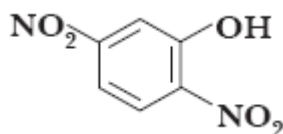
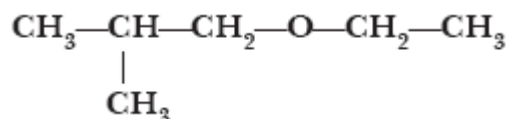


# 11. ALCOHOLS, PHENOLS AND ETHERS

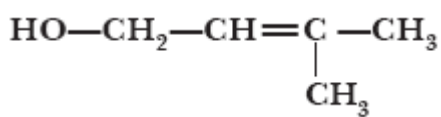
1 Write the IUPAC name of the given compound:



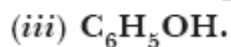
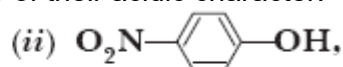
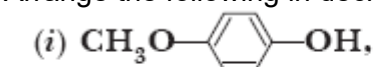
2 Write the IUPAC name of the given compound:



3 Write the IUPAC name of the given compound:

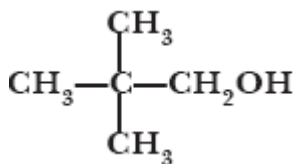


4 Arrange the following in decreasing order of their acidic character:

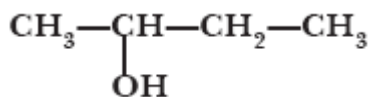


5 Name a compound which is used as antiseptic as well as disinfectant.

6 Write IUPAC name of the following:



7 Write IUPAC name of the compound:



8 Convert anisole to *p*-Bromoanisole

9 Draw the structural formula of 2-methylpropan-2-ol molecule.

10 Draw the structure of hex-1-en-3-ol compound.

11 Draw the structure of 2, 6-dimethylphenol.

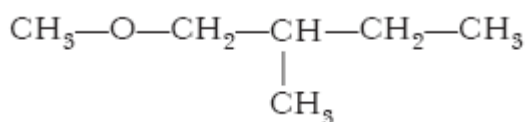
12 Write the structure of the following compound:

2-methyl-2-ethoxypentane

13 How is *t*-butyl alcohol obtained from acetone?

14 Illustrate with examples the limitations of Williamson's synthesis for the preparation of certain types of ethers. 1

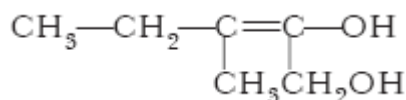
15



1

Write the IUPAC name of the following compound:

16



1

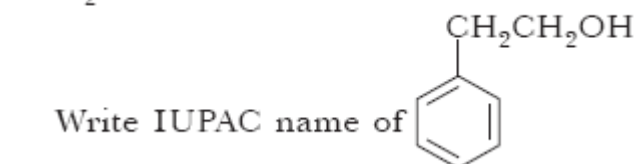
Write the IUPAC name of the compound given below.

17 Explain a process in which a biocatalyst is used in industrial preparation of compound known to you. 1

18 Name the factors responsible for the solubility of alcohols in water. 1

19 What is denatured alcohol? 1

20 (a) Arrange the following compounds in decreasing order of acidity. (b)



1

21 How are following conversions carried out?

(i) Propene to Propan-2-ol

2

(ii) Ethyl chloride to Ethanal

22 Name the reagents used in the following reactions:

(i) Bromination of phenol to 2,4,6-tribromophenol

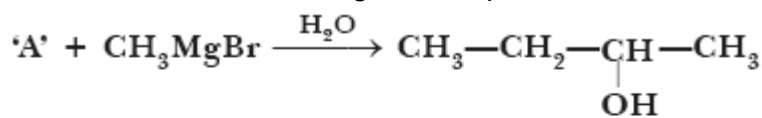
(ii) Butan-2-one to Butan-2-ol

2

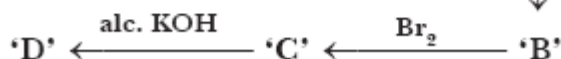
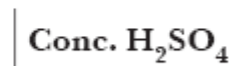
(iii) Friedel-Crafts alkylation of anisole

(iv) Oxidation of primary alcohol to carboxylic acid.

