Important Questions for Class 10

Science

Chapter 4 - Carbon & Its Compounds

Very Short Answer Questions **1 Mark**

1. Soaps are formed by the saponification of
a. Alcohols
b. Simple ester
c. carboxylic acids
d. glycerides
Ans: d. glycerides

2. The functional group of butanone is
a. Carboxyl
b. Ketonic
c. Aldehydic
d. Alcoholic
Ans: b. ketonic

3. Enzyme which converts starch into glucose is
a. Zymase
b. Maltase
c. Diastase
d. Invertase
Ans: a. Zymase

4. The first compound to be prepared in the laboratory was
a. Methane
b. Ethyl alcohol
c. Acetic acid
d. Urea
Ans: d. Urea

5. The IUPAC name of CH_3CHO is
a. Acetaldehyde

b. Formaldehyde
c. Methyl formaldehyde
d. Ethanol
Ans: d.Ethanol

6. Rectified spirit is
a. 50% ethanol
b. 80% ethanol
c. 95% ethanol
d. 40%to50% ethanol
Ans: c. 95% ethanol

7. Dilute alkaline solution $KMnO_4$ is
a. an oxidizing agent
b. a reducing agent
c. a bleaching agent
d. none of these
Ans: a. an oxidizing agent

8. The by product in soap industry is
a. Isoprene
b. Ethylene glycol
c. Glycerol
d. Butane
Ans : c. Glycerol

9. An example of soap is
a. $C_{15}H_{31}COONa$
b. CH_3COONa
c. C_6H_5COONa
d. $C_{17}H_{35}OSO_3Na$
Ans: a. $C_{15}H_{31}COONa$

10. The number of $C-H$ bonds in ethane C_2H_6 molecule are
a. 4
b. 6
c. 8

d. 10
Ans: b. 6

11. The odor of acetic acid resembles that of
a. Rose
b. Burning Plastic
c. Vinegar
d. Kerosene
Ans: kerosene

12. Diamond is not a good conductor of electricity because
a. It is very hard
b. Its structure is very compact
c. It is not soluble in water
d. It has no free electrons to conduct electric current.
Ans: d. It has no free electrons to conduct electric current.

13. Alcohols can be produced by the hydration of
a. Alkenes
b. Alkynes
c. Alkynes
d. Acids
Ans: a. Alkenes

14. The IUPAC name of CH_3CHO is
a. Acetaldehyde
b. Formaldehyde
c. Methyl formaldehyde
d. Ethanol
Ans: d. Ethanol

15. IUPAC name of first member of homologous series of ketones is
a. Ethanone
b. Methanone
c. Propanone
d. Butanone
Ans: c. Propanone

16. An unknown compound has the smell of vinegar. Identify it
Ans: Acetic acid or Ethanoic acid that comprises $3-9\%$ of the vinegar.

17. Out of butter and groundnut oil which is unsaturated in nature?
Ans: Groundnut oil

18. Which has triple bond, C_2H_4, C_3H_4, C_3H_6
Ans: C_3H_4

19. Which substance is added for the denaturation of ethyl alcohol
Ans: Methyl Alcohol

20. Which ions are responsible for making water hard?
Ans: Ca^{2+} and Mg^{2+}

21. Ethane, with the molecular formula has
a. 6 covalent bonds
b. 7 covalent bonds
c. 8 covalent bonds
d. 9 covalent bonds
Ans: b. 7 covalent bonds

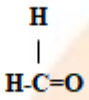
22. Butanone is a four carbon compound with the functional group
a. Carboxylic acid
b. aldehyde
c. ketone
d. alcohol
Ans: c. Ketone

23. While cooking, if the bottom of the vessels is getting blackened on the outside, it means that
a. The fuel is not cooked completely
b. The fuel is not burning completely
c. The fuel is wet
d. The is burning completely
Ans: b. the fuel is not burning completely.

24. Which of the following hydrocarbons undergo addition reactions?
$C_2H_6, C_3H_8, C_3H_6, C_2H_2$ and CH_4
Ans: C_3H_6 and C_2H_2 will undergo addition reactions.

