed. On bringing a burning splinter the gas evolved burns with a pop sound. Identify 'A' and write the chemical equation.

(b) What will happen when you heat the organic compound 'A' at 443K with excess of concentrated sulphuric acid?

6. Write the name of following compounds:

(a) $\text{CH}_3\text{CH}_2-\text{C}\equiv\text{CH}$ (b) $\text{CH}_3\text{CH}_2\text{OH}$ (c) CH_3COCH_3

7. (a) Draw the structure for following compounds (i) ethanoic acid, (ii) butanone

(b) Conversion of ethanol to ethanoic acid is considered an oxidation reaction. Why?

8. Describe an activity to show the formation of an ester in the school laboratory.

9. Two carbon 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 reaction? Explain with the help of a chemical equation, how an addition reaction is useful in industries.

10. What are micelles? How does the formation of a micelle help to clean the clothes?

11. (a) Write the names of: (i) $\text{CH}_3-\text{CH}_2-\text{CHO}$ (ii) $\text{CH}_3-\text{CH}_2-\text{OH}$

(b) Name the gas evolved when an alcohol reacts with sodium. Give chemical equation for the reaction involved.

(c) Which two of the following compounds belong to same homologous series? $\text{C}_2\text{H}_6\text{O}$, $\text{C}_2\text{H}_6\text{O}_2$, C_2H_6 , CH_4O

12. What are detergents chemically? Why are they more effective than soaps in cleansing action? How can detergent molecules be altered to make them biodegradable?

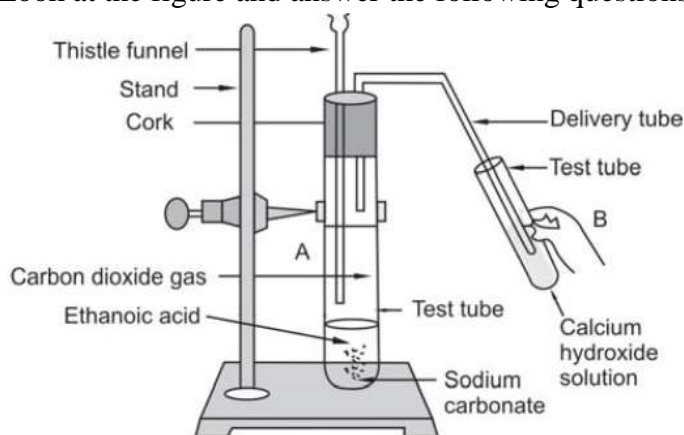
13. What is ethanol? Draw the structure of ethanol molecule. How does ethanol behave with the following?

- (a) Sodium? (b) Excess of conc. sulphuric acid at 443K? Write chemical equation for each reaction.
14. (a) Distinguish between esterification and saponification reactions of organic compounds.
(b) With a labelled diagram describe an activity to show the formation of an ester.
15. (a) What is vinegar? (b) Describe with a chemical equation, what happens when sodium hydrogen carbonate reacts with ethanoic acid.
16. Soap does not work well with hard water. Name the class of compounds which can be used as cleansing agent in place of soap. Write the name of one such compound. Explain in brief the mechanism of its cleansing action when used in hard water.
17. What is ethanoic acid? Write the formula of the functional group present in this acid. What special name is given to its 5-8% solution in water? How does ethanoic acid react with sodium carbonate? Write chemical equation of the reaction and common name of the salt produced.
18. (a) Write the chemical equation representing the preparation of ethanol from ethene.
(b) Name the product obtained when ethanol is oxidised by either chromic anhydride or alkaline potassium permanganate.
(c) Give an example of esterification reaction.
19. What happens when ethanoic acid reacts with
(i) magnesium,
(ii) sodium carbonate, and
(iii) sodium hydroxide? Write the necessary chemical equation in each case.

