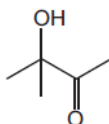


13.1 ALIPHATIC ALDEHYDES AND KETONES- MCQs

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Introduction

- Which of the following is commonly used as a nail polish remover?
A) formalin B) acetone C) ammonia D) formose
- The common name of $\text{CH}_3\text{CH}_2\text{COCH}_3$ is:
A) Dimethyl ketone B) Ethyl methyl ketone C) Diethyl ketone D) Propyl methyl ketone
- IUPAC name of $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$ is:
a. pentan-2-one b. propyl methyl ketone c. 4-pentanone d. ethyl acetate
- Which pair represents **chain isomers**?
A) Pentan-2-one and pentan-3-one B) Butanal and butan-2-one
C) Butanal and 2-methylpropanal D) Propanal and propanone
- Which pair represents **position isomers**?
A) Butanal and 2-methylpropanal B) Pentan-2-one and pentan-3-one
C) Propanal and propanone D) Ethanal and propanal
- Aldehydes and ketones are
a. functional isomers b. conformational isomers c. tautomers d. positional isomers
- Which statement about aldehydes is correct?
A) Aldehydes show position isomerism due to movement of the $-\text{CHO}$ group.
B) Aldehydes generally do not show position isomerism because the $-\text{CHO}$ group is at the end of the chain.
C) Aldehydes cannot show chain isomerism.
D) Aldehydes cannot show functional isomerism.
- Acetone contains
a. 8 σ & 2 π bonds b. 10 σ & 1 π bonds c. 9 σ & π bonds d. 10 σ bonds only
- Hybridisation of the carbon atom of the carbonyl group is
a. sp b. sp^2 c. sp^3 d. sp^1
- The following compound X contains both an alcohol group and a carbonyl group.



Which row correctly identifies them?

	type of alcohol group	type of carbonyl group
A	Primary	aldehyde
B	Primary	aldehyde
C	Tertiary	ketone
D	Tertiary	ketone

- IUPAC name of acetaldehyde is
(a) methanal (b) propanal (c) ethanal (d) butanal

General Methods of Preparation of Aldehydes & Ketones

1. From alcohols

- Acetone can be obtained by the oxidation of
a. ethanol c. n-propyl alcohol b. iso-propyl alcohol d. Iso-butyl alcohol
- Acetaldehyde undergoes oxidation with acidified $\text{K}_2\text{Cr}_2\text{O}_7$ to form
a. ethanoic acid c. propanone b. ethanone d. ethanal

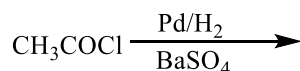
14. Which of the following compounds, on oxidation, gives ethyl methyl ketone?
 a. propan-2-ol c. butan-1-ol b. 2-methylpropan-2-ol d. butan-2-ol
15. When propan-2-ol is heated with Cu at 300 °C, it gives
 a. acetone c. acetaldehyde b. propene d. propyne
16. During oxidation of a primary alcohol to an aldehyde, the aldehyde is distilled off immediately mainly to:
 A) Increase its boiling point
 B) Prevent its further oxidation to a carboxylic acid
 C) Convert it into a ketone
 D) Reduce the alcohol

2. From alkenes (by **ozonolysis**)

17. Which of the following olefins gives 2 molecules of formaldehyde on ozonolysis?
 a. $\text{CH}_2=\text{CH}_2$ b. $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$ c. $\text{CH}_2=\text{CH}-\text{CH}_3$ d. $\text{CH}_3-\text{CH}_2=\text{CH}-\text{CH}_3$
18. Which of the following is obtained by ozonolysis of but-2-ene?
 a. formaldehyde c. acetaldehyde b. acetone d. acetic acid
19. Which alkene is expected to produce only ketones on reductive ozonolysis?
 A) $\text{CH}_2=\text{CH}_2$ B) $\text{CH}_3\text{CH}=\text{CH}_2$ C) $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$ D) $\text{CH}_3\text{CH}=\text{CHCH}_3$
20. An alkene with molecular formula C_7H_{14} , on ozonolysis, gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is
 a. propanone b. butan-2-one c. pentan-2-one d. pentan-3-one
21. Ozonolysis of an alkene gives only aldehydes when the carbon atoms of the double bond:
 A) Both have two alkyl groups B) Both have one hydrogen atom attached
 C) One has two alkyl groups D) Neither has hydrogen