Short Answer Questions **2 Marks**

1. Name the following compounds
a)



Ans: Methanol

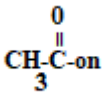
b) $CH_3 - CH_2 - Cl$
Ans: Chloroethane

2. Define Soaps?
Ans: A substance used with water for washing and cleaning, made of a compound of natural oils or fats with sodium hydroxide or another strong alkali**.** These are represented by $RCOONa$ or $RCOOR$.

3. Name the second member of alkynes family Give its structure?
Ans: The second member of the alkyne family is propyne. The structural formula is $CH_3 - C \equiv CH$.

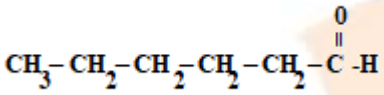
4. Give a chemical test to distinguish between Ethane and Ethene .
Ans: Take ethane and ethene in two separate test tubes and dissolve them in carbon tetrachloride solution. Pass bromine gas into the two test tubes. If the color of bromine gas is discharged, and decolorizes the yellow color then that gas is ethene and if the color of gas remains the same, then that test tube contains ethane gas.

5. Write the structures of
i. Ethanoic acid
Ans:



ii. Hexanal

Ans:



6. Name the following compounds

a) $CH_3 - \overset{H}{C} = 0$

Ans: Ethanal

b) $CH_3 - CH_2 - OH$

Ans: Ethanol

7. Which organic compound is added to make ethanol unfit for drinking purposes? What is the name of the mixture formed?

Ans: Methanol is highly poisonous and is added in small amount to ethanol in order to make it unfit for drinking purposes. This mixture is called methylated spirit or denatured alcohol.

8. Write a test to identify the presence of Ethanoic acid?

Ans: Dip a strip of blue litmus paper in the solution of Ethanoic acid. Its color changes to red and Ethanoic acid gives a sweet-smelling compound called ester when treated with Ethanol

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

Ans: The two properties of carbon which lead to the huge number of carbon compounds we see around us are Catenation and Tetravalence . The self-linking property called catenation. As Carbon is tetravalent it can readily unite with atoms like hydrogen, oxygen etc by sharing electrons.

10. Name the following compound.

a) $CH_3 - CH_2 - Br$

Ans: Bromoethane

b) $CH_3 - CH_2 - CH_2 - C \equiv CH$

Ans: Hex -1- yne

11. Why conversion of ethanol into ethanoic acid is an oxidation reaction?

Ans: Ethanoic acid has one or more O_2 atom and two hydrogen atoms less than ethanol. Loss of hydrogen is known as oxidation and gain of oxygen is known as reduction. Therefore it is an oxidation reaction.

12. A mixture of ethyne and oxygen is used for welding. Can you justify why a mixture of ethyne and air is not used?

Ans: When ethyne is burnt in oxygen, it gives a clean flame with high temperature because of the complete combustion of ethyne. Hence, this oxyacetylene flame is used for welding, and it is not possible to attain a high temperature with air. Air contains mixture of nitrogen and oxygen. As nitrogen is more in amount it does not support combustion. Because of this mixture of ethyne and air is not used for welding.

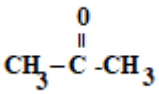
13. Why carbon and its compounds are used as fuels in most cases?

Ans: Carbon compounds are used as fuel because they burn with a clean flame and no smoke is produced which is highly exothermic . Carbon compounds have higher maximum ignition temperature and their combustion can be restrained. Hence, carbon and its compounds are a great source of fuel.

14. A compound X has the molecular formula C_3H_6O with structural formula CH_3CH_2CHO .Give its IUPAC name. Can another compound have the same molecular formula? Give the structure and IUPAC name of that compound also.

Ans: The IUPAC name of X is propanol.

Another similar compound is Y is.



X and Y are related to each other as functional isomers.

15. Why CHO group cannot be present in the middle of the carbon atom chain?

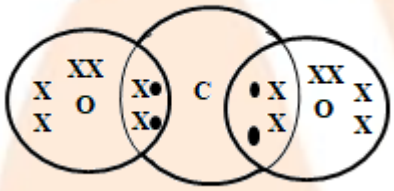
Ans: The terminal functional group is CHO group and as three valencies of the C-atom is already satisfied; this group cannot be present in the middle of the chain.

