Next Toppers

आरंभ BATCH

ACP

AARAMBH CHAPTERWISE PROBLEMS

Class-10th

Carbon & its Compounds

PRASHANT KIRAD

Carbon & its Compounds

(Options acche se padhna)

VERY SHORT QUESTIONS (1 Mark)

(A) Multiple Choice Questions (MCQ's)

1. A hydrocarbon which does not belong to the same homologous series of carbon compounds is:
(a) C_4H_{10}
(b) C_6H_{14}
(c) C_7H_{14}
(d) $C_{10}H_{22}$

2. 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.

3. What is the general formula for an alkane?
(a) C_nH_{2n+2}
(b) C_nH_{2n}
(c) C_nH_{2n-2}
(d) C_nH_{2n+1}

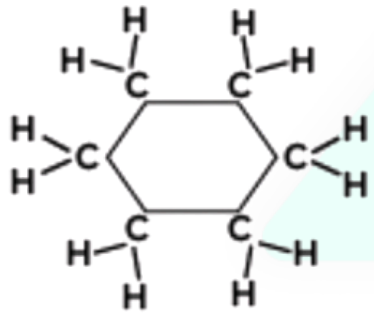
4. Which of the following isomeric formula corresponds to C_4H_{10}?
(a) Butane only
(b) n-butane and isobutane
(c) 2-methylpropene and butene
(d) But-1-ene and But-2-ene

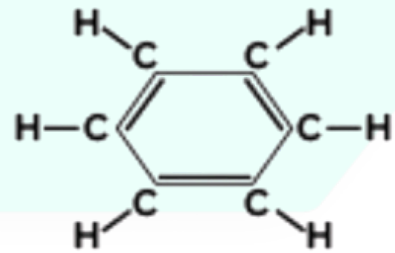
5. Which of the following statements is true about micelle formation by soaps?
(a) The hydrophobic tails of soap molecules remain in water, while hydrophilic heads surround the dirt.
(b) The hydrophilic heads of soap molecules remain in water, while hydrophobic tails surround the dirt.
(c) Both hydrophilic and hydrophobic parts dissolve in water.
(d) Micelles form only in non-polar solvents like benzene.

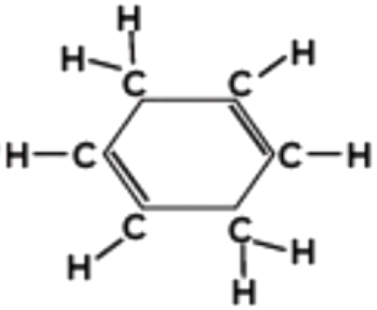
6. Carbon compounds:
(i) are good conductors of electricity.
(ii) are bad conductors of electricity.
(iii) have strong forces of attraction between their molecules.
(iv) have weak forces of attraction between their molecules.
The correct statements are:
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (ii) and (iv)
(d) (i) and (iii)

7. 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

8. Consider the structures of the three cyclic carbon compounds (I), (II) and (III) given below and select the correct option from the following:

(I) 

(II) 

(III) 

(a) (I) and (III) are isomers of hexane and (II) is benzene.
(b) (I) is an isomer of hexane, (II) is benzene and (III) is an isomer of hexene.
(c) (I) is a saturated cyclic hydrocarbon and (II) and (III) are unsaturated cyclic hydrocarbons.
(d) (I) is cyclohexane and (II) and (III) are the isomers of benzene.

9. Consider the following statements about homologous series of carbon compounds :
(A) All succeeding members differ by — CH_2 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) C_2H_2 and C_3H_4 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)

10. Compound X and Y both have formula C_4H_8O. X is an aldehyde and Y is an ether. Which statement is true?
(a) X shows addition reaction with H_2, Y shows substitution reaction with HCl.
(b) X shows oxidation to a carboxylic acid, Y does not get oxidised easily.
(c) X and Y will both react with Na metal to release H_2.
(d) Y gives effervescence with Na_2CO_3, X does not.

