

10. ALCOHOLS

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Introduction

- Butan-2-ol is
 - 1° alcohol
 - 2° alcohol
 - 3° alcohol
 - 4° alcohol
- Pentan-3-ol is an example of
 - Aromatic alcohol
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
- A compound has the structure $(C_2H_5)_2CHCH_2OH$. Which of the following correctly describes its class and IUPAC name?
 - Primary alcohol; 2-ethylbutan-1-ol
 - Secondary alcohol; 2-ethylbutan-1-ol
 - Primary alcohol; 3-ethylbutan-1-ol
 - Secondary alcohol; 3-ethylbutan-1-ol
- What is the IUPAC name of tert-butyl alcohol?
 - Propan-2-ol
 - Butan-2-ol
 - 2-methylpropan-2-ol
 - 2-methylpropan-1-ol
- Alcohols are isomeric with
 - Carboxylic acids
 - Aldehydes
 - Ketones
 - Ethers
- The functional isomer of Methoxyethane is
 - Propane
 - Propanal
 - Propanol
 - Propanone
- Ethanol is an isomer of
 - Methoxymethane
 - Propanone
 - Methoxymethanoate
 - Methylmethanoate
- How do position isomers of alcohols differ from chain isomers?**
 - Position isomers have different functional groups
 - Position isomers have the -OH group on different carbons of the same main chain
 - Chain isomers have different molecular formulas
 - Position isomers differ in the length of the main carbon chain
- How many primary alcohols are possible for the molecular formula $C_4H_{10}O$?
 - 1
 - 2
 - 3
 - 4
- How many structurally isomeric secondary alcohols exist with the molecular formula $C_5H_{12}O$?
A 1 B 2 C 3 D 4
- The lowest number of carbon atoms in an alcohol to show the chain isomer is:
A) 2 B) 3 C) 4 D) 5

Victor-Meyer Test

- When Propan-1-ol is treated with P_4/I_2 , $AgNO_2$ and HNO_2 successively, it gives
 - Nitrolic acid
 - Pseudonitrol
 - Nitroalkane
 - 2° Nitroalkane
- During Victor Meyer's test, propan-2-ol is treated successively with red P/I_2 , alcoholic $AgNO_2$, and then nitrous acid followed by aqueous alkali. The final colour observed is:
A) Blood red B) Blue C) Colourless D) Green
- In Victor Meyer's test, Pseudonitrol is given by
 - Primary alcohol
 - Secondary Alcohol
 - Tertiary alcohol
 - Quaternary alcohol
- In Victor Meyer's test, nitrolic acid is given by
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - Quaternary alcohol
- In Victor Meyer's test, blood red colouration is given by
 - Primary alcohol
 - Secondary Alcohol
 - Tertiary alcohol
 - Quaternary alcohol
- Which gives a blue colour in Victor Meyer's test?
 - Propyl alcohol
 - Isopropyl alcohol
 - tert-Butyl alcohol
 - Ethyl alcohol
- Primary, secondary, and Tertiary alcohols can be distinguished by
 - Tollen's test
 - Iodoform test
 - Hoffmann's test
 - Victor Meyer's test
- Why does tertiary alcohol give a colourless solution in Victor Meyer's test, whereas primary alcohol gives a red colour?
 - Tertiary alcohols do not form nitroalkanes due to the absence of α -hydrogen
 - Tertiary alcohols form nitroalkanes that do not react with nitrous acid

- C) Tertiary alcohols are oxidised instead of undergoing nitration
D) Tertiary alcohols form pseudonitrols which are colourless

