CBSE

CARBON AND ITS COMPOUNDS WS 5

Class 10 - Science

Section A

1. i. The formula of an ester is $CH_3COOC_2H_5$. Write the structural formulae of the corresponding alcohol and the acid. **[2]**

   ii. a. Mention the experimental conditions involved in obtaining ethene from ethanol.

   b. Write the chemical equation for the above reaction.

2. An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D. **[2]**

3. What happens when ethanol reacts with **[2]**

   i. sodium

   ii. potassium permanganate solution.

4. What are enzymes? Name the enzymes required for the fermentation of sugarcane to ethanol. **[2]**

5. Write the balanced chemical equation for the following: **[2]**

   a. Methane is burned insufficient air.

   b. Ethanol is treated with sodium.

   c. Ethanoic acid is reacted with sodium hydroxide.

   d. Ethanoic acid is treated with sodium carbonate.

   e. Ethanol is mixed with ethanoic acid in the presence of an acid.

6. What name is given to the reaction which take place when ethanoic acid reacts with ethanol in the presence of conc. sulphuric acid? Name the products obtained in this reaction. **[2]**

7. Write the chemical equations of the reaction of ethanoic acid with the following: **[2]**

   i. Sodium

   ii. Sodium hydroxide

   iii. Ethanol

8. The molecular formula of an ester is $C_3H_7COOC_2H_5$. Write the molecular formula of the alcohol and the acid from which it might be prepared. **[2]**

9. Write the chemical equations for the following chemical reactions and name the carbonic compound obtained. **[2]**

   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.

10. 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 pop sound. Identify P, Q, R and **[2]**

write the balanced chemical equation of the reactions involved.

11. How would you bring about the following conversions? Name the process and write the reaction involved. **[2]**
    i. Propanol to propanoic acid
    ii. Ethanol to ethene
    Write the reactions.

12. What is saponification? Write the reaction involved in this process. **[2]**

13. How will you bring about the following conversions: Ethanoic acid to ethanol ? **[2]**

14. Ethyl ethanoate smells like pears and is used for flavouring sweets. **[2]**
    i. Write the chemical formula of ethyl ethanoate.
    ii. Write the chemical reaction between ethanoic acid and ethanol in the presence of concentrated sulphuric acid.
    iii. Suggest the function of concentrated sulphuric acid in the reaction.

15. i. Name the property of ethanol which makes it useful in medicines. **[2]**
    ii. Name the organic compound which is used in pickles. Mention its composition.
    iii. Mention any two uses of alcohol in medicines.

16. What happens when ethyl alcohol and acetic acid react with each other in presence of conc. H_2SO_4? Write the chemical equation. **[2]**

17. Explain the Saponification reaction with the examples. **[2]**

18. Explain the following: **[2]**
    i. CH_3COOH is a weak acid.
    ii. Propene undergoes addition reaction.
    iii. The gas stoves have inlets for air.

19. List any two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed? **[2]**

20. How is ethene prepared from ethanol? Give the reaction involved in it. **[2]**

21. Name the gases evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas? **[2]**

22. Write the structural formula of ethanol. What happens when it is heated with excess of conc. H_2SO_4 at 443 K? **[2]**
    Write the chemical equation for the reaction stating the role of conc. H_2SO_4 in this reaction.

23. What happens when ethanol is warmed with ethanoic acid in the presence of few drops of concentrated sulphuric acid? Give equation of the reaction and the name of the product formed. **[2]**

24. Complete the following chemical equations: **[2]**
    i. $CH_3COOC_2H_5 + NaOH$ _____
    ii. $CH_3COOH + NaOH$ _____
    iii. $C_2H_5OH + CH_3COOH \xrightarrow[H_2SO_4]{\text{conc.}}$ _____

25. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess. **[2]**
    i. How is 5% solution of $KMnO_4$ prepared?
    ii. State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?
    iii. Write chemical equation of this reaction.