3. From acid chlorides (**Rosenmund's reduction**)

22. In the following reaction, the product formed is:



- a. acetaldehyde b. acetone c. carboxylic acid d. acetic anhydride
23. The catalyst in Rosenmund's reduction is
 a. Pd-BaSO₄ c. Pd- BaCl₂ b. Pd-CuSO₄ d. Pd- CaSO₄
24. The reduction of -COCl group to -CHO is carried out by which of the following reagents?
 a. H_2/Ni b. LiAlH_4 c. $\text{H}_2/\text{Pd-BaSO}_4$ d. H_2/Pd
25. $\text{R-COCl} + \text{H}_2 (\text{Pd/BaSO}_4) \rightarrow \text{R-CHO} + \text{HCl}$ is:
 a) Cannizzaro reaction b) Clemmensen reduction c) Friedel-Crafts acylation d) Rosenmund reduction
26. An aldehyde is prepared from an acid chloride by:
 a) Rosenmund reaction b) Cannizzaro reaction c) Benzoin condensation d) Perkin's condensation

4. From alkynes (by hydration)

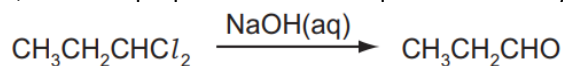
27. Ethyne, when heated with dil. H_2SO_4 and HgSO_4 , the major product is
 a. ethanol c. propanone e. ethanal b. ethenol d. methanol f. ethanone
28. Acetylene, when heated with dil. H_2SO_4 in the presence of Hg^{++} gives
 b. CH_3COCH_3 c. CH_3CHO d. CH_4
29. The hydration of an alkyne in the presence of HgSO_4 and dilute H_2SO_4 follows:
 A) Anti-Markovnikov addition B) Markovnikov addition
 C) Free-radical substitution D) Electrophilic substitution

5. From gem-dihaloalkanes

30. Gem-dihalides on hydrolysis give

- a. aldehyde b. ketone c. aldehyde or ketone d. carboxylic acid

31. 1,1-dichloropropane reacts with aqueous sodium hydroxide in a series of steps to give propanal.



Which term describes the first step of this reaction?

- A addition B elimination C oxidation D substitution

32. Hydrolysis of CH_3CHCl_2 gives

- a. CH_3CHO b. CHCl_3 c. CH_3COOH d. $\text{CH}_3\text{CH}_2\text{OH}$

33. Aldehydes and ketones have higher boiling points than hydrocarbons of comparable molecular mass mainly because of:

- A) Ionic bonding B) Hydrogen bonding between their molecules
C) Dipole–dipole interactions D) Metallic bonding

34. The boiling points of aldehydes and ketones generally increase with increasing molecular mass because:

- A) The number of hydrogen bonds increases
B) Intermolecular attractions generally become stronger
C) Their ionic character increases
D) Their carbonyl groups disappear

35. Which statement correctly explains the decrease in water solubility of aldehydes and ketones with increasing molecular size?

- A) The carbonyl group becomes non-polar.
B) The hydrocarbon portion becomes relatively larger and more hydrophobic.
C) The oxygen atom is removed.
D) The compounds become ionic.

36. The compound having the least solubility in water is

- b. ethanal b. propanal c. methanal d. acetophenone

Chemical Properties of Aldehydes and Ketones

Nucleophilic addition reactions

37. The carbonyl group is polar mainly because:

- A) Carbon is more electronegative than oxygen.
B) Oxygen is more electronegative than carbon.
C) Carbon and oxygen have identical electronegativities.
D) The carbonyl group contains an ionic bond.