16. Two carbon atoms cannot be linked to each other by more than three covalent bonds. Why?

Ans: There is a single bond between the two carbon atoms and both share their one atom therefore for completing its shell it need to combine with three atoms of carbon or other element. Therefore it cannot be linked to more than three covalent bonds since its shell will be completed to become stable

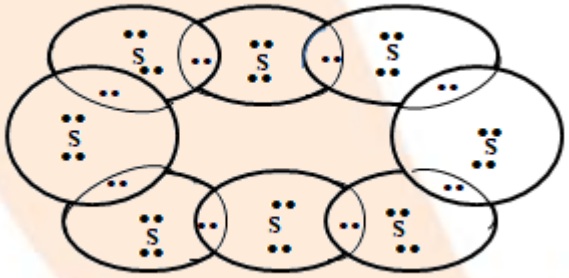
17. What would be the electron dot structure of carbon dioxide which has the formula of?

Ans: $O = C = O$



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

Ans: Sulphur is a chemical element with the symbol S



19. How would you name the following compounds?

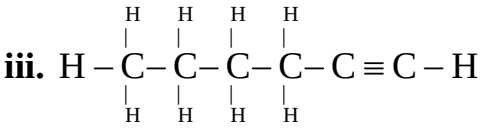
i. $CH_3 - CH_2 - Br$

Ans: Bromomethane

ii.

$$H - \overset{H}{\underset{|}{C}} = O$$

Ans: Methanal

iii. 

Ans: Hexyne

20.

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

Ans: The two properties are:

(a) catenation: The ability to form a covalent bond by combining with other carbon

(b) Tetravalancy of carbon.

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

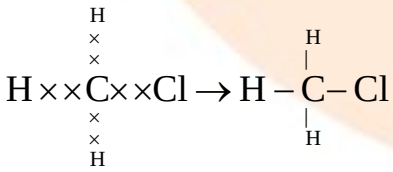
Ans: No, we would not be able to check if water is hard by using a detergent.

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

Ans: Soap lowers the surface tension of water. The long chain non-ionic hydrocarbon group in soap gets attached to the oil or grease droplets and loosens them from the fibres of cloth along with the dirt. However this loosening is insufficient to remove the grease with dirt completely. Hence the clothes are agitated to remove the grease droplets completely.

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

Ans: Covalent bond is formed by sharing of electrons between two atoms. It is non-ionic in nature.



v. Give a test that can be used to differentiate chemically between butter and cooking oil?

Ans: Butter and cooking oil can be differentiated using bromine water test. Cooking oil will decolorize the red color of bromine water on shaking and butter will not decolorize.

vi. A compound 'X' has molecular formula . It undergoes substitution reaction readily than addition reaction. It burns with blue flame and is present in LPG. Identify 'X' and give the balanced equation for its combustion and substitution reaction with in presence of sunlight.

Ans: $C_4H_{10} + \frac{13}{2}O_2 \rightarrow 4CO_2 + 5H_2O$

'X'

$C_4H_{10} + Cl_2 \rightarrow C_4H_9Cl + HCl$

vii. 'A' compound works well with hard water. It is used for making shampoos & products for cleaning clothes. A is not 100% biodegradable and causes water pollution. 'B' does not work well with hard water. It is 100% biodegradable and does not create water pollution. Identify A & B.

Ans: A is the detergent & B is the soap.

viii. An organic compound P with molecular formula C_2H_6O is an active ingredient of all alcoholic drinks. It is also used in medicines such as tincture iodine, cough syrups. Identify 'P'. Drop small piece sodium into the test tube containing 'P'. A new compound 'Q' is formed with the evaluation of colorless and odorless gas Name the gas evolved and compound 'Q' write the chemical reaction.

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

Short Answer Questions **3 Marks**

1. Complete the following reaction

i. $\mathbf{H_2C = CH_2 + H_2O \xrightarrow{H_2SO_4}}$

Ans: $H_2C = CH_2 + H_2O \xrightarrow{H_2SO_4} CH_3 - CH_2 - OH$

ii. $\mathbf{HC \equiv CH + Br_2 \rightarrow}$

Ans: $HC \equiv CH + Br_2 \rightarrow H-\overset{\overset{Br}{|}}{\underset{\underset{Br}{|}}{C}}-\overset{\overset{Br}{|}}{\underset{\underset{Br}{|}}{C}}-H$

