CHEMISTRY

BOOKS - OMEGA PUBLICATION

ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

Questions

1. Write the structural formula of 1-phenylpentan-1-one.

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2. Draw the structure of carbonyl group and indicate the electrophilic and nucleophilic centres.

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3. Why do aldehydes and ketones have high dipole moments?

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4. What type of hybridisation is involved for carbon in a carbonyl group?

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5. Give various methods of preparation of aldehydes and ketones.

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6. Complete the reaction : $CH_2 = CH\_2 + O\_3$ to ? $Underset(- H_2O) \xrightarrow{H_2O, Zn}$?

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7. How will you convert CH_3CN to CH_3COCH_3 ?

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8. What is catalytic dehydrogenation of alcohols ?

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9. Discuss the preparation of aldehydes by Rosenmund's reduction

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10. How will you prepare aldehydes from nitriles ? (Stephan's reaction)

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11. Discuss the preparation of aldehyde by Etard's reaction.

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12. Write Gatterman Koch reaction

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13. How will you bring about the following conversions :Ethanol to 3-hydroxybutanal

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14. How will you bring about the following conversions :Benzaldehyde to Benzophenone

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15. How will you bring about the following conversions : Formaldehyde to methanol

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16. How will you bring about the following conversions :Propanal to butanone.

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17. Do aldehydes exhibit position isomerism ?

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18. Aromatic aldehydes and ketones are less reactive than correspondingAliphatic compounds. Explain.

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19. Explain why sodium is less reactive than potassium ?

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20. It is necessary to control pH during the reaction of carbonyl compounds with ammonia derivatives. Explain.

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21. Carbonyl compounds mainly show nucleophilic addition. reactions. Why?

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22. Why do aldehydes and ketones undergo nucleophilic addition reaction?

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23. Explain why aldehydes are more reactive than ketones towards nucleophilic addition reactions ?

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24. Why Benzaldehyde is metadirecting for nucleophilic substitution rections ?

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25. How aldehydes and ketones are distinguished? Give two chemical reactions.

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26. Give a chemical test to distinguish between aldehydes and ketones.

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27. How will you distinguish between acetaldehyde and propanone?

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28. How will you distinguish acetone and acetaldehyde? Give one test.

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29. Write equation for preparation of acetal.

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30. How will youdistinguish between benzaldehyde andacetaldehyde?

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31. How will you distinguish between ethanol and acetic acid ?

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32. How will you distinguish between HCHO and CH_3CHO ? Give chemical reactions.

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33. How will you distinguish between formaldehyde and acetaldehyde ?

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34. What happens when Formaldehyde is treated with ammonia ?

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35. What happens when Formaldehyde is treated with ammonia ?

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36. Give a relation for nitration of urotropine (hexamethylenetetramine) under controlled condition produce a well known RDX.

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37. Write the chemical equations when acetaldehyde reacts with hydroxyl amine.

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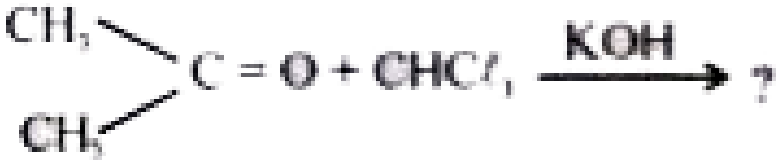
38. Complete the following reaction :



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39. Give aldol condensation reaction of acetaldehyde and explain why formaldehyde does not give this reaction ?

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40. Write cross aldol condensation.

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41. Benzaldehyde does not undergo Aldol condensation. Give reason only.

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42. Write short note on Wolf-Kishner reaction.

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43. Write short note on Cannizzaro's reaction.

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44. Write short note on Cannizzaro's reaction.

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45. Write Clemmensen reduction.

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46. Write Claisen condensation.

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47. Complete the following :

Formaldehyde to acetaldehyde

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48. Write a chemical test to distinguish between Acetic acid and Acetone.

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49. How will you distinguish between acetaldehyde and acetone ?

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50. How will you convert benzene to benzophenone ?

