

QUESTION BANK (CARBON AND ITS COMPOUND)**MCQ (1 mark each)**

Q1) The electronic configuration of an element is found to be 2, 4. How many bonds can one carb atom form in a compound?

- (a) 1 (b) 2 (c) 4 (d) 6

Q2) The chemical reaction shows the addition of chlorine to methane in the presence of sunlight.



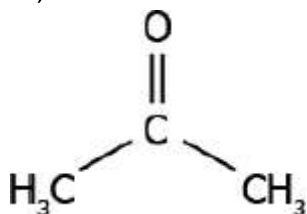
What is likely to be the product of the reaction represented by "X"?

- (a) $\text{CH} + \text{H}_2\text{SO}_4$ (b) $\text{CH}_2\text{Cl}-\text{HCl}$
 (c) $\text{CHCl}_3 + \text{HCl}$ (d) $\text{CHCl}_3 + \text{H}_2\text{SO}_4$

Q3) A carbon compound contains two atoms of carbon. Which name should the carbon compound bear?

- (a) Butane (b) Ethane (c) Methane (d) Propane

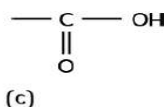
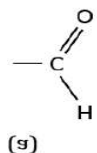
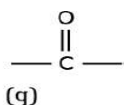
Q4)



Which functional group is present in the compound?

- (a) alcohol
 (b) aldehyde
 (c) carboxylic acid
 (d) ketone

Q4) Which of these functional groups can combine with carbon to produce alcohol?



Q5) A student studies that vinegar, which is a diluted form of ethanoic acid, freezes during winter. What does this suggest about the physical properties of pure ethanoic acid?

- (a) it has a low boiling point
 (b) it has a low melting point
 (c) it has a very high boiling point
 (d) it has a very high melting point

Q6) Which of the following is the molecular formula of cyclobutane?

- a) C_4H_{10}
- b) C_4H_6
- c) C_4H_8
- d) C_4H_4

Q7) A student studies that a soap molecule has two ends, one of which is an ionic end and the other is the carbonic chain. Which option explains the interaction of a soap molecule with oil?

- (a) ionic end of the soap interacts with the oil
- (b) the closest end of the soap interacts with the oil
- (c) carbonic chain end of the soap interacts with the oil
- (d) ends of the soap randomly interact with the oil

Q8) Methane, ethane and propane are said to form a homologous series because all are-

- (a) Hydrocarbons
- (b) saturated compounds
- (c) aliphatic compounds
- (d) differ from each other by a CH_2 group

Q9) Which of the following belongs to a homologous series of alkynes?

C_6H_6 , C_2H_6 , C_2H_4 , C_3H_4

- (a) C_6H_6
- (b) C_2H_6
- (c) C_2H_4
- (d) C_3H_4

Q10) Choose the correct statement

- (a) The ethene molecule is made up of 2 carbon atoms and 4 hydrogen atoms.
- (b) Each carbon atom shares three electrons with three hydrogen atoms to form three carbon-hydrogen single covalent bonds.
- (c) In ethane, the two carbon atoms share one pair of electrons among themselves to form one carbon-carbon single covalent bond.
- (d) All the above.

Q11) Following is (are) the property(ies) of ionic compounds.

- (a) They have high melting and boiling points
- (b) They conduct electricity in solution or in molten state
- (c) Both (a) and (b)
- (d) None of the above

Q12) Which of the following is not a characteristic of fullerenes?

- (a) Of all the fullerene, C₆₀ allotrope is the most stable.
- (b) Its shape is similar to that of a soccer ball.
- (c) It contains only fused six-membered carbon-carbon rings.
- (d) Its hardness is lower than that of diamond.

Q13) How many single bonds are present in methane?

- (a) Four
- (b) Five
- (c) Six
- (d) Three

Q14) A hydrocarbon should have a minimum of how many carbon atoms to show isomerism?

- (a) Three
- (b) Four
- (c) Fived
- (d) Six

Q15) Which of the following statements are correct for carbon compounds?

- (i) Most carbon compounds are good conductors of electricity.
 - (ii) Most carbon compounds are poor conductors of electricity.
 - (iii) Force of attraction between molecules of carbon compounds is not very strong.
 - (iv) Force of attraction between molecules of carbon compounds is very strong.
- (a) (ii) and (iv)
 - (b) (ii) and (iii)
 - (c) (i) and (iv)
 - (d) (i) and (iii)

Q16) C₃H₈ belongs to the homologous series of

- (a) Alkynes
- (b) Alkenes
- (c) Alkanes
- (d) Cyclo alkanes

Q17)

The IUPAC name of $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \text{CH}_2 - \text{CH}_3$ is

- (a) 2-ethyl-2-methyl propane
- (b) 2, 2-dimethyl butane
- (c) 1,1,1-trimethyl propane
- (d) 2, 2-methyl butane

Q18). The number of isomers of pentane is

- (a) 2
- (b) 3
- (c) 4
- (d) 5

Q19) Which of the following will undergo addition reactions?

