CHEMISTRY

BOOKS - CHEMISTRY

ALDEHYDE, KETONES AND CARBOXYLIC ACIDS

Aldehyde Ketones And Carboxylic Acids

1. Addition of water to alkyness occurs in acidic medium and in the presence of Hg^{2+} ions as a catalyst. Which of the following products will be formed on additon of water to but-1-yne under these conditions?

A. $CH_3 - CH_2 - CH_2 - \overset{O}{\overset{||}{C}} - H$

B. $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - CH_3$

C. $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - OH + CO_2$

D. $CH_3 - \overset{\overset{O}{||}}{C} - OH + H - \overset{\overset{O}{||}}{C} - H$

Answer: B

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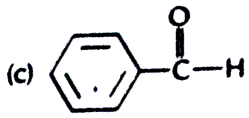
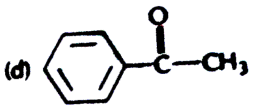
2. Which of the following compounds is the most reactive towards electrophilic addition reactions?

A. $CH_3 - \overset{\overset{O}{||}}{C} - H$

B. $CH_3 - \overset{\overset{O}{||}}{C} - CH_3$

C. 

D. 

Answer: A

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3. The correct order of increasing acidic strength is

A. $\text{phenol} < \text{ethanol} < \text{chloroacetic acid} < \text{acetic acid}$

B. $\text{ethanol} < \text{phenol} < \text{chloroacetic acid} < \text{acetic acid}$

C. $\text{ethanol} < \text{phenol} < \text{acetic acid} < \text{chloroacetic acid}$

D. $\text{chloroacetic acid} < \text{acetic acid} < \text{phenol} < \text{ethanol}$

Answer: C

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4. Compound $Ph - O - \overset{O}{\overset{||}{C}} - Ph$ can be prepared by the reaction of _____.

A. Phenol and benzoic acid in the presence of NaOH

B. phenol and benzoyl chloride in the presence of pyridine

C. phenol and benzoyl chloride in the presence of $ZnCl_2$

D. phenol and benzaldehyde in the presence of palladium

Answer: B

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5. The reagent with which both acetaldehyde and acetone react easily is

A. Sodium hydrogen sulphite

B. Phenyl hydrazine

C. Fehling's solution

D. Grignard reagent

Answer: C

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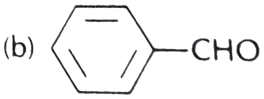
6. Cannizzaro's reaction is not given by

A. 

B. 

C. HCHO

D. CH_3CHO

Answer: D

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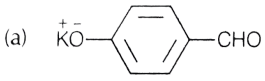
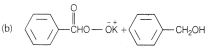
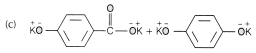
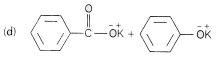
7. Which product is formed when the compound is treated with concentrated aqueous KOH solution ?

A. 

B. 

C. 

D. 

Answer: B

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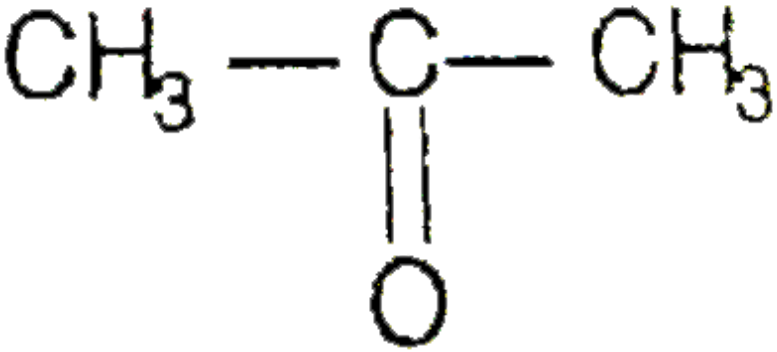
8. $CH_3 - C \equiv CH \xrightarrow[1\,\% HgSO_4]{40\,\% H_2SO_4} A \xrightarrow{\text{isomerisation}}$



