



CHEMISTRY

BOOKS - R G PUBLICATION

ALDEHYDES, KETONES AND CARBOXYLIC ACID

Exercise

1. Which compound is produced when ethanal is heated with dilute NaOH solution?



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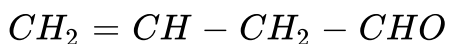
2. Give one chemical test to distinguish between the following pair
Pentan-2-one and Pentan-3-one

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3. Identify the products : $CH_3CH_2CH_2OH + SOCl_2 \rightarrow ?$

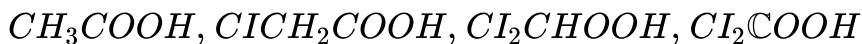
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4. Give the IUPAC name of the following compound:



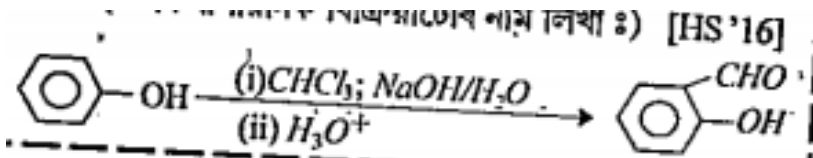
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5. Arrange the following in increasing order of pKa values:



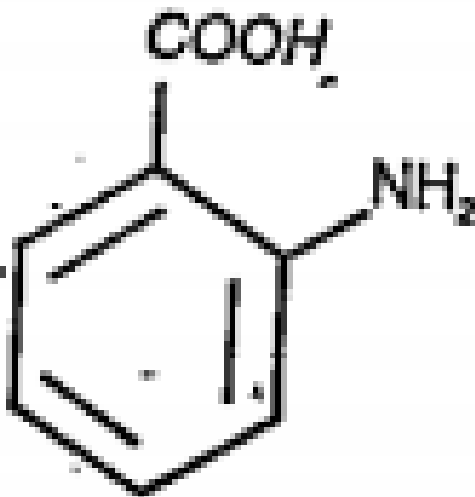
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6. Name the following chemical reaction:



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7. Give IUPAC name of the following compound.



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8. Name the functional group of a compound that gives silver mirror test with Tollens reagent.

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9. Write chemical reactions to affect the following transformations:
Butan-1-ol to butanoic acid.

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10. Write chemical reactions to affect the following transformations:
Cyclohexene to hexane-1,6-dioic acid

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11. Write chemical reactions to affect the following transformations:
Butanal to butanoic acid



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12. Write chemical reactions to affect the following transformations:

Ethanoic acid to ethanoic anhydride



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13. How will you convert the following? Give equations only. Benzene to acetophenone.



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14. How will you convert the following? Give equations only. Propene to acetone.



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15. An organic compound (A) (molecular formula, $C_4H_8O_2$) was hydrolysed with dilute H_2SO_4 to give a carboxylic acid (B) and alcohol (C). Oxidation of (C) with chromic acid produced (B). Write possible structures of (A), (B) and (C) and give their IUPAC name. Write the chemical equations involved in the process.

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16. Give one example of each of the following reactions:
Clemmensen reduction

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17. Give one example of each of the following reactions: Cannizzero reaction.

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18. A compound $X(C_2H_4O)$ on oxidation gives $Y(C_2H_4O_2)$. 'X' undergoes haloform reaction. On treatment with HCN, 'X' forms a product 'Z' which on hydrolysis given 2-Hydroxypropanoic acid.

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19. A compound $X(C_2H_4O)$ on oxidation gives $Y(C_2H_4O_2)$. 'X' undergoes haloform reaction. On treatment with HCN, 'X' forms a product 'Z' which on hydrolysis given 2-Hydroxypropanoic acid.

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20. An organic compound contains 69.77% carbon, 11.63% hydrogen and the rest is oxygen. The molecular mass of the compound is 86u. The compound does not reduce Tollens reagent but reacts with Brady's reagent to give yellow precipitate. On vigorous oxidation

the molecule produces ethanoic acid and propanoic acid. The compound also shows iodoform test. Identify and name the compound and write the reactions.