- (a) CH_4
- (b) C_3H_8
- (c) C_2H_6
- (d) C_2H_4

Q20) When ethanoic acid is treated with NaHCO_3 the gas evolved is

- (a) H_2
- (b) CO_2
- (c) CH_4
- (d) CO

Assertion and Reason (1 mark each)

The questions given below consist of an assertion and the reason. Use the following key to choose the appropriate answer.

- (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.
- (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.
- (c) Assertion is true but the Reason is false.
- (d) The statement of the Assertion is false but the Reason is true.

1) Assertion: Ethanoic acid liberates hydrogen with Sodium metal.

Reason: More reactive sodium displaces hydrogen from ethanoic acid.

2) Assertion: Ethanoic acid reacts with ethyl alcohol in presence of conc H_2SO_4 to form ethyl ethanoate.

Reason: Esters are used in ice creams and cold drinks.'

3) Assertion: Carbon forms a large number of organic compounds.

Reason : Carbon atom contains 6 valence electrons.

Reason: Esters are sweet smelling compounds.

Reason: This reaction is saponification.

Reason (R) : Carbon is tetravalent and shows the property of catenation.

Reason (R) : All the members of a homologous series show similar chemical properties.

Reason (R) : Some elements can have several different structural forms while in the same physical state. These forms are called allotropes.

Reason (R) : Soaps have relatively weak cleansing action.

10) **Assertion(A):** n-butane and iso-butane are examples of isomers.

Reason (R) : Isomerism is possible only with hydrocarbons having 4 or more carbon atoms.

Q. 1. Define catenation.

Q. 2. Name a cyclic unsaturated carbon compound.

Q. 3. Name the functional group present in propanone.

Q. 4. How are covalent bonds formed?

Q. 5. Write the molecular formula of the 2nd and the 3rd member of the homologous series whose first member is methane.

Q.6. Write the molecular formula of first two members of homologous series having functional group -Br.

Q.7. Write the molecular formula of the 2nd and 3rd member of the homologous series where the first member is ethyne.

Q. 8. What is a homologous series of carbon compounds?

Q.9. Write the next homologue of each of the following:

(i) C_2H_4 (ii) C_4H_6

Q. 10. Name the following compounds:

(i) $\text{CH}_3 - \text{CH}_2 - \text{OH}$ (ii) $\text{CH}_3 - \underset{\text{H}}{\text{C}} = \text{O}$

Q. 11. Which element exhibits the property of catenation to maximum extent and why?

Q1 Define soaps?

Q2. Give a chemical test to distinguish between Ethane and ethene.

Q3. Write a test to identify the presence of ethanoic acid?

Q4. A mixture of ethyne and oxygen is used for welding. Can you justify why a mixture of ethyne and air is not-used?

- Q5. Carbon and its compounds are used as fuels in most cases? Give reason.
- Q6. "CHO group cannot be present in the middle of the carbon atom chain." Justify.
- Q7. Two carbon atoms cannot be linked to each other by more than three covalent bonds. Why?
- Q8. Would you be able to check if water is hard by using a detergent?
- Q9. People use a variety of methods to wash clothes. Usually after adding the soap, they beat the clothes on stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?
- Q10. Give a test that can be used to differentiate chemically between butter and cooking oil?

Short answer – questions (40-50 words / 3 marks each)

- Q. 1. What is a homologous series of carbon compounds? Give an example and list its three characteristics. (1+2)
- Q.2. Which compounds called (a) alkanes, are (b) alkenes and (c) alkynes? C_4H_{10} belongs to which of these? Draw two structural isomers of this compound. (1+1+1)
- Q. 3. Draw the structures of the following compounds and identify the functional group present in them (1+1+1)
- (a) Butanoic acid
- (b) Bromopropane
- (c) Butyne
- Q. 4. Write the molecular formula of the following compounds and draw their electron-dot structures: (1+1+1)
- (a) Ethane
- (b) Ethene
- (c) Ethyne
- Q. 5. 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 scientific relation between the two. (1.5+1.5)
- Q6. What happens when (write chemical equation in each case) (1+1+1)
- (a) ethanol is burnt in air?
- (b) ethanol is heated with excess conc. H_2SO_4 at 443 K?
- (c) a piece of sodium is dropped into ethanol?
- Q.7. (a) Draw the structures for (i) ethanol, (ii) ethanoic acid. (1.5+1.5)
- (b) Why is the conversion of ethanol to ethanoic acid considered an oxidation reaction? Write the oxidizing agent used in the reaction involved.
- Q.8. Distinguish between esterification and saponification reactions with the help of the chemical equations for each. State one use of each (i) esters, and (ii) saponification process. (1.5+1.5)
- Q.9. With the help of a diagram, explain cleansing action of soap. (1+2)
- Q.10. 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. (1+1+1)

