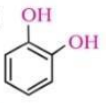
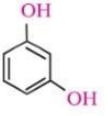
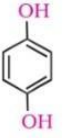
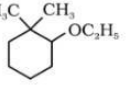
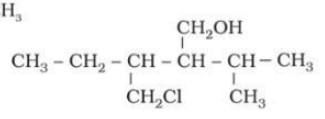
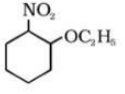
Chapter 5
ALCOHOLS, PHENOLS AND ETHERS

INTRODUCTION

1. Allylic and benzylic alcohols may be primary, secondary or tertiary. T/F
2. Draw sec-Butyl alcohol.
3. Common name of $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$ is -
4. Draw isobutyl alcohol.
5. For naming polyhydric alcohols, the 'e' of alkane is replaced by 'ol'. T/F
6. Draw ortho-cresol.
7. Common name of - (i)  (ii)  (iii) 
8. Draw Anisole. (NEET)
9. Draw Phenetole.
10. Common name of - $C_6H_5-O-CH_2-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH_3$
11. IUPAC name of - (i)  (iii) 

(ii)  (iv) $H_2C=CH-\underset{\underset{OH}{|}}{CH}-CH_2-CH_2-CH_3$

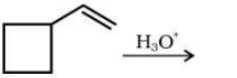
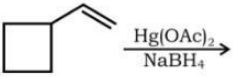
12. The bond angle in alcohols is slightly more than the tetrahedral angle. T/F
13. Bond angle in ether is slightly higher than alcohol because -

ALCOHOLS AND PHENOLS

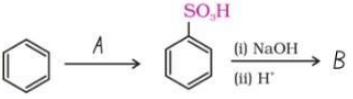
PREPARATION OF ALCOHOLS

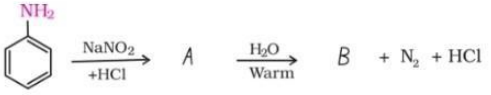
14. $CH_3-CH=CH_2 \xrightarrow[D_3O^+]{H_2O}$

15. $CH_3-CH=CH_2 \xrightarrow[H_3O^+]{D_2O}$

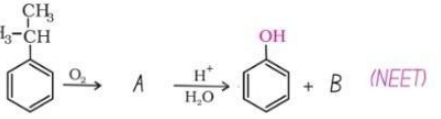
16. _____ on reaction with B2H6 give trialkyl boranes.
17. Syn/Anti addition takes place in B2H6.
18. Hydroboration oxidation Rxn follow markovnikov/anti-markovnikov rule.
19. Ring expansion and rearrangement takes place in HBO (Hydroboration-oxidation). T/F
20. $CH_3-CH=CH_2 + (BH_3)_2 \xrightarrow{H_2O/OH^-}$
21. $CH_3-CO-CH=CH_2 + (BH_3)_2 \xrightarrow{H_2O/OH^-}$
22. Reagents used in Oxymercuration demercuration (OMDM) rxn are - (2)
23. Syn/anti addition takes place in OMDM.
24. No ring expansion and rearrangement takes place in OMDM. T/F
25. $CH_3-CH=CH_2 + H_2O \xrightarrow{Hg(CH_3COO)_2/NaBH_4}$
26. 
27. 
28. 
29. RCHO + H2/Pd →
30. RCOR' + NaBH4/H2O →
31. Esters, carboxylic acids and acid chloride are only reduced by LiAlH4/NaBH4.
32. LiAlH4 and NaBH4 do not reduce C=C. T/F
33. Reducing agents which reduce = bond are - (4)
34. Ester $\xrightarrow{LiAlH_4/H_3O^+}$
35. $CH_3CHO \xrightarrow{LiAlD_4/H_3O^+}$
36. $CH_3CHO \xrightarrow{LiAlH_4/D_3O^+}$
37. Commercially acids are converted to alcohol by -
38. R-CO-R + R'-MgX after hydrolysis give -
39. Ester on rxn with Grignard reagent produces 1°/2°/3° alcohol.