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51. How does > C= C < differ from >C =O group in chemical reactions ?

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52. Write cross aldol condensation.

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53. Complete the following reactions/ equations by giving the indicated missing substances.

$CH_3CHO \xrightarrow{H_2NCONHNH_2} \ldots\ldots\ldots\ldots ?$

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54. Calculate the wave number of radiations having a frequency of 4 . (10 *11 KHz).

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55. The wavelength of blue light is 315 nm. calculate the frequency of this light.

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56. Complete the following reactions/ equations by giving the indicated missing substances.

benzoic acid and ethyl benzoate

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57. Calculate wavenumber of yellow radiation having wavelength 5800 A*

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58. Complete the following reaction :

$CH_3CHO + CH_3OH \xrightarrow{HCl} ?$

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59. Complete the following reaction :

$2HCHO + NaOH(50\,\%) \rightarrow$ ------- + --------- ?

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60. Calculate frequency of yellow radiation having wavelength 5800 A*

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61. How will you bring about the following conversions : Propanone to propene

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62. How will you bring about the following conversions :Benzaldehyde to Benzophenone

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63. How will you bring about the following conversions :Ethanol to 3-hydroxybutanal

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64. How will you distinguish:

Propanal and Propanone

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65. Write a chemical test to distinguish between phenol and benzoic acid.

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66. Give one test to distinguish between Acetophenone and Benzophenone.

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67. Write a chemical test to distinguish between phenol and benzoic acid.

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68. Give one chemical test of distinguish between Pentanone-2 and Pentanone-3.

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69. How will you distinguish:

Propanal and Propanone

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70. Write a chemical test to distinguish between benzaldehyde and acetophenone.

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71. Write a chemical test to distinguish between phenol and benzoic acid.

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72. Give one chemical test to distinguish between the following pairs of compounds.

Ethylamine and aniline

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73. Give one chemical test of distinguish between Pentanone-2 and Pentanone-3.

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74. Write the reaction between acetone andphenylhydrazine.

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75. Write the reaction between acetone and 2,4- dinitropheitylhydrazine.

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76. Write the IUPAC name of succinic acid.

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77. How will you prepare carboxylic acids from primary alcohols aldehydes ?

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78. Benzoic acid from ethylbenzene

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79. How will you prepare benzoic acid from alkylbenzene ? Give equation also.

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80. How is benzoic acid prepared from ethy benzoate ?

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81. Complete the following reactions : $RCN \xrightarrow[H_2O]{H^+ / OH^-}$?

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82. The wavelength of a beam of light is 25 micrometer. What is its frequency ?

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83. What is colloidal solution, suspension and True solution?

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84. How benzoic acid is prepared from benzamide ?

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85. How will you prepare acetic acid from acetylene ?

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86. How will you convert ethyne into ethanal.

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87. Explain, why monocarboxylic acids have higher boiling points as compare to the alcohols of comparable molecular mass ?

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88. Why are the boiling points of carboxylic acids higher than the corresponding alcohols ?

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89. What are lyophilic colloids?

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90. What are lyophobic Colloids?

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91. Carboxylic acids do not give the characteristic reactions of carbonyl group. Explain.

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92. Ethanoic acid is weaker acid than benzoic acid.Why ?

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93. Why chloroacetic acid is stronger acid than acetic acid ?

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94. Why are bond length of C = O in carboxylic acid is slightly larger than that in aldehyde and ketone ?

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95. What are Multimolecular colloids?

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96. Carboxylic acid exists as dimers, explain why ?

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97. Why aliphatic carboxylic acids are stronger than phenols?

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98. Why acetic-acid is a stronger acid than phenol ?

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99. Formic acid is stronger acid than acetic acid. Justify.

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100. Formic acid is stronger acid than acetic acid. Justify.

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101. Why chloroacetic acid is stronger acid than acetic acid ?

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102. p-Nitrobenzoic acid is a stronger acid than benzoic acid. Justify.

