

CBSE CLASS X
Science (086)**QUESTION PAPER***From previous CBSE Board Exam questions***Code: 7PQQ02****Questions: 78****Maximum Marks: 237****Generated: 2026-06-15 13:05****SELECTIONS USED**

Source	Previous-year board
Subject	Science
Lessons	Carbon and its Compounds
Year	2022-2026
Questions selected	78

Composition — Types: 30 Long · 19 MCQ · 14 Short · 7 Assertion–reason · 4 Case-based · 3 Very short · 1 source_based

Q1. § 4.1 BONDING IN CARBON – THE COVALENT BOND**[1]**

Carbon compounds :

- (i) are good conductors of electricity.
- (ii) are bad conductors of electricity.
- (iii) have strong forces of attraction between their molecules.
- (iv) have weak forces of attraction between their molecules.

The correct statements are :

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (ii) and (iv)
- (d) (i) and (iii)

Previously asked in: 2024 31/1/1 Q4

♦ Carbon and its Compounds

Properties of carbon compounds – electrical conductivity and intermolecular forces

Q2. § 4.1 BONDING IN CARBON – THE COVALENT BOND**[2]**

The melting and boiling points of carbon compounds are generally low and they are largely non-conductors of electricity. State two conclusions based on these two properties.

Previously asked in: 2024 31/5/1 Q22

♦ Carbon and its Compounds

Covalent Nature of Carbon Compounds – Low Melting/Boiling Points and Poor Electrical Conductivity

Q3. § 4.2 VERSATILE NATURE OF CARBON § 4.3.1 Combustion**[3]**

State the reasons, why carbon cannot (i) Lose four electrons to form C^{4+} cation, and (ii) Gain four electrons to form C^{4-} anion. How does carbon overcome this problem to form compounds ?

Previously asked in: 2022 31/4/1 Q11 (OR)

♦ Carbon and its Compounds

Why carbon forms covalent bonds (inability to form C^{4+} or C^{4-} ions)

Q4. § 4.2 VERSATILE NATURE OF CARBON**[3]**

"Two different forms of carbon – diamond and graphite have different structures and very different physical properties even though their chemical properties are same." Explain why.

Previously asked in: 2022 31/4/1 Q11 (main)

♦ Carbon and its Compounds

Allotropes of Carbon – Diamond and Graphite: Structure and Physical Properties

Q5. § 4.2 VERSATILE NATURE OF CARBON**[2]**

"Carbon prefers to share its valence electrons with other atoms of carbon or with atoms of other elements rather than gaining or losing the valence electrons in order to attain noble gas configuration." Give reasons to justify this statement.

Previously asked in: 2022 31/2/1 Q1

♦ Carbon and its Compounds

Covalent bonding in carbon – reasons for sharing rather than gaining/losing electrons

Q6. § 4.1 BONDING IN CARBON – THE COVALENT BOND**[3]**

State the reason why (i) carbon compounds have low melting and boiling points. (ii) carbon compounds do not conduct electricity. (iii) carbon can form only covalent compounds.

Previously asked in: 2022 31/3/1 Q9(a)

♦ Carbon and its Compounds

Covalent nature of carbon compounds – low melting/boiling points and non-conductivity

Tetravalency and tendency of carbon to form only covalent bonds

Q7. § 4.2 VERSATILE NATURE OF CARBON

§ 4.2.1 Saturated and Unsaturated Carbon Compounds

§ 4.2.3 Will you be my Friend?

[1]

The correct representation of covalent bonding in an oxygen molecule is :

Previously asked in: 2023 31/5/1 Q7

♦ Carbon and its Compounds

Covalent Bonding in Molecules (O₂)**Q8.** § 4.2 VERSATILE NATURE OF CARBON

§ 4.2.1 Saturated and Unsaturated Carbon Compounds

§ 4.3.4 Substitution Reaction

[1]

The total number of electrons shared in the formation of an ethyne molecule is :

- (a) 6
- (b) 3
- (c) 10
- (d) 4

Previously asked in: 2023 31/2/1 Q7

♦ Carbon and its Compounds

Covalent bonding in ethyne (triple bond) – electron sharing

Q9. § 4.2 VERSATILE NATURE OF CARBON**[1]**

Assertion (A) : There are large number of compounds with many carbon atoms linked to each other.

Reason (R) : Carbon-Carbon bond is very strong and stable.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/3/1 Q24

♦ Carbon and its Compounds

Catenation – strength and stability of C-C bonds

Q10. § 4.2 VERSATILE NATURE OF CARBON § 4.2.3 Will you be my Friend? § 4.2.4 Homologous Series**[1]**

Assertion (A) : Carbon compounds can form chains, branched and ring structures.

Reason (R) : Carbon exhibits the property of catenation.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/2/1 Q24

♦ Carbon and its Compounds Catenation and Versatile Nature of Carbon

Q11. § 4.2 VERSATILE NATURE OF CARBON**[1]**

Assertion (A) : Carbon shares its valence electrons with other atoms of carbon or with atoms of other elements.

Reason (R) : The shared electrons belong to the outermost shells of both the atoms and lead to both atoms attaining the noble gas configuration.

- A Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/1/1 Q24

♦ Carbon and its Compounds Covalent bonding in carbon compounds

Q12. § 4.1 BONDING IN CARBON – THE COVALENT BOND § 4.2.2 Chains, Branches and Rings § 4.2.5 Nomenclature of Carbon Compounds**[3]**

Answer the following: (1+2 = 3)

- (a) Draw the electron dot structure for ethyne.
(b) List two differences between the properties exhibited by covalent compounds and ionic compounds.