Structure of A and type of isomerism in the above reaction respectively are

A. Prop-1-en-2-01, metamerism

B. Prop-1-en-1-01, tautomerism

C. Prop-2-en-2-01, geometrical isomerism

D. Prop-1-en-2-01, tautomerism

Answer: D

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9. Complete the following reaction sequence :

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_3 \xrightarrow[(ii)\, H_2O]{(i)\, CH_3MgBr} (A) \xrightarrow[\text{ether}]{\text{Na metal}} (B) \xrightarrow{CH_3 - Br} (C)$$

A. Identical

B. positional isomers

C. functional isomers

D. optical isomers

Answer: B

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10. Which is the most suitable reagent for the following conversion ?

$$CH_3 - CH = CH - CH_2 - \overset{\overset{O}{||}}{C} - CH_3 \rightarrow$$

$$CH_3 - CH = CH - CH_2 - \overset{\overset{O}{||}}{C} - OH$$

A. Tollen's reagent

B. Benzoyl peroxide

C. I_2 and $NaOH$ solution

D. Sn and $NaOH$ solution

Answer: C

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11. Which of the following compound will give butanone on oxidation with alkaline $KMnO_4$ solution ?

A. Butan-1-01

B. Butan-2-01

C. Both (a) and (b)

D. None of these

Answer: B

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12. In Clemmensen reduction, carbonyl compound is treated with .....

A. zinc amalgam + HCl

B. sodium amalgam + HCl

C. zinc amalgam + nitric acid

D. sodium amalgam + HNO_3

Answer: A

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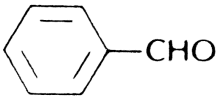
13. Which of the following will undergo aldol condensation ?

A. $CH_3 - CHO$

B. (b) 

C. $CH_3 - \overset{\overset{O}{||}}{C} - CH_3$

D. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CHO$

Answer: B::D

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14. Treatement of compound $Ph - O - \overset{\overset{O}{||}}{C} - Ph$

with NaOH solution yields

A. phenol

B. sodium phenoxide

C. sodium benzoate

D. benzophenone

Answer: B::C

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15. Which of the following conversion can be carried out by Clemmensen reduction ?

A. Benzaldehyde into benzyl alcohol

B. Cyclohexanone into cyclohexane

C. Benzoyl chloride into benzaldehyde

D. Benzophenone into diphenyl methane

Answer: B::D

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16. Through which of the following reactions number of carbon atoms can be increased in the chain ?

A. Grignard reaction

B. Cannizzaro's reaction

C. Aldol condensation

D. HVZ reaction

Answer: A::C

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17. Benzophenone can be obtained by .....

A. $\text{benzoyl chloride} + \text{benzene} + AlCl_3$

B. $\text{benzoyl chloride} + \text{diphenyl cadmium}$

C. $\text{benzoyl chloride} + \text{phenyl magnesium chloride}$

D. $\text{benzene} + \text{carbon monoxide} + ZnCl_2$

Answer: A

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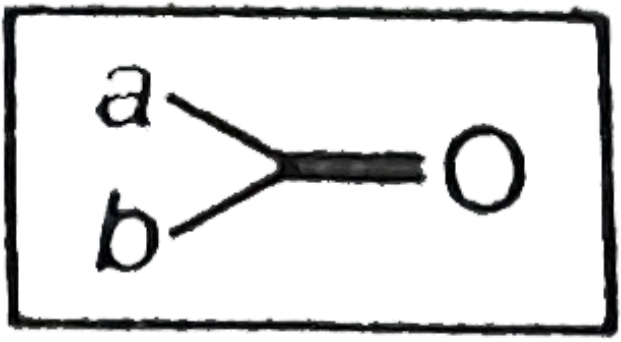
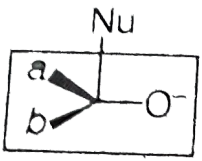
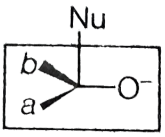
18. Which of the following is the correct represetation for intermediate of nucleophilic addition reaction to the given carbonyl compound (A) ?

