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CHEMISTRY TEST - CHAPTER 21: ORGANIC SYNTHESIS

Name:		Roll No.		Section:

Total Time: 2:30 Hour
Time Allowed: 150 Minutes

Total Marks: 150

PAPER OBJECTIVE
SECTION-A (MARKS 150)

NOTE: Section-A is compulsory. All parts of this section are to be answered on these pages and handed over to the center superintendent. Deleting / overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

Questions	A	B	C	D	A B C D
1. Organic synthesis is the process of:	separating organic mixtures	burning organic compounds	preparing organic compounds from simpler compounds	identifying organic compounds only	○○●○
2. Converting one functional group into another is called:	polymerisation	hydrogenation	functional group interconversion	combustion	○○●○
3. Research chemists making a new compound usually work:	only forwards from random chemicals	backwards from the desired compound	only by trial and error	without any plan	○●○○
4. In industry, common starting materials are hydrocarbons from:	crude oil and its refining	sea water	air only	metal ores	●○○○
5. Common plant-derived starting materials include esters from:	fats and vegetable oils	metals	minerals	sand	●○○○
6. An extra carbon atom can be added to an organic compound by introducing the:	hydroxyl group	nitro group	nitrile (–CN) group	carbonyl group	○○●○
7. Nitriles can be made by heating an alkyl halide with:	ethanolic NaOH	ethanolic KCN	aqueous NaOH	ammonia	○●○○
8. RCN has ___ carbon atom more than RX.	no	two	one	three	○○●○
9. An RCN molecule can be hydrolysed to a carboxylic acid by refluxing with:	dilute hydrochloric acid	water at 25 °C	dilute NaOH only	ethanol	●○○○
10. An RCN molecule can be reduced to an amine using:	water	dilute HCl	aqueous NaOH	$LiAlH_4$ in dry ether	○○○●
11. The Friedel–Crafts reaction is used to add an alkyl or acyl side chain to a:	benzene ring	alcohol	double bond	nitrile	●○○○
12. The catalyst used in Friedel–Crafts reactions is:	NaOH	Ni	$AlCl_3$	H_2SO_4	○○●○
13. The reaction of benzene with CH_3CH_2Cl in the presence of $AlCl_3$ gives:	phenol	toluene	ethylbenzene	chlorobenzene	○○●○
14. The reaction of benzene with CH_3COCl in the presence of $AlCl_3$ gives:	chlorobenzene	ethylbenzene	phenylethanone (acetophenone)	benzoic acid	○○●○

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Questions	A	B	C	D	A B C D
15. The first step in converting benzene to benzenediazonium chloride is:	chlorination	nitration	sulphonation	hydration	○●○○
16. In the three-stage conversion of benzene into benzenediazonium chloride, the second stage is:	nitration	reduction of nitrobenzene to phenylamine	hydrolysis	diazotisation	○●○○
17. The last step in converting benzene to benzenediazonium chloride is:	oxidation	reaction of phenylamine with HNO_2/HCl at low temperature	esterification	nitration	○●○○
18. An orange dye is formed when benzenediazonium chloride is coupled with:	benzene	phenol	chloroethane	ethanol	○●○○
19. In a multi-step synthesis of ethanoic acid from methane, the first step is the:	free radical chlorination of methane	reduction	nucleophilic substitution	hydrolysis	●○○○
20. The reagents for the free radical substitution of methane to chloromethane are:	chlorine gas in UV light	$KMnO_4$	aqueous NaOH	HCl in water	●○○○
21. Chloromethane is converted to ethanenitrile (cyanomethane) by:	ammonia	NaOH(aq)	KCN in ethanol with heating	dilute H_2SO_4	○○●○
22. The reaction of chloromethane with KCN is:	elimination	electrophilic addition	free radical substitution	nucleophilic substitution	○○○●
23. Cyanomethane is hydrolysed to ethanoic acid by:	bromine water	refluxing with dilute acid	ethanolic NaOH	hydrogen and nickel	○●○○
24. In the synthesis of ethanoic acid from methane, the type of reaction in step 3 is:	reduction	addition	hydrolysis	polymerisation	○○●○
25. The test for unsaturation in an organic compound uses:	aqueous silver nitrate	bromine water	Tollens reagent	Fehling's solution	○●○○
26. In the bromine water test, an alkene causes the reddish-brown colour to:	turn blue	become darker	fade away	remain unchanged	○○●○
27. The reagent used to identify the halogen in a halogenoalkane is:	bromine water	aqueous silver nitrate in ethanol	iodine and NaOH	Fehling's solution	○●○○
28. A chloroalkane gives a ___ precipitate with ethanolic silver nitrate.	yellow	cream	green	white	○○○●
29. A bromoalkane gives a ___ precipitate with ethanolic silver nitrate.	black	white	yellow	cream	○○○●
30. An iodoalkane gives a ___ precipitate with ethanolic silver nitrate.	yellow	green	cream	white	●○○○
31. The reaction of RCl with $AgNO_3$ in ethanol gives AgCl and:	RCN	$ROCH_2CH_3$ (ether) and HNO_3	RCOOH	RNH_2	○●○○