Previously asked in: 2022 31/2/1 Q9 (OR-2)

♦ Carbon and its Compounds Electron dot structure of ethyne (triple bond / covalent bonding in carbon compounds)
Properties of covalent compounds vs ionic compounds**Q13.** § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings § 4.2.5 Nomenclature of Carbon Compounds**[1]**

The structural formula of Cyclohexane is

- A Six-membered ring with two C=C double bonds, each C bearing H
B Six-membered saturated ring, each C bearing two H (CH₂ groups)
C Six-membered ring with two C≡C triple bonds
D Six-membered ring with double bonds, each C bearing H

Previously asked in: 2024 31/3/1 Q4

♦ Carbon and its Compounds Cyclic Hydrocarbons – Structural Formula of Cyclohexane

Q14. § 4.2.1 Saturated and Unsaturated Carbon Compounds**[1]**

Draw the electron dot structure of the following: Butane

Previously asked in: 2022 31/3/1 Q2 (b)

♦ Carbon and its Compounds Electron Dot Structure of Carbon Compounds (Butane)

Q15. § 4.2.1 Saturated and Unsaturated Carbon Compounds**[1]**

Draw the electron dot structure of the following: Cyclohexane

Previously asked in: 2022 31/3/1 Q2 (a)

♦ Carbon and its Compounds

Electron dot structure of Cyclohexane

Q16. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings**[2]**

Answer the following:

(a) Write the molecular formula of the following carbon compounds : (i) Methane (ii) Propane [1]

(b) Carbon compounds have low melting and boiling points. Why ? [1]

Previously asked in: 2022 31/1/1 Q1

♦ Carbon and its Compounds

Low melting and boiling points of carbon compounds

Molecular formulas of simple hydrocarbons (Methane, Propane)

Q17. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.3 Will you be my Friend?**[1]**

The electron dot structure of chlorine molecule is :

(a) Electron dot structure option (a)

(b) Electron dot structure option (b)

(c) Electron dot structure option (c)

(d) Electron dot structure option (d)

Previously asked in: 2023 31/4/1 Q7

♦ Carbon and its Compounds

Electron Dot Structure (Lewis Structure) of Molecules

Q18. § 4.2 VERSATILE NATURE OF CARBON § 4.2.2 Chains, Branches and Rings**[1]**The number of single and double bonds present in a molecule of benzene (C_6H_6) respectively, are :

A 6 and 6

B 9 and 3

C 3 and 9

D 3 and 3

Previously asked in: 2024 31/4/1 Q5

♦ Carbon and its Compounds

Structure of Benzene – single and double bonds

Q19. § 4.2.2 Chains, Branches and Rings**[1]**

Consider the structures of the three cyclic carbon compounds A, B and C given below and select the correct option from the following :

(a) A and C are isomers of hexane and B is benzene.

(b) A is an isomer of hexane, B is benzene and C is an isomer of hexene.

(c) A is a saturated cyclic hydrocarbon and B and C are unsaturated cyclic hydrocarbons.

(d) A is cyclohexane and B and C are the isomers of benzene.

Previously asked in: 2023 31/1/1 Q7

♦ Carbon and its Compounds

Cyclic carbon compounds – structures and properties (benzene, cyclohexane, cyclopentane)

Q20. § 4.2.3 Will you be my Friend? § 4.2.5 Nomenclature of Carbon Compounds**[1]**

The formula of functional group for aldehyde is :

- A –COOH
- B –CHO
- C –C– I O
- D –OH

Previously asked in: 2026 31/1/1 Q20

♦ Carbon and its Compounds

Functional groups in carbon compounds (aldehyde)

Q21. § 4.2.2 Chains, Branches and Rings § 4.2.4 Homologous Series § 4.2.5 Nomenclature of Carbon Compounds**[1]**

Consider the following statements about homologous series of carbon compounds :

- (a) All succeeding members differ by – CH₂ unit.
- (b) Melting point and boiling point increases with increasing molecular mass.
- (c) The difference in molecular masses between two successive members is 16 u.
- (d) C₂H₂ and C₃H₄ are NOT the successive members of alkyne series.

The correct statements are –

- (A) (a) and (b)
- (B) (b) and (c)
- (C) (a) and (c)
- (D) (c) and (d)

Previously asked in: 2024 31/2/1 Q7

♦ Carbon and its Compounds

Homologous Series

Q22. § 4.2.3 Will you be my Friend? § 4.2.4 Homologous Series § 4.2.5 Nomenclature of Carbon Compounds**[1]**

A Hydrocarbon which does not belong to the same homologous series of carbon compounds is

- (A) C₄H₁₀
- (B) C₆H₁₄
- (C) C₇H₁₄
- (D) C₁₀H₂₂

Previously asked in: 2025 31/6/1 Q4

♦ Carbon and its Compounds

Homologous Series

Q23. § 4.2.4 Homologous Series § 4.2.5 Nomenclature of Carbon Compounds**[3]**

What is a homologous series? Find the difference in molecular mass between the two consecutive members of a homologous series. State how in a homologous series of carbon compounds the following properties vary with increase in molecular mass: (i) Melting and boiling points (ii) Chemical properties

Previously asked in: 2022 31/3/1 Q9(b)

♦ Carbon and its Compounds

Homologous Series – definition, molecular mass difference, and variation of properties

Q24. § 4.2.5 Nomenclature of Carbon Compounds**[1]**

Which of the following set of compounds does not belong to same homologous series ?

- (A) CH₄ and C₄H₁₀
- (B) C₂H₆ and C₃H₈
- (C) C₃H₈ and C₅H₁₂
- (D) C₄H₈ and C₅H₁₂

Previously asked in: 2026 31/5/1 Q18

♦ Carbon and its Compounds

Homologous Series

Q25. § 4.2.2 Chains, Branches and Rings § 4.2.3 Will you be my Friend? § 4.2.5 Nomenclature of Carbon Compounds**[3]**

Consider the following organic compounds:

- (i) $\text{H}-\text{C}-\text{C}=\text{O}$ with three H atoms on top bonded to carbons and H atoms below the first two carbons (i.e. $\text{CH}_3-\text{CH}_2-\text{CHO}$ type structure).
(ii) $\text{H}-\text{C}-\text{C}=\text{O}$ with two H on top and one H below the first carbon (i.e. CH_3-CHO type structure).

- (a) Name the functional group present in their compounds.
(b) Write the general formula for the compounds of this functional group.
(c) State the relationship between these compounds and draw the structure of any other compound having similar functional group.

Previously asked in: 2022 31/2/1 Q9 (OR-1)

♦ Carbon and its Compounds

Aldehydes – functional group, general formula, and homologous series

Q26. § 4.2.4 Homologous Series § 4.2.5 Nomenclature of Carbon Compounds**[5]**

Answer the following :

- (i) Give reason why carbon can neither form C^{4+} cations nor C^{4-} anions but form covalent compounds.
(ii) What is homologous series of carbon compound ? Write the molecular formula of any two consecutive members of homologous series of aldehydes.
(iii) Draw the structure of the molecule of cyclohexane (C_6H_{12}).