11. A hydrocarbon “H” decolourises bromine water and, on further treatment with H_2/Pt, gives a saturated hydrocarbon which upon chlorination gives multiple monochlorinated products. Which H is it?
(a) Ethene
(b) But-1-ene
(c) Propene
(d) But-2-ene

12. An organic compound "X" (C_2H_6O) reacts with sodium metal to produce hydrogen gas but does not react with sodium carbonate. What is compound X?
(a) Ethanol
(b) Ethanoic acid
(c) Methanoic acid
(d) Acetone

13. Which of the following observations helps distinguish ethanol from ethanoic acid?
(a) Only ethanol reacts with Na metal to produce H_2.
(b) Only ethanoic acid turns blue litmus red.
(c) Ethanol gives effervescence with Na_2CO_3 but ethanoic acid does not.
(d) Ethanoic acid is insoluble in water; ethanol is soluble.

14. A certain carbon compound gives a test with bromine water, and under suitable conditions, undergoes substitution reaction with Cl_2 in presence of UV light. Which compound could it be?
(a) Ethene
(b) Propane
(c) Ethane
(d) Butane

15. Why does soap form scum in hard water while detergents do not (or less)?
(a) Soap molecules are ionic and precipitate with Ca^{2+} / Mg^{2+} to form insoluble salts.
(b) Detergents are non-ionic and do not react with Ca^{2+} / Mg^{2+}.
(c) Soap molecules cannot emulsify grease in presence of Ca^{2+}.
(d) Detergents remove Ca^{2+} ions before cleaning.

16. Which one of these sequences is impossible under syllabus-permitted reactions?
(a) Alkene → (H_2 addition) → alkane → (chlorination) → alkyl halide
(b) Alcohol → (oxidation) → aldehyde → (oxidation again) → carboxylic acid
(c) Alkane → (addition of Br_2) → bromoalkane
(d) Aldehyde → (addition of H_2) → alcohol

17. Which of these pairs are both in the same homologous series and also show chain isomerism?
(a) Pentane and 2-methylbutane
(b) Ethene and ethanol
(c) Butanoic acid and methyl propanoate
(d) Ethan-2-ol and ethanoic acid

18. A student observed that soap lather was more easily formed with distilled water than with tap water. The reason is —
(a) Tap water contains dissolved salts of Ca^{2+} and Mg^{2+} which form scum with soap.
(b) Distilled water has stronger alkalinity.
(c) Tap water has dissolved oxygen that reduces lathering.
(d) Distilled water increases emulsifying power of soap.

19. Why is ethanol used as an additive in petrol ("gasohol")?
(a) It increases viscosity of petrol.
(b) It reduces knocking by improving combustion.
(c) It decreases energy output.
(d) It absorbs water from the engine.

(yaha Marks katate h)

Assertion and Reason type of Questions

In the following questions a statement of Assertion is followed by a statement of Reason.
Mark the correct choice as two statements are given one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

20. Assertion (A): Propanal and propanone are structural isomers.
Reason (R): Propanal and propanone both have the same molecular formula.

21. 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.

22. Assertion(A): Esterification is a process in which a sweet smelling substance is produced.
Reason (R): When esters react with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained.

23. Assertion(A): Carbon has a strong tendency to either lose or gain electrons to attain noble gas configuration.
Reason (R): Carbon has four electrons in its outermost shell and has the tendency to share electrons with carbon or other elements.

24. Assertion (A): Carbon forms covalent compounds by sharing its valence electrons with other atoms.
Reason (R): Carbon has 4 valence electrons and can easily lose or gain 4 electrons to complete its octet.

25. Assertion (A): Diamond is the hardest natural substance known.
Reason (R): Each carbon atom in diamond is covalently bonded to four other carbon atoms in a tetrahedral structure, forming a 3D rigid network.

(ho jaayenge aaram se)

SHORT ANSWER TYPE QUESTIONS
(2 and 3 Marks)

26. Why does carbon form covalent compounds? Why can't it form C^{4+} or C^{4-} ions?

27. Differentiate between ionic and covalent compounds on the basis of conductivity, solubility, and melting/boiling points.