PREPARATION OF PHENOLS

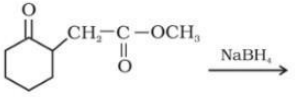
40. Phenol is also known as -
41. A + NaOH $\xrightarrow{623K/300atm}$ B, B on acidification → Phenol, Identify A & B.
42. 

43. 

44. Draw cumene.

45. 

(NEET)

46. 

PHYSICAL AND CHEMICAL PROPERTIES

47. The solubility of alcohol decreases with increase in size of the alkyl/aryl group. T/F

48. Phenol is more acidic than alcohol. T/F

49. Water is more acidic than methanol. T/F

50. Phenol is a stronger acid than water. T/F

51. Phenol molecules are more stable than phenoxide ions. T/F

52. Arrange o-nitrophenol, p-nitrophenol, m--nitrophenol in order of acidic strength.

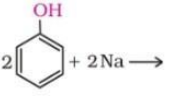
53. Arrange o-fluorophenol, p-fluorophenol, m-fluorophenol in order of acidic strength.

54. Arrange o-cresol, p-cresol and m-cresol in order of acidic strength.

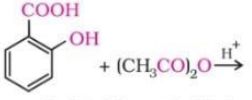
55. Arrange o-methoxyphenol, p-methoxyphenol and m-methoxyphenol in order of acidic strength.

CHEMICAL REACTION OF ALCOHOL

56. ROH + Na →

57. 

58. The reaction with acid chloride is carried out in the presence of a _____ so as to neutralise HCl which is formed during the reaction.

59. 

60. Arrange Cl-,OH-,RO- and R-CO-O- in order of their leaving tendency.

61. Lucas reagent is - (NEET)

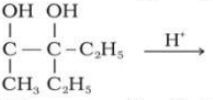
62. Lucas test is a test to find -

63. How does Lucas reagent differentiate between 1°,2°,3° alcohol? (NEET)

64. How does Lucas reagent cause turbidity ?

65. Order of 1°, 2°, 3° alcohol in its ease of dehydration is -

66. Dehydration of alcohol happens by treating it with - (5)

67. 

68. RCH2OH (in presence of acidified KMnO4) →

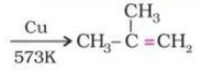
69. RCH2OH (in presence of CrO3) →

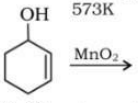
70. CH3-CH=CH-CH2OH (in presence of PCC) →

71. Sec-alcohols are oxidised to _____ in CrO3.

72. RCH2OH $\xrightarrow{Cu/573K}$

73. R-CH(OH)-R' $\xrightarrow{Cu/573K}$ (NEET)

74. 

75. 

76. MnO2 oxidises only allylic or benzylic alcohol. T/F

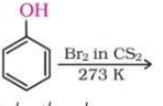
CHEMICAL REACTIONS OF PHENOL

77. Ortho and para nitrophenol can be separated by _____ technique. (NEET)

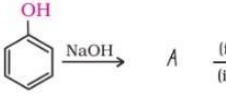
78. p-nitrophenol has intra/intermolecular H bonding.

79. Direct nitration of phenol by conc. HNO3 gives poor yields of picric acid. T/F

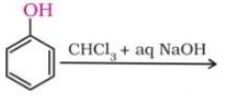
80. To get good yields of picric acid, what is done?

81. Major and minor products formed are - 

82. Phenol + Br2/H2O → A. Identify A and also its colour.

83. 