Preparation of Alcohols

Hydrolysis of Esters

20. The hydrolysis of ester to give alcohol and carboxylic acid is
a. esterification b. oxidation c. dehydration d. ester hydrolysis
21. The formation of alcohol and carboxylic acid from an ester is an example of
a. oxidation b. esterification c. ester hydrolysis d. none of the above
22. The ester $\text{CH}_3\text{CH}_2\text{CO}_2\text{CH}_3$ is hydrolysed by boiling with aqueous sodium hydroxide.
Which compound is one of the products?
A ethanol B propan-1-ol C sodium methanoate D sodium propanoate
23. Which compound produces butan-2-ol and ethanoic acid on hydrolysis?
A $\text{CH}_3\text{CO}_2\text{CH}(\text{CH}_3)_2$ B $\text{CH}_3\text{CO}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
C $\text{CH}_3\text{CH}(\text{CH}_3)\text{CO}_2\text{CH}_2\text{CH}_3$ D $\text{CH}_3\text{CH}_2\text{CO}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
24. Which reaction gives butanoic acid as one of its products?
A acid hydrolysis of butyl ethanoate B alkaline hydrolysis of butyl ethanoate
C acid hydrolysis of ethyl butanoate D alkaline hydrolysis of ethyl butanoate
25. The structural formula of an ester is $(\text{CH}_3)_2\text{CHOCO}(\text{CH}_2)_2\text{CH}_3$.
This ester is boiled with aqueous hydrochloric acid.
Which two products are formed?
A propan-1-ol and butanoic acid B propan-2-ol and butanoic acid
C propan-1-ol and propanoic acid D propan-2-ol and propanoic acid
26. Which reaction will form propanoic acid?
A acidic hydrolysis of propyl ethanoate B alkaline hydrolysis of ethyl propanoate
C acidic hydrolysis of Propanenitrile D acidic hydrolysis of ethanenitrile
27. The ester ethyl butanoate can be hydrolysed using an excess of dilute sodium hydroxide solution.
Which substance is a product of this reaction?

A	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{Na}$
B	$\text{CH}_3\text{CO}_2\text{Na}$
C	$\text{CH}_3\text{CH}_2\text{ONa}$
D	H_2O

28. The compound cetyl palmitate, $\text{C}_{15}\text{H}_{31}\text{CO}_2\text{C}_{16}\text{H}_{33}$, is a waxy solid.
Cetyl palmitate is heated under reflux with an excess of aqueous sodium hydroxide.
Which products will be formed?
A $\text{C}_{15}\text{H}_{31}\text{ONa}$ and $\text{C}_{16}\text{H}_{33}\text{CO}_2\text{Na}$ B $\text{C}_{15}\text{H}_{31}\text{CO}_2\text{Na}$ and $\text{C}_{16}\text{H}_{33}\text{ONa}$
C $\text{C}_{15}\text{H}_{31}\text{OH}$ and $\text{C}_{16}\text{H}_{33}\text{CO}_2\text{Na}$ D $\text{C}_{15}\text{H}_{31}\text{CO}_2\text{Na}$ and $\text{C}_{16}\text{H}_{33}\text{OH}$
29. Alkaline hydrolysis of esters is called
a. alkylation b. acylation c. saponification d. reduction

Fermentation

30. The enzyme that converts sucrose to glucose and fructose is
a. Diastase b. Invertase c. Maltase d. Zymase
31. The enzyme that converts glucose into alcohol is
a. Zymase b. Invertase c. Maltase d. Diastase
32. The enzyme used during the production of alcohol from carbohydrates by fermentation is
a. Insertase b. starch c. molasses d. zymase
33. Starch can be converted into ethanol through a series of enzymatic steps. Which is the correct sequence of enzymes involved?
A) Zymase $\rightarrow$ Diastase $\rightarrow$ Maltase B) Diastase $\rightarrow$ Maltase $\rightarrow$ Zymase
C) Maltase $\rightarrow$ Diastase $\rightarrow$ Zymase D) Invertase $\rightarrow$ Diastase $\rightarrow$ Zymase

34. Amines can be changed into alcohols by
 a. Acidified KMnO_4 b. HNO_2 c. HNO_3 d. aq. KOH
35. Action of nitrous acid on methylamine gives
 a. CH_4 b. CH_3OH c. NH_3 d. CH_3NO_2
36. Primary amines react with ice-cold nitrous acid ($\text{NaNO}_2 + \text{HCl}$) to yield:
 A) Aldehydes B) Primary alcohols C) Esters D) Ethers
37. Hydroboration-oxidation of ethene yields which final organic product?
 A) Ethanol B) Ethanal C) Ethane-1,2-diol D) Diethyl ether
38. Propene on hydroboration-oxidation gives
 a. primary alcohol b. propan-2-ol c. propan-1-ol d. propanone
39. How many molecules of alkene are converted into alcohol by one molecule of diborane in hydroboration-oxidation?
 a) 1 b) 3 c) 2 d) 6
40. In hydroboration-oxidation, alkenes are treated with diborane followed by:
 A) Acidic KMnO_4 B) Alkaline H_2O_2 C) Conc. H_2SO_4 D) Aqueous HCl
41. Which of the following cannot be prepared by the Oxo process?
 a. Ethyl alcohol c. n-propyl alcohol
 b. n-butyl alcohol d. both c and b
42. Ethene reacts with water gas ($\text{CO} + \text{H}_2$) in the presence of dicobalt octacarbonyl at high temperature and pressure, followed by heating with Ni/H_2 , to give:
 a) propan-1-ol b) propan-2-ol c) ethanol d) butan-1-ol