iii. $C_2H_5OH + Na \rightarrow$

Ans: $2C_2H_5OH + Na \rightarrow 2C_2H_5ONa + H_2$

2. What is the role of concentrated sulphuric acid in the esterification reaction?

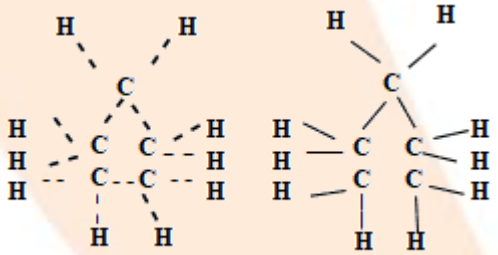
Ans: In esterification reaction carboxylic acid reacts with alcohol to form ester and water reacts in the presence of concentrated sulphuric acid. Concentrated sulphuric acid is used as a catalyst. This reaction is reversible and this reverse reaction is called ester hydrolysis. Concentrated sulphuric acid removes water from the reaction mixture as it is strong dehydrating agent. As a result, the reaction takes place only in the forward direction to form ester.

$$RCOOH + ROH \xrightarrow{conc H_2So_4} RCOOR + H_2O$$

Acid Alcohol Ester

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

Ans: Cyclopentane is a cyclic compound with a formula C_5H_{12} . The structure of the compound is represented as



4. Draw the structures of the following compounds

a) Ethanoic acid

b) Bromopentane

c) Butanone

Ans:

a) Ethanoic acid

$$H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{O}{\|}}{C}-OH \quad \text{Ethanoicacid}$$

b) Bromopentane

$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - Br$ Bromopen tan e

c) Butanone

$H_3C - \overset{\overset{O}{\|}}{C} - CH_2 - CH_3$ Bu tan one

5. Give names of the following

a) An aldehyde derived from ethane

Ans: Ethane

CH_3CHO

b) Ketone derived from butane

Ans: Butanone

$CH_3COCH_2CH_3$

c) Compound obtained by the oxidation of ethanol by chromic anhydride

Ans: Ethanol

CH_3CHO

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

Ans: The Ethyl alcohol which contains small amount of methyl alcohol or copper sulphate is called as denatured alcohol. The purpose of denaturing the alcohol is to make it unfit for drinking purposes. Denatured alcohol is also used for industrial purposes.

7. Write chemical equations of the reactions of ethanoic acid with

a) Sodium

Ans:

$2CH_3COOH + 2Na \rightarrow 2CH_3COONa + H_2$

(Sod.Ethanoate)

b) Sodium carbonate

Ans:

$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$

(Sod.Ethanoate)

c) Ethanol in the presence of conc. H_2So_4

Ans:

$$CH_3COOH + C_2H_5OH \xrightarrow{conc.H_2So_4} CH_3COOC_2H_5$$

(Ethyl.ethanoate)

8. Complete the reaction and names of the products formed

i. $CH_3COOH + NaOH \xrightarrow{(Heat)}$

Ans:

$$CH_3COOH + NaOH \xrightarrow{(Heat)} CH_3COONa + H_2O$$

(Sod.Ethanoate)

ii. $C_2H_5OH + O_2 \dfrac{\text{alkaline}}{\text{KMnOH}}$

Ans:

$$C_2H_5OH + O_2 \frac{\text{alkaline}}{\text{KMnOH}} CH_3COOH + H_2$$

(EthanoicAcid)

iii. $CH_3COOH + C_2H_5OH \xrightarrow{(Conc.H_2Sol)}$

Ans:

$$CH_3COOH + C_2H_5OH \xrightarrow{(Conc.H_2Sol)} CH_3COOC_2H_5 + H_2O$$

(EthylEthanoate)

9. What is a homologous series? State any two characteristics of homologous series?

Ans: A homologous series is a series of hydrocarbons which have similar chemical properties and they share the same general formula. They are organic compounds having similar structure and functional groups. A particular series differ in their molecular formula by group. Characteristics of homologous series are: Same functional group and same chemical properties.

10. Give the structural formulas for

i. Methyl Ethanoate

ii. Ethyl Ethanoate

Write two uses of Ester?
Ans:

i. $H-\overset{\overset{o}{\|}}{C}-OCH_3$

ii. $CH_3COOC_2H_5$

Uses of esters:

a) Esters that have fragrant odors are used as a constituent of perfumes, essential oils, food flavorings, cosmetics, etc.
b) It is used as an organic solvent.
c) Esters of glycerol known as triglycerides are used in the manufacture of soaps.
d) Natural esters are found in pheromones.