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Questions	A	B	C	D	A B C D
32. The iodoform test is given by alcohols, aldehydes and:	ketones	ethers	alkanes	alkenes	●○○○
33. The reagents of the iodoform test are:	chlorine and HCl	iodine and aqueous sodium hydroxide	bromine and NaOH	iodine and HCl	○●○○
34. The positive result of the iodoform test is a:	yellow precipitate of CHI_3	blue solution	red precipitate	silver mirror	●○○○
35. The only primary alcohol that gives a positive iodoform test is:	butan-1-ol	propan-1-ol	ethanol	methanol	○○●○
36. The only aldehyde that gives a positive iodoform test is:	propanal	butanal	methanal	ethanal	○○○●
37. The ketones that give a positive iodoform test have the carbonyl group at position:	1	2	3	4	○●○○
38. The iodoform test is NOT given by:	tertiary alcohols	ethanal	propan-2-ol	ethanol	●○○○
39. The identifying test for carbonyl compounds (aldehydes and ketones) uses:	2,4-dinitrophenylhydrazine	bromine water	Tollens reagent	Fehling's solution	●○○○
40. The observation with 2,4-DNPH is a:	red precipitate	green colour	silver mirror	yellow/orange precipitate	○○○●
41. Which test is given by aldehydes only?	2,4-DNPH test	Fehling's test	Bromine water test	Iodoform test only	○●○○
42. Fehling's solution gives a ___ precipitate with aldehydes.	white	yellow	silver	red	○○○●
43. Tollens reagent gives a ___ with aldehydes.	blue solution	silver mirror	yellow precipitate	red precipitate	○●○○
44. Tollens reagent is:	alkaline copper sulphate	ammoniacal silver nitrate	acidified dichromate	iodine solution	○●○○
45. The test used to distinguish primary, secondary and tertiary alcohols (by oxidation) uses:	bromine water	ethanolic silver nitrate	2,4-DNPH	acidified potassium dichromate	○○○●
46. A primary alcohol with acidified dichromate gives an orange to ___ colour change.	red	green	colourless	blue	○●○○
47. A tertiary alcohol with acidified dichromate gives:	a blue colour	a green colour	a red colour	no colour change	○○○●
48. A secondary alcohol is oxidised to a ketone that gives no colour with:	2,4-DNPH	iodine/NaOH	Fehling's solution	acidified dichromate	○○●○