38. In a carbonyl group, the carbon atom carries:

- A) δ^- charge B) δ^+ charge
C) A complete negative charge D) No charge because $\text{C}=\text{O}$ is non-polar

39. The nucleophilic character of the carbonyl addition reaction is mainly due to:

- A) δ^- carbonyl carbon B) δ^+ carbonyl carbon
C) Non-polar $\text{C}=\text{O}$ bond D) sp^3 hybridisation of carbonyl carbon

40. A carbonyl compound is treated with HCN , and the product is hydrolysed. The final product is

- a. A β -hydroxy ketone c. A β -hydroxy aldehyde
b. A β -hydroxy carboxylic acid d. An α -hydroxy carboxylic acid

41. Which reaction takes place by a nucleophilic addition mechanism?

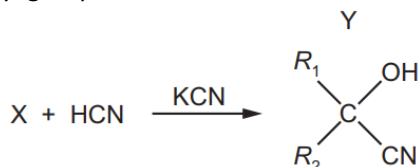
- A propene reacting with hydrogen bromide
B 2-bromopropane reacting with sodium hydroxide in ethanol
C propanone reacting with hydrogen cyanide
D methane reacting with chlorine

42. Ethanal, CH_3CHO , undergoes an addition reaction with HCN in the presence of CN^- ions.

Which row identifies the type of reaction and the name of the product formed?

	type of reaction	name of product
A	electrophilic addition	2-hydroxypropanenitrile
B	electrophilic addition	2-hydroxyethanenitrile
C	nucleophilic addition	2-hydroxypropanenitrile
D	nucleophilic addition	2-hydroxyethanenitrile

43. The diagram shows the formation of compound Y from compound X in a chemical reaction. R_1 and R_2 are alkyl groups.



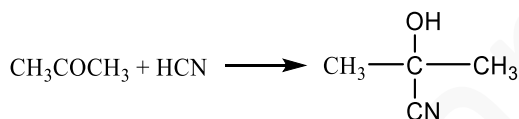
Which row about this reaction is correct?

	mechanism	compound X
A	electrophilic addition	aldehyde
B	electrophilic addition	ketone
C	nucleophilic addition	ketone
D	nucleophilic addition	aldehyde

44. Formation of cyanohydrin from acetone is an example of

- a. Nucleophilic substitution
- b. Nucleophilic addition
- c. Electrophilic substitution
- d. Electrophilic addition

45. Consider the following reaction



What type of mechanism is involved?

- a. Electrophilic addition
- b. Nucleophilic addition
- c. Electrophilic substitution
- d. nucleophilic substitution

46. An aldehyde undergoes reaction with hydrocyanide to yield an addition compound P, which finally, on hydrolysis, yields an acid Q.

- a. P = Propionaldehyde cyanohydrin; Q = 2-hydroxypentanoic acid
- b. P = Acetaldehyde cyanohydrin; Q = 2-hydroxyethanoic acid
- c. P = Acetone cyanohydrin; Q = 2-hydroxybutanoic acid
- d. P = Acetaldehyde cyanohydrin; Q = 2-hydroxypropanoic acid

47. The reaction of an aldehyde or ketone with NaHSO_3 is best classified as:

- A) Nucleophilic addition
- B) Electrophilic addition
- C) Nucleophilic substitution
- D) Oxidation

Nucleophilic addition followed by elimination (Addition of ammonia derivatives)

48. The product formed when propanone reacts with hydroxylamine is:

- A) Propanone oxime
- B) Propanone hydrazone
- C) Propanone semicarbazone
- D) Propanone phenylhydrazone

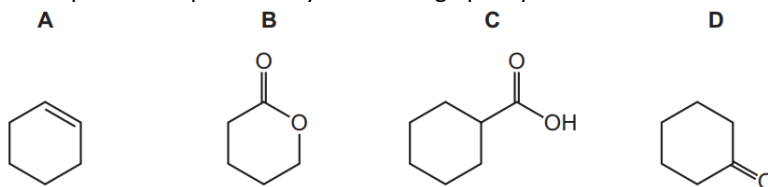
49. Which reagent gives an oxime with an aldehyde or ketone?