Previously asked in: 2024 31/2/1 Q34(a)

♦ Carbon and its Compounds

Covalent bonding in carbon – inability to form $\text{C}^{4+}/\text{C}^{4-}$ ions

Homologous series of carbon compounds

Structure of cyclohexane (cyclic carbon compounds)

Q27. § 4.2.4 Homologous Series § 4.2.5 Nomenclature of Carbon Compounds**[5]**

Answer the following about carbon compounds :

- (i) Define a homologous series of carbon compounds.
(ii) Why is the melting and boiling points of C_4H_8 higher than that of C_3H_6 or C_2H_4 ?
(iii) Why do we NOT see any gradation in chemical properties of a homologous series compounds ?
(iv) Write the name and structures of (i) aldehyde and (ii) ketone with molecular form $\text{C}_3\text{H}_6\text{O}$.

Previously asked in: 2024 31/1/1 Q34(A)

♦ Carbon and its Compounds

Aldehydes and Ketones – Nomenclature and Structures

Homologous Series – Definition and Properties

Q28. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings**[3]**

Draw two different possible structures of a saturated hydrocarbon having four carbon atoms in its molecule. What are these two structures of the hydrocarbon having same molecular formula called ? Write the molecular formula and the common name of this compound. Also write the molecular formula of its alkyne.

Previously asked in: 2022 31/1/1 Q9 (a)

♦ Carbon and its Compounds

Homologous Series – Alkanes, Alkenes, Alkynes

Isomerism in Carbon Compounds

Structural Isomers of Saturated Hydrocarbons (Alkanes)

Q29. § 4.2.5 Nomenclature of Carbon Compounds**[2]**

Answer the following:

- (a) Select from the following the members of same homologous series : (1) $\text{H}-\text{C}-\text{C}=\text{O}$ (propanal / propionaldehyde structure) (2) $\text{H}-\text{C}-\text{C}-\text{H}$ (with a $\text{C}=\text{O}$ group, i.e., propanone/acetone) (3) $\text{H}-\text{C}-\text{C}-\text{C}=\text{O}$ (butanal structure) (4) $\text{H}-\text{C}-\text{C}-\text{C}-\text{OH}$ (propan-1-ol structure) [Structures as given in paper: (1) $\text{CH}_3\text{CH}_2\text{CHO}$, (2) CH_3COCH_3 , (3) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$, (4) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$] [1]
- (b) What happens to (i) the melting point, and (ii) the solubility of compounds as the molecular mass of the compounds in a homologous series increases ? [1]

Previously asked in: 2025 31/2/1 Q22

♦ Carbon and its Compounds

Homologous Series – identification of members

Properties of Homologous Series – trends in melting point and solubility with increasing molecular mass

Q30. § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS**[1]**

Assertion (A) : Carbon and its compounds are our major sources of fuels.

Reason (R) : Most of the carbon compounds on burning release a large amount of heat and light.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of the Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2025 31/6/1 Q17

♦ Carbon and its Compounds

Carbon compounds as fuels and combustion

Q31. § 4.2.5 Nomenclature of Carbon Compounds § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS**[5]**

(b) Answer the following:

- (i) Name the simplest saturated hydrocarbon. Draw its electron dot structure. Which type of bonds exist in this compound ?
- (ii) Name any two mixtures of the carbon compound used as a fuel in daily life, of which the above mentioned compound is an important component.
- (iii) In which homologous series of carbon compounds can this compound be placed ? Write the general formula of the series.
- (iv) Which type of flame is produced on burning it ?

Previously asked in: 2023 31/2/1 Q34 (b)

♦ Carbon and its Compounds

Carbon compounds as fuels – CNG and Biogas

Covalent bonds in carbon compounds

Electron dot structure of carbon compounds

Homologous series – Alkanes and general formula $\text{C}_n\text{H}_{2n+2}$ Simplest saturated hydrocarbon – Methane (CH_4)

Types of flame – clean/blue flame on burning saturated hydrocarbons

Q32. § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS § 4.3.3 Addition Reaction**[2]**

Distinguish between a saturated and an unsaturated hydrocarbon by flame test. List the products of combustion reaction of a saturated hydrocarbon.

Previously asked in: 2024 31/4/1 Q22

♦ Carbon and its Compounds

Combustion of Hydrocarbons – Products of Combustion

Saturated and Unsaturated Hydrocarbons – Flame Test

Q33. § 4.3.1 Combustion § 4.3.4 Substitution Reaction

[1]

Which of the following will not undergo addition reaction ?

- (A) C_4H_8
- (B) C_2H_2
- (C) C_3H_8
- (D) C_2H_4

Previously asked in: 2026 31/5/1 Q21

♦ Carbon and its Compounds Addition Reactions of Carbon Compounds

Q34. § 4.2.3 Will you be my Friend? § 4.2.5 Nomenclature of Carbon Compounds § 4.3.2 Oxidation

[4]

More than three million carbon compounds have been discovered in the field of chemistry. The diversity of these compounds is due to the capacity of carbon atoms for bonding with one another as well as with other atoms. Most of the carbon compounds are poor conductors of electricity and have low melting and boiling points.

Read the source and answer the sub-parts that follow.

- (a) Write the molecular formula of first two members of homologous series having functional group $-Br$. [1]
- (b) Given below are the formulae of some functional groups : (i) $-C(=O)H$ (an aldehyde group, $-CHO$), (ii) $-C(=O)-$ (a carbonyl/ketone group, $>C=O$). Write the name of these functional groups. [1]
- (c) What would be observed on adding a 5% alkaline potassium permanganate drop by drop to some warm ethanol taken in a test tube ? State the role of $KMnO_4$ in the reaction and write the chemical equation for the reaction involved. [2]

Previously asked in: 2024 31/3/1 Q37

♦ Carbon and its Compounds Functional groups – aldehyde ($-CHO$) and ketone ($>C=O$)
Homologous series and haloalkanes ($-Br$ functional group) Oxidation of ethanol by alkaline $KMnO_4$ – role of oxidising agent**Q35.** § 4.2.2 Chains, Branches and Rings § 4.2.3 Will you be my Friend? § 4.2.5 Nomenclature of Carbon Compounds

[2]

Consider the carbon compounds having following molecular formula : (i) C_3H_6 (ii) C_3H_8 (iii) C_4H_6 (iv) C_6H_6 (v) C_6H_{12}

- (a) State the number of double covalent bonds present in C_3H_6 .
- (b) Write the formula of first member of the homologous series to which the carbon compound C_4H_6 belongs.
- (c) Which one of the above compounds forms ring structure of carbon atoms ?
- (d) Identify, which of the above compounds, is a member of alkane series.