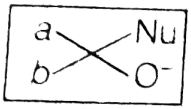


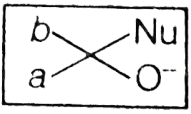
(A)

A. (a)



B. (b) 

C. (c) 

D. (d) 

Answer: A::B

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19. Why is there a large difference in the boiling points of butanal and butan-1-ol ?

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20. Write a test to differentiate between pentan-2-one and pentan-3-one.

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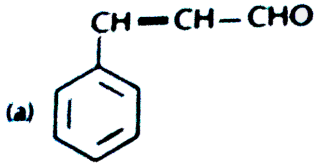
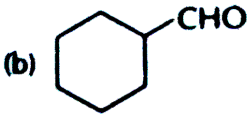
21. Give the IUPAC names of the following compounds.

(a) 



(c) $CH_3 - CH_2 - \underset{\underset{O}{||}}{C} - CH_2 - CHO$, (d) $CH_2 - CH = CH - CHO$

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22. Give the structure of the following compounds :

(i) 4-Nitropropiophenone

(ii) 2-Hydroxycyclopentanecarbaldehyde

(iii) Phenyl acetaldehyde.

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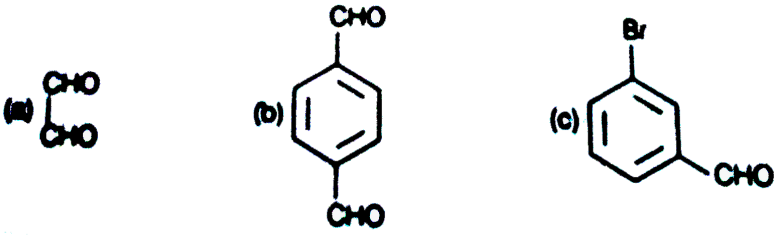
23. Write IUPAC names of the following structures



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24. Benzaldehyde can be obtained from benzalchloride. Write reactions for obtaining benzalchloride and then benzaldehyde from it.

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25. Name the electrophile produced in the reaction of benzene with benzoyl chloride in the presence of anhydrous $AlCl_3$. Name the reaction also.

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26. Oxidation of ketones involves carbon-carbon bond cleavage. Name the products formed on oxidation of 2, 5-dimethylhexan-3-one.

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27. Arrange the following in decreasing order of their acidic strength and give reason for your answer.

$CH_3CH_2OH, CH_3COOH, ClCH_2COOH, FCH_2COOH, C_6H_5CH_2COO$

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28. What product will be formed on reaction of propanal with 2-methylpropanal in the presence of NaOH? Write the name of the reaction also.

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29. Compound 'A' is prepared by oxidation of compound 'B' with alkaline $KMnO_4$. Compound 'A' on reduction with lithium aluminium hydride gets converted back to compound 'B'. When compound 'A' is heated with compound 'B' in the presence of H_2SO_4, it produces fruity smell of compound 'C'. To which family, the compounds 'A', 'B' and 'C' belong to ?

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30. Arrange the following in decreasing order of their acidic strength. Give explanation for the arrangement.