23 Write the structural formulae of the organic compounds 'A', 'B', 'C' and 'D' in the following sequence of

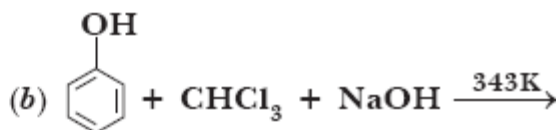
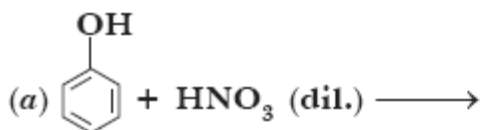


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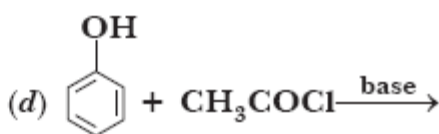
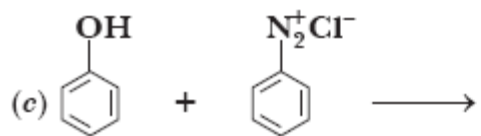


reactions:

24 Complete the following:



2



25 Etherial solution of an organic compound 'A' when heated with magnesium gave 'B'. 'B' on treatment with ethanal followed by acid hydrolysis gave 2-propanol. Identify the compound 'A'. What is 'B' known as?

2

26 Give one chemical test each to distinguish between the following pairs of compounds :

(i) Phenol and Benzoic acid

2

(ii) 1-Propanol and 2-Propanol

27 How will you distinguish between the following pairs by chemical reactions?

(i) CH<sub>3</sub>OH and C<sub>2</sub>H<sub>5</sub>OH

(ii) Phenol and methanol

2

(iii) 1-Propanol and 2-methyl-2-propanol

(iv) Ethanol and 1-propanol?

28 How would you obtain

(i) Picric acid (2, 4, 6-trinitrophenol) from phenol,

2

(ii) 2-Methylpropene from 2-methylpropanol?

29 Write the reactions and the conditions involved in the conversion of :

(a) Propene to 1-Propanol (b) Phenol to Salicylic acid

2

30 How are the following conversions carried out? (Write the reactions and conditions in each case) :

(i) Ethanol to 2-propanol

2

(ii) Phenol to Acetophenone

31 How are following conversions done?

(i) 1-Propanol to 1-Bromopropane

(ii) 1-Chloropropane to 1-Propanol

2

(iii) 2-Methyl-1-pentene to 2-Methyl-2-pentanol

(iv) Phenol to Phenyl ethanoate.

32 Name the enzymes and write the reactions involved in the preparation of ethanol from sucrose by fermentation.

2

33 Write steps to carry out the conversion of phenol to aspirin.

2

34 Out of 2-chloroethanol and ethanol which is more acidic and why?

2

35 Arrange the following compounds in increasing order of acidity and give a suitable explanation.

Phenol, o-nitrophenol, o-cresol

2

The presence of electron withdrawing group increases acidic strength, whereas presence of electron releasing group decreases acid strength.

36 In Kolbe's reaction, instead of phenol, phenoxide ion is treated with carbon dioxide. Why? 2

37 Give reasons for the following:

- (i) Phenol is more acidic than methanol. 3
- (ii) The C—O—H bond angle in alcohols is slightly less than the tetrahedral angle ( $109^{\circ}28'$ ).
- (iii)  $(\text{CH}_3)_3\text{C—O—CH}_3$  on reaction with HI gives  $(\text{CH}_3)_3\text{C—I}$  and  $\text{CH}_3\text{—OH}$  as the main products and not  $(\text{CH}_3)_3\text{C—OH}$  and  $\text{CH}_3\text{—I}$ .

38 
$$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{HBr}} \text{CH}_3\text{CH}_2\text{Br} + \text{H}_2\text{O}$$

- (a) Write the mechanism of the following reaction: 3
- (b) Write the equation involved in Reimer-Tiemann reaction.

39 Account for the following:

- (i) The boiling points of alcohols decrease with increase in branching of the alkyl chain. 3
- (ii) Phenol does not give protonation reaction readily.
- (iii) Phenylmethyl ether reacts with HI to give Phenol and Methyl iodide and not Iodobenzene and Methyl alcohol.