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103. Arrange the following compounds in increasing order of their property as indicated: Acetaldehyde, acetone, di tert-butyl ketone, tert-butylmethyl ketone (reactivity towards HCN)

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104. Arrange the following compounds in increasing order of their property as indicated: $CH_3CH_2CH(Br)COOH, CH_3CH(Br)CH_2COOH, (CH_3)_2CHOOH, C$ (acidic strength).

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

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106. Why chloropropionic acid is stronger acid than propionic acid ?

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107. Complete the reaction : $CH_3COOH + 6HI \xrightarrow{P} \_\_$.

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108. Complete the reaction : $CH_3COOH \xrightarrow{LiAlH_4}$

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109. What is formalin solution ? Give its one use..

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110. Complete the following reaction :

$$CH_3COOH \xrightarrow{SOCl_2} \ldots\ldots\ldots ? \ldots\ldots \xrightarrow[Hd/BaSO_4]{H_2} \ldots\ldots\ldots\ldots ? \ldots\ldots$$

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111. Arrange the following in the increasing order of acidity : $CHCl2COOH$, ClCl3COOH, CH2ClCOOH`

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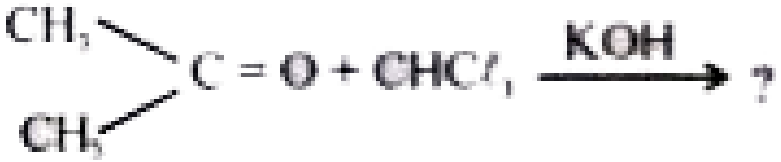
112. Complete the following reaction :



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113. How to convert acetic acid to ethylamine.

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114. How will you convert propanoic acid into propane.

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115. Identify the products X, Y, Z in the reaction

$$C_6H_5COOH \xrightarrow{PCl_5} X \xrightarrow{NH_3} Y \xrightarrow{P_2O_5} C_6H_5CN \xrightarrow{H_2/Ni} Z$$

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116. Why is the ester distilled as fast as it is formed during the preparation of esters from the reaction between alcohol and carboxylic acid ?

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117. Write the chemicat equations when acetic acid reacts with $SOCl_2, PCl_3$ and PCl_5.

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118. Convert the following : Acetic acid to acetaldehyde

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119. How will you convert Benzoic acid into benzamide ?

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120. Why does benzoic acid not undergo Friedel -Craft reaction ?

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121. Illustrate decarboxyiation reaction by giving one example.

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122. What happens when Benzoic acid is heated with CaO ?

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123. The depression in freezing point of water observed for the same amount of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order given above. Explain briefly.

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124. Discuss the process and mechanism of esteritication of carboxylic acid.

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125. Write short note on electro-dialysis.

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126. Explain acylation.

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127. Write Hell Volhard Zelinsky reaction.

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128. Name the reagents used in the following reactions :

$$CH_3COCH_3 \xrightarrow{?} CH_3 - \underset{OH}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_3$$

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129. Name the reagents used in the following reactions :

$$CH_3COOH \xrightarrow{?} ClCH_2 - COOH$$

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130. What are macromolecular colloids?

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131. What happens when ethanoyl chloride is reduced with H_2 in the presence of $Pd/BaSO_4$?

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132. Write short note on Rosenmund's reaction.

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133. Which organic compound is used in artificial flavouring and perfuming ?

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134. Explain, why acid amides are amphoteric in nature ?

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135. Predict the product of the following reactions : $CH_3COOH \xrightarrow{NH_3/\Delta}$?

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136. Predict the product of the following reactions : $C_6H_5 - CH_3 \xrightarrow[(b)\,H^+]{(a)\,KMnO_2/KOH}$?

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137. Predict the product of the following reactions : $C_6H_5 - CH_3 \xrightarrow[(b)\,H^+]{(a)\,KMnO_2/KOH}$?

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Multiple Choice Questions

1. In the following reaction, product P is

$$R - \overset{\overset{O}{||}}{C} - Cl \xrightarrow[Pd/BaSO_4]{H_2} P$$

A. RCH_2OH

B. $RCOOH$

C. $RCHO$

D. RCH_3

Answer: C

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2. Rosenmund's reduction of an acyl chloride gives

A. an aldehyde

B. an alcohol

C. an ester

D. a hydrocarbon

Answer: A

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3. The wavelength of a beam of light is 25 micrometer. What is its wavenumber ?