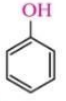
84. Reagents in Reimer-Tiemann reaction are -

85.  (NEET)

86. Intermediate electrophile formed in Rimer-tiemann reaction that attack benzene is - (NEET)

87.  $\xrightarrow[NaOH]{CHCl_3}$

88.  + Zn ⟶

89.  $\xrightarrow[H_2SO_4]{Na_2Cr_2O_7}$

SOME COMMERCIALLY IMPORTANT ALCOHOLS

90. Methanol is also known as -

91. $CO + 2H_2 \xrightarrow[200\text{-}300\ atm\ 573\text{-}673\ K]{ZnO\text{-}Cr_2O_3}$

92. C12H22O11 + H2O ⟶ Glucose + Fructose, enzyme used in this rxn -

93. Glucose ⟶ C2H5OH + CO2, enzyme used in this rxn -

94. Action of zymase is inhibited once the % of alcohol formed reaches ___%.

95. Commercial alcohol is made unfit for drinking by mixing - (2)

96. The above process is called -

ETHERS

PREPARATION OF ETHERS

97. CH3CH2OH $\xrightarrow{H_2SO_4/443K}$

98. Alcohol in low temp. conditions form ether. T/F

99. Ether formation is a Sn1/Sn2 reaction.

100. Write Williamson synthesis reaction - (NEET)

101. If 3° alkoxide ion is used, no ether is formed. T/F

102. If 3° alkyl halide is used, no ether is formed. T/F

103. The B.P. of alcohol is less than ether for the same molar mass. T/F

CHEMICAL REACTIONS

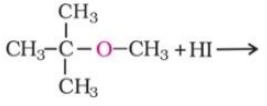
104. Least reactive functional group is -

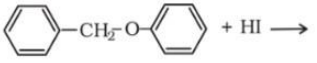
105. Aryl-oxygen bond is more stable than alkyl-oxygen bond. T/F

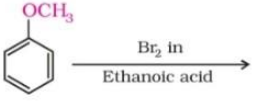
106. The order of reactivity of hydrogen halides with ether is -

107. CH3-O-CH2-CH3 + HI ⟶

108. If a tertiary alkyl group is present in the ether, the reaction process through ____ mechanism, otherwise it proceed through ____

109. 

110. 

111. 

112. Victor meyer test is not given by 1°/ 2°/ 3° alcohol. (NEET)

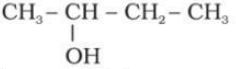
113. Aspirin is acetylation product of - (NEET)

114. Oil of winter green is - (NEET)

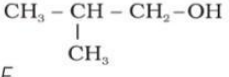
ANSWERS

• INTRODUCTION

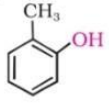
1. T

2. 

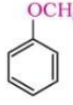
3. Isopropyl alcohol

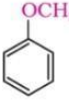
4. 

5. F

6. 

7. Catechol, resorcinol, hydroquinone or quinol

8. 

9. 

10. Phenyl Isopentyl ether

11. (i) 2-Ethoxy-1,1-dimethylcyclohexane

(ii) 1-Ethoxy-2-nitrocyclohexane

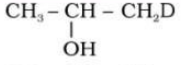
(iii) 4-Chloro-3-ethyl-2-(1-methylethyl)-butan-1-ol

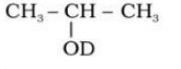
(iv) Hex-1-en-3-ol

12. F

13. Of repulsion between bulky alkyl groups on either side of O

• ALCOHOLS AND PHENOLS

14. 

15. 

16. Alkene

17. Syn

18. Anti-markovnikov rule

19. F

20. CH3-CH2-CH2-OH

21. CH3-CO-CH(OH)-CH3, this product is formed because the terminal carbon have partial +ve charge due to resonance with C=O

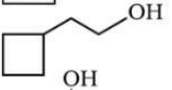
22. Hg(CH3COO)2/NaBH4

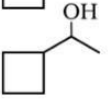
23. Anti

24. T

25. CH3-CH(OH)-CH3

26. 

27. 

28. 

29. R-CH2-OH

30. R-CH(OH)-R'

31. LiAlH4

32. T

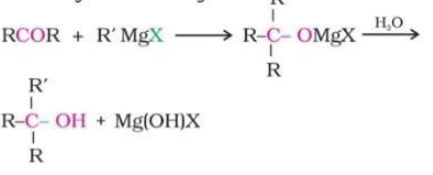
33. Pd/H2, B2H6, Na/Ethanol, Raney Ni/H2

34. Alcohol

35. CH3-CH(OH)-D

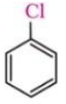
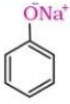
36. CH3-CH2-OD

37. By converting them to esters followed by reduction using H2/Pd (or any other metal)

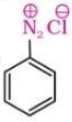
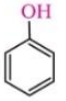
38. 