40 How would you convert the following:

- (i) Phenol to benzoquinone 3
- (ii) Propanone to 2-methylpropan-2-ol
- (iii) Propene to propan-2-ol

41 Name the reagents used in the following reactions :

- (i) Benzyl alcohol to benzoic acid. 3
- (ii) Dehydration of propan-2-ol to propene.
- (iii) Butan-2-one to butan-2-ol.

42 (i)  $\text{CH}_3\text{—CH=CH}_2 \xrightarrow[\text{(ii) } 3\text{H}_2\text{O}_2/\text{OH}^-]{\text{(i) B}_2\text{H}_6} ?$

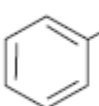
(ii)  $\text{C}_6\text{H}_5\text{—OH} \xrightarrow{\text{Br}_2(\text{aq})} ?$  3

Predict the products of the following reaction: (iii)  $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Cu}/573\text{K}} ?$

43 Draw the structure and name the product formed if the following alcohols are oxidized. Assume that an excess of oxidizing agent is used.

- (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$  3
- (ii) 2-butenol
- (iii) 2-methyl-1-propanol

44 (i)  $\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—O—CH}_3 + \text{HBr} \longrightarrow$

(ii)  + HBr  $\longrightarrow$  3

(iii)  $(\text{CH}_3)_3\text{C—OC}_2\text{H}_5 \xrightarrow{\text{HI}}$

State the products of the following reactions:

45 (a) Write the mechanism of the following reaction:  $2\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{H}^+} \text{CH}_3\text{CH}_2\text{—O—CH}_2\text{CH}_3$  (b) 3

Write the equation involved in the acetylation of Salicylic acid.

46 Give reasons:

- (i) p-nitro phenol is more acidic than p-methyl phenol.
- (ii) Bond length of C—O bond in phenol is shorter than that in CH<sub>3</sub>OH.
- (iii) (CH<sub>3</sub>)<sub>3</sub>CBr on reaction with CH<sup>3</sup>O—Na<sup>+</sup> gives alkene as major product and not an ether.

3

47 How do you convert the following:

- (i) Aniline to phenol.
- (ii) Prop-1-ene to propan-1-ol
- (iii) Anisole to 2-methoxy toluene

3

48 What happens when:

- (i) Ethanol is treated with Cu at 573 K.
- (ii) Phenol is treated with CH<sub>3</sub>COCl/anhydrous AlCl<sub>3</sub>
- (iii) Ethyl chloride is treated with NaOCH<sub>3</sub>?

3

49 How do you convert the following:

- (i) Phenol to 2-hydroxy acetophenone
- (ii) Ethyl chloride to methoxy ethane,
- (iii) Acetone to 2-methyl propan-2-ol.

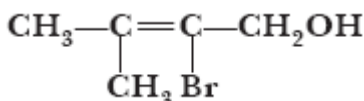
3

50 (a) Give mechanism of preparation of alcohols from alkenes (Acid catalysed hydration).

(b) How are the following obtained

- (i) Toluene from phenol
- (ii) Phenol from aniline.

5



(c) Write IUPAC names of the following:

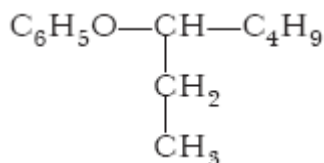
51 (a) Give reason for the following:

- (i) o-nitrophenol is more acidic than o-methoxyphenol.
- (ii) C—O bond in phenol is much shorter than ethanol.
- (b) Give chemical test to distinguish between the following pair of compounds:

- (i) Ethanol and phenol
- (ii) Methanol and propan-2-ol

(c) Write IUPAC name of the following:

5

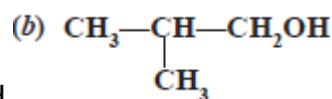


52 The heating of phenyl methyl ether with HI produces

- (a) Iodobenzene (b) Phenol
- (c) Benzene (d) Ethyl chloride

1

53

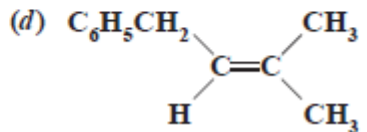
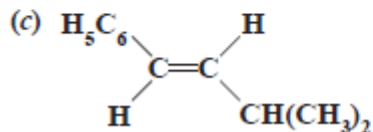
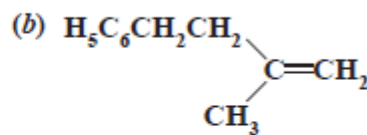
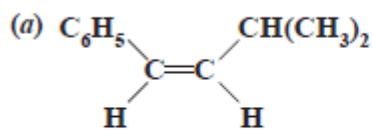


Which of the following gives positive iodoform test? (a) C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>CH<sub>2</sub>OH

(c) PhCHOHCH<sub>3</sub> (d) CH<sub>3</sub>CH<sub>2</sub>CH(OH)CH<sub>2</sub>CH<sub>3</sub>

1

54  $C_6H_5CH_2CH(OH)CH(CH_3)_2 \xrightarrow{\text{Conc. } H_2SO_4}$  is



55  $CH_3-O-CH(CH_3)_2 + HI \rightarrow$  Products is/are  
 (a)  $ICH_2OCH(CH_3)_2$  (b)  $CH_3OC(CH_3)_2I$   
 (c)  $CH_3I + (CH_3)_2CHOH$  (d)  $CH_3OH + (CH_3)_2CHI$

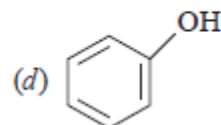
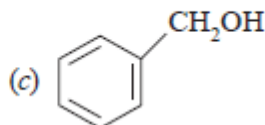
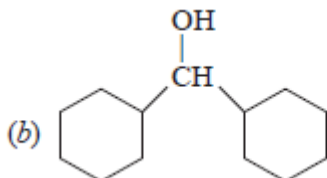
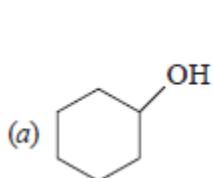
56 Phenol  $\xrightarrow{\text{Zn, dust}}$  'X'  $\xrightarrow[\text{Anhy. } AlCl_3]{CH_3Cl}$  'Y'  $\xrightarrow[\text{KMnO}_4]{\text{Alkaline}}$  'Z'

The product 'Z' is

(a) Benzaldehyde (b) Benzoic acid (c) Benzene

(d) Toluene

57 Which one of the following compounds has the most acid nature?



58 Among the following sets of reactants which one produces anisole?

(a)  $CH_3CHO : RMgX$  (b)  $C_6H_5OH; NaOH, CH_3I$

(c)  $C_6H_5OH, \text{neutral } FeCl_3$  (d)  $C_6H_5-CH_3; CH_3COCl; AlCl_3$

59 The electrophile involved in Reimer-Tiemann reaction of phenol with  $CHCl_3$  in presence of  $NaOH$  is

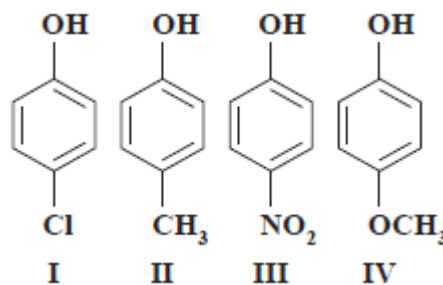
(a)  $:CCl_2$

(b)  $\ominus CCl_3$

(c)  $\oplus CHO$

(d)  $\oplus CHCl_2$

60

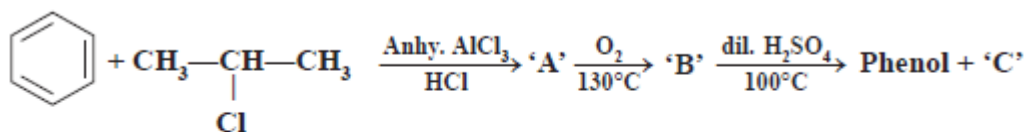


Arrange the following in decreasing order of acidic character:

> I > II (b) II > IV > I > III (c) I > II > III > IV (d) III > I > II > IV

61  $(CH_3)_3CONa + CH_3CH_2Cl \xrightarrow{-NaCl} (CH_3)_3COC_2H_5$  is called (a) Etard reaction (b) Gattermann Koch reaction  
 (c) Williamson synthesis (d) Esterification