A.

B.

C.

D.

Answer: C

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4. Which of the following compounds gives a ketone with Grignard's reagent?

A. Formaldehyde

B. Ethanenitrile

C. Ethyl alcohol

D. Methyl iodide

Answer: B

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5. Identify the product Y in the sequence.

$$CH_3CHO + CH_3MgBr \xrightarrow{\text{Ether}} X \xrightarrow[H^+]{H_2\,\frac{0}{}} Y$$

A. CH_3OH

B. CH_3CH_2OH

C. $(CH_3)_2CHOH$

D. $(CH_3)_3COH$

Answer: C

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6. Which of the following reacts with NaOH to produce an acid and an alcohol ?

A. $HCHO$

B. CH_3COOH

C. CH_3CH_2COOH

D. C_6H_5COOH

Answer: A

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7. Which of the following gives aldol condensation reaction?

A. C_6H_5OH

B. $C_6H_5 - \overset{\overset{O}{||}}{C} - C_6H_5$

C. $CH_3CH_2 - \overset{\overset{O}{||}}{C} - CH_3$

D. $(CH_3)_3\overset{\overset{O}{||}}{C} - C - CH_3$

Answer: C

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8. $CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - CH_3, \xrightarrow{SeO_2} X + H_2O$ here X is

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

B. CH_3COCH_3

C. $CH_3 - \overset{\overset{O}{||}}{C} - CH_2OH$

D. none of these

Answer: A

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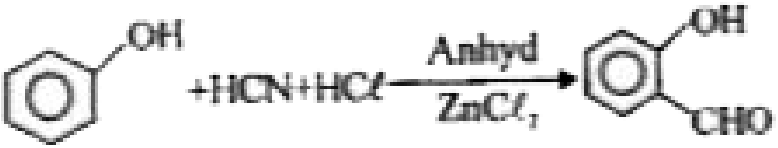
9. The following reaction



is known as

A. Perkin reaction

B. Gattermann aldehyde synthesis

C. Kolbe's reaction

D. Gattermann-Koch reaction.

Answer: B

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10. What happens when ethanoyl chloride is reduced with H_2 in the presence of $Pd/BaSO_4$?

A. CH_3CHO is formed

B. CH_3CH_2OH is formed

C. CH_3COOH is formed

D. CH_3COCH_3 is formed

Answer: B

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11. If formaldehyde and KOH are heated, then we get

A. Methyl

B. Methyl alcohol

C. Ethyl formate

D. Acetylene

Answer: B

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12. The addition of HCN to carbony compounds ts an example of

A. Nlicleophilic substitution

B. Electrophilic addition

C. Nucleophilic addition

D. Electrophilic substitution

Answer: C

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13. Dimerisation in carboxylic acid is due to

A. ionic bond

B. covalent bond

C. coordinate bond

D. intermolecular hydrogen bond

Answer: D

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14. Lower carboxylic acids are soluble in water due to

A. low molecular weight

B. hydrogen bonding

C. dissociation into ions

D. easy hydrolysis

Answer: B

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15. Carboxylic acids are more acidic than phenols and alcohols because of

A. intermolecular hydrogen bonding

B. formation of dimers

C. highly acidic hydrogen

D. resonance stabilization of their conjugate bases

Answer: D

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16. CH_3COCl can be obtained directly by reacting PCl_5 with

A. CH_3COOH

B. $(CH_3CO)_2O$

C. CH_3CONH_2

D. CH_3COOR

Answer: A

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17. HCOOH$reacts with conc.$ H_2SO_4` to produce

A. CO

B. CO_2

C. NO

D. NO_2

Answer: A

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18. The reaction

$RCH_2CH_2COOH \xrightarrow[Br_2]{\text{Red P}} R-CH_2-\underset{|}{CH}-COOH$ is called