28. Why are most carbon compounds poor conductors of electricity?

29. State reasons:
(a) Carbon shows catenation.
(b) Carbon forms a large number of compounds compared to other elements.

30. Write IUPAC names:
(a) $CH_3–CH_2–CH_2–CH_3$
(b) $CH_2=CH–CH_3$
(c) $CH_3–CH_2–OH$

31. (a) Name two cyclic hydrocarbons and draw the structure of any one.
(b) Explain the process of micelle formation on adding soap in water.

32. Distinguish between saturated and unsaturated hydrocarbons with a chemical test.

33. Write equations for:
(a) Combustion of ethanol.
(b) Oxidation of ethanol.

34. Why is ethanol used in spirit lamps? Why is it called a clean fuel?

35. Why does ethanoic acid turn blue litmus red? Give one chemical test for ethanoic acid.

36. Write the reaction for esterification and hydrolysis of esters.

37. Why are detergents more effective than soaps in hard water?

38. Differentiate between soap and detergent on the basis of (a) structure, (b) action in hard water.

39. Why is graphite a good conductor of electricity but diamond is not?

40. Write chemical equations to show:
(a) Addition of hydrogen to ethene.
(b) Substitution of hydrogen by chlorine in methane.

(pahle points socho firr likho)

LONG ANSWER TYPE QUESTIONS (5 Marks)

41. (i) Draw electron dot structure of chlorine molecule. (Atomic Number of Chlorine = 17)
(ii) What happens when chlorine reacts with methane in the presence of sunlight? Write the name of the reaction.
(iii) Name the two oxidising agents used for the conversion of alcohols to acids.
(iv) List four differences in properties between covalent compounds and ionic compounds.

42. (a) (i) Draw two isomeric structures of Butene (C_4H_8).
(ii) Name the following compounds: [Assumed compounds: CH_3COOH, C_2H_5OH].
(b) (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.

43. A saturated organic compound 'A' with two carbon atoms belongs to the homologous series of alcohols. On oxidation, it forms an organic acid 'B' with molecular mass 60 u. On heating 'A' with excess concentrated sulphuric acid at 443 K, an unsaturated hydrocarbon 'C' is formed.
(i) Name A, B, and C.
(ii) Calculate molecular mass of C.
(iii) What happens when a pinch of sodium carbonate is added to compound B? Write chemical equation for the reaction.
(iv) Draw electron dot structure of compound B.

44. (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.
(ii) Compare its pH nature with a mineral acid.
(iii) 'X' on reacting with alcohols produces sweet smelling compounds, used in making perfumes. Name the reaction and write its chemical equation.
(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.

45. 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'.

46. (a) Define the term "homologous series of carbon compounds". Write a homologous series of compounds having functional group -CHO.
(b) Design an experiment to distinguish between an alcohol and a carboxylic acid. Also write chemical equation for that case in which reaction occurs.

47. (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 cone, 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.

48. Write the chemical equation for the following:
(i) Combustion of methane
(ii) Oxidation of ethan
(iii) Hydrogenation of ethene
(iv) Esterification reaction
(v) Saponification reaction

(pahle points socho firr likho)

Case Study/Source Based Question

49. 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?
(b) List two properties by virtue of which carbon can form a large number of compounds.

(c) (i) Write the formula of the functional group present in (1) aldehydes, and (2) ketones. Write chemical equation for the reaction that occurs between ethanoic acid and ethanol in the presence of a catalyst.

OR

(c) (ii) What are structural isomers ? Write the structures of two isomers of butane (C_4H_{10}).

PK Special [KBC]

50. Ethanol is oxidised with acidified $KMnO_4$ to form compound A. A reacts with ethanol (in presence of conc. H_2SO_4) to form compound B (sweet smell). When B is hydrolysed with NaOH, compounds C and D are formed. Identify A, B, C, D and write all reactions.

51.Write equations for both complete and incomplete combustion of C_3H_6. What observations help you identify incomplete combustion?

52.You are given propanone, ethanol, and ethanoic acid. Suggest chemical tests to distinguish them (minimum two).

