PYQ

Carbon and its compound

4

Carbon and the covalent bond

1. Carbon can neither form C^{4+} Cation nor C4 anion. Why?
2. Write down physical property of carbon compound?
3. Give the reason
   a) Covalent compounds are bad conductor of electricity?
   b) Covalent compounds have no melting point and boiling point?
4. List 3 reasons for carbon forming a large number of compounds. Name the type of bonding found in the most of its compound. Why does carbon form compound mainly by this kind of bonding?
5. Give two examples of covalent compounds which you have studied. State any four properties in which covalent compounds differ from ionic compounds.

Saturated and unsaturated carbon compound

1. What are hydrocarbon? Explain with examples.
2. Explain the meaning of saturated and unsaturated hydrocarbon with two examples.
3. Differentiate between alkane and alkene.
4. State any four characteristics of isomer.
5. What are homologous series of carbon compound? Write the molecular formula of two consecutive members of homologous series of aldehyde. State which part of this compound determine there physical and chemical property.
6. State the meaning of functional group in an organic compound. Write the formula of functional group present in alcohol and carboxylic acid
7. Specify any two rules of nomenclature of organic compounds.
   Ans. (i) Count the number of carbon atoms in the compound and give it the base name accordingly.
   (ii) Identify the functional groups in the compound and name the compound by adding the prefix or suffix to the base name.
8. How many isomers are possible for the compound with the molecular formula C_4H_8? Draw the electron dot structure of branched chain isomer.(b) How will you prove that C_4H_8 and C_5H_{10} are homologues?
9. What is homologous series of carbon compounds? List its any two characteristics. Write the name and formula of next higher homologue of HCOOH
10. A carbon compound 'A' having melting point 156 K and boiling point 351 K, with molecular formula C_2H_6O is soluble in water in all proportions.
    (a) Identify 'A' and draw its electron dot structure.
    (b) Give the molecular formulae of any two homologues of 'A

Chemical properties of carbon compounds

1. (a) Give a chemical test to distinguish between saturated and unsaturated hydrocarbon.
   (b) Name the products formed when ethane burns in air. Write the balanced chemical equation for the reaction showing the types of energies liberated.

(c) Why is reaction between methane and chlorine in the presence of sunlight considered a substitution reaction?
(d) (1) Name the products formed when ethanol burns in air.
(ii) What two forms of energy are liberated on burning alcohol?

2. **Draw the electron dot structure for ethyne. A mixture of ethyne and oxygen is burnt for welding. In your opinion, why cannot we use a mixture of ethyne and air for this purpose?**
3. **What is an oxidising agent? What happens when an oxidising agent is added to propanol? Explain with the help of a chemical equation. Or, What happens when 5% alkaline potassium permanganate solution is added drop by drop to warm propyl alcohol (propanol) taken in a test tube? Explain with the help of a chemical equation.**
4. **Describe two examples of different oxidations of ethanol. Name the products obtained in each case.**
5. **Write the name of the reaction that converts alkenes into alkanes and also write a chemical equation to show the necessary conditions for the reaction to occur. [2017 OD**
6. **Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen can take place. Stating the essential conditions required for an addition reaction to occur. Write the chemical equation giving the name of the reactant and the product of such a reaction**
7. **With the help of an example, explain the process of hydrogenation. Mention the essential conditions for the reaction and state the change in physical property with the formation of the product**
8. **With the help of an example, explain the process of hydrogenation.**
   Mention the essential conditions for the reaction and state the change in physical property with the formation of the product.
   What is hydrogenation? Explain it with the help of a chemical equation. State the role of this reaction in industry.
9. **(a) Write the chemical equation for the following:**
   (i) Combustion of methane (ii) Hydrogenation of ethene
   (b) Which class of carbon compounds is responsible for the depletion of ozone layer at the higher level of the atmosphere

Ethanol and Ethnoic Acid

1. **Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks. List its two uses.**
2. **Write chemical equations for what happens when**
   (i) sodium metal is added to ethanoic acid.
   (ii) solid sodium carbonate is added to ethanoic acid.
   (iii) ethanoic acid reacts with a dilute solution of sodium hydroxide
3. **Name the main products formed when**
   (i) Ethanol is oxidised by an alkaline solution of $KMnO_4$
   (ii) Ethanol reacts with ethanoic acid.
   (iii) Sodium ethanoate is heated with soda lime.
   (iv) Ethanol is heated with conc. H_2SO_4 acid.