26. Intake of small quantity of methanol can be lethal. Comment. **[2]**

27. Ethene is formed when ethanol is heated at 443 K with excess of concentrated sulphuric acid. What is the role of sulphuric acid in this reaction? Write the balanced chemical equation of this reaction. **[2]**

28. Name the product formed when an organic acid and alcohol react in the presence of acid catalyst. Write the equation and give two uses of the product formed. **[2]**

29. Explain giving chemical equation, how are esters prepared? Specify any one property and one use of esters. **[2]**

30. Name the compound formed when ethanol is heated in excess of concentrated sulphuric acid at 443k. Also write the chemical equation of the reaction stating the role of concentrated 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? **[2]**

31. Which organic compound is added to make ethanol unfit for drinking purposes? What is the name of the mixture formed? **[2]**

32. Name the group of derivatives of hydrocarbons that have pleasant fruity smell. Explain with the help of chemical equation how these can be prepared? Name the process involved. **[2]**

33. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved. **[2]**

34. What is the role of concentrated H_2SO_4 in the esterification reaction? **[2]**

35. Apart from the organic compounds, where else do we find carbon? **[2]**
Mention the form in which it is available there and also its percentage.

36. An organic compound A is a constituent of many medicines and used as an antifreeze and has the molecular formula C_2H_6O. Upon reaction with alk. $KMnO_4$, compound A is oxidised to another compound B with formula $C_2H_4O_2$. Identify the compounds A and B. Write the chemical equation for the reaction which leads to the formation of B. **[2]**

37. Name two forms of alcohol which are poisonous. **[2]**

38. List two chemical properties on the basis of which ethanol and ethanoic acid may be differentiated and explain how. **[2]**

39. Write the physical properties of ethanol. **[2]**

40. State the meaning of functional group in a carbon compound. Write the functional group present in **[2]**
    i. Ethanol
    ii. Ethanoic acid and also draw their structure.

41. When ethanol reacts with ethanoic acid in the presence of conc. H_2SO_4, a substance with fruity smell is produced Answer the following. **[2]**
    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 in this reaction.

42. A student reports the police about the illegal vending of alcohol near his school. He also knew about denatured alcohol. **[2]**
    i. What is denatured alcohol?
    ii. What would happen if somebody consumes denatured alcohol?

43. Write two tests to show that acetic acid is acidic in nature. **[2]**

44. A carbon compound **P** on heating with excess of Cone. 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 **[2]**

R on combustion forms two molecules of carbon dioxide and three molecules of water. Identify P, Q and R and write the chemical equations involved.

45. Ethanol is used on a large scale. At commercial level, this is a very useful chemical. It is commonly called alcohol and is the active ingredient of alcoholic drink. But consumption of alcohol also causes drunkenness and this practice is socially condemned. **[2]**

Read the given passage and answer the following questions.

i. As a responsible student of class, what steps you would take to discourage the use of alcohol?

ii. What values did learners have learn from the above text?

46. How would you distinguish experimentally between an alcohol and a carboxylic acid? **[2]**

Section B

47. Write the name and molecular formula of a carbon compound having its name suffixed with **-ol** and having two carbon atoms in its molecule. With the help of a chemical equation indicate what happens when this compound is heated with excess conc. H_2SO_4. **[3]**

48. i. An organic compound 'A' has the molecular formula CH_2O_2. It turns blue litmus red and gives brisk effervescence with $NaHCO_3$. Identify 'A' and give its chemical reaction. **[3]**

ii. How many electrons are shared by each atom in the formation of

a. a double bond and

b. a triple bond?

49. i. An organic compound A on heating with concentrated H_2SO_4 forms a compound B which on addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO_2 and 3 moles of H_2O. Identify the compounds A, B and C and write the chemical equations of the reactions involved. **[3]**

ii. An organic compound A of molecular formula C_2H_6O on oxidation gives an acid B with the same number of carbon atoms in the molecule as A. Compound A is often used for sterilization of skin by doctors. Name the compounds A and B. Write the chemical equations involved in the formation of B from A.

50. What happens when a mixture of sodium acetate and sodalime is heated? **[3]**

51. An organic compound 'A' has the molecular formula CH_2O_2. It turns blue litmus red and gives brisk effervescence with $NaHCO_3$. Identify 'A' and give chemical reaction. **[3]**

52. Write formulae of the products in the following reactions: **[3]**

i) reaction of sodium and ethanol.

ii) reaction of alkaline potassium permanganate solution with ethanol.