53.Explain why soap forms scum in hard water but detergents do not. Support with chemical equation.

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

55. Name the compound: $CH_3–CO–CH_2–CH_2OH$. Which functional group is given priority?

56. Ethanol can give both ethene and bromoethane. Which reagent/condition is required in each case? Write equations.

Kitne Questions kar paaye?

SOLUTIONS

SOLUTIONS

VERY SHORT ANSWER TYPE QUESTIONS:

1. (c)

2. (d)

3. (a)

4. (b)

5. (b)

6. (c)

7. (b)

8. (c)

9. (a)

10. (b)

11. (b)

12. (a)

13. (b)

14. (a)

15. (a)

16. (c)

17. (a)

18. (a)

19. (b)

SOLUTIONS

20. (a)

21. (a)

22. (c)

23. (b)

24. (b)

25. (a)

SHORT ANSWER TYPE QUESTIONS:

26. Carbon shares electrons to form covalent compounds because forming C^{4+} or C^{4-} ions is highly unstable and requires very high energy.

27. Ionic compounds conduct electricity in molten/aqueous state, soluble in water, and have high melting/boiling points; covalent compounds are poor conductors, mostly insoluble in water, and have low melting/boiling points.

28. Most carbon compounds are poor conductors of electricity as they do not have free ions or delocalized electrons.

29 (a). Carbon shows catenation due to strong C–C bonds.
(b). Carbon forms many compounds because of catenation, tetravalency, and ability to form multiple bonds with various elements.

30 (a). Butane
(b). Propene
(c). Ethanol

31 (a). Examples: Cyclohexane, Cyclopentane.
(b). Soap forms micelles where hydrophobic tails trap grease and hydrophilic heads remain in water.

32. Unsaturated hydrocarbons decolorize bromine water, while saturated hydrocarbons do not.

SOLUTIONS

33 (a). $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$
(b). $C_2H_5OH + [O] \rightarrow CH_3COOH + H_2O$

34. Ethanol is used in spirit lamps as it burns cleanly, producing only CO_2 and H_2O, hence called a clean fuel.

35. Ethanoic acid turns blue litmus red as it is acidic; it reacts with $NaHCO_3$ to produce CO_2 gas.

36. Esterification: $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$
Hydrolysis: $CH_3COOC_2H_5 + H_2O \rightarrow CH_3COOH + C_2H_5OH$

37. Detergents are more effective in hard water because they do not form insoluble salts with calcium and magnesium ions.

38 (a). Soaps are sodium/potassium salts of fatty acids; detergents are salts of sulfonic acids.
(b). Soaps form scum in hard water, detergents work well even in hard water.

39. Graphite conducts electricity due to delocalized electrons, but diamond does not as all electrons are tightly bonded.

40 (a). $CH_2=CH_2 + H_2 \rightarrow CH_3-CH_3$
(b). $CH_4 + Cl_2 \rightarrow$(sunlight) $CH_3Cl + HCl$

LONG ANSWER TYPE QUESTIONS:

41. (i) Cl_2

(ii) Reaction: Substitution; $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ (in sunlight).
(iii) Oxidising Agents: $KMnO_4$, $K_2Cr_2O_7$.

(iv) Differences: Covalent:
Low melting/boiling points; Ionic: High melting/boiling points.
Poor conductors; Ionic: Conduct in molten/aqueous state.
Soluble in organic solvents; Ionic: Soluble in water.
Molecular structure; Ionic: Lattice structure.

SOLUTIONS

Explanation:
Cl_2 forms a single covalent bond.
Substitution replaces H with Cl in methane.
$KMnO_4$ / $K_2Cr_2O_7$ oxidize alcohols to acids.
Covalent compounds lack ions, ionic compounds have strong electrostatic forces.