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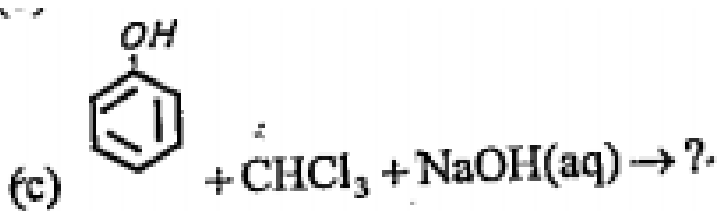
21. Give reason that Benzoic acid would undergo Hell-Volhard-Zelinsky reaction or not and why?

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22. Give reason that propanoic acid would undergo Hell-Volhard-Zelinsky reaction or not and why:

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23. Complete the following reactions:



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24. Write one chemical test to distinguish between propanal and propanone.

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25. Write why aldehydes are generally more re-active than ketones in nucleophilic addition reactions.

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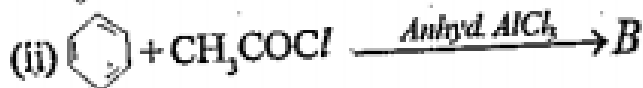
26. How will you bring about the following conversions? (Give chemical equations only): Toluene to benzaldehyde.

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27. How will you bring about the following conversions? (Give chemical equations only): Ethanenitrile to ethanoic acid.

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28. Identify A, B, C, and D in the following reactions:



Give a

chemical test with equation to distinguish between methanal and ethanal.

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29. An organic compound has the molecular formula $C_5H_{10}O$. The compound does not reduce Tollen's reagent but reacts with Brady's reagent to give orange precipitate. On vigorous Oxidation, the molecule produces ethanoic acid and propanoic acid. The compound also gives iodoform test. Identify the compound and write equations for chemical reactions involved.

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30. What happens when carbonyl compound is treated with zinc-amalgam and concentrated hydrochloric acid? Give chemical equation. What is name of the reaction?

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31. Discuss the mechanism of aldol condensation.

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32. Give a general method of preparation of aldehyde, using a selective oxidising agent.

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33. Give an example of Clemmensen reduction reaction.

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34. Identify the products A and B in the following reaction: $2\text{HCHO} + \text{conc. KOH} \rightarrow \text{A} + \text{B}$

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35. Write complete chemical equation for the transformation of benzamide to benzoic acid.

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36. Arrange the following in increasing order of acidity:
 CH_3COOH , $\text{CH}_3\text{CH}_2\text{COOH}$, $\text{C}_6\text{H}_5\text{COOH}$, $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$

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37. Mention one use of methanoic acid

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38. An organic compound $X(C_2H_4O)$, on oxidation, gives $Y(C_2H_4O_2)$. Compound (X) undergoes haloform reaction. On treatment with HCN, compound (X) produces Z which on hydrolysis, gives 2-Hydroxypropanoic acid. Write the equation for the reactions involved. What happens when X is treated with dilute NaOH?

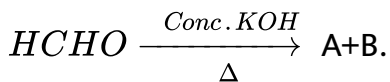
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39. Identify the products A and B in the following reactions:



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40. Identify the products A and B in the following reactions:



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41. Write the formula of the carbonyl compound found in vanilla beans.

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42. What will happen when ethyl nitrile is reduced by DIBAL-H followed by hydrolysis?

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43. What is Etard reactions?

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44. Explain why the boiling points of aldehyde and ketone are higher than hydrocarbons and ethers of comparable molecular masses?

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45. Arrange the following compounds in increasing order of their boiling points.

CH_3CHO , CH_3CH_2OH , CH_3OCH_3 , $CH_3 - CH_2 - CH_3$

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46. What is Schiff's base?