Previously asked in: 2022 31/4/1 Q7

♦ Carbon and its Compounds Alkanes – saturated hydrocarbons Degree of unsaturation and double bonds in carbon compounds
Homologous series and first member identification Ring (cyclic) structures of carbon compounds – Benzene and cyclic hydrocarbons**Q36.** § 4.2.2 Chains, Branches and Rings § 4.2.3 Will you be my Friend?

[1]

Which one of the following hydrocarbons is different from the others ?

- A C_4H_{10}
- B C_7H_{14}
- C C_5H_{12}
- D C_2H_6

Previously asked in: 2024 31/3/1 Q6

♦ Carbon and its Compounds Classification of Hydrocarbons (Saturated vs Unsaturated)

Q37. § 4.3.3 Addition Reaction

[1]

Choose the incorrect statement about the common reaction used in hydrogenation of vegetable oils.

- (A) It is an addition reaction.
- (B) It takes place in the presence of nickel or palladium catalyst.
- (C) The product contains only single bonds between carbon atoms.
- (D) It is an addition reaction which occurs in the presence of an acid catalyst.

Previously asked in: 2025 31/3/1 Q5

♦ Carbon and its Compounds

Hydrogenation of Vegetable Oils

Q38. § 4.2.2 Chains, Branches and Rings

[1]

Given below are the structures of some hydrocarbons. Select the two structures which are related to each other from the given options :

- (i) $\text{H}-\text{C}-\text{C}=\text{C}-\text{H}$ (but-1-ene type structure)
- (ii) $\text{H}-\text{C}-\text{C}-\text{C}-\text{H}$ (butane type structure)
- (iii) $\text{H}-\text{C}-\text{C}-\text{C}-\text{H}$ (another butane-type structure)
- (iv) $\text{Cl}-\text{C}-\text{C}=\text{C}-\text{H}$ (chloro-but-1-ene type structure)

- (A) (i) and (iv)
- (B) (ii) and (iv)
- (C) (ii) and (iii)
- (D) (i) and (iii)

Previously asked in: 2025 31/3/1 Q4

♦ Carbon and its Compounds

Alkanes and Alkenes (saturated and unsaturated hydrocarbons)

Homologous Series

Structural Isomers of Hydrocarbons

Q39. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.3 Addition Reaction

[5]

Answer the following:

- (i) Differentiate between saturated and unsaturated hydrocarbons by giving one example each, with a structural formula. [2]
- (ii) Write the method of converting an unsaturated hydrocarbon into a saturated hydrocarbon. Name the industry where this reaction is commonly used. [2]
- (iii) Write the name and structure of a hydrocarbon having double bond and four carbon atoms in its one molecule. [1]

Previously asked in: 2025 31/2/1 Q34 (b)

♦ Carbon and its Compounds

Addition Reaction / Hydrogenation of Unsaturated Hydrocarbons

Alkenes – Structure and Nomenclature (But-1-ene / But-2-ene)

Saturated and Unsaturated Hydrocarbons

Q40. § 4.2.5 Nomenclature of Carbon Compounds § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC

[5]

ACID § 4.4.2 Properties of Ethanoic Acid

Name an alcohol and a carboxylic acid having two carbon atoms in their structures. Draw their structures and state how this alcohol can be converted into a carboxylic acid. What happens when these two compounds react in the presence of an acid? Write chemical equations for the reactions involved in the two cases mentioned above.

Previously asked in: 2025 31/6/1 Q34(a)

♦ Carbon and its Compounds

Esterification reaction

Ethanol and Ethanoic Acid – Structures and Properties

Oxidation of Ethanol to Ethanoic Acid

Q41. § 4.2.5 Nomenclature of Carbon Compounds § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC ACID [5]
§ 4.4.1 Properties of Ethanol

Answer the following about ethyne and ethanol.

- (a) Write the molecular formula of ethyne and draw its electron dot structure.
- (b) Write chemical equation to show the reaction of ethanol with (i) Sodium metal (ii) Ethanoic acid (in the presence of an acid) (iii) Acidified potassium dichromate. Write the name of the product formed in each case.

Previously asked in: 2025 31/5/1 Q34 (B)

♦ Carbon and its Compounds Chemical properties of ethanol – reactions with sodium, ethanoic acid, and acidified potassium dichromate
Ethyne – molecular formula and electron dot structure

Q42. § 4.2.5 Nomenclature of Carbon Compounds [5]

Answer the following about carbon compounds.

- (a) What is meant by the term homologous series of carbon compounds? Write molecular formula of any two consecutive members of homologous series of ketones.
- (b) Write chemical equation of the reactions of ethanoic acid with (i) Sodium hydroxide and (ii) Ethanol (in the presence of an acid); giving the name of the products in each case.
- (c) Draw the structure of the molecule of benzene.

Previously asked in: 2025 31/5/1 Q34 (A)

♦ Carbon and its Compounds Chemical Properties of Ethanoic Acid – Reactions with NaOH and Ethanol (Esterification)
Homologous Series Structure of Benzene

Q43. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.1 Combustion § 4.3.4 Substitution Reaction [5]

A neutral organic compound X (molecular formula C_2H_6O) on reacting with acidified $K_2Cr_2O_7$ forms another organic compound Y whose nature is acidic. X and Y on heating in the presence of conc. H_2SO_4 give a sweet smelling compound Z.

- (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.

Previously asked in: 2023 31/5/1 Q34 (a)

♦ Carbon and its Compounds Esterification and saponification reactions Ethanoic acid – properties and esterification reaction
Ethanol (C_2H_5OH) – properties and oxidation to ethanoic acid Role of acidified $K_2Cr_2O_7$ as an oxidising agent
Role of conc. H_2SO_4 as a dehydrating/catalyst agent in esterification

Q44. § 4.3.3 Addition Reaction [1]

Assertion (A) : Some vegetable oils are healthy.

Reason (R) : Vegetable oils generally have long unsaturated carbon chains.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2024 31/5/1 Q17

♦ Carbon and its Compounds Properties and Health Effects of Oils and Fats Saturated and Unsaturated Carbon Compounds

Q45. § 4.3.4 Substitution Reaction

[3]

Why is the conversion of ethanol to ethanoic acid an oxidation reaction? Name the oxidising agent used in this conversion. Write chemical equation for this oxidation reaction. How is this reaction different from the reaction in which ethanol burns in the presence of oxygen?