42. (a)(i) Two isomers of C_4H_8:
1-Butene: $CH_2=CH-CH_2-CH_3$
2-Butene: $CH_3-CH=CH-CH_3$ (exists as cis/trans stereoisomers)
(ii) CH_3COOH = Ethanoic acid (acetic acid); C_2H_5OH = Ethanol.
(b)(I) Combustion: $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$.
(II) Dehydration (443 K, conc. H_2SO_4): $C_2H_5OH \rightarrow CH_2=CH_2 + H_2O$.
(III) Oxidation (acidified $K_2Cr_2O_7$/$KMnO_4$): $C_2H_5OH + [O] \rightarrow CH_3COOH + H_2O$.

43. (i) A = Ethanol (C_2H_5OH); B = Ethanoic acid (CH_3COOH); C = Ethene (C_2H_4).
(ii) Molar mass of C (C_2H_4) = 2×12 + 4×1 = 28 u.
(iii) With sodium carbonate: $Na_2CO_3 + 2CH_3COOH \rightarrow 2CH_3COONa + H_2O + CO_2\uparrow$. ($CO_2$ effervescence)
(iv) Lewis/structural formula of B:
$CH_3-C(=O)-OH$
(Each O has two lone pairs; pictorially: $H_3C-C(=O):O-H$ with lone pairs on oxygens.)

44. (i) X = Ethanoic acid (acetic acid), structure: CH_3COOH.
(ii) pH/nature: X is a weak (organic) acid — less acidic (higher pH at same concentration) than mineral strong acids (e.g., HCl).
(iii) Esterification: $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$. (Reaction name: esterification; gives esters used in perfumes.)
(iv) With sodium carbonate: $Na_2CO_3 + 2CH_3COOH \rightarrow 2CH_3COONa + H_2O + CO_2\uparrow$.
Salt formed: sodium ethanoate (sodium acetate). CO_2 turns lime water milky.

45. 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'.

SOLUTIONS

46. (a) Homologous series: a family of compounds with same functional group, similar chemical properties and successive members differing by CH_2; aldehyde series: methanal (HCHO), ethanal (CH_3CHO), propanal (C_2H_5CHO), butanal (C_3H_7CHO), ... (general formula $C_nH_{2n}O$).
(b) Experiment to distinguish alcohol and carboxylic acid: add a pinch of sodium carbonate to samples; carboxylic acid effervesces (CO_2), alcohol shows no effervescence.
Equation: $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2\uparrow$.

47. (i) Example: Ethanol (commercially important), C_2H_5OH.
(ii) Reactions & products:
(1) $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2\uparrow$ (sodium ethoxide)
(2) $C_2H_5OH \rightarrow$ (excess conc. H_2SO_4, heat) $CH_2=CH_2 + H_2O$ (ethene)
(3) $C_2H_5OH + CH_3COOH \rightleftharpoons CH_3COOC_2H_5 + H_2O$ (ethyl ethanoate, ester)
(4) $C_2H_5OH + [O] \rightarrow CH_3COOH + H_2O$ (ethanoic acid, with acidified $K_2Cr_2O_7$).

48. (i) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$.
(ii) $C_2H_5OH + [O] \rightarrow CH_3COOH + H_2O$.
(iii) $CH_2=CH_2 + H_2 \rightarrow$ (Ni) CH_3CH_3.
(iv) $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$.
(v) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$.

CASE STUDY/SOURCE BASED QUESTION:

(a) Hydrocarbons are organic compounds made up of only carbon and hydrogen atoms (e.g., methane, ethane, benzene).

(b) Two properties of carbon responsible for forming a large number of compounds:
1. Catenation – ability of carbon to form long chains and rings with other carbon atoms.
2. Tetravalency – ability to form four covalent bonds with various atoms (H, O, N, Cl, S, etc.).

(c) (i) Functional groups:
Aldehydes: –CHO
Ketones: –CO– (carbonyl group in middle of chain)

SOLUTIONS

Equation (esterification):
$CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$
(in presence of conc. H_2SO_4 catalyst, ester formed is ethyl ethanoate).