A. Reimer -Tiemann reaction

B. Hell - Volhard Zelinsky reactfon

C. Cannizzaro reaction

D. Sandmeyer reaction.

Answer: B

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19. $C_6H_6 + CO + HCl \xrightarrow{\text{Anhy}.AlCl_3} X + HCl$ Compound X is

A. $C_6H_5CH_3$

B. $C_6H_5CH_2Cl$

C. C_6H_5CHO

D. C_6H_5COOH

Answer: C

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20. The chemical reaction of acetaldehyde and ammonia gives

A. Ethaylamine

B. Hexamethhylenetetra amine

C. Acetic acid

D. Acetaldehyde ammonia adduct

Answer: D

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21. $2HCHO \xrightarrow{50\% NaOH} CH_3OH + HCOONa.$

The above chemical reaction represents

A. Rosenmund's reaction

B. Cannizzaro's reaction

C. Kolbe's reaction

D. Etard's reaction

Answer: B

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22. Chlorobenzene react with methyl chloride in the presence of sodium in anhydrous ether ? What is the name of reaction.

A. Cross aldol condensation

B. Perkin's condensation

C. Aldol condensation

D. Benzoin condensation.

Answer: A

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23. Formalin is

A. liquid formaldehyde

B. 40% solution of formaldehyde in water

C. 40% solution of formaldehyde in acetone

D. 40% solution of formaldehyde in acetaldehyde.

Answer: B

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24. $C_6H_5 - CH = CHCHO \xrightarrow{X} C_6H_5CH = CHCH_2OH.$

In the above sequence X can be

A. H_2 / Ni

B. $NaBH_4$ s

C. $K_2Cr_2O_7 / H^+$

D. `both (A) and (B)

Answer: B

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25. IUPAC name of oxalic acid is :

A. Hexane - 1, 2-dioic acid

B. Ethane -1,2-dioic acid

C. Ethanoic acid

D. Butane-1, 2-dioic acid

Answer: B

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26. Freshly prepared ammonical silver nitrate solution is known as

A. Tollen's reagent

B. Baker's reagent

C. Fehling solution

D. Liquid-ammonia

Answer: A

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27. Formalin is a 40% aqueous solution of : Methanol, Ethanol, Methanal, Ethanal.

A. Methanol

B. Ethanol

C. Methanal

D. Ethanal

Answer: C

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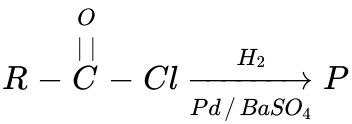
28. In the following reaction, product P is



A. RCH_2OH

B. $RCOOH$

C. $RCHO$

D. RCH_3

Answer: C

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29.  on

heating will yield ?

A. CaO, CO_2, H_2O

B. $Ca(COCH_3)_2$

C. $CaCO_3$ and CH_3COCH_3

D. CH_3CHO and $CaCO_3$

Answer: C

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30. Which of the following compounds gives a ketone with Grignard's reagent?

A. Formaldehyde

B. Ethanenitrile

C. Ethyl alcohol

D. Methyl iodide.

Answer: B

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31. Identify the product Y in the sequence.

$$CH_3CHO + CH_3MgBr \xrightarrow{\text{Ether}} X \xrightarrow{H_2 \frac{\emptyset}{H+}} Y$$

A. CH_3OH

B. CH_3CH_2OH

C. $(CH_3) - 2CHOH$

D. $(CH_3)_3COH$

Answer: C

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32. Which of the following reacts with NaOH to produce an acid and an alcohol ?

A. $HCHO$

B. CH_3COOH

C. CH_3CH_2COOH

D. C_6H_5COOH

Answer: A

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33. What is the wavelength of light emitted when the electron in hydrogen atom undergoes transition from an energy level with n = 6 to an energy level with n = 3 ?

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34. If formaldehyde and KOH are heated, then we get

A. methyl

B. methyl alcohol

C. ethyl formate

D. acetylene

Answer: B

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35. The addition of HCN to carbony compounds ts an example of

A. nucleophilic substitution

B. electrophilic addition

C. nucleophilic addition

D. electropliilic substitution.

Answer: C

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