Previously asked in: 2024 31/4/1 Q28

♦ Carbon and its Compounds

Difference between controlled oxidation and combustion of ethanol

Oxidation of Ethanol to Ethanoic Acid

Q46. § 4.2.5 Nomenclature of Carbon Compounds § 4.4.1 Properties of Ethanol

[4]

Alcohol forms a homologous series with general formula $C_nH_{2n+1}-OH$ and $-OH$ group as functional group. Ethanol is commonly called alcohol and is used in alcoholic drinks. It is good solvent, used in medicines, cough syrups, tonics etc.

Answer the following questions based on the passage:

- (a) Write structural formula and name of 4th member of alcohol homologous series. [1]
- (b) What happens when ethanol is heated with alkaline $KMnO_4$? Write chemical equation involved. [1]
- (c) Write the chemical equation of reaction of ethanol with ethanoic acid in the presence of concentrated H_2SO_4 . Write the name of this reaction. [2]

Previously asked in: 2026 31/5/1 Q28

♦ Carbon and its Compounds

Esterification reaction – ethanol and ethanoic acid with conc. H_2SO_4

Homologous series of alcohols – general formula and members

Oxidation of ethanol with alkaline $KMnO_4$ **Q47.** § 4.4.2 Properties of Ethanoic Acid

[1]

Assertion (A) : Pure ethanoic acid is also known as glacial acetic acid.

Reason (R) : Pure ethanoic acid often freezes during winter due to its low melting point of 290 K.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/4/1 Q24

♦ Carbon and its Compounds

Ethanol and Ethanoic Acid (Properties)

Q48. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS § 4.3.4 Substitution Reaction

[5]

Answer the following:

- (i) Name the compound formed when ethanol is heated at 443 K in the presence of conc. H_2SO_4 and draw its electron dot structure. State the role of conc. H_2SO_4 in this reaction.
- (ii) What is hydrogenation? Explain it with the help of a chemical equation. State the role of this reaction in industry.

Previously asked in: 2023 31/6/1 Q34(b)

♦ Carbon and its Compounds

Dehydration of Ethanol – Formation of Ethene using conc. H_2SO_4 at 443 K

Hydrogenation of Unsaturated Compounds and its Industrial Role

Q49. § 4.1 BONDING IN CARBON – THE COVALENT BOND

[1]

Assertion (A) : Melting point and boiling point of ethanol are lower than that of sodium chloride.

Reason (R) : The forces of attraction between the molecules of ionic compounds are very strong.

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

Previously asked in: 2023 31/6/1 Q20

♦ Carbon and its Compounds

Ethanol – physical properties

Properties of covalent compounds vs ionic compounds – melting and boiling points

Q50. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.1 Combustion § 4.3.4 Substitution Reaction

[5]

A saturated organic compound 'A' belongs to the homologous series of alcohols. On heating 'A' with concentrated sulphuric acid at 443 K, it forms an unsaturated compound 'B' with molecular mass 28 u. The compound 'B' on addition of one mole of hydrogen in the presence of Nickel, changes to a saturated hydrocarbon 'C'.

- (i) Identify A, B and C.
- (ii) Write the chemical equations showing the conversion of A into B.
- (iii) What happens when compound C undergoes combustion ?
- (iv) State one industrial application of hydrogenation reaction.
- (v) Name the products formed when compound A reacts with sodium.

Previously asked in: 2023 31/1/1 Q34(a)

♦ Carbon and its Compounds

Alcohols – identification and properties

Combustion of hydrocarbons

Dehydration of alcohols with concentrated H₂SO₄

Hydrogenation of unsaturated hydrocarbons

Industrial application of hydrogenation

Q51. § 4.2.3 Will you be my Friend? § 4.2.5 Nomenclature of Carbon Compounds

[5]

Answer the following :

- (i) Name a commercially important carbon compound having functional group –OH and write its molecular formula.
- (ii) Write chemical equation to show its reaction with (1) Sodium metal (2) Excess conc. sulphuric acid (3) Ethanoic acid in the presence of an acid catalyst (4) Acidified potassium dichromate. Also write the name of the product formed in each case.

Previously asked in: 2024 31/2/1 Q34(b)

♦ Carbon and its Compounds

Esterification reaction

Ethanol – properties, reactions and uses

Functional group – hydroxyl (–OH) / Alcohols

Oxidation of ethanol using acidified potassium dichromate

Q52. § 4.2.5 Nomenclature of Carbon Compounds § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS § 4.3.1 Combustion

[5]

Answer the following :

- (i) Write the name and structure of an organic compound 'X' having two carbon atoms in its molecule and its name is suffixed with '–ol'.
- (ii) What happens when 'X' is heated with excess concentrated sulphuric acid at 443 K? Write chemical equation for the reaction stating the conditions for the reaction. Also state the role played by concentrated sulphuric acid in the reaction.
- (iii) Name and draw the electron dot structure of hydrocarbon produced in the above reaction.

Previously asked in: 2024 31/1/1 Q34(B)

♦ Carbon and its Compounds

Dehydration of alcohols – role of concentrated H₂SO₄ as dehydrating agent

Electron dot structure of ethene (alkene)

Ethanol (structure, properties and reactions)

Q53. § 4.3.4 Substitution Reaction § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC ACID**[5]**

Carry out the following conversions, stating the condition(s) for each :

- (i) Ethanol → Ethene
- (ii) Ethene → Ethane
- (iii) Ethane → Chloroethane
- (iv) Ethanol → Ethanoic acid
- (v) Ethanoic acid → Ethyl ethanoate

Previously asked in: 2023 31/5/1 Q34 (b)

♦ Carbon and its Compounds

Dehydration of Ethanol to Ethene

Esterification: Ethanoic Acid to Ethyl Ethanoate

Halogenation of Ethane to Chloroethane

Hydrogenation of Ethene to Ethane

Interconversion of Carbon Compounds (Ethanol, Ethene, Ethane, Ethanoic acid, Ethyl ethanoate)

Oxidation of Ethanol to Ethanoic Acid

Q54. § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS § 4.3.2 Oxidation § 4.4.1 Properties of Ethanol**[5]**

Answer the following :