$C_6H_5COOH, FCH_2COOH, NO_2CH_2COOH$

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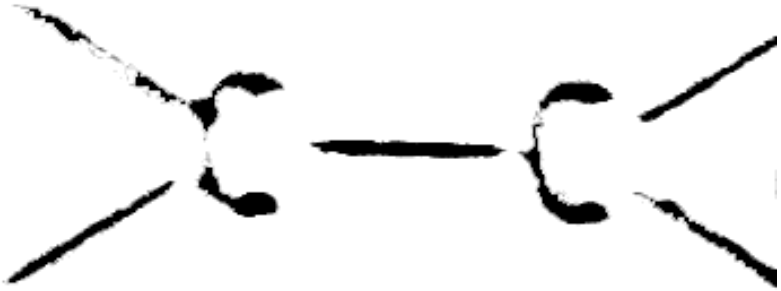
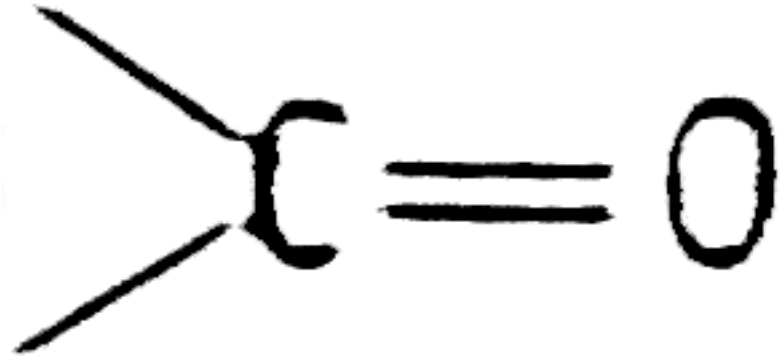


31. Alkenes and carbonyl compounds



both contain a π bond but alkenes show electrophilic addition reactions whereas carbonyl compounds show nucleophilic addition reactions. Explain.

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32. Carboxylic acids contain carbonyl group but do not show the nucleophilic addition reactions like aldehydes or ketones. Why?

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33. Identify the compounds A, B and C in the following reaction :

$$CH_3 - Br \xrightarrow{Mg\,/\,ether} (A) \xrightarrow[(i)\,\text{Water}]{(i)\,CO_2} (B) \xrightarrow[\Delta]{CH_3OH\,/\,H} (C)$$

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34. Why are carboxylic acids more acidic than alcohols or phenols although all of them have hydrogen atom attached to a oxygen atom (-O-H)?

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35. Complete the following reaction sequence :

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_3 \xrightarrow[(ii)\, H_2O]{(i)\, CH_3MgBr} (A) \xrightarrow[\text{ether}]{\text{Na metal}} (B) \xrightarrow{CH_3 - Br} (C)$$

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36. Ethylbenzene is generally prepared by acetylation of benzene followed by reduction and not by the direct alkylation of benzene. Think of a possible reason.

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37. Can Gattermann-Koch reaction be considered similar to Friedel Craft's acylation ? Discuss.

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38. Match the common names given in Column I with the IUPAC names given in Column II.

	Column I (Common names)		Column II (IUPAC names)
A.	Cinnamaldehyde	1.	Pentanal
B.	Acetophenone	2.	Prop-2-en-al
C.	Valeraldehyde	3.	4-methylpent-3-en-2-one
D.	Acrolein	4.	3-phenylprop-2- en-al
E.	Mesityl oxide	5.	1-phenylethanone

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39. Match the acids given in Column I with their correct IUPAC names given in Column II.

	Column I (Acids)	Column II (IUPAC names)
A.	Phthalic acid	1. Hexane- 1, 6-dioic acid
B.	Oxalic acid	2. Benzene-1, 2-dicarboxylic acid
C.	Succinic acid	3. Pentane-1, 5-dioic acid
D.	Adipic acid	4. Butane-1, 4-dioic acid
E.	Glutaric acid	5. Ethane-1, 2-dioic acid

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40. Match the reactions given in Column I with the suitable reagents given in Column II.