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47. Why benzaldehyde do not responds Fehling test?

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48. Which functional groups are tested by haloform reaction?

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49. What is the basic difference between aldol con-densation & cannizzaro reaction?

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50. Draw structures of the following derivatives: The 2, 4 dinitrophenyl hydrazone of benzal-dehyde.



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51. Draw structures of the following derivatives: Cyclo propanone oxime



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52. Draw structures of the following derivatives: Acetaldehyde dimethyl acetal.



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53. Draw structures of the following derivatives: The semicarbazone of cyclobutanone.



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54. Draw structures of the following derivatives: The ethylene ketal of hexan-3-one.

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55. Draw structures of the following derivatives: The methyl hemiacetal of formaldehyde.

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56. Name the acids present in small ants and vinegar.

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57. What is Jones reagent? For which purpose it is used?

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58. Why carboxylic acid exists as dimer?

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59. Why esterification is carried in presence of little acid?

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60. Out of F_3CCOOH and H_3CCOOH compounds which would you expect to be stronger acid and why?

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61. Describe the following conversions in not more than two steps:

Ethanol to 3-Hydroxy butanal



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62. Describe the following conversions in not more than two steps:

Benzoic acid to m-nitrobenzyl alcohol



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63. Describe the following conversions in not more than two steps:

Propanone to propene



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64. Write why aldehydes are generally more reactive than ketones in nucleophilic addition reactions.



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65. Give reasons: Electrophilic substitution in benzoic acids takes place at meta position.

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66. Give reasons: Carboxylic acids do not give the characteristic reactions of carbonyl group

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67. Arrange the following in increasing order of pKa values:

CH_3COOH , $ClCH_2COOH$, $Cl_2CHCOOH$, Cl_2COOH

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68. Arrange the following: (in increasing order of reactivity towards nucleophiles) $HCHO$, CH_3COCH_3 , $ClCH_2CHO$, CH_3CHO .

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69. Explain why carbonyl compounds always show nucleophilic addition reaction?

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70. Write one common method for the preparation of ethanal & prop-2-one.

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71. Assign the type of force exist in the following compounds. Which of these has the highest boiling point?

CH_3CH_2CHO , $CH_3CH_2CH_2OH$, $CH_3 - O - C_2H_5$, $CH_3CH_2CH_3$

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72. Explain the reactivity order of the following carbonyl compounds.

$HCHO$, CH_3CHO , CH_3COCH_3

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73. How carbonyl compound are purified by so-dium bi sulphite reaction?

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74. Why is *Alpha*-hydrogens of aldehyde or ketone very important.

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75. Explain with reason, arrange the following carbonyl compounds in order of increasing reactivity - p-Tolualdehyde, Acetophenone, p-nitro benzaldehyde and Benzaldehyde.

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76. Explain three factors which are responsible for acidity of carboxylic acid.

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77. Which is stronger acid, benzoic acid or phenol. Explain.

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78. There are two $-NH_2$ groups in semi carbazide. But why only one is involved in the formation of semicarbazones.

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79. Write short notes on: Gatter man-Koch reaction.

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80. Write short notes on: Hemi acetal formation

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81. Write short notes on: Clemmensen reduction



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82. Write short notes on: Wolff-Kishner reduction



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83. Write short notes on: Tollen's test



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84. Write short notes on: Haloform reaction



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85. Write short notes on: Aldol condensation.