Long answer – questions (70-80 words / 5 marks each)

- Q1. What is methane? Draw its electron dot structure. Name the type of bonds formed in this compound. Why are such compounds: (i) poor conductors of electricity and (ii) have low melting and boiling points? What happens when this compound burns in oxygen? (1+1+1+2)
- Q.2. Describe the following chemical properties of carbon compounds briefly and give one chemical reaction for each: (1+1+1+1+1)
- (a) Combustion

- (b) Addition
- (c) Substitution
- (d) Esterification
- (e) Oxidation

Q.3.(a) Give a chemical test to distinguish between saturated and unsaturated hydrocarbon.

(1+2+2)

(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?

Q.4. Compare soaps and detergents on the basis of their composition and cleansing action in hard water.

(2.5+2.5)

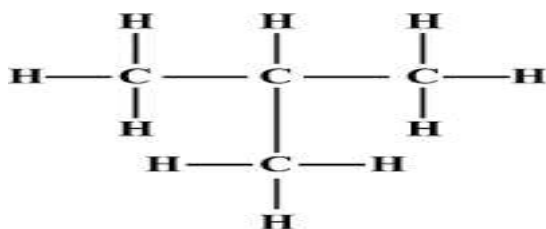
Q.5. Soaps and detergents are two types of salts. State the difference between the two. Write the mechanism of the cleansing action of soaps. Why do soaps not form lather (foam) with hard water? Mention any two problems that arise due to the use of detergents instead of soaps.

(1+1+1+2)

Cases based study questions (Information+ 4 Question / 4 marks each)

CASE 1. Read the given passage and answer the questions that follow:

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



Q.1. Name the characteristic property of carbon as depicted in the fig.

- (A) Catenation
- (B) Polymerization
- (C) Isomerisation
- (D) None of the above

Q. 2. Carbon forms large number of compounds due to:

- (A) Catenation only
- (B) Tetravalency only
- (C) Both catenation and tetravalency
- (D) None of the above

Q.3. Carbon is:

- (A) Divalent
- (B) Monovalent
- (C) Tetravalent
- (D) Trivalent

Q.4. Write the name and structure of a saturated compound in which 6 carbon atoms are arranged in a ring.

- (A) Hexane
- (B) Cyclohexane
- (C) Pentane
- (D) Cyclopentane

CASE 2. Read the given passage and answer the questions that follow:

Homologous series is a series of compounds with similar chemical properties and same functional group differing from the successive member by CH_2 . Carbon chains of varying length have been observed in organic compounds having the same general formula. Such organic compounds that vary from one another by a repeating unit and have the same general formula form a series of compounds. Alkanes with general formula $\text{C}_n\text{H}_{2n+2}$ alkenes with general formula C_nH_{2n} and alkynes with general formula $\text{C}_n\text{H}_{2n-2}$ form the most basic homologous series in organic chemistry.

All the members belonging to this series have the same functional groups. They have similar physical properties and follow a fixed gradation with increasing mass. This series has enabled scientists to study different organic compounds systematically. They can predict the properties of organic compounds belonging to a particular homologous series based on the data available from the other members of the same series. The study of organic compounds has been simplified.

Q. 1. Name the fourth member of the alkane series.

Q. 2. The difference in the molecular formula of any two consecutive members of a homologous series of organic compounds is _____

Q. 3. Name the functional group present in the following compound:

(i) CH_3COOH (ii) $\text{CH}_3\text{C(O)CH}_3$

Q. 4. Define homologous series? Which two of the following organic compounds belong to the same homologous?

CASE 3. Read the given passage and answer the questions that follow:

Soaps and detergents are widely used as cleaning agents. Chemically soaps and detergents are quite different from each other. The common feature of soaps and detergents is that when dissolved in water the molecules of soap and detergent tend to concentrate at the surface of the solution or at interface. Therefore, the surface tension of the solution is reduced, it causes foaming of the solution. A sample of water which gives lather with soap with difficulty is known as hard water, while a sample of water which gives lather with soap easily is known as soft water. Hardness of water is due to the presence of bicarbonates, sulphates and chlorides of calcium and magnesium. When hardness of water is due to the presence of bicarbonates of magnesium and calcium, it is called temporary hardness. When hardness of water is due to the presence of sulphates and chlorides of magnesium and calcium, it is called permanent hardness.

Q. 1 How soap and detergent molecules differ chemically?

Q. 2. Micelle formation take place when soap is added to water? State reason.

Q. 3. Give reason why soaps not form lather in hard water?

Q.4 List two problems that arise due to the use of detergents instead of soaps.