Alcoholic Beverages

43. Another name for grain alcohol is
 a. Wood alcohol b. methyl alcohol c. ethyl alcohol d. propyl alcohol
44. Drinking of which alcohol may cause blindness
 a. Wood spirit b. ethanol c. absolute alcohol d. rectified spirit
45. 95% ethyl alcohol is
 a. Absolute alcohol c. methylated spirit b. Power alcohol d. rectified spirit
46. Ethanol containing some methanol is
 a. Rectified spirit c. denatured alcohol
 b. Absolute alcohol d. power alcohol
47. Proof spirit contains about:
 a) 40% alcohol by weight b) 57.1% alcohol by weight c) 67.1% alcohol by weight d) 95.6% alcohol by weight
48. A bottle labelled "rectified spirit" contains 95% ethanol and 5% water. If this is further treated to remove all traces of water, what is the resulting product called?
 A) Denatured alcohol B) Absolute alcohol C) Power alcohol D) Methylated spirit
49. **Which statement accurately compares Rectified Spirit and Denatured Alcohol?**
 A) Rectified spirit is 100% pure ethanol; denatured alcohol contains 5% water
 B) Rectified spirit contains 95% ethanol and 5% water; denatured alcohol is ethanol mixed with toxic agents like methanol
 C) Both are suitable for human consumption
 D) Rectified spirit is produced by the Oxo process; denatured alcohol by fermentation

Physical Properties of Alcohols

50. Ethanol and Methanol are soluble in water due to
 a. Van der Waal's forces c. Hydrogen bond
 b. Covalent bond d. Electrovalent forces
51. Which of the following is highly soluble in water?
 a. Ethane b. Ethyl iodide c. Diethyl ether d. Ethanol
52. Which of the following is highly soluble in water?
 a) ether b) ethyl alcohol c) ethane d) ethyl iodide

53. Alcohols boil at a higher temperature than corresponding alkanes due to
 a. Intermolecular hydrogen bonding c. Intramolecular hydrogen bonding
 b. Van der Waals' force of attraction d. Dipole Dipole interaction
54. Which of the following has the highest boiling point?
 a. Propan-1-ol b. Butane c. Chloropropane d. Methoxyethane
55. Which has the highest boiling point?
 a) propan-1-ol b) propane c) chloropropane d) diethyl ether
56. The compound with the highest boiling point is
 a. CH_3CH_3 b. CH_3Cl c. CH_3Br d. CH_3OH
57. What is the correct order for the boiling points of isomeric alcohols?
 a. $1^\circ > 2^\circ > 3^\circ$ c. $3^\circ > 2^\circ > 1^\circ$ b. $2^\circ > 3^\circ > 1^\circ$ d. $3^\circ > 1^\circ > 2^\circ$
58. Which of the following has the lowest solubility in water?
 a) MeOH b) $\text{C}_2\text{H}_5\text{OH}$ c) $(\text{CH}_3)_2\text{CHOH}$ d) $(\text{CH}_3)_3\text{COH}$
59. Alcohols boil at a higher temperature than the corresponding hydrocarbon due to
 a. intermolecular H-bonding b. intramolecular H-bonding
 c. van der Waals' forces of attraction d. dipole-dipole interaction
60. Why are the boiling points of alcohols higher than those of corresponding alkanes of similar molecular mass?
 A) Alcohols have stronger van der Waals forces B) Alcohols form intramolecular hydrogen bonds
 C) Alcohols form intermolecular hydrogen bonds D) Alcohols have higher molecular masses
61. How does the solubility of monohydric alcohols in water change as their molecular mass increases?
 A) Increases because polarity increases
 B) Decreases due to the growing size of the hydrophobic alkyl group
 C) Remains completely unchanged
 D) Increases because hydrogen bonding becomes stronger
62. Ethanol has a significantly higher boiling point than methoxyethane (CH_3OCH_3), even though both have the same molecular formula ($\text{C}_2\text{H}_6\text{O}$). What is the primary reason?
 A) Ethanol has a larger molecular mass B) Ethanol forms intermolecular hydrogen bonds
 C) Ethanol has weaker van der Waals forces D) Methoxyethane has a more branched structure
63. A student observes that ethanol is miscible with water in all proportions, whereas hexan-1-ol is only sparingly soluble. What explains this difference?
 A) Ethanol has a smaller alkyl group, so the hydrophobic part is less significant
 B) Hexan-1-ol cannot form hydrogen bonds with water
 C) Ethanol is more acidic than hexan-1-ol
 D) Hexan-1-ol has a higher molecular mass