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86. Write short notes on: Cannizzaro reaction

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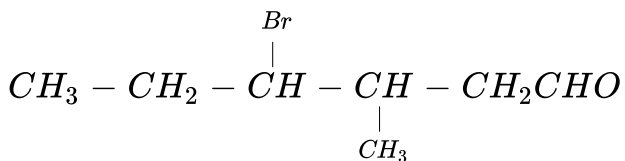
87. Write short notes on: Esterification of carboxylic acids

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88. Write short notes on: Hell-volhard-Zelinsky reaction

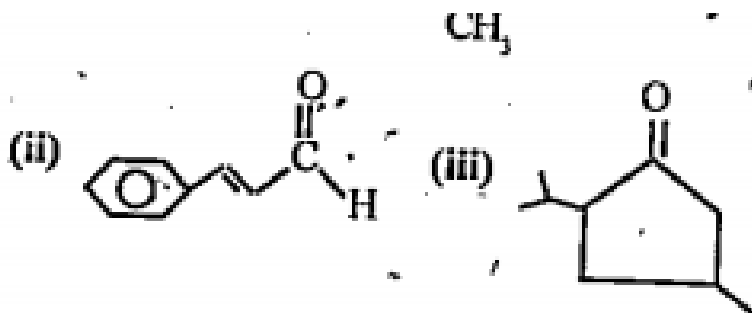
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89. Write the IUPAC name of the following:



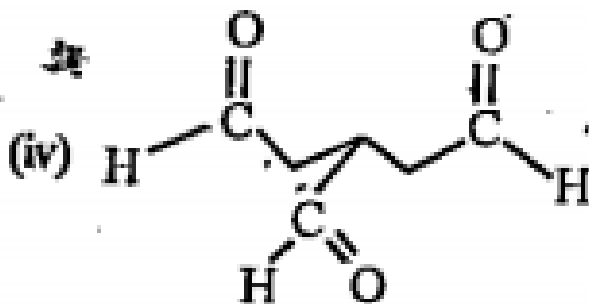
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90. Write the IUPAC name of the following: `



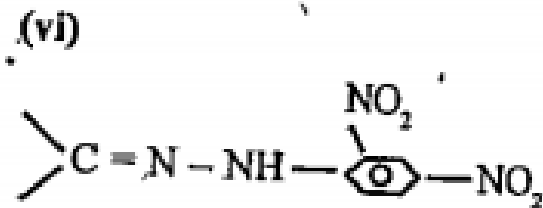
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91. Write the IUPAC name of the following: `



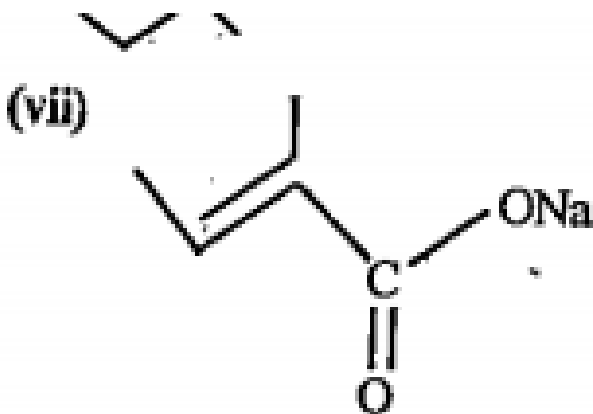
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92. Write the IUPAC name of the following: `



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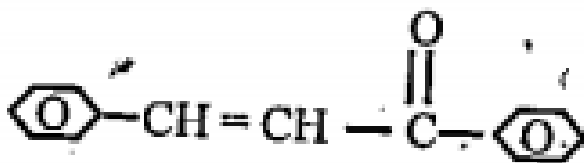
93. Write the IUPAC name of the following: `



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94. Write the IUPAC name of the following: `

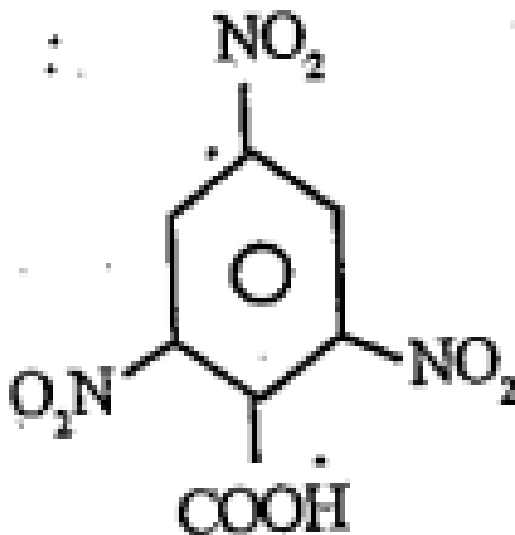
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95. Write the IUPAC name of the following: `