62



(a) Water

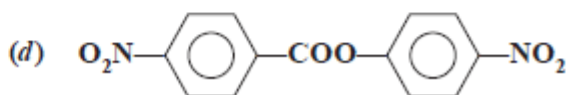
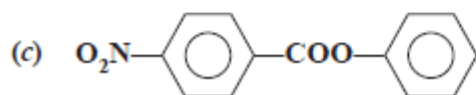
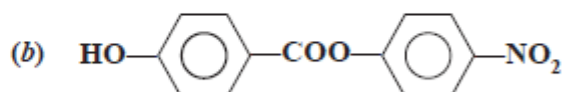
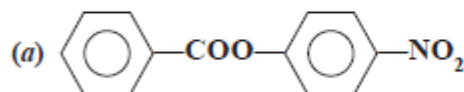
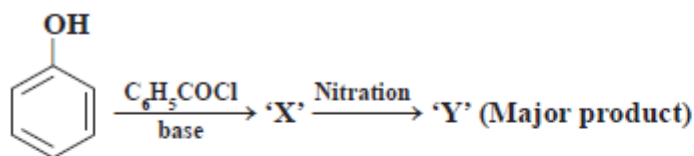
(b) Ethanol

Identify 'C' in the following:

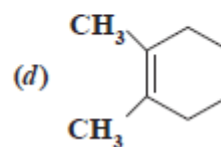
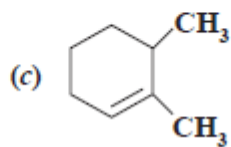
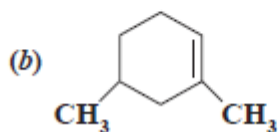
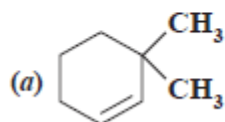
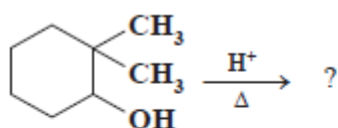
(c) Propanone

(d) Cumene hydroperoxide

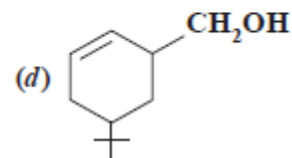
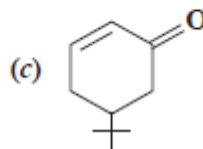
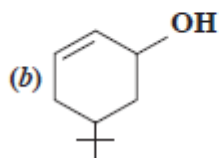
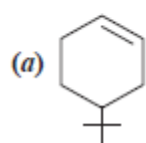
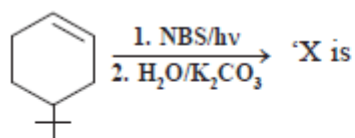
63



64 Find the product of the given reaction:



65

66 How many alcohols with molecular formula  $\text{C}_4\text{H}_{10}\text{O}$  are chiral in nature?

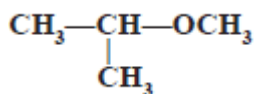
- (a) 1 (b) 2
- 
- (c) 3 (d) 4

67

What is the correct order of reactivity of alcohols in the following reaction?  $\text{R-OH} + \text{HCl} \xrightarrow{\text{ZnCl}_2} \text{R-Cl} + \text{H}_2\text{O}$

- (a)
- $1^\circ > 2^\circ > 3^\circ$
- (b)
- $1^\circ < 2^\circ > 3^\circ$
- 
- (c)
- $3^\circ > 2^\circ > 1^\circ$
- (d)
- $3^\circ > 1^\circ > 2^\circ$

68

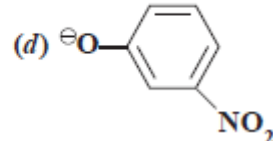
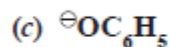
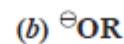
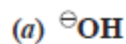