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49. The test used to identify carboxylic acids uses:	sodium carbonate (effervescence of CO_2)	Tollens reagent	Fehling's solution	bromine water	●○○○
50. Carboxylic acids react with sodium carbonate to release:	hydrogen	oxygen	carbon dioxide	nitrogen	○○●○
51. Alkanes undergo:	elimination only	electrophilic addition	free radical substitution	nucleophilic addition	○○●○
52. Alkenes and alkynes undergo mainly:	substitution reactions	no reactions	addition reactions	elimination only	○○●○
53. In an addition reaction, a ___ product is always formed.	double	mixed	single	no	○○●○
54. Alkenes are oxidised to diols by cold dilute alkaline:	$NaBH_4$	$K_2Cr_2O_7$	$LiAlH_4$	$KMnO_4$	○○○●
55. Ozonolysis of alkenes gives:	alcohols only	carboxylic acids only	aldehydes and ketones	alkanes	○○●○
56. Alkyl halides undergo two types of reactions:	oxidation and reduction only	nucleophilic substitution and elimination	dehydration and hydration	addition and polymerisation	○●○○
57. The nucleophiles used in nucleophilic substitution of alkyl halides include OH^-, NH_3 and:	H^+	CN^-	BF_3	$AlCl_3$	○●○○
58. R–X reacted with OH^- gives:	R–OH	R–CN	alkene	$R–NH_2$	●○○○
59. R–X reacted with NH_3 gives:	$R–NH_2$	alkene	R–OH	R–CN	●○○○
60. R–X reacted with CN^- gives:	R–OH	alkene	$R–NH_2$	R–CN	○○○●
61. The reagent used for the elimination reaction of alkyl halides is:	ammonia	aqueous NaOH	ethanolic NaOH	KCN	○○●○
62. Alcohols undergo oxidation, substitution, dehydration and:	esterification	polymerisation	hydrogenation	diazotisation	●○○○
63. Carbonyl compounds undergo nucleophilic addition, oxidation and:	dehydration	halogenation	reduction	polymerisation	○○●○
64. In the nucleophilic addition of HCN to a carbonyl compound, the product is a:	ester	hydroxynitrile (cyanohydrin)	amine	nitrile	○●○○
65. Aldehydes are oxidised to carboxylic acids, while ketones:	are reduced	form esters	are oxidised more easily	resist oxidation	○○○●

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66. Aldehydes are reduced to:	alkanes only	primary alcohols	secondary alcohols	tertiary alcohols	○●○○
67. Ketones are reduced to:	carboxylic acids	primary alcohols	tertiary alcohols	secondary alcohols	○○○●
68. Carboxylic acids undergo acid-base reactions and:	free radical substitution	nucleophilic addition	polymerisation	esterification	○○○●
69. The reaction of a carboxylic acid with an alcohol is called:	oxidation	hydrolysis	esterification	reduction	○○●○
70. Acidified potassium dichromate or potassium permanganate are used as:	oxidising agents	dehydrating agents	reducing agents	catalysts	●○○○
71. $NaBH_4$ reduces a carbonyl group to:	an alcohol	an ester	an acid	an alkane	●○○○
72. $LiAlH_4$ is a ___ reducing agent than $NaBH_4$.	not a	stronger	equal	weaker	○●○○
73. $LiAlH_4$ can reduce carboxylic acids to:	ketones	alkanes	aldehydes	primary alcohols	○○○●
74. H_2 with a nickel catalyst reduces a:	C–C single bond	O–H bond	C=C double bond	C–H bond	○○●○
75. A dehydrating agent is one that:	reduces a molecule	removes water from a molecule	adds water to a molecule	oxidises a molecule	○●○○
76. Common dehydrating agents are Al_2O_3 and:	NaOH	water	concentrated H_2SO_4	dilute HCl	○○●○
77. Retrosynthesis is a method that involves:	working backward from the target molecule to simple starting materials	burning the target molecule	measuring physical properties	combining reactants forward only	●○○○
78. The main difference between synthesis and retrosynthesis is that retrosynthesis:	works backward from the target compound	requires no reagents	works forward from reactants	gives only physical data	●○○○
79. In the retrosynthesis of ethyl propanoate, the precursors are propanoic acid and:	ethanoic acid	propanol	ethanal	ethanol	○○○●
80. Propanoic acid and ethanol react in the presence of H_2SO_4 to form:	propyl ethanoate and water	propanal and water	ethyl ethanoate and water	ethyl propanoate and water	○○○●
81. Retrosynthesis helps chemists to develop:	multiple pathways for a given target compound	no routes	only one fixed route	unusable routes	●○○○
82. Retrosynthesis can lead to pathways that are more:	cost-effective and environmentally friendly	expensive and polluting	dangerous	slow only	●○○○