- (i) A carbon compound X is a good solvent. On reaction with sodium, X forms two products Y and Z. Z is used to convert vegetable oil into vegetable ghee. Identify and name X, Y and Z. Also write the equation of reaction of X with sodium to justify your answer. [3]
- (ii) Write chemical equation to show what happens when ethanol : (I) burns in oxygen/air. (II) is heated at 443 K in excess conc. H_2SO_4 . (III) reacts with acidified potassium dichromate. [2]

Previously asked in: 2025 31/1/1 Q34(b)

♦ Carbon and its Compounds

Combustion of ethanol

Dehydration of ethanol (elimination reaction with conc. H_2SO_4)

Identification of carbon compounds (ethanol as solvent reacting with sodium)

Oxidation of ethanol using acidified potassium dichromate

Q55. § 4.3 CHEMICAL PROPERTIES OF CARBON COMPOUNDS § 4.3.1 Combustion**[5]**

Attempt either (a) or (b) :

(a) A carbon compound 'P' of molecular formula $\text{C}_2\text{H}_6\text{O}$ is found to be neutral when tested with red and blue litmus. A gas that burns with a pop sound is produced when sodium metal reacts with compound 'P'.

(i) Identify the compound 'P'.

(ii) The carbon compound 'P' is heated with conc. H_2SO_4 at 443 K to produce compound 'Q'.

(I) Write the chemical equation for the reaction.

(II) What is the role of conc. H_2SO_4 in this reaction ?

(iii) What is likely to be observed on heating compound 'P' with ethanoic acid with an acid as a catalyst ? Write the chemical equation for the reaction.

Previously asked in: 2026 31/2/1 Q29 (a)

♦ Carbon and its Compounds

Dehydration of ethanol with conc. H_2SO_4 at 443 K to form ethene

Esterification – reaction of ethanol with ethanoic acid

Identification of ethanol ($\text{C}_2\text{H}_6\text{O}$) from properties – neutral nature and reaction with sodium

Q56. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.1 Combustion**[5]**

Answer the following:

- (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.
- (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.

Previously asked in: 2023 31/6/1 Q34(a)

♦ Carbon and its Compounds Acetic acid (Ethanoic acid) – properties and reactions with bases

Esterification reaction – reaction of carboxylic acid with alcohol in presence of acid catalyst

Q57. § 4.2.5 Nomenclature of Carbon Compounds § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC ACID **[5]**

A carbon 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'.

- (i) Identify the compound 'A' and write its structure.
- (ii) Write the chemical equation for the reaction of 'A' with ethanol to form compound 'B'. State the role of presence of an acid in the reaction.
- (iii) How can we get compound 'A' back from 'B' ?
- (iv) How can 'A' be obtained from ethanol ?
- (v) Name the gas produced when compound 'A' reacts with washing soda.

Previously asked in: 2025 31/4/1 Q34(B)

♦ Carbon and its Compounds Acetic acid (Ethanoic acid) – identification and properties

Esterification reaction and the role of acid catalyst

Oxidation of Ethanol to Ethanoic Acid

Reaction of carboxylic acids with carbonates (washing soda)

Saponification / Hydrolysis of esters

Q58. § 4.3.1 Combustion**[5]**

A carbon compound 'A' on heating with excess conc. H_2SO_4 forms a compound 'B', which on addition of one mole of hydrogen gas in the presence of nickel catalyst forms a compound 'C'. 'C' on combustion in air forms 2 moles of carbon dioxide and 3 moles of water. Identify 'A', 'B' and 'C' and write their structures. Give chemical equations of the reactions involved. Also state the role of concentrated sulphuric acid in the formation of 'B' from 'A'.

Previously asked in: 2025 31/4/1 Q34(A)

♦ Carbon and its Compounds Combustion of carbon compounds Dehydration of alcohols using conc. H_2SO_4

Hydrogenation of unsaturated carbon compounds

Role of conc. H_2SO_4 as a dehydrating agent**Q59.** § 4.3.1 Combustion § 4.4.1 Properties of Ethanol § 4.4.2 Properties of Ethanoic Acid**[5]**

- (B) (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 ?
- (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.

Previously asked in: 2023 31/4/1 Q34 (B)

♦ Carbon and its Compounds Glacial acetic acid Reactions of ethanol (with sodium, dehydration with conc. H_2SO_4)

Saponification reaction

Q60. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.1 Combustion § 4.3.4 Substitution Reaction**[5]**

(a) An acid X reacts with an alcohol Y in the presence of a catalyst acid to form a substance Z that has a pleasant smell. Identify X, Y and Z. Write the chemical equation for the reaction involved and name it, giving justification for the name. The substance Z on reacting with sodium hydroxide gives back alcohol Y and sodium ethanoate. Write the chemical equation for the reaction involved.

Previously asked in: 2023 31/2/1 Q34 (a)

♦ Carbon and its Compounds

Esterification reaction – formation of ester from carboxylic acid and alcohol

Saponification / Hydrolysis of ester with NaOH

Q61. § Introduction § 4.2.5 Nomenclature of Carbon Compounds § 4.3.2 Oxidation**[5]**

Answer the following:

- (i) A compound 'X' having two carbon atoms in its molecule turns blue litmus red and 5 – 8% solution of 'X' in water is widely used as a preservative. Identify the compound 'X' and write its structure. [1.5]
- (ii) Compare its pH nature with a mineral acid. [1]
- (iii) 'X' on reacting with alcohols produces sweet smelling compounds, used in making perfumes. Name the reaction and write its chemical equation. [1.5]
- (iv) When sodium carbonate is added to 'X', a colourless gas is produced which turns lime water milky. Write the chemical equation for the reaction giving the name of the salt produced. [1]

Previously asked in: 2025 31/2/1 Q34 (a)

♦ Carbon and its Compounds

Acetic acid (Ethanoic acid) – structure, properties and uses

Esterification reaction of carboxylic acids with alcohols

Reaction of carboxylic acids with sodium carbonate / carbonates

Q62. § 4.3.1 Combustion § 4.3.3 Addition Reaction**[5]**

Attempt either (a) or (b) :

- (i) Name the following compounds : (I) $\text{CH}_3\text{--C(=O)--CH}_3$ (II) $\text{H--C}\equiv\text{C--H}$ [1]
- (ii) Name the reaction which is commonly used in the conversion of vegetable oils to fats. [1]
- (iii) Why is the melting point of C_4H_{10} higher than C_3H_8 ? [1]
- (iv) What happens when a piece of sodium is dropped into ethanol ? [1]
- (v) Write the products in the following reaction : $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow$ [1]

Previously asked in: 2026 31/3/1 Q29 (b)

♦ Carbon and its Compounds

Effect of Molecular Size on Melting/Boiling Points of Carbon Compounds

Hydrogenation of Vegetable Oils (Addition Reaction)

IUPAC Nomenclature of Carbon Compounds (Ketones and Alkynes)

Reaction of Sodium with Ethanol

Saponification (Hydrolysis of Esters with NaOH)

Q63. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC ACID

[5]

Attempt either (a) or (b) :

(b)

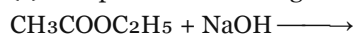
(i) Write the structural formula of benzene.