IUPAC name of the compound  
 (a) 2-methoxy-2-methylethane  
 (b) 2-methoxypropane  
 (c) isopropylmethyl ether

is \_\_\_\_\_ . (a) 1-methoxy-1-methylethane

1

69



1

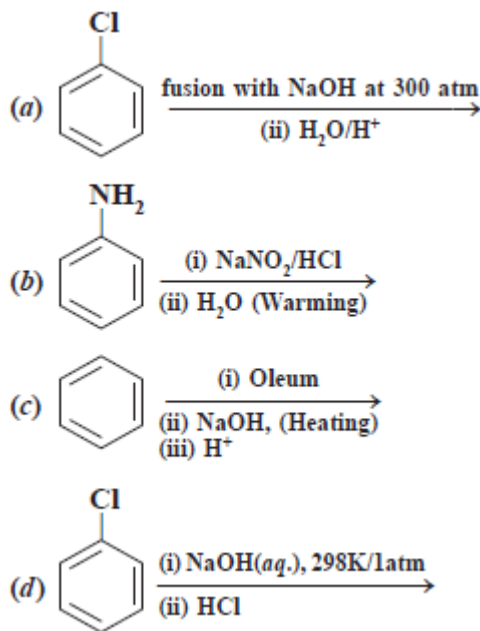
Which of the following species can act as the strongest base?

70 Which of the following are used to convert RCHO into RCH<sub>2</sub>OH?

- (a) H<sub>2</sub>/Pd  
 (b) LiAlH<sub>4</sub>  
 (c) NaBH<sub>4</sub>  
 (d) Reaction with RMgX followed by hydrolysis

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71



1

Which of the following reactions will yield phenol?

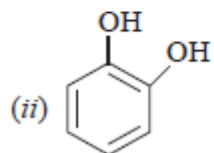
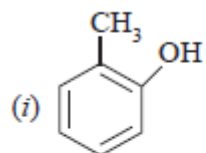
72 Which of the following reagents can be used to oxidise primary alcohols to aldehydes? [NCERT Exemplar Problem]

- (a) CrO<sub>3</sub> in anhydrous medium.  
 (b) KMnO<sub>4</sub> in acidic medium.  
 (c) Pyridinium chlorochromate.  
 (d) Heat in the presence of Cu at 573K.

1



## Column I



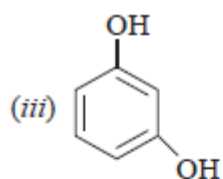
## Column II

(a) Hydroquinone

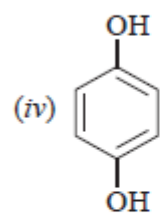
(b) Phenetole

pounds given in Column I with

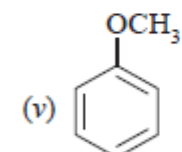
Match the structures of the compounds given in Column I with the name of the compounds given in Column II.