- A) NH_2OH
- B) NH_2NH_2
- C) $\text{NH}_2\text{NHCONH}_2$
- D) $\text{C}_6\text{H}_5\text{NH}_2$

50. The product formed when ethanal reacts with hydrazine is:

- A) Ethanal oxime
- B) Ethanal hydrazone
- C) Ethanal semicarbazone
- D) Ethanal phenylhydrazone

51. An aldehyde reacts with phenylhydrazine to form:
 A) Oxime B) Hydrazone C) Phenylhydrazone D) Semicarbazone
52. Acetaldehyde gives an orange ppt. with
 a. NH_2OH b. NaOH c. NaHSO_3 d. 2,4-DNP
53. $\text{Acetone} + \text{NH}_4\text{OH} \rightarrow \text{X} (+ \text{LiAlH}_4) \rightarrow \text{Y}$
 In this reaction, the compound Y is
 a. Tertiary amine b. secondary amine c. Primary amine d. an alcohol
54. Which compound will produce a yellow-orange precipitate when added to 2,4-dinitrophenylhydrazine?



Reduction properties of aldehydes (Oxidation of aldehydes)

1) Oxidation with Tollens' reagent

55. Tollens' reagent is
 a. Alkaline CuSO_4 b. Ammoniacal cuprous chloride c. Ammoniacal silver nitrate d. Alkaline KMnO_4
56. Which of the following organic compounds gives a positive test with Tollens' reagent?
 a. RCHO b. RCOR c. RCOOH d. ROR
57. Which of the following responds to Tollens' test?
 a. CH_3COCH_3 b. CH_3CHO c. CH_3OCH_3 d. $\text{CH}_3\text{CH}_2\text{OH}$
58. An aldehyde may be distinguished from a ketone by the use of
 a. Tollens' reagent c. 2,4-dinitrophenylhydrazine
 b. Baeyer's reagent d. Liebermann's test
59. Which compound reacts with 2,4-dinitrophenylhydrazine reagent but does **not** react with Tollens' reagent?
A $\text{CH}_3\text{COCO}_2\text{H}$ **B** $\text{CH}_3\text{CH}(\text{OH})\text{CHO}$ **C** CH_3COCHO **D** $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$

2. Oxidation with Fehling's solution

60. A carbonyl compound has the structural formula CH_3COCHO .

Which row is correct for the observations made when this compound is treated with the given reagents?

	2,4-DNPH reagent	Fehling's reagent
A	silver mirror	red precipitate
B	silver mirror	orange precipitate
C	orange precipitate	silver mirror
D	orange precipitate	red precipitate

61. A carbonyl compound, X, reacts with HCN in the presence of NaCN to make a compound with Mr 85.

Compound X does not react with Fehling's reagent.

What is compound X?

- A butanal B butanone C propanal D Propanone
62. Which reagent:
 • can confirm the presence of a carbonyl group in an organic compound
 • does **not** distinguish between aldehydes and ketones?
A acidified $\text{K}_2\text{Cr}_2\text{O}_7$ **B** 2,4-DNPH reagent **C** Fehling's reagent **D** LiAlH_4
63. Aldehydes can be distinguished from ketones by
 (a) Fehling's solution (b) conc. H_2SO_4 (c) Grignard's reagent (d) pyrogallol

Iodoform test

64. Which of the following compounds gives the iodoform test?
a. propanone b. propanal c. butanal d. butanol
65. Methyl ketones are characterised by:
a) Benedict's test b) Schiff's test c) Iodoform test d) Tollens' test
66. Which compound gives both:
• an orange precipitate with 2,4-DNPH reagent
• and a yellow precipitate with alkaline $I_2(aq)$?
A ethanol B methanal C propanal D propanone
67. Which compound produces a precipitate with 2,4-dinitrophenylhydrazine reagent **and** also with alkaline aqueous iodine?
A butan-2-ol **B** butanal **C** butanone **D** pentan-3-one
68. Which of the following compounds gives a positive Tollens' test as well as the iodoform test?
a. propanone b. ethanol c. ethanal d. methanal
69. Which of the following does not give the iodoform test?
a. ethanol b. ethanal c. acetophenone d. benzophenone
70. Which of the following is true about carbonyl compounds?
A. They give a positive iodoform test.
B. They give a positive Claisen condensation test.
C. They give a negative iodoform test.
D. They give a positive DNP test.
71. What could be W, X, Y and Z in the following reaction sequence?
• W gives a positive test with 2,4-DNP
• X gives Tollens' test
• Y gives Fehling's test
• Z is a carboxylic acid
A. W- alcoholic compounds, X- ketone, Y- aliphatic aldehyde and Z can be ethanoic acid
B. W- carbonyl compounds, X- aldehyde, Y-aliphatic aldehyde, and Z can be ethanoic acid
C. W-carboxylic acid, X- aldehyde, Y-aliphatic aldehyde and Z can be benzoic acid
D. W- alcohol, X- ketone, Y-aliphatic aldehyde and Z can be benzoic acid