LONG ANSWER QUESTIONS

IMPORTANT QUESTIONS

1. (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.
2. Look at the figure and answer the following questions:

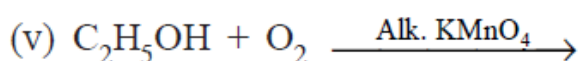
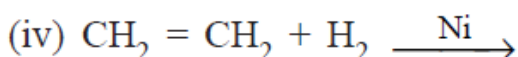
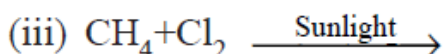
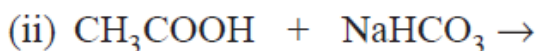
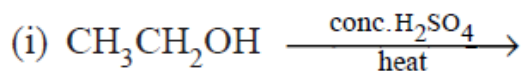


- (a) What change would you observe in calcium hydroxide solution taken in tube B?
(b) Write the reaction involved in test tubes A and B respectively.
(c) If ethanol is given instead of ethanoic acid, would you expect the same change?
(d) How can a solution of limewater be prepared in the laboratory? [HOTS]
3. 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

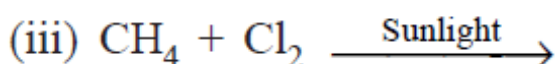
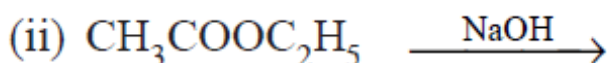
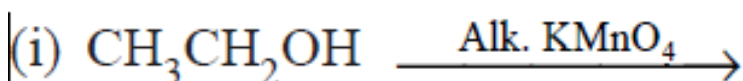
apparatus to prove that the evolved gas is the one which you have named. Also write chemical equation of the reaction involved.

QUESTIONS FROM CBSE EXAMINATION PAPERS

1. Complete the following reactions.



2. (a) Complete the following reactions and name the main product formed in each case.



(b) Write chemical test to distinguish between ethanol and ethanoic acid.

3. Name the main product formed when: (i) Ethanoic acid is treated with sodium bicarbonate

(ii) Ethanol is heated with alkaline KMnO_4 solution. (iii) Ethyl ethanoate is treated with NaOH solution. Also write the chemical equation for each of the above reactions.

4. (a) Write a chemical equation for the combustion of ethanol.

(b) List any two differences between saturated and unsaturated carbon compounds.

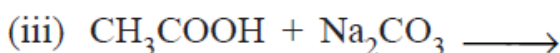
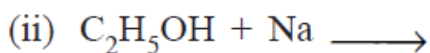
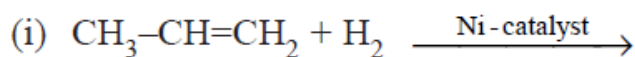
(c) Draw the structures of any two isomers of butane and name them.

5. (a) Draw the structure of Ethyne (C_2H_2).

(b) Define Esterification. Write a chemical equation to illustrate it.

(c) List any two differences between soaps and detergents.

6. (a) Complete the following reactions stating the main products formed in each reaction.



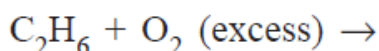
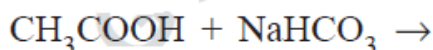
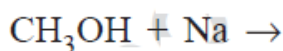
(b) Write the next homologue of propanol ($\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$) and butanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$).

7. (a) Define catenation. Why no other element exhibits the property of catenation to the extent seen in carbon compounds?

(b) Name the type of compound formed by the reaction of an organic acid and an alcohol. Write the chemical equation for the reaction involved.

(c) Write chemical equation to represent hydrogenation of vegetable oils.

8. (a) Write balanced equations for the following reactions.



(b) Write the formula and name of the next homologue of:

(i) $\text{CH}_3\text{CH}=\text{CH}_2$ and (ii) $\text{CH}_3-\text{CO}-\text{CH}_3$

9. (a) Write chemical equation of the reactions of ethanoic acid with :

(i) sodium (ii) sodium carbonate (iii) ethanol in the presence of conc. H_2SO_4

(b) State the role of concentrated sulphuric acid in the esterification reaction. (c) Write one use of ethanoic acid.