(ix)



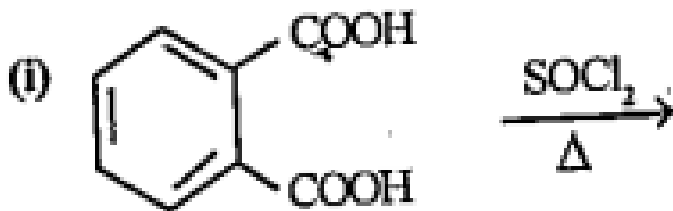
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96. Write the IUPAC name of the following: `



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97. Complete each synthesis by giving missing starting material reagent or products.

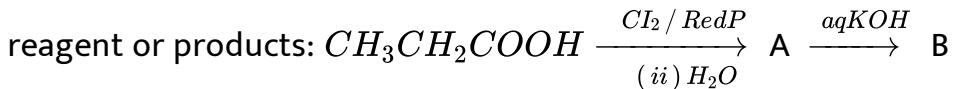


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98. Complete each synthesis by giving missing starting material reagent or products: $Cl_3CCHO \xrightarrow{\text{ConcNaOH}}$ A+B

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99. Complete each synthesis by giving missing starting material



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100. How will bring about following conversions: Propanone to propene.

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101. How will bring about following conversions: Acetone to ethylene glycol ketal.

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102. How will bring about following conversions: Hexan-1-ol to hexanal

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103. How will bring about following conversions: p-fluorotluene to p-fluoro benzaldehyde

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104. How will bring about following conversions: Propanoyl chloride to butan-2-one

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105. How will bring about following conversions: Carbon dioxide to ethanoic acid

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106. How will bring about following conversions: 3-Nitrobromo benzene to 3-nitro benzoic acid.

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107. How will bring about following conversions: Benzaldehyde to *Alpha*-hydroxy phenylacetic acid

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108. How will bring about following conversions: Benzene to m-nitro aceto phenone.

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109. How will bring about following conversions: Benzen 1,2 dioic acid to phthalimide

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110. Distinguish the following pair: Phenol & benoic acid.

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111. Distinguish the following pair: Ethanal and propanal

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112. Give one chemical test to distinguish between the following pair Pentan-2-one and Pentan-3-one

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113. Distinguish the following pair: Benzaldehyde and Acetophenone

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114. Distinguish the following pair: Benzoic acid and ethyl benzoate.

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115. An organic compound contains 69.77% carbon, 11.63% hydrogen and the rest is oxygen. The molecular mass of the compound is 86u. The compound does not reduce Tollens reagent but reacts with Brady's reagent to give yellow precipitate. On vigorous oxidation the molecule produces ethanoic acid and propanoic acid. The compound also shows iodoform test. Identify and name the compound and write the reactions.

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116. A Ketone 'A' Which undergoes haloform reaction gives compound B on reduction. B on heating with H_2SO_4 gives compound C, which forms mono-ozonide D. D on hydrolysis in presence of Zn dust gives only acetaldehyde. Identify A, B and C. Write down the reactions involved.

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117. An organic compound (A) (molecular formula, $C_4H_8O_2$) was hydrolysed with dilute H_2SO_4 to give a carboxylic acid (B) and alcohol (C). Oxidation of (C) with chromic acid produced (B). Write possible structures of (A), (B) and (C) and give their IUPAC name. Write the chemical equations involved in the process.

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118. An organic compound (A) on treatment with acetic acid in presence of sulphuric acid produces as ester(B). (A) on mild oxidation gives (C). (C) with 50% KOH followed by acidification with dil HCl generates (A) and (D). (D) with PCl_5 followed by reaction with ammonia give (E). (E) on dehydration produces HCN-acid. Identify A to E.