Chemical Properties

Action of reactive metals

64. Alcohols react with active metals like sodium to liberate which gas?
 A) Oxygen B) Carbon dioxide C) Hydrogen D) Nitrogen
65. The sodium metal cannot be stored under
 a. Water b. ammonia c. alcohol d. all of them
66. Alcohol reacts with sodium metal, giving sodium alkoxide and hydrogen; this indicates
 a. Acidic nature of alcohol c. basic nature of alcohol
 b. Neutral nature of alcohol d. amphoteric nature of alcohol
67. When a small piece of sodium is added to ethanol, bubbles of gas are observed. What is the gas produced and what does this reaction indicate about the nature of ethanol?
 A) O_2 gas; ethanol is basic B) H_2 gas; ethanol is acidic
 C) CO_2 gas; ethanol undergoes oxidation D) H_2 gas; ethanol is neutral
68. Ethanol shows acidic character in the reaction with
 a. HCl b. CH_3COOH c. Na d. $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$
69. $2 \text{R-OH} + 2 \text{Na} \rightarrow 2 \text{RONa} + \text{H}_2$; is an example of
 a. Acidic nature of alcohol c. Electrophilic substitution reaction

- b. Basic nature of alcohol d. Nucleophilic substitution reaction
70. $\text{ROH} + \text{Na} \rightarrow \text{RONa} + \text{H}_2$
This reaction indicates:
a) acidic nature of alcohol b) basic nature of alcohol
c) neutral nature of alcohol d) amphoteric nature of alcohol
71. 1 mole of sodium reacts with excess alcohol to give
a. 1 mole of O_2 b. $1/2$ mole of H_2 c. 1 mole of H_2 d. 2 mole of H_2
72. Alcohol reacts with sodium metal, giving sodium alkoxide and hydrogen gas. It indicates
a. Acidic nature of alcohol c. Basic nature of alcohol
b. Neutral nature of alcohol d. Amphoteric nature of alcohol
73. An organic liquid X reacts with sodium metal to evolve H_2 gas and yields a blue colour in the Victor Meyer test. Liquid X is:
A) Propan-1-ol B) Propan-2-ol C) 2-Methylpropan-2-ol D) Ethanol

Esterification

74. The reaction of alcohol with carboxylic acid is
a. Hydrogenation b. Hydrolysis c. Esterification d. Etherification
75. $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{conc. H}_2\text{SO}_4} \text{X} + \text{H}_2\text{O}$
What is X?
a. Ester b. ether c. alcohol d. acid
76. An organic compound gives a pleasant fruity smell when warmed with ethanoic acid and a few drops of conc. H_2SO_4 . The compound belongs to which class?
A) Alkane B) Alcohol C) Ether D) Aldehyde

Dehydration

77. Alcohol vapours can be dehydrated by passing over heated
a. Al_2O_3 b. CaO c. CaCl_2 d. Ca(OH)_2
78. Which of the following is used as a dehydrating agent for alcohols?
a) H_2SO_4 b) Al_2O_3 c) P_2O_5 d) All of these
79. The reagent used for the dehydration of an alcohol is
a) phosphorus pentachloride b) calcium chloride c) aluminium oxide d) sodium chloride
80. When vapours of ethanol are passed over heated alumina at 523 K, it gives
a. Ethoxyethane c. ethanal c. ethene d. ethyl hydrogen sulphate
81. Alcohol vapour can be dehydrated by passing it over a heated reagent. What reagent is it?
a. Al_2O_3 b. CaO c. CaCl_2 d. Ca(OH)_2
82. Dehydration of ethanol ($\text{C}_2\text{H}_5\text{OH}$) at 170°C forms:
a. Ethene b. Acetaldehyde c. Nitric acid d. Phenol
83. Which of the following is an example of an elimination reaction?
a. Chlorination of CH_4 c. Dehydration of $\text{C}_2\text{H}_5\text{OH}$ c. Nitration of benzene d. Hydroxylation of C_2H_4
84. When Ethanol is heated with concentrated H_2SO_4 at temperature 160°C to 170°C , it gives
a. Ethoxyethane c. Ethene b. Ethyl hydrogensulphate d. Ethyne
85. Dehydration of alcohols to ethers is catalysed by
a. conc. H_2SO_4 at 413 K b. hot and conc. NaOH c. HBr d. HNO_3
86. Vapours of ethanol are passed over heated alumina (Al_2O_3) at 523 K (250°C). What is the major product?
A) Ethene B) Diethyl ether C) Ethanal D) Ethanoic acid
87. **Passing alcohol vapour over heated alumina (Al_2O_3) at temperatures above 300°C causes:**
A) Intermolecular dehydration to form an ether
B) Intramolecular dehydration to form an alkene
C) Direct oxidation to a carboxylic acid
D) Catalytic dehydrogenation to an aldehyde