10. (a) The formula of an ester is : $\text{CH}_3\text{COOC}_2\text{H}_5$. Write the structural formulae of the corresponding alcohol and the acid.

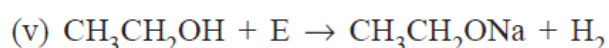
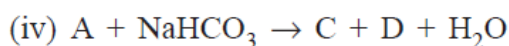
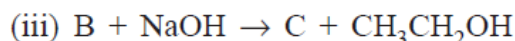
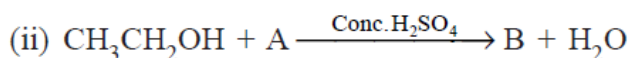
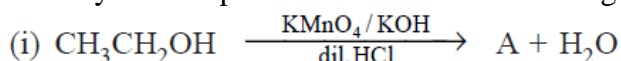
(b) (i) Mention the experimental conditions involved in obtaining ethene from ethanol.

(ii) Write the chemical equation for the above reaction.

(c) Explain the cleansing action of soap.

11. An organic compound A on heating with conc. H_2SO_4 forms a compound B which on addition of one mole of hydrogen in presence of nickel forms a compound 'C'. One mole of 'C' on combustion forms 2 moles of CO_2 and 3 moles of H_2O . Identify the compounds A, B and C and write the equations for the reactions involved.

12. Identify the compounds A to E in the following reaction sequence:



13. A compound 'C' molecular formula ($\text{C}_2\text{H}_4\text{O}_2$) reacts with sodium 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 $\text{C}_3\text{H}_6\text{O}_2$). 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 the reactions involved.

14. Write chemical equations to represent what happens when

(a) ethanol burns in air?

(b) ethanol reacts with sodium metal?

(c) ethanol is heated with alkaline KMnO_4 ?

(d) ethanol is heated with ethanoic acid in presence of few drops of concentrated sulphuric acid?

(e) ethanol is heated at 443 K in excess of concentrated H_2SO_4 ?

15. (a) Illustrate the following reactions with example.

(i) Substitution reaction (ii) Addition reaction

(iii) Oxidation reaction

(b) What is glacial acetic acid? Why is it named so? State its two uses.

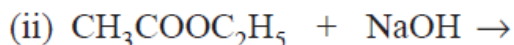
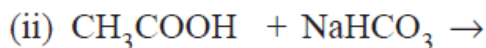
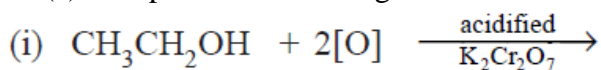
16. (a) What is denatured alcohol?

(b) What is hydrogenation? State its industrial application.

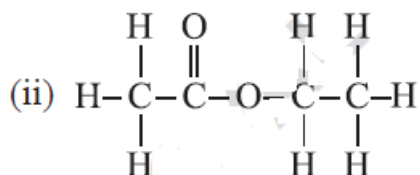
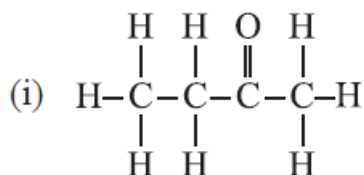
(c) Define isomerism.

(d) How many covalent bonds does a molecule of ethane (C_2H_6) have? Draw its structure to justify your answer.

17. (a) Complete the following reactions and name the main product formed in each case.



(b) Write the name of the following compounds.



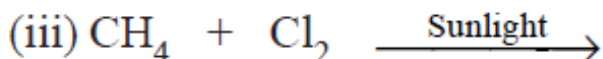
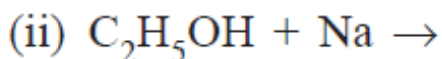
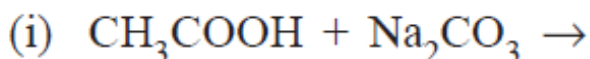
State the functional group present in each compound.