(ii) State the reason why carbon can neither form C^{4+} cation nor C^{4-} anion.

(iii) What type of bond is formed between carbon and hydrogen ?

(iv) How is ethanol converted to ethanoic acid ?

(v) Complete the following chemical equation :



Previously asked in: 2026 31/2/1 Q29 (b)

♦ Carbon and its Compounds

Covalent Bond between Carbon and Hydrogen

Covalent Nature of Carbon – Inability to form C^{4+} or C^{4-} ions

Oxidation of Ethanol to Ethanoic Acid

Saponification (Ester Hydrolysis with NaOH)

Structure of Benzene

Q64. § 4.3.1 Combustion

[5]

Mohan heated ethanol with a compound 'X' in the presence of a few drops of conc. H_2SO_4 and observed a sweet smelling compound 'Y' is formed. When 'Y' is treated with sodium hydroxide it gives back ethanol and a compound 'Z'.

(i) Identify 'X', 'Y' and 'Z'.

(ii) Write the role of conc. H_2SO_4 in the reaction.

(iii) Write the chemical equations involved and name the reactions.

Previously asked in: 2026 31/1/1 Q29(b)

♦ Carbon and its Compounds

Esterification reaction

Role of conc. H_2SO_4 as dehydrating agent/catalyst

Saponification (hydrolysis of ester with NaOH)

Q65. § 4.5 SOAPS AND DETERGENTS

[5]

Answer the following:

(i) With the help of diagram, show the formation of micelles, when soap is applied on oily dirt.

(ii) Take two test tubes X and Y with 10 mL of hard water in each. In test tube 'X', add few drops of soap solution and in test tube 'Y' add a few drops of detergent solution. Shake both the test tubes for the same period. (1) In which test tube the formation of foam will be more ? Why ? (2) In which test tube is a curdy solid formed ? Why ?

Previously asked in: 2023 31/1/1 Q34(b)

♦ Carbon and its Compounds

Micelle formation and cleansing action of soap

Soaps vs Detergents in hard water

Q66. § 4.5 SOAPS AND DETERGENTS

[5]

What are soaps ? Write the structure of a soap molecule. Explain the cleansing action of a soap. Why are soaps not considered suitable for washing clothes in a region where water is hard ? How is this problem overcome ?

Previously asked in: 2025 31/6/1 Q34(b)

♦ Carbon and its Compounds

Cleansing Action of Soaps and Micelle Formation

Detergents as an Alternative to Soaps in Hard Water

Soaps and Hard Water – Scum Formation

Soaps – Definition and Structure of Soap Molecule

Q67. § 4.5 SOAPS AND DETERGENTS

[4]

'A' and 'B' are two salts used for washing purposes. Salt 'A' is used for bathing also. Four test tubes I, II, III and IV as mentioned below are taken.

I. Rain water + solution of salt 'A'

II. Rain water + solution of salt 'B'

III. Tubewell water + solution of salt 'A'

IV. Tubewell water + solution of salt 'B'

The test tubes are shaken one by one almost identically for the same time and the lengths of foam formed in each test tube is noted.

Read the following case and answer the questions that follow.

(a) In which one of the four test tubes is the foam formed the minimum ? [1]

(b) Differentiate between salt A and salt B. [1]

(c) (i) What are esters ? What happens when an ester reacts with an alkali (say sodium hydroxide) ? Give chemical equation for the reaction. [2]

Previously asked in: 2025 31/3/1 Q37

♦ Carbon and its Compounds

Esters – definition, saponification reaction with alkali (NaOH)

Soaps and Detergents – cleansing action, foam formation with hard and soft water

Q68. § 4.2.5 Nomenclature of Carbon Compounds § 4.3.4 Substitution Reaction § 4.5 SOAPS AND DETERGENTS

[5]

Attempt either (a) or (b) :

(i) What is homologous series ? Which two of the following organic compounds belong to the same homologous series ? C_2H_4 , C_4H_{10} , C_3H_4 , C_4H_8 [2]

(ii) Write the product(s) in the following reactions : (I) $CH_3-CH_2-OH + CH_3COOH \xrightarrow{\text{Acid}}$ (II) $C_2H_5OH + O_2 \xrightarrow{\text{Burning}}$ [2]

(iii) Why does micelle formation take place when soap is added to water ? [1]

Previously asked in: 2026 31/3/1 Q29 (a)

♦ Carbon and its Compounds

Combustion of alcohols

Esterification reaction

Homologous series – definition and identification

Micelle formation – cleansing action of soaps

Q69. § 4.1 BONDING IN CARBON – THE COVALENT BOND § 4.3.4 Substitution Reaction § 4.4 SOME IMPORTANT CARBON COMPOUNDS – ETHANOL AND ETHANOIC ACID

[5]

(i) Give reasons for the following :

(I) Covalent compounds are poor conductor of electricity.

(II) Soap does not form lather in hard water.

(III) Carbon shows catenation but silicon does not.

(ii) Write chemical equations for the following :

(I) Oxidation of ethanol by acidified $K_2Cr_2O_7$.

(II) Hydrogenation of ethene.

Previously asked in: 2026 31/1/1 Q29(a)

♦ Carbon and its Compounds

Catenation and tetravalency of carbon

Chemical properties of carbon compounds (oxidation, addition)

Covalent bonding and properties of covalent compounds

Soaps, micelles and hard water

Q70. § 4.5 SOAPS AND DETERGENTS

[1]

While washing dirty clothes by soap, micelles are formed. Select the correct statement about micelles.