53. i. Which property of ethanol enables its use in preparation of certain types of medicines? **[3]**

ii. A shiny soft metal is put in a test tube containing ethanol, a reaction takes place within the test tube with the evolution of bubbles. The gas is collected and exposed to a burning candle. The gas burns with a pop sound.

a. Name the shiny soft metal.

b. Name the gas evolved as a result of chemical reaction.

c. Write the equation for chemical reaction.

54. i. An element of group 14 has two common allotropes, A and B. A is hard and is bad conductor of electricity while B is soft to touch and a good conductor of electricity. Identify the element and its allotropes. Explain the reasons for their different properties. **[3]**

ii. An organic compound A on heating with concertrated H_2SO_4 forms a compound B which on addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO_2 and 3 moles of H_2O. Identify the compounds A, B and C and write the chemical equations of the reactions involved.

55. 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? Justify your answer. **[3]**

56. 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 with sweet smell is formed. **[3]**

i. Identify X and Y.

ii. Write the chemical equation for the reaction involved.

57. A compound X is formed by the reaction of a carboxylic acid $C_2H_4O_2$ and an alcohol in presence of a few drops of H_2SO_4. The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of**:** **[3]**

a. carboxylic acid,

b. alcohol

c. the compound X. Also write the reaction.

58. An organic compound X which is sometimes used as an antifreeze has the molecular formula C_2H_6O. X on oxidation gives a compound Y which gives effervescence with a baking soda solution. Identify X and Y. write the chemical equation of reaction. **[3]**

59. An organic compound A having molecular formula $C_2H_4O_2$ reacts with sodium metal and evolves a gas B which readily catches fire. A also reacts with ethanol in the presence of concentrated sulphuric acid to form sweet smelling substance C used in making perfumes. **[3]**

i. Identify the compounds A, B and C.

ii. Write balanced chemical equations to represent the conversion of:

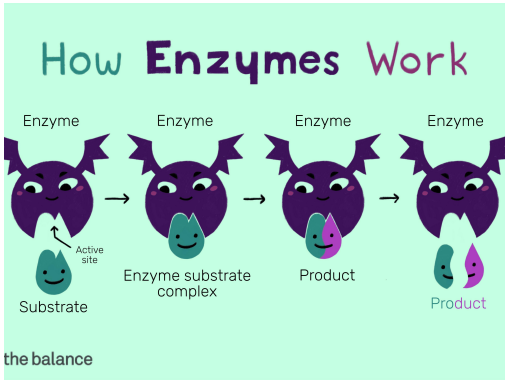
a. Compound A into compound B

b. Compound A into compound C.

Section C

60. The breakdown of complex substances into simpler substances by the action of enzymes released by anaerobic bacteria is called fermentation. By this method, we can prepare only ethanol. In this, firstly, sugarcane juice and water are mixed and heated to form a sweet liquid called molasses. Then, in the presence of yeast and enzyme invertase, it breaks into glucose and fructose and then further, glucose and fructose break into further simpler **[4]**

substances called ethanol and carbon dioxide. This method is generally carried out in breweries.



Answer the following questions:

i. What do you understand by fermentation?
ii. What is molasses?
iii. Which method is used for the preparation of the ethanol?
iv. What is the general mechanism by which enzyme acts?

Section D

61. a. 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. **[5]**
b. Give the reason for the formation of scum when soaps are used with hard water.

62. Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks. List its two uses. Write the chemical equation and name of the product formed when this compound reacts with - **[5]**
a. sodium metal
b. hot concentrated sulphuric acid

63. 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. **[5]**
i. Identify the compound A.
ii. Write the chemical equation for its reaction with ethanol to form compound B.
iii. How can we get compound A form B?
iv. Name the process and write corresponding chemical equation.
v. Which gas is produced when compound A reacts with washing soda? Write the chemical equation.

64. i. What happens when a small piece of sodium is dropped in ethanol? Write the equation for this reaction. **[5]**
ii. Why is glacial acetic acid called so?
iii. What happens when ethanol is heated at 443 K in the presence of conc. H_2SO_4? Write the role of conc. H_2SO_4 in this case.
iv. Write an equation showing saponification.