11. What are enzymes? Name the enzymes required for the fermentation of sugarcane to ethanol?

Ans: An enzyme is a protein molecule in cells which works as a biological catalyst. In the process of fermentation of sugar into ethanol, two enzymes are used.

$C_{12}H_{22}O_{11} + H_2O \xrightarrow{(Invertase)} C_6H_{12}O_6 + C_6H_{12}O_6$

Sugar glucose fructose

$C_6H_{12}O_6 \xrightarrow{(Zymase)} 2C_2H_5OH + 2CO_2$

Glucose and Fructose

12. The formula of an ester is $C_3H_7COOC_2H_5$ .Write the formulae of the acid and alcohol from which the ester is prepared.

Ans: The molecular formula of acid is C_3H_7COOH (Butanoic acid) and for alcohol is C_2H_5OH (Ethyl alcohol)

$C_3H_7COOH + C_2H_5OH \rightarrow C_3H_7COOC_2H_5 + H_2O$

13. Write three difference between ethanol and ethanoic acid on the basis of chemical properties?

Ans:

i.Add a small amount of $NaHCO_3$ to ethanoic acid CO_2 gas is evolved with brisk effervescence and such reaction doesn't takes place in case of ethanol

$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$

ii.Ethanol is neutral so does not bring any change in the color of litmus paper but ethanoic acid is acidic and changes the color of a blue litmus strip to red when dipped in it.

iii. Ethanoic acid reacts with NaOH and KOH to form salt and water whereas ethanol does not react.

$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O$

$CH_3COOH + KOH \rightarrow CH_3COOK + H_2O$

14. Given a chemical test to distinguish between

i. Ethene and ethane

Ans: Ethene decolorizes the yellow color of bromine while ethane does not.

ii. Ethanol and ethanoic acid

Ans: Ethanoic acid gives a brisk effervescence with sodium hydrogen carbonate while ethanol does not.

iii. Soaps and Detergents

Ans: Soaps form curdy white precipitate or scum with hard water while detergents do not form any precipitate.

15. Name the functional groups present in the following compounds?

i. $CH_3 - CH_2 - CH_2 - OH$

Ans: –OH(ol)

ii. $CH_3 - CH_2 - CH_2 - COOH$

Ans: –COOH(oic _ acid)

iii. $CH_3 - CH_2 - CHO$

Ans: –CHO(al)

16. What are esters? Write an equation to show the formation of ester?

Ans: Esters any of a class of organic compounds that react with water to produce alcohols and organic or inorganic acids. They are pleasant smelling compounds and they are commonly used as flavoring agents. Monocarboxylic acids react with alcohol to form esters and water. This reaction is called as esterification

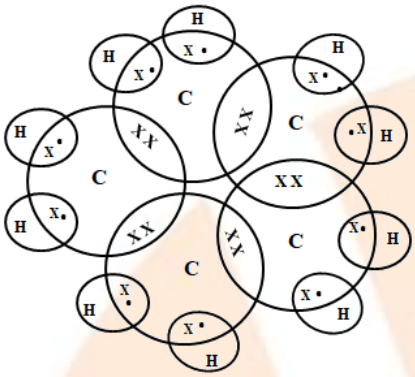
Methyl Ethanoate (Ester)

$CH_3COOH + CH_3OH \xrightarrow{(Conc.H_2SOH)} CH_3COOCH_3 + H_2O$

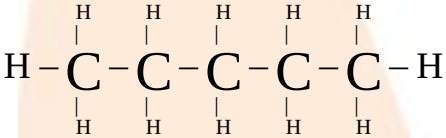
Ethyl Ethanoate (Ester)

$CH_3COOH + C_2H_5OH \xrightarrow{(Conc.H_2SO_4)} CH_3COOC_2H_5 + H_2O$

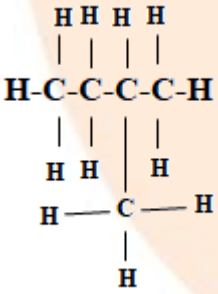
17. What will be the formula and electron dot structure for cyclopentane?
Ans: Formula of cyclopentane is C_5H_{10}. The electron dot structure cyclopentane is :