- (A) The hydrophobic tail of the soap molecule is in the interior of the cluster, whereas hydrophilic end is on the surface of the cluster.
- (B) The hydrophobic tail is on the surface of the cluster, whereas hydrophilic end is in the interior of cluster.
- (C) Both hydrophobic tail and hydrophilic end are in the interior of the cluster.
- (D) Both hydrophobic tail and hydrophilic end are on the surface of the cluster.

Previously asked in: 2026 31/4/1 Q20

♦ Carbon and its Compounds

Soaps, Detergents and Micelle Formation

Q71. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings

[4]

The combining capacity of various elements depends on the number of valence electrons. Also the reactivity of elements is explained as their tendency to attain a completely filled outer shell, that is, to attain a noble gas configuration. This may be either through gain of electrons or loss of electrons or sharing of electrons.

Answer the following sub-parts based on the given passage about combining capacity and valence electrons.

- (a) An element A has atomic number 16, how will it attain its nearest noble gas configuration?
- (b) Write the number of (i) single and (ii) double covalent bonds in a molecule of butene (C_4H_8).
- (c) Explain the formation of a molecule of ammonia (NH_3), using electron dot structure. (Atomic number of nitrogen is 7)

Previously asked in: 2025 31/5/1 Q37

♦ Carbon and its Compounds

Covalent bonds – single and double bonds in carbon compounds (butene C_4H_8)Electron dot structure and covalent bond formation (NH_3)

Valence electrons and combining capacity

Q72. § 4.2 VERSATILE NATURE OF CARBON § 4.2.2 Chains, Branches and Rings § 4.2.4 Homologous Series

[1]

If we make carbon skeleton with four carbon atoms, the two different possible skeletons will be

- A C–C–C (with C branch below middle); C–C–C–C
- B C–C–C–C; C–C with C and C branches
- C C–C–C–C; C–C with C–C vertical chain below second carbon
- D C–C–C–C; C–C with C below each carbon

Previously asked in: 2025 31/5/1 Q7

♦ Carbon and its Compounds

Carbon skeletons and structural isomers (straight-chain and branched-chain)

Q73. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings

[1]

Select from the following a hydrocarbon having one C–C bond and one $C\equiv C$ bond :

- (a) Benzene
- (b) Cyclohexane
- (c) Butyne
- (d) Propyne

Previously asked in: 2025 31/4/1 Q4

♦ Carbon and its Compounds

Alkynes and Carbon–Carbon Triple Bond ($C\equiv C$)

Q74. § 4.2.2 Chains, Branches and Rings § 4.2.5 Nomenclature of Carbon Compounds**[3]**

Answer the following:

- (i) Write the molecular formula of benzene and draw its structure.
- (ii) Write the number of single and double covalent bonds present in a molecule of benzene.
- (iii) Which compounds are called alkynes ?

Previously asked in: 2022 31/1/1 Q9 (b)

♦ Carbon and its Compounds

Alkynes – definition and characteristics

Covalent bonds in benzene (single and double bonds)

Structure and molecular formula of benzene

Q75. § 4.2.2 Chains, Branches and Rings**[5]**

(A) (i) Draw the structure of the following compounds :

- (a) Butanoic acid
- (b) Chloropentane

(ii) How are structure (i) and structure (ii) given below related to one another ? Give reason to justify your answer. Draw one more possible structure for above case.

(iii) Differentiate between saturated and unsaturated carbon compounds on the basis of their general formula.

Previously asked in: 2023 31/4/1 Q34 (A)

♦ Carbon and its Compounds

Isomers and Isomerism in Carbon Compounds

Saturated and unsaturated carbon compounds – general formula

Structural formulae of carbon compounds (Butanoic acid, Chloropentane)

Q76. § 4.2 VERSATILE NATURE OF CARBON**[4]**

Carbon is a versatile element that forms the basis of all living organisms and many of the things we use. A large variety of compounds is formed because of its tetravalency. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements.

Answer the following questions :

- (a) What are hydrocarbons ? [1]
- (b) List two properties by virtue of which carbon can form a large number of compounds. [1]
- (c) Answer either (i) or (ii): [2]

Previously asked in: 2024 31/5/1 Q37

♦ Carbon and its Compounds

Hydrocarbons – definition and examples

Tetravalency and catenation of carbon

Q77. § 4.2.1 Saturated and Unsaturated Carbon Compounds § 4.2.2 Chains, Branches and Rings § 4.2.5 Nomenclature of Carbon Compounds**[5]**

Answer the following :

- (i) Draw two isomeric structures of Butene (C_4H_8). [2]
- (ii) Name the following compounds : (I) $H-C-C-C-Cl$ (with H atoms shown fully: $CH_3-CH_2-CH_2Cl$) (II) $H-C-C-C-C-H$ with a ketone group ($CH_3-CO-CH_2-CH_3$ type structure as depicted) [1]
- (iii) Write the chemical equations for the following reactions. Mention one essential condition each for these reactions to take place. (I) Ethanol undergoes complete oxidation (II) Propene undergoes hydrogenation (III) Ethanoic acid reacts with ethanol [2]

Previously asked in: 2025 31/1/1 Q34(a)

♦ Carbon and its Compounds

Esterification – reaction of ethanoic acid with ethanol

Hydrogenation of unsaturated hydrocarbons (addition reaction)

IUPAC nomenclature of carbon compounds (haloalkanes and ketones)

Isomers of carbon compounds – Butene (C_4H_8)Oxidation of alcohols (ethanol to ethanoic acid/ CO_2)

Q78. § 4.2.5 Nomenclature of Carbon Compounds**[1]**

Consider the structures 'X' and 'Y' given below :

X: $\text{H}-\text{C}-\text{C}-\text{C}-\text{H}$ (butane, C_4H_{10} , straight chain)

Y: $\text{H}-\text{C}-(\text{C with methyl branch})-\text{C}-\text{H}$ (isobutane/2-methylpropane, C_4H_{10} , branched chain)

Which of the following statements are correct ?

- (i) 'X' and 'Y' are homologues.
- (ii) 'X' and 'Y' have the same structural formula, but different molecular formula.
- (iii) 'X' and 'Y' have the same molecular formula, but different structural formula.
- (iv) 'X' and 'Y' are structural isomers.

- (A) (i) and (iii)
- (B) (i) and (iv)
- (C) (ii) and (iv)
- (D) (iii) and (iv)

Previously asked in: 2026 31/3/1 Q20

♦ Carbon and its Compounds

Homologous Series

Isomers and Isomerism in Carbon Compounds

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