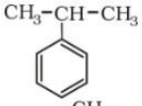
39. 3°

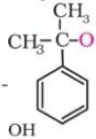
40. Carbolic acid

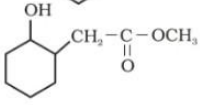
41. A -  B - 

42. A - Oleum, B - Phenol

43. A -  B - 

44. 

45. A -  B - CH_3COCH_3

46. 

47. T

48. T

49. F

50. T

51. F

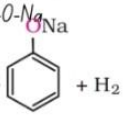
52. p-nitrophenol > o-nitrophenol > m--nitrophenol

53. o > p > m

54. m > p > o

55. m > o > p

56. R-O-Na

57. 

58. base(pyridine)

59. 

60. Cl- > R-COO- > OH- > RO- [Tip - Strong acid have good leaving conjugate base. As HCl > RCOOH > H2O > ROH in terms of acidity, their conjugate base stability order is also the same and hence the leaving tendency]

61. ZnCl2/HCl

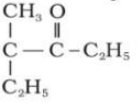
62. the 'degree' of alcohol, i.e. 1°, 2°, 3°

63. 1° alcohol - No turbidity, 2° alcohol - Turbidity after 5 min, 3° alcohol - turbidity immediate

64. R-OH + Lucas reagent → R-X, which in insoluble in Lucas reagent hence give turbidity

65. 3° > 2° > 1°

66. Protic acid (eg. -Conc. H2SO4 or H3PO4), P2O5/Δ, Al2O3/Δ, ZnCl2, POCl3/Pyridine

67.  This is pinacole, pinacolone rearrangement reaction

68. R-COOH

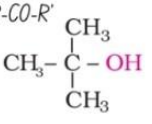
69. RCHO

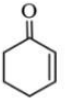
70. CH3-CH=CH-CHO

71. Ketone

72. RCHO

73. R-CO-R'

74. 

75. 

76. T

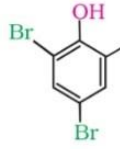
77. Steam distillation

78. Intermolecular H bonding

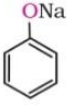
79. T

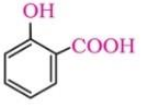
80. First phenol is sulphonated than nitrated

81. 

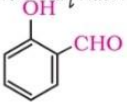
82. 

white precipitate

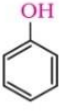
83. A - 

B - 

84. $CHCl_3$ + aq NaOH

85. 

86. CCl_2 (dichlorocarbene)

87. 

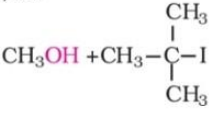
88.  + ZnO

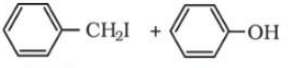
89. 

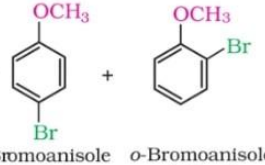
90. Wood spirit
91. CH_3OH
92. Invertase
93. Zymase
94. 14
95. $CuSO_4$ (to give it a colour) and pyridine (a foul smelling liquid)
96. Denaturation of alcohol

• ETHERS

97. $CH_2=CH_2$
98. T
99. Sn2
100. R-X + R-O-Na+ → R-O-R' + NaX
101. F
102. T
103. F
104. Ether
105. T
106. HI > HBr > HCl
107. CH3-I, CH3-CH2-OH
108. SnI, Sn2

109. 

110. 

111. 

p-Bromoanisole (Major) o-Bromoanisole (minor)

112. 3° [Victor mayer give red colour with 1°, blue colour with 2° and remains colourless with 3° alcohol as no reaction with HNO2 occur]
113. Salicylic acid
114. Methyl salicylate