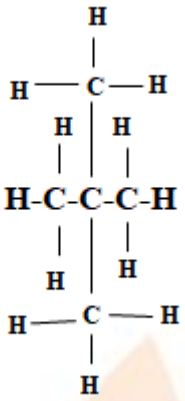
18. How many structural isomers can you draw for pentane?
Ans: The isomers are as under :



i. n - pentane



ii. iso-pentane



iii. neo-pentane

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

Ans: A sequence of compounds with the same functional group substitutes for hydrogen in a carbon chain is called homologous series. The difference between the formulae of any two successive members is $-CH_2$ and difference between the molecular formula is 14 u .

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

Ans:

- On the basis of physical properties:
- Melting and boiling points of ethanol is $156K$ and $351K$
- Melting and boiling point of Ethanoic acid is $290K$ and $391K$.
- On the chemical properties:
- Ethanoic acid reacts with sodium hydrogen carbonate liberating carbon dioxide
- ethanol does not react with sodium hydrogen carbonate liberating carbon dioxide.

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

Ans: Carbon burns with clean flame and no smoke is produced on combustion it gives carbon dioxide and water. This reaction involves evolution of heat and light. The same takes place for compounds of carbon. That is the reason why carbon and its compounds are used as fuel for most applications.

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

Ans: When soap is dissolved in hard water it reacts with calcium and magnesium ions that are present there and forms calcium and magnesium salt of fatty acid which reacts with soap to form scum. For example, calcium chloride reacts with soap to form scum.

$$\text{Sodium stearate} + \text{Calcium chloride} \rightarrow \text{sodium chloride} + \text{Calcium stearate}(\text{scum})$$

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

Ans: Soap is a sodium or potassium salt of fatty acid. Soap molecules have two ends. Soap is obtained when caustic soda is treated with oil. Sodium stearate is thus a salt of weak acid and strong base. As its water solution is slightly alkaline it will turn red litmus red.

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

Ans: The process of adding unsaturated hydrocarbons and hydrogen in presence of catalysts such as palladium or nickel to give saturated hydrocarbons is called hydrogenation. It is commercially used for converting vegetable oils to vanaspati ghee in presence of nickel as catalyst.

25. Explain mechanism of the cleaning action of soap.

Ans: Soaps are sodium or potassium salt of fatty acids. Soap molecules have two ends. One end is hydrophilic and another end is hydrophobic. Two molecular ends behave differently. This ionic end is hydrophilic and it is oriented towards water. The other hydrocarbon end is hydrophobic and it is oriented towards dirt which is oily in nature. A micelle formation around the oily dirt takes place. The cleaning of clothes etc takes place when flushed with excess of water; the micelle containing the dirt is removed.

26. An organic compound X with a molecular formula C undergoes oxidation with in presence of alkaline $KMnO_4$ to form a compound I X on heating in presence of Cone. 11 At 443 K gives Z. which on reaction with 112 cm presence of 11 gives back 'X''Z' reacts with Br (aq) and decolorizes it. Identify X, Y, & Z and write the reactions involved.

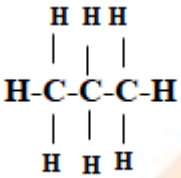
Ans:

$$\underset{\textbf{X}}{CH_3 - CH_2OH} \xrightarrow[K_2Cr_2O_4+\text{Heat}]{\text{Alkaline}KMnO_4+\text{Heat}} \underset{\textbf{Y}}{CH_3COOH}$$

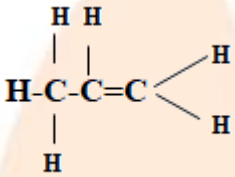
$$CH_3 - CH_2OH \xrightarrow[H_2SO_4]{\text{Hot}COOC} \underset{\textbf{Z}}{CH_2 = CH_2} + H_2O$$

27. 'A' compound works well with hard water. It is used for making shampoos & products for cleaning clothes. A is not 100% biodegradable and causes water pollution. 'B' does not work well with hard water. It is 100% biodegradable and does not create water pollution. Identify A & B.