Reduction of Aldehydes and Ketones

72. An organic compound (P) undergoes reduction with $LiAlH_4$ to product (Q). When (Q) is heated with copper at $300^\circ C$, (P) is again produced. The compound (P) is
a. CH_3CHO b. CH_3COCH_3 c. CH_3CH_2OH d. CH_3OCH_3
73. Reduction of propanal with H_2/Ni gives:
A) propan-1-ol B) propan-2-ol C) propane D) propanoic acid
74. Reduction of butanone with $LiAlH_4$ gives:
A) butan-1-ol B) butan-2-ol C) butanal D) butane

1. Clemmensen's reduction

75. Which of the following reduces carbonyl compounds to hydrocarbons?
a. Birch reduction c. Clemmensen's reduction
b. Meerwein pondorf verley reduction d. Perkin's condensation
76. Acetone, when reacted with conc. HCl & $Zn-Hg$ gives
a. CH_3CH_3 b. $CH_3CH_2CH_3$ c. CH_3COOH d. $CH_3CHOHCH_3$
77. $A \xrightarrow{aq. NaOH} B \xrightarrow{K_2Cr_2O_7/H^+} C$
The compound (C) undergoes Clemmensen's reduction to give propane. The compound (A) is:
a. Propan-1-ol c. Propan-2-ol b. 2-halopropane d. Propanoic acid

2. Wolff - Kishner reduction

78. Which of the following is used to convert the $>\text{C}=\text{O}$ group to $-\text{CH}_2-$?
- a. $\text{Ni}/\text{H}_2/\Delta$ b. LiAlH_4/Δ c. $\text{Zn-Hg}/\text{HCl}/\Delta$ d. $\text{Pd}/\text{H}_2/\Delta$
79. Reduction of an aldehyde gives
- a. An acid b. an alcohol c. an ester d. an alkyne
80. In a reaction, RCHO is reduced to $\text{R}-\text{CH}_3$ using amalgamated zinc and conc. HCl , and warming the solution. The reaction is known as:
- a) Schiff's reaction b) Pondorf reaction c) Wolff-Kishner reduction d) Clemmensen reduction

Other reactions of aldehydes and ketones

81. Treatment of ethanal with PCl_5 produces:
- A) $\text{CH}_3\text{CH}_2\text{Cl}$ B) CH_3CHCl_2 C) CH_3COCl D) CHCl_3

Aldol condensation reaction

82. Aldol condensation is not given by
- c. HCHO b. CH_3CHO c. $\text{CH}_3\text{CH}_2\text{CHO}$ d. CH_3COCH_3
83. Which one of the following products is obtained when acetaldehyde reacts with dil. NaOH ?
- a. propan-1-ol c. 3-hydroxybutanal butanal d. butanone
84. Presence of which of the following is necessary for Aldol condensation?
- a. α hydrogen b. δ hydrogen c. β hydrogen d. γ hydrogen
85. $\text{CH}_3\text{CHO} + \text{CH}_3\text{CHO} \longrightarrow \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO}$
- This reaction is called
- a. Cannizaro's reaction c. Aldol condensation b. Carbylamine reaction d. Iodoform reaction