18. (a) An organic compound A is liquid at room temperature. It is also a good solvent and has the molecular formula C_2H_6O . A on oxidation gives compound B which gives effervescence with sodium hydrogen carbonate. A reacts with B in the presence of conc. sulphuric acid to give another compound C, which has a pleasant smell. Identify A and C. Also write the chemical equations for the reactions involved in the formation of B and C.

(b) Draw the structures of benzene C_6H_6 and cyclohexane C_6H_{12} .

(c) What is the difference between vegetable oil and animal fat?

19. (a) Complete and balance the following reactions :



(b) What are structural isomers? Draw the possible structural isomers for butane.

20. (a) Answer the following questions in one sentence or one word.

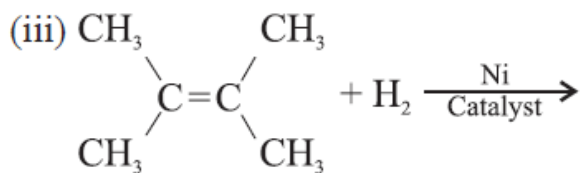
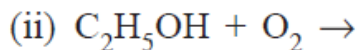
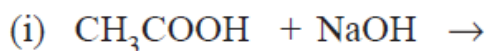
(i) What type of organic compounds show substitution reaction?

(ii) How will you convert ethanol into unsaturated hydrocarbon?

(iii) How is carboxylic acid different from mineral acids?

(b) With the help of electron dot representation explain the formation of O_2 molecule.

21. (a) Complete the following reactions and name the main product formed in each case.



(b) What is covalent bond? How many such bonds are present in ethane? Write two characteristic features of covalent compounds.

22. (a) Draw the structure of propanoic acid ($\text{C}_2\text{H}_5\text{COOH}$).

(b) Why do the bottoms of cooking vessels get blackened?

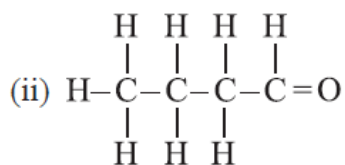
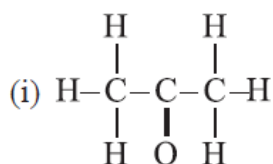
(c) What is a Micelle? Draw a labeled diagram of a micelle.

(d) List two factors responsible for the versatile nature of carbon.

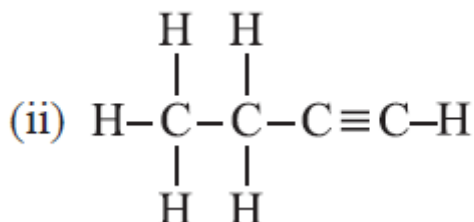
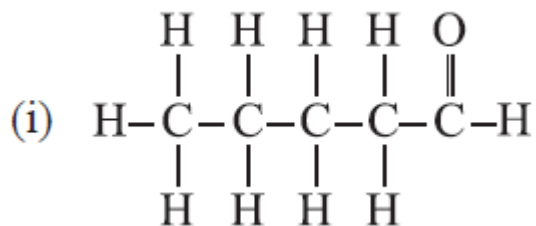
23. (a) What is a functional group?

(b) Draw the structure of : (i) Chloropentane ($\text{C}_5\text{H}_{11}\text{Cl}$) (ii) Ethanoic acid

(c) How is scum formed? (d) Write the name of the following compounds.



24. (a) Write the name of the following compounds :



(b) Write chemical equations for the following reactions:

(i) Ethene is made to react with hydrogen in the presence of nickel catalyst.

(ii) Ethanol is heated with alkaline KMnO_4

(iii) Sodium carbonate is made to react with ethanoic acid.