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83. For cyano propane, the precursors are a propyl halide (e.g., chloropropane) and:	ammonia	hydroxide ion	cyanide ion	water	○○●○
84. Synthesis is a ___ process that combines building blocks to create new molecules.	backward	reverse	random	forward	○○○●
85. Retrosynthesis is a ___ process that breaks down a complex molecule.	combustion	random	backward	forward	○○●○
86. Recognising the functional groups in a molecule enables us to:	measure its melting point	find its mass only	find its colour only	predict its reactions	○○○●
87. The length of a carbon chain can be increased by:	dehydration	halogenation of alkanes only	introducing and hydrolysing nitriles	oxidation of alcohols	○○●○
88. Which of the following is used to extend a carbon chain by one carbon?	KCN	NaOH	NH_3	H_2O	●○○○
89. Which test is used to detect the presence of a CH_3CO- or $CH_3CH(OH)$- group?	Iodoform test	Bromine water test	Fehling's test	Lucas test	●○○○
90. Which of the following would give a silver mirror with Tollens reagent?	Ethanal	Ethene	Ethanol	Propanone	●○○○
91. Which of the following would decolourise bromine water?	Propane	Propene	Ethanol	Propanoic acid	○●○○
92. Which of the following gives effervescence with $NaHCO_3$?	Ethanol	Ethanal	Ethene	Ethanoic acid	○○○●
93. Which of the following gives an orange precipitate with 2,4-DNPH but no silver mirror?	Propanal	Propanone	Ethanol	Propanoic acid	○●○○
94. Which of the following gives a positive iodoform test and a silver mirror?	Propanal	Ethanal	Propanone	Ethanol	○●○○
95. Which of the following compounds gives a green colour with acidified dichromate on warming?	Ethane	Propan-1-ol	Propanone	2-Methylpropan-2-ol	○●○○
96. Which of the following gives no reaction with acidified dichromate?	Propan-2-ol	Ethanal	2-Methylpropan-2-ol	Propan-1-ol	○○●○
97. Which of the following reacts with acidified dichromate to give a ketone?	Propan-1-ol	Propan-2-ol	Ethanol	2-Methylpropan-2-ol	○●○○
98. An alkene reacts with HBr to give a halogenoalkane. This is:	electrophilic addition	free radical substitution	elimination	nucleophilic substitution	●○○○
99. Ethene to ethanol can be achieved by:	hydration with steam and phosphoric acid	halogenation	oxidation	hydrogenation	●○○○