	Column I (Reactions)		Column II (Reagents)
A.	Benzophenone → Diphenylmethane	1.	$LiAlH_4$
B.	Benzaldehyde → 1-phenylethanol	2.	DIBAL-H
C.	Cyclohexanone → Cyclohexanol	3.	Zn(Hg)/Conc. HCl
D.	Phenyl benzoate → Benzaldehyde	4.	CH_3MgBr

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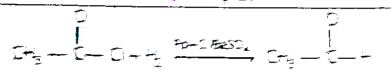
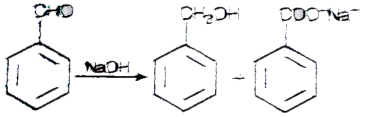
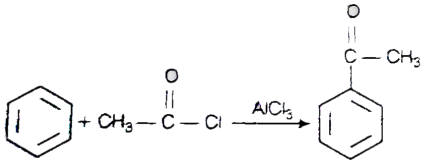
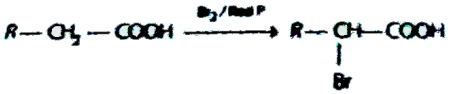
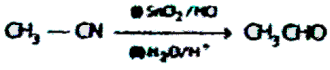
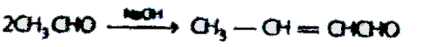
41. Match the example given in Column I with the name of the reaction in Column II.

Column I (Example)	Column II (Reaction)
A. 	1. Friedel–Crafts acylation
B. 	2. HVZ reaction
C. 	3. Aldol condensation

Column I (Example)	Column II (Reaction)
D. 	4. Cannizzaro's reaction
E. 	5. Rosenmund's reduction
F. 	6. Stephen's reaction

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42. Assertion (A) Formaldehyde is a planar molecule.

Reason (R) It contains sp^2 hybridised carbon atom.

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43. Assertion (A) compound containing -CHO group are easily oxidised to corresponsing carboxylic acids

Reason (R) : Carboxylic acids can be reduced to alcohols by treatement with $LiAlH_4$

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44. Assertion (A) The α-hydrogen atom in carbonyl compounds is less acidic.

Reason (R) The anion formed after the loss of α-hydrogen atom is resonance stabilised.

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45. Assertion : Aromatic aldehydes and formaldehyde undergo Cannizzaro reaction

Reason : Aromatic aldehydes are almost as reactive as formaldehyde.

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46. Assertion (A) Aldehydes and ketones, both react with Tollen's reagent to form silver mirror.

Reason (R) Both, aldehydes and ketones contain a carbonyl group.

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47. An alkene 'A' (molecular formula C_5H_{10}) on ozonolysis gives a mixture of two compounds 'B' and 'C'. Compound 'B' gives positive Fehling's test and also forms iodoform on treatement with I_2 and $NaOH$. Compound 'C' does not give Fehling's test but forms iodoform. Identify the compounds A, B and C. Write the reaction for ozonolysis and formation of iodoform from B and C.

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48. An aromatic compound 'A' (Molecular formula C_8H_8O)) gives positive 2, 4-DNP test. It gives a yellow precipitate of compound 'B' on treatment

with iodine and sodium hydroxide solution. Compound 'A' does not give Tollen's or Fehling's test. On drastic oxidation with potassium permanganate, it forms a carboxylic acid 'C' (Molecular formula $C_7H_6O_2$), which is also formed along with the yellow compound in the above reaction. Identify A, B and C and write all the reactions involved.

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49. Write down functional isomers of a carbonlyl compound with molecular formula C_3H_6O. Which isomer will react faster with HCN and why ? Explain the mechanism of the reaction also. Will the reaction lead to the completion with the conversion of whole reactant into product under reaction conditions ? If a strong acid is added to the reaction mixture, what will be the effect on concentration of the product and why?

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50. When liquid 'A' is treated with a freshly prepared ammoniacal silver nitrate solution it gives bright silver mirror. The liquid forms a white

crystalline solid on treatment with sodium hydrogen sulphate. Liquid 'B' also forms a white crystalline solid with sodium hydrogen sulphate. but it does not give test with ammoniacal silver nitrate. Which of the two liquids is aldehyde? Write the chemical equations of these reactions also.

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