Cannizaro's reaction

86. In Cannizaro's reaction:
- a. An acid is converted into an amine
b. An aldehyde is converted only into an alcohol
c. An alcohol is converted into an aldehyde.
d. An aldehyde is simultaneously oxidised to a carboxylate and reduced to an alcohol.
87. The compound that undergoes Cannizzaro's reaction is
- a. CH_3COOH b. $\text{C}_2\text{H}_5\text{CHO}$ c. HCHO d. CH_3OCH_3
88. Which of the following will give Cannizzaro reaction?
- a) CH_3CHO b) CH_3COCH_3 c) $(\text{CH}_3)_3\text{CCHO}$ d) $\text{CH}_3\text{CH}_2\text{CHO}$
89. Cannizzaro's reaction is shown by
- a. Acetaldehyde c. Formaldehyde Benzaldehyde d. Both b and c
90. Cannizzaro reaction is NOT given by:
- a) Formaldehyde b) Benzaldehyde c) Acetaldehyde d) Trimethyl acetaldehyde
91. Which of the following, on treatment with 50% aq. NaOH gives alcohol and acid?
- a. $\text{C}_6\text{H}_5\text{CHO}$ c. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ b. CH_3COCH_3 d. $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$
92. In Cannizaro's reaction,
- a. Aldehyde forms alcohol c. amide forms alcohol Aldehyde forms ester d. amine forms aldehyde
93. A compound X undergoes a Cannizzaro reaction, and Y undergoes a positive iodoform test. Therefore,
- a. X = acetaldehyde Y = Pentanal
b. X = $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$ Y = pentan-3-one
c. X = formaldehyde Y = Pentan-2-one
d. X = Propionaldehyde Y = Pental-1-ol

94. Which one could be true about the information given in the following table?

SN	Compounds	Possible reactions/products
	A	Gives Tollens' test but not Fehling's test
	B	Gives Cannizzaro's reaction
	C	Gives 2-hydroxy-2-methylpropanoic acid by reacting C with HCN followed by hydrolysis

- A. A is acetone, B is acetaldehyde, and C is formaldehyde
 B. A is benzaldehyde, B is acetone, and C is acetaldehyde
 C. A is acetaldehyde, B is acetone, and C is benzaldehyde
 D. A is benzaldehyde, B is formaldehyde, and C is acetone

95. Choose the best alternative from the following

Reaction condition	Name of the reaction
Dil. NaOH	Tollens' test
Zn-Hg/HCl	Aldol condensation
Hydrazine/glycerol/KOH	Clemmensen's reduction
Ammoniacal AgNO ₃	Wolff-Kishner's reduction

- A. a-1, b-2, c-3, d-4
 B. a-3, b-4, c-1, d-2
 C. a-2, b-3, c-4, d-1
 D. a-4, b-2, c-1, d-3

Reaction of Methanal

96. Methanal reacts with ammonia to form:

- A) Methylamine
 B) Urotropine (hexamethylenetetramine)
 C) Acetamide
 D) Formic acid

97. Urotropine is used in medicine as a

- d. Tranquilizer
 c. Urinary antiseptic
 b. Sulpha drug
 d. Sedative

98. Bakelite is formed by polymerisation of

- e. Formaldehyde and phenol
 c. Acetaldehyde and acetone
 f. Acetone and phenol
 d. acetic acid and formaldehyde

99. Bakelite is made by the action of

- (a) phenol on formaldehyde
 (b) urea on formaldehyde
 (c) melamine on formaldehyde
 (d) ethylene glycol on phthalic acid

Formalin and its uses

100. Formalin is an aqueous solution of formaldehyde containing approximately:

- A) 10% formaldehyde
 B) 20% formaldehyde
 C) 37–40% formaldehyde
 D) 70% formaldehyde

101. Iodoform can be prepared from all except:

- a. isopropyl alcohol
 b. 3-methyl-2-butanone
 c. isobutyl alcohol
 d. ethyl methyl ketone

102. Which of the following gives the Cannizzaro reaction?

- a. C₆H₅CHO
 b. CH₃CHO
 c. CH₃CH₂CHO
 d. CH₃COCH₃

103. Acetaldehyde and acetophenone can be separated from their mixture by using the reagent.

- a. NaOH + I₂
 b. 2,4-DNPh
 c. NaHSO₃
 d. NH₂NH₂

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