Ans: 'Y' will burn with a sooty flame. So it is an unsaturated hydrocarbon**.**



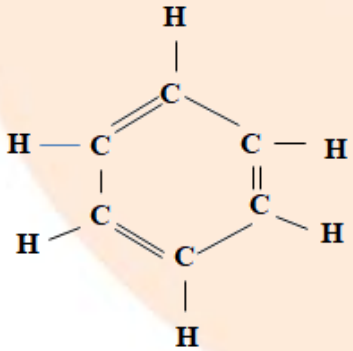
Propane (X)



Propene (Y)

28. A cyclic compound 'X' has molecular formula. It is unsaturated and burns with sooty flame. Identify 'X' and write its structural formula. Will it decolorize bromine water or not and why?

Ans:



Benzene— C_6H_6

It does not decolorize bromine water because it does not undergo addition reaction.

29. An organic compound 'A' is a constituent of antifreeze and has the molecular formula C_2H_6O **. Upon reaction with alkaline** $KMnO_4$ **the compound 'A' is oxidized to another 'B' with formula C Identify the compound A' and 'B'. Write the chemical equation for the reaction which leads to the formulation of 'B'**

Ans: $CH_3 - CH_2OH \xrightarrow[KCr_2O_7+Heat]{Alkaline\,KMnO_4+Heat} CH_3COOH$

'A' 'B'

30. Two compounds 'X' and 'Y' have the same formula C One of them reacts with sodium metal to liberate 112 and CO with NaHCO Second one does not reacts with Na metal and NaHCO but undergo hydrolysis with NaOH to form salt of carboxylic acid and compound 'Z' which is called wood spirit. Identify 'X', 'Y', and 'Z' and write chemical equation for the reaction involved.

Ans: $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$

'X'

$CH_3COOH + Na \rightarrow CH_3COONa + H_2$

$HCOOH_3 + NaOH \rightarrow HCOONa + CH_3OH$

'Y' 'Z'

31. A compound 'X' with molecular formula C burns with a sooty flame. It decolorizes bromine water. Identify 'X' Will it dissolve in water or not? Will it conduct electricity in aq. Solution? Will it have high melting point or low melting point?

Ans: As 'X' ethane is a covalent compound it will neither dissolve in water nor conduct electricity and it has low melting point.

Long Answer Questions **5 Marks**

1. Define fermentation. Name the enzyme which converts

a) Milk into curd (yogurt)

b) Cane sugar into glucose and fructose

c) Glucose into ethanol

Ans: The chemical process of preparation of ethyl alcohol from sugar is known as fermentation.

a) Milk into curd (yogurt) : Lactase

b) Cane sugar into glucose and fructose : Invertase

c) Glucose into ethanol : Zymase

2.

a) Name the gas evolved during fermentation process?

Ans: CO_2 Gas is evolved and accompanied by the brisk effervescence.

b) What role is played by yeast in the conversion of cane sugar to ethanol?
Ans: Yeast is the source of enzymes invertase and zymase needed for fermentation.

c) How may the following be obtained from pure ethanol? Express $(C_{12}H_{22}O_{11})$ chemical reactions by the chemical equations.

i. Sodium ethoxide

Ans: $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$

ii. Ethyl ethanoate

Ans: $2C_2H_5OH + CH_3COOH \xrightarrow{H_2SO_4} CH_3COOC_2H_5 + H_2O$
(EthylEthanoate)

iii. Ethanal

Ans: $C_2H_5OH + \frac{1}{2}O_2 \xrightarrow[Ch_3COOH]{CrO_3} CH_3CHO + H_2O$

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

a) Identify the compound A.
Ans: Compound A is ethanoic acid (CH_3COOH)

b) Write the chemical equation for its reaction with ethanol to form compound B.
Ans: $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

c) How can we get compound A back from B.
Ans: Ethanoic acid Ethyl Ethanoate (Ester)

$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$
Ethanoic acid

d) Name the process and write the corresponding chemical equation.
Ans: The process is known as ester hydrolysis.

e) Which gas is produced when compound A reacts with washing soda? Write the chemical equation?

Ans: CO_2 is produced with effervescence when compound A reacts with washing soda which is chemically Na_2CO_3

$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2$

4.

a) Why does carbon form largest number of compounds?

Ans: Carbon forms strong bonds with another carbon due to the overlapping of orbitals. Carbon forms large number of compounds called organic compounds due to which the self-linking property is called catenation.

b) Why some of these are called saturated and other unsaturated compounds?