65. i. A compound **A** with a molecular formula of $C_2H_4O_2$ reacts with a base to give salt and water. Identify A, state its nature and the name of the functional group it possesses. Write chemical equation for the reaction involved. **[5]**
ii. When the above stated compound **A** reacts with another compound **B** having molecular formula C_2H_6O in the presence of an acid, a sweet smelling compound **C** is formed.

1. Identify **B** and **C**.
2. State the role of acid in this reaction.
3. Write chemical equation for the reaction involved.

66. A salt X is formed and a gas is evolved when ethanoic acid reacts with sodium hydrogencarbonate. 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. **[5]**

67. A compound C (molecular formula, $C_2H_4O_2$) reacts with Na - metal to form a compound R and evolves a gas that burns with a pop sound. Compound C on treatment with an alcohol A in presence of an acid forms a sweet-smelling compound S (molecular formula, $C_3H_6O_2$). On the addition of NaOH to C, it also gives R and water. S on treatment with NaOH solution gives back R and A. **[5]**

Identify C, R, A, S, and write down the reactions involved.

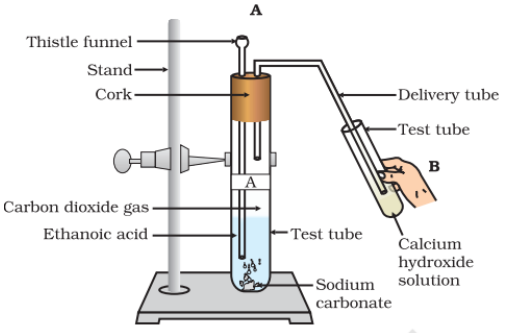
68. A neutral organic compound **X** (Molecular formula C_2H_6O) on reacting with acidified $K_2Cr_2O_7$ gives an organic compound **Y** which is acidic in nature. **X** reacts with **Y** on warming in the presence of conc. H_2SO_4 to give a sweet smelling compound **Z**. **[5]**

i. Identify **X**, **Y** and **Z**.
ii. Write the chemical equations for the reactions in the conversion of (1) **X** to **Y** and (2) **X** to **Z**.
iii. State the role of (1) acidified $K_2Cr_2O_7$ in the conversion of **X** to **Y** and (2) conc. H_2SO_4 in the reaction of **X** and **Y**.
iv. Name the reaction which occurs when **Z** reacts with an alkali.

69. **[5]**
a. Name the gas evolved during fermentation process.
b. What role is played by yeast in the conversion of cane sugar ($C_{12}H_{22}O_{11}$) to ethanol?
c. How can the following be obtained from pure ethanol? Express chemical reactions by the chemical equations.
   i. Sodium ethoxide
   ii. Ethyl ethanoate
   iii. Ethanal

70. Esters are sweet-smelling substances and are used in making perfumes. Suggest some activity and the reaction involved for the preparation of an ester with a well-labeled diagram. **[5]**

71. Look at the given figure and answer the following questions: **[5]**



i. What change would you observe in the calcium hydroxide solution taken in tube B?
ii. Write the reaction involved in test tubes A and B respectively.
iii. If ethanol is given instead of ethanoic acid, would you expect the same change?
iv. How can a solution of lime water be prepared in the laboratory?

72. i. State the litmus test to distinguish between an alcohol and a carboxylic acid. **[5]**

ii. Give the equation for the reaction of a carboxylic acid with an alcohol. State the condition for the reaction and name the product formed. What is this reaction known as?

iii. Write a reaction which is reverse of this reaction? Mention the conditions required for the reaction. Name and write the use of this reaction.

73. i. Distinguish between esterification and saponification reactions with the help of chemical equation for each. **[5]**

ii. Write an activity to show the formation of an ester in a school laboratory.

74. i. How is vinegar made? **[5]**

ii. What is glacial acetic acid? What is its melting point?

iii. Why is butanoic acid a weak acid?

iv. Write the name and the formula of the two compounds formed when the ester, $CH_3COOC_2H_5$ undergoes saponification.

75. i. What is a homologous series? Explain with an example. **[5]**

ii. Define the following terms giving one example of each.

a. Esterification

b. Addition reaction