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100. Ethanol to ethanoic acid is achieved by:	reduction	dehydration	hydrogenation	oxidation with acidified $K_2Cr_2O_7$ under reflux	○○○●
101. Ethanol to ethene is achieved by:	dehydration with Al_2O_3 or concentrated H_2SO_4	esterification	oxidation	hydrogenation	●○○○
102. Ethene to 1,2-dibromoethane is achieved by:	dehydration	hydrolysis	substitution with HBr	addition of bromine	○○○●
103. Bromoethane to ethanol is achieved by:	heating with ethanolic NaOH	reacting with Br_2	heating with aqueous NaOH	reacting with H_2	○○●○
104. Bromoethane to ethene is achieved by:	heating with ethanolic NaOH	heating with aqueous NaOH	reacting with water	reacting with KCN	●○○○
105. Bromoethane to propanenitrile is achieved by:	heating with ethanolic KCN	reacting with HBr	heating with aqueous NaOH	reacting with $LiAlH_4$	●○○○
106. Propanenitrile to propanoic acid is achieved by:	reducing with $LiAlH_4$	dehydration	refluxing with dilute HCl	oxidising with $K_2Cr_2O_7$	○○●○
107. Propanenitrile to propylamine is achieved by:	dehydration	oxidation	hydrolysis with HCl	reduction with $LiAlH_4$	○○○●
108. Ethanol to propanoic acid in three stages involves: conversion to a halogenoalkane, to a nitrile and then:	dehydration	oxidation	reduction	hydrolysis	○○○●
109. Propene to propan-2-ol is achieved by:	dehydration	hydration (acid-catalysed addition of water)	oxidation	reduction	○●○○
110. Propene to 1,2-propanediol is achieved by:	$NaBH_4$	cold dilute alkaline $KMnO_4$	$LiAlH_4$	hot concentrated $KMnO_4$	○●○○
111. Propanone to propan-2-ol is achieved by:	reduction with $NaBH_4$	oxidation with $KMnO_4$	esterification	dehydration	●○○○
112. Propanone to 2-hydroxy-2-methylpropanenitrile is achieved by:	reaction with NaOH	reaction with HCN	oxidation	reaction with NH_3 only	○●○○
113. Hydrolysis of 2-hydroxy-2-methylpropanenitrile with acid gives:	2-hydroxy-2-methylpropanoic acid	propanoic acid	2-methylpropan-2-ol	2-methylpropanoic acid	●○○○
114. The product of the reaction of propanone with HCN followed by acid hydrolysis is:	an ether	an amine	a hydroxy acid	an ester	○○●○
115. Butanedioic acid can be synthesised from 1,2-dibromoethane by treating with KCN and then:	oxidising	reducing with $LiAlH_4$	dehydrating	hydrolysing the dinitrile	○○○●
116. Reaction of 1,2-dibromoethane with KCN gives:	butanedinitrile	ethane-1,2-diamine	ethene	ethane-1,2-diol	●○○○

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117. Reduction of butanedinitrile with $LiAlH_4$ gives:	butane	butane-1,4-diamine	butanedioic acid	butane-1,4-diol	○●○○
118. Nylon 66 is made from a diamine and a:	diol	diketone	dicarboxylic acid	dihalide	○○●○
119. Hexanedioic acid is one of the monomers of:	PVC	polyethene	polystyrene	nylon 66	○○○●
120. A compound with two functional groups such as burnt sugar may give positive tests with 2,4-DNPH and Fehling's reagent due to:	only a carboxyl group	only an ether group	a carbonyl group and an aldehyde group	only an alcohol group	○○●○
121. A compound that reacts with its own oxidation product to give a sweet-smelling liquid is:	ethane	ethene	ethanal	ethanol	○○○●
122. The sweet-smelling liquid formed from an alcohol and an acid is:	an alkene	an amine	an ester	an ether	○○●○
123. A chemist wants to convert propan-1-ol to propanoic acid. The best reagent is:	H_2/Ni	$NaBH_4$	$LiAlH_4$	acidified $K_2Cr_2O_7$ under reflux	○○○●
124. A chemist wants to convert propanoic acid to propan-1-ol. The best reagent is:	$NaBH_4$ in water	$K_2Cr_2O_7$	dilute HCl	$LiAlH_4$	○○○●
125. A chemist wants to convert propanal to propan-1-ol. The best reagent is:	$NaBH_4$	acidified dichromate	Fehling's solution	Tollens reagent	●○○○
126. A chemist wants to prepare ethanal from ethanol without further oxidation. The best method is to:	add $NaBH_4$	distil the aldehyde as it forms	reflux with excess oxidant	add HCl	○●○○
127. An unknown organic compound decolourises bromine water, burns with a sooty flame and does not react with $NaHCO_3$. It is likely to be an:	carboxylic acid	alcohol	alkane	alkene	○○○●
128. An unknown compound gives effervescence with Na_2CO_3 and forms a sweet-smelling liquid with ethanol. It is a:	ketone	carboxylic acid	alkene	ether	○●○○
129. An unknown liquid gives an orange precipitate with 2,4-DNPH and a silver mirror with Tollens reagent. It is an:	ketone	ester	alcohol	aldehyde	○○○●
130. An unknown liquid gives an orange precipitate with 2,4-DNPH but no silver mirror. It is a:	ketone	carboxylic acid	alcohol	aldehyde	●○○○
131. An unknown halogenoalkane gives a cream precipitate with ethanolic $AgNO_3$, which dissolves partly in concentrated NH_3. The halogen is:	iodine	bromine	chlorine	fluorine	○●○○
132. The conversion of an alkane to a halogenoalkane requires:	acidified dichromate	KCN	aqueous NaOH	chlorine in UV light	○○○●
133. The conversion of a halogenoalkane to an alcohol requires:	KCN in ethanol	ethanolic NaOH	aqueous NaOH and heat	acidified dichromate	○○●○