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119. Explain the following: Chloroacetic acid is stronger than acetic acid.

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120. Explain the following: pH of reaction should be carefully controlled while preparing ammonia derivatives of carbonyl compounds.

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121. Although phenoxide ion has more numbers of resonating structures than carboxylate ion, carboxylic acid is a stronger acid than phenol. Give reason.

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122. Give chemical tests to distinguish between: Phenol and Benzoic acid

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123. Give chemical tests to distinguish between: Benzophenone and acetophenone

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124. Acid catalysed dehydration of tert-butanol is faster than that of n-butanol. Explain.

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125. Sodium bisulphite is used for the purification of aldehydes and Ketones. Why?



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126. Two moles of organic compound 'A' on treatment with a strong base give two compounds 'B' and 'C'. Compound 'B' on dehydrogenation with Cu gives 'A' while acidification of 'C' yield carboxylic acid 'D' with molecular formula of CH_2O_2 . Identify the compounds A, B, C and D. Write all chemical reactions involved.



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127. Arrange the following compounds in an increasing order of their property as indicated: Acetaldehyde, Acetone, Methyl tert-butyl ketone (reactivity towards HCN)



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128. Arrange the following compounds in an increasing order of their property as indicated: Benzoic acid, 3,4-dinitrobenzoic acid, 4-methoxy benzoic acid (acid strength)

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129. A Ketone 'A' Which undergoes haloform reaction gives compound B on reduction. B on heating with H_2SO_4 gives compound C, which forms mono-ozonide D. D on hydrolysis in presence of Zn dust gives only acetaldehyde. Identify A, B and C. Write down the reactions involved.

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130. An organic compound (A) (molecular formula, $C_4H_8O_2$) was hydrolysed with dilute H_2SO_4 to give a carboxylic acid (B) and

alcohol (C). Oxidation of (C) with chromic acid produced (B). Write possible structures of (A), (B) and (C) and give their IUPAC name. Write the chemical equations involved in the process.

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131. How would you account for the following facts: Aldehydes are more reactive than Ketones towards nucleophiles.

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132. How would you account for the following facts: The boiling points of aldehydes and Ketones are lower than that of the corresponding acids.

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133. How would you account for the following facts: The aldehydes and Ketones undergo a number of addition reactions.

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134. An unknown aldehyde 'A' on reacting with alkali gives a β hydroxy aldehyde, which loses water to form an unsaturated aldehyde, but-2-enal. Another aldehyde 'B' undergoes disproportionation reaction in the presence of conc alkali to form products 'C' and 'D'. 'C' is an aryl alcohol with formula C_7H_8O : Identify A and B.

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135. An unknown aldehyde 'A' on reacting with alkali gives a β hydroxy aldehyde, which loses water to form an unsaturated

aldehyde, but-2-enal. Another aldehyde 'B' undergoes disproportionation reaction in the presence of conc alkali to form products 'C' and 'D'. 'C' is an aryl alcohol with formula C_7H_8O : Write the sequence of reactions involved

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136. An unknown aldehyde 'A' on reacting with alkali gives a β hydroxy aldehyde, which loses water to form an unsaturated aldehyde, but-2-enal. Another aldehyde 'B' undergoes disproportionation reaction in the presence of conc alkali to form products 'C' and 'D'. 'C' is an aryl alcohol with formula C_7H_8O : Name the product, when 'B' reacts with zinc amalgam and hydrochloric acid.

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137. An organic compound A on treatment with ethanol yields a carboxylic acid B and a neutral compound C. On hydrolysis, C produces B and another compound D. D on oxidation produces B, which on heating with Ca (OH)_2 gives E ($\text{C}_3\text{H}_6\text{O}$). E forms 2,4-Dinitrophenyl hydrazone derivatives but does not show Fehling test.



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