PYQ

Carbon and its compound

4

4. **Complete the following equations:**
   (i) $CH_4 + O_2 \rightarrow$ (ii) $C_2H_5OH \xrightarrow{\text{Hot Conc. H2SO4}}$ (iii) CH3COOH + NaOH →
   (i) $CH_3COOC_2H_5$ + NaOH (v) CH_3COOH + NaOH (vi) $C_2H_5OH + CH_3COOH \xrightarrow{\text{Conc.}H_2SO}$
11. **What are esters? How are they prepared? List two uses of esters.**
12. **Write chemical equations to show what happens when**
    (i) ethanol reacts with ethanoic acid in the presence of an acid acting as a catalyst.
    (ii) an ester reacts with a base
13. **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.**
    (i) How is 5% solution of KMnO, 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.
14. **Name the oxidising agent used for the conversion of ethanol to ethanoic acid. Distinguish between ethanol and ethanoic acid on the basis of (i) litmus test, (ii) reaction with sodium carbonate.Or, "Conversion of ethanol to ethanoic acid is an oxidation reaction." Justify this statement giving the relevant equation for the chemical reaction involved. [2020 JBB/1, 2019 JMS/4**
15. **How would you bring about the following conversions ? Name the process and write the reactions involved. (a) Ethanol to ethene (b) Propanol to propanoic acid**
16. **State the meaning of functional group in a carbon compound. Write the functional group present in: (i) ethanol and (ii) ethanoic acid and also draw their structures.**
17. **On dropping a small piece of sodium in a test tube containing carbon compound 'X' with molecular formula C_2H_2O, a brisk effervescence is observed and a gas 'Y' is produced. On bringing a burning splinter at the mouth of the test tube the gas evolved burns with a pop sound. Identify 'X' and 'Y', Also write the chemical equation for the reaction. Write the name and structure of the product formed, when you heat 'X' with excess conc. sulphuric acid. [2016 OD**
18. **(i) What happens when a small piece of sodium is dropped in ethanol? Write the equation for this reaction.**
    (ii) Why is glacial acetic acid called so?
    (iv) 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.
19. **What happens when ethanoic acid reacts with (i) magnesium, (ii) sodium, (iii) sodium carbonate, (iv) sodium hydrogen carbonate (v) sodium hydroxide (vi) ethanol. Write the necessary chemical equation in each case.**
    Or, Write three different chemical reactions showing the conversion of ethanoic acid to sodium ethanoate. Write balanced chemical equation in each case. Write the name of the reactants and the products other than ethanoic acid and sodium ethanoate in each case.
20. **Write the name and the structural formula of the compound formed when ethanol is heated at 443 K with excess of conc. H_2SO_4**
    State the role of conc. H_2SO_4 in this reaction. Write chemical equation for the reaction.
    What would happen if hydrogen is added to the product of this reaction in the presence of catalysts such as palladium or nickel? [2013D, 2015 D, 2015 OD, 2016 D, 2017 OD, 2020 JBB/3
21. **When ethanol reacts with ethanoic acid in the presence of conc.H_2SO_4, a substance with fruity smell is produced. Answer the following:**
    (i) State the class of compounds to which the fruity smelling compounds belong. Write the chemical equation for the reaction and write the chemical name of the product formed.

(ii) State the role of conc. H_2SO_4 in this reaction.

22. , A compound 'X' on heating with excess conc. sulphuric acid at 443 K gives an unsaturated compound 'Y'. 'X' also reacts with sodium metal to evolve a colourless gas 'Z'. Identify 'X', 'Y' and 'Z'. Write the equation of the chemical reaction of formation of 'Y' and also write the role of sulphuric acid in the reaction.
23. A carboxylic acid $C_2H_4O_2$ reacts with an alcohol in the presence of H_2SO_4 to form a compound x' The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid, $C_2H_4O_2$
    Write the name and structure of: (i) Carboxylic acid, (ii) alcohol and (iii) the compound 'X'.
24. An organic compound 'x' on heating with conc. H_2SO_4 forms a compound 'Y' which on addition of one molecule of hydrogen in the presence of nickel forms a compound 'Z'. One molecule of compound 'Z' on combustion forms two molecules of CO_2 and three molecules of H_2O. Identify giving reasons the compounds 'X', 'Y' and 'Z'. Write the chemical equations for all the chemical reactions involved.
25. 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.
    (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.
26. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed
27. When ethanol reacts with ethanoic acid in the presence of conc. H_2SO_4 a substance with fruity smell is produced. Answer the following:
    (1) 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
28. (a) Give reasons for the following:
    (1) Unsaturated hydrocarbons show addition reaction.
    (ii) Conversion of ethanol to ethanoic acid is an oxidation reaction.
    (iii) Alcohol supplied for industrial purpose is mixed with copper sulphate.
    Write chemical equation to represent the preparation of ethane from ethanol.
    State the role of concentrated sulphuric acid in an esterification reaction.
29. A compound A $C_2H_4O_2$ reacts with Na metal to form a compound B and evolves a gas which burns with a pop Compound A on treatment with an alcohol C in the presence of an acid forms a sweet smelling compound, D $C_4H_8O_2$ On addition of NaOH to D gives back B and C. Identify A, B, C and D. Write the reactions involved
30. A carbon compound 'P' on heating with excess conc. H_2SO_4 forms another carbon compound compound 'R'. One molecule of R on combustion forms two molecules of carbon dioxide and Q which on addition of hydrogen in the presence of catalyst forms a saturated carbon three molecules of water. Identify P, Q and R and write chemical equations for the reactions involved.[CBSE 2016]
31. (a) Define isomerism. Draw all possible isomers of butane.
    (b) "A compound 'X' on combustion gives a yellow flame with lots of smoke." What inference would you draw from this statement?
    (c) State the role of alkaline $KMnO_4$, in the reaction involving conversion of an alcohol to corresponding carboxylic acid

PYQ

Carbon and its compound

4

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

Soap and Detergent

1. **How is soap able to clean oily dirt?**
2. **Differentiate between soft water and hard water.**
3. **Name two salts each of calcium and magnesium which make the water hard.**
4. **Are soap molecules hydrophobic or hydrophilic in nature.**
5. **In three test tubes A, B and C, three different liquids namely, distilled water, underground water and distilled water in which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will the length of the foam (lather) be longest? Justify your answer.**
6. **Soap cannot be used in hard water. Why?**
   Or, Why are soaps not very effective when a fabric is washed in hard water? How is this problem resolved?
7. **Detergents are better than soaps. Justify**
8. **What is the difference between the molecules of soaps and detergents, chemically? Explain the cleansing action of soaps.[2015 D, 2017 D, 2019 JMS/4, 2020 JBB/3**
   Or, How are soaps chemically different from detergents?
9. **What are detergents chemically? List two merits and two demerits of using detergents for cleansing.**