Oxidation

88. Conversion of Ethanol into Ethanal using acidified KMnO_4 is an example of
a. Reduction b. Oxidation c. Hydrolysis d. Rearrangement
89. Tertiary alcohol in 1st oxidation gives
a. Alkene b. Carboxylic acids c. Ketone d. Aldehyde
90. The first oxidation product of primary alcohols is
a. Acid b. aldehyde c. ether d. ketone
91. Which compound produces a ketone when refluxed with an acidified solution of potassium dichromate(VI)?
A pentan-1-ol B 2-methylbutan-1-ol C 2-methylbutan-2-ol D 3-methylbutan-2-ol
92. During the oxidation of primary alcohols to aldehydes and then carboxylic acids, what happens to the number of carbon atoms?
A) It decreases by one B) It increases by one C) It remains unchanged D) It doubles
93. Compound X ($\text{C}_3\text{H}_8\text{O}$) reacts with PI_3 , then alc. AgNO_2 , then NaNO_2/HCl , and finally NaOH to form a blue solution. X on oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ gives Y ($\text{C}_3\text{H}_6\text{O}$). Identify X and Y.
A) X = Propan-1-ol, Y = Propanal B) X = Propan-2-ol, Y = Propanone
C) X = Propan-1-ol, Y = Propanoic acid D) X = 2-Methylpropan-2-ol, Y = Propanone

Dehydrogenation

94. Alcohol vapours can be dehydrogenated by passing over
a. conc. H_2SO_4 b. Heated Al_2O_3 c. Heated Cu d. Anhydrous CaCl_2
95. When vapours of Ethyl alcohol are passed over red-hot copper, the product formed is
Ethanoic acid b. Ethylene c. Ethyne d. Ethanal
96. Compound 'A' ($\text{C}_4\text{H}_{10}\text{O}$) produces a red color in the Victor Meyer test and yields Butanal when passed over Cu at 300°C . Identify compound 'A'.
A) Butan-2-ol B) 2-Methylpropan-2-ol C) Butan-1-ol D) 2-Methylpropan-1-ol

Tests of Alcohols

97. Which structural unit must an alcohol possess to give a positive Iodoform test?
A) A tertiary carbon atom B) The $\text{CH}_3\text{CH}(\text{OH})$ - grouping
C) A carbon-carbon double bond D) At least 4 carbon atoms
98. In the laboratory, Ethanol can be distinguished from Methanol by
a. Reaction with HCl c. Reaction with NH_3 b. Solubility in water d. Iodoform test
99. Which of the following compounds gives the iodoform test?
a. CH_3OH c. $\text{CH}_3\text{CH}_2\text{OH}$ c. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ d. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
100. $\text{C}_2\text{H}_5\text{OH}$ can be differentiated from CH_3OH by
a. reaction with HCl b. reaction with NH_3 c. by iodoform test d. by solubility in water
101. Which one of the following is a laboratory test of alcohol?
a. Iodoform test c. Victor Meyer test b. Esterification test d. Oxidation test
102. Which of the following compounds gives a positive iodoform test?
a. benzyl alcohol b. propan-2-ol c. 2-Phenylethanol d. pentan-3-ol
103. Iodoform can be prepared from all except
a. Isopropyl alcohol b. 3-methyl-2-butanone c. Isobutyl alcohol d. Ethylmethyl ketone
104. A compound X gives a yellow crystalline precipitate when treated with I_2 and aqueous NaOH . Which of the following could be compound X?
A) Methanol B) Propan-1-ol C) Propan-2-ol D) 2-methylpropan-1-ol

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