OR

(c) (ii) Structural isomers: Compounds having same molecular formula but different structural arrangement of atoms.
Two isomers of butane (C_4H_{10}):
1. n-Butane: $CH_3–CH_2–CH_2–CH_3$
2. Iso-butane (2-methylpropane):
$CH_3–CH(CH_3)–CH_3$

PK Special :

50. A = Ethanoic acid (CH_3COOH)
- B = Ethyl ethanoate ($CH_3COOCH_2CH_3$)
- C = Sodium ethanoate (CH_3COONa)
- D = Ethanol (C_2H_5OH)

Reactions:
1. $CH_3CH_2OH + [O] \rightarrow CH_3COOH + H_2O$
2. $CH_3COOH + CH_3CH_2OH \rightleftharpoons CH_3COOCH_2CH_3 + H_2O$ (conc. H_2SO_4)
3. $CH_3COOCH_2CH_3 + NaOH \rightarrow CH_3COONa + CH_3CH_2OH$

51. Complete: $2\ C_3H_6 + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$
- Incomplete: $2\ C_3H_6 + 6\ O_2 \rightarrow 6\ CO + 6\ H_2O$
- or $C_3H_6 + O_2 \rightarrow 3\ C$ (soot) $+ 3\ H_2O$

Observation: Incomplete combustion → yellow, smoky flame + soot. Complete combustion → clean blue flame.

52. Ethanol: Iodoform test (yellow ppt).
- Propanone: Iodoform test (yellow ppt too) BUT not oxidised easily by mild $KMnO_4$.
- Ethanoic acid: Reacts with $NaHCO_3$ to give brisk effervescence of CO_2.

So:
1. Add $NaHCO_3$ → only ethanoic acid produces gas.
2. Add I_2/NaOH → ethanol and propanone positive (yellow ppt), acid negative.
3. Oxidation test: $KMnO_4$ oxidises ethanol but not propanone.

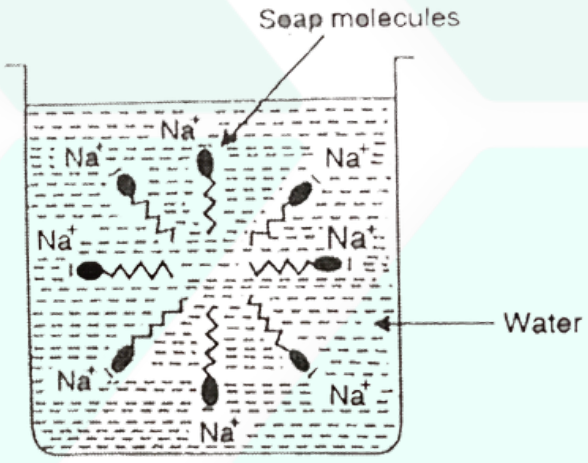
SOLUTIONS

53. Soap = sodium salt of fatty acid ($RCOO^- Na^+$).

- **In hard water:**
- **$2\ RCOO^- Na^+ + Ca^{2+} \rightarrow (RCOO)_2Ca \downarrow$ (insoluble scum).**
- **Detergent = sodium alkyl sulphonate ($R–SO_3^- Na^+$).**
- **With Ca^{2+}: salts remain soluble → no scum.**

Thus, soaps fail in hard water; detergents clean effectively.

54.The micelle formation takes place when soap is added to water because the hydrocarbon chains of soap molecules are hydrophobic (water repelling) which are insoluble in water but the ionic ends of the soap molecules are hydrophilic (water attracting) and hence soluble in water. In a soap micelle, the uncharged ends of the hydrocarbon chains are on the inside whereas the charged ionic ends are on the outside. A micelle will not be formed in other solvents such as ethanol because the hydrocarbon chains of soap molecules are soluble in organic solvents like ethanol.



Soap micelle

55. Functional groups: ketone (–CO–) and alcohol (–OH).
Ketone has higher priority.
So parent = butan-2-one, with hydroxy substituent at C4 → 4-hydroxybutan-2-one.

56. To ethene (dehydration):

- **$C_2H_5OH \rightarrow C_2H_4 + H_2O$ (conc. H_2SO_4, 443 K).**
- **To bromoethane (substitution):**
- **$C_2H_5OH + HBr \rightarrow C_2H_5Br + H_2O$.**