Ans: Compounds which has only $C-C$ (single bond) present are saturated compounds whose as those compounds which has $C=C$ (double bond) or $C\equiv C$ (triple) bond is present are called unsaturated compounds.

c) Which of these two is more reactive?

Ans: Saturated compounds are less reactive than unsaturated compounds

d) Write the names of the following compounds

i. CH_2-CH_2-Br

Ans: Bromoethane

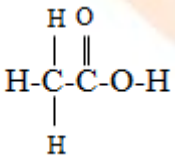
ii. $CH_3-CH-CH-CH-C\equiv C-H$

Ans: Hex-1-yne

5. Draw the structure for the following compounds:

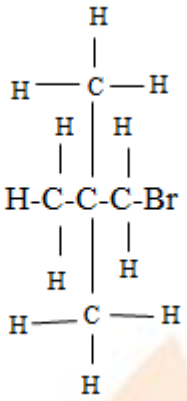
i. Ethanoic acid

Ans:



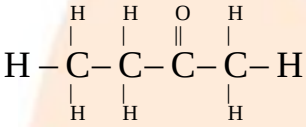
ii.Bromopentane

Ans:



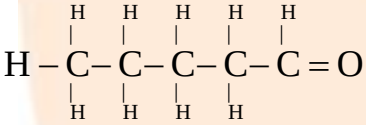
iii. Butanone

Ans:



iv. Hexanal

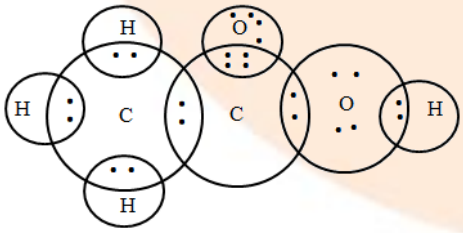
Ans:



6. Draw the electron dot structure for

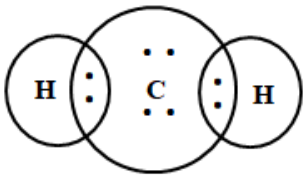
a) Ethanoic acid

Ans:

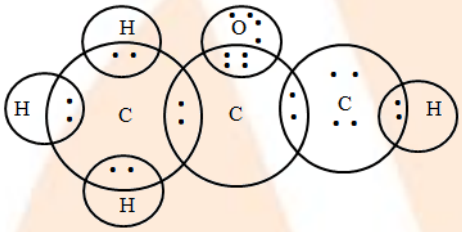


b) H_2S

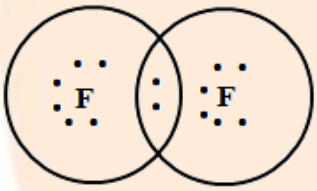
Ans:



c) Propanone
Ans:



d) F_2
Ans:



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

Ans: Soap molecules have two ends. One end is hydrophilic and another end is hydrophobic and the ionic end is hydrophilic. Soaps dissolve in water while the hydrogen chain is hydrophobic, it dissolves in hydrocarbon. The hydrocarbon chains are oriented towards the oil droplet and the ionic ends are oriented towards water. In ethanol Micelles formation will not take place.s

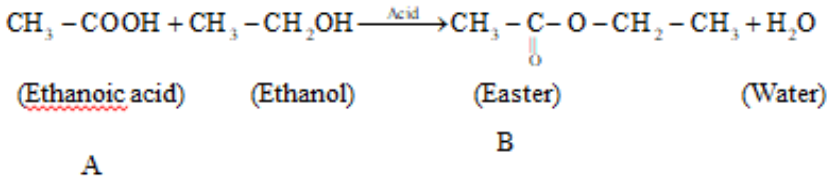
8. An organic compound 'A' is widely used as a preservative in pickles and has a molecular formula C. This compound reacts with ethanol to form a sweet smelling compound 'B'.

i. Identify the compound 'A'

Ans: Ethanoic acid, CH_3COOH

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

Ans:



iii.How can we get compound 'A' back from 'B'?

Ans: Esters react with the acid or a base to give back the alcohol and carboxylic acid.

iv.Name the process and write corresponding chemical equation.

Ans: Saponification

$$CH_3COOC_2H_5 \xrightarrow{NaOH} C_2H_5OH + CH_3COOH$$

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

Ans: CO_2 gas is evolved

$$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2$$