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134. The conversion of a halogenoalkane to an alkene requires:	KCN in ethanol	ethanolic NaOH and heat	aqueous NaOH and heat	dilute HCl	○●○○
135. The conversion of an alkene to an alkane requires:	HBr	Br_2	$KMnO_4$	H_2 with a nickel catalyst	○○○●
136. The conversion of an alkene to a halogenoalkane requires:	HX at room temperature	KCN	$LiAlH_4$	NaOH	●○○○
137. The conversion of an alcohol to a halogenoalkane requires:	KCN	H_2/Ni	NaOH	PCl_5 or $SOCl_2$	○○○●
138. The conversion of an alcohol to an alkene requires:	a reducing agent	an oxidising agent	a nucleophile	a dehydrating agent such as Al_2O_3	○○○●
139. The conversion of a nitrile to a carboxylic acid requires:	esterification	hydrolysis with dilute acid	dehydration	oxidation	○●○○
140. The conversion of a nitrile to an amine requires:	dehydration	hydrolysis	oxidation	reduction with $LiAlH_4$	○○○●
141. The conversion of an ester to a carboxylic acid and alcohol is called:	reduction	esterification	oxidation	hydrolysis	○○○●
142. The conversion of a carboxylic acid to an ester requires:	an alcohol and concentrated H_2SO_4	$LiAlH_4$	NaOH	$KMnO_4$	●○○○
143. The conversion of nitrobenzene to phenylamine requires:	HNO_3	H_2O	Sn/HCl	NaOH	○○●○
144. The conversion of phenylamine to a diazonium salt requires:	NaOH	$KMnO_4$	$NaNO_2$/HCl below 10 °C	HNO_3	○○●○
145. The coupling of a diazonium salt with phenol produces:	an ester	an azo dye	a nitrile	an amide	○●○○
146. The reaction of an aldehyde with Fehling's solution is an example of:	oxidation of the aldehyde	dehydration	reduction of the aldehyde	esterification	●○○○
147. The reaction of an alcohol with sodium to give hydrogen is an example of:	an addition reaction	polymerisation	an acid–base (redox) reaction	elimination	○○●○
148. Multistep synthesis requires knowledge of:	nothing in particular	only the physical properties of compounds	reactions and conditions of each homologous series	only the colours of compounds	○○●○
149. In a synthetic route, each step involves a specific:	mass change only	colour change only	random reagent	reagent and reaction condition	○○○●
150. A flow chart of important organic reactions helps students to:	plan synthetic routes	find atomic masses	measure densities	test acids only	●○○○

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