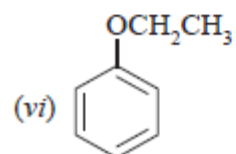
(c) Catechol



(d) *o*-Cresol



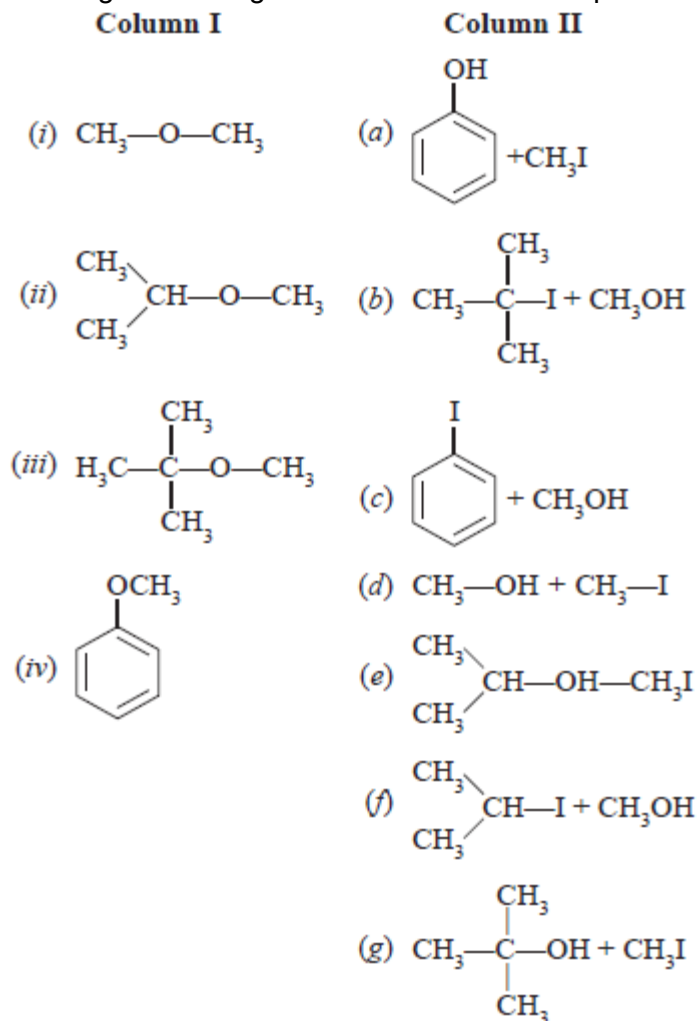
(e) Quinone



(f) Resorcinol

(g) Anisole

74 Match the starting materials given in Column I with the products formed by these (Column II) in the reaction



with HI.

75 Phenol reacts with  $\text{Br}_2$  in  $\text{CS}_2$  to give \_\_\_\_\_ as major product.

76 Phenol gives o and p-nitrophenol with \_\_\_\_\_ .

77 o-nitrophenol has \_\_\_\_\_ melting point than p-nitrophenol.

78 Diethyl ether has dipole moment because they are bent molecule. [True/False]

79 Ethers have lower boiling point than alcohol. [True/False]

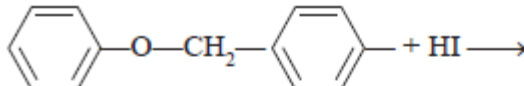
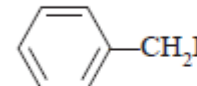
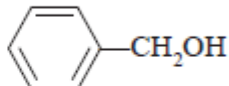
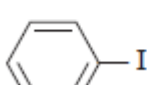
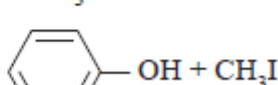
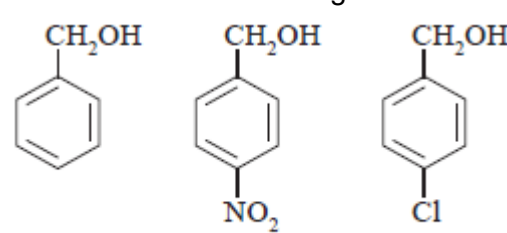
80 Dettol contains phenolic compound. [True/False]

81 Salicylic acid on heating with acetic anhydride in basic medium gives

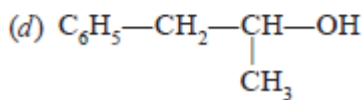
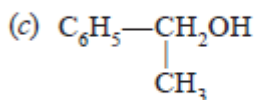
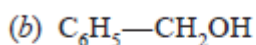
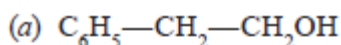
- (a) Aspirin (b) Methyl salicylate  
(c) Phenyl salicylate (d) Acetyl salicylate

82 Phenol reacts with  $\text{CO}_2$  at 3-7 atm, on heating in presence of NaOH followed by acidification to form

- (a) Salicylic acid (b) Aspirin  
(c) Benzoic acid (d) Methyl benzoate

- 83 Salicylic acid on reaction with  $\text{CH}_3\text{OH}$  in presence of Conc.  $\text{H}_2\text{SO}_4$  gives  
 (a) Methyl salicylate (Iodex) (b) Benzoic acid  
 (c) Methyl benzoate (d) Phenol 1
- 84 Salicylic acid reacts with Zinc dust on heating to give  
 (a) Benzene (b) Benzoic acid  
 (c) Phenol (d) None of these 1
- 85 Which of the following compound would not react with Lucas reagent at room temperature?  
 (a)  $\text{CH}_2 = \text{CH}-\text{CH}_2\text{OH}$  (b)  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$   
 (c)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  (d)  $(\text{CH}_3)_3\text{COH}$  1
- 86   $\text{C}_6\text{H}_5\text{OCH}_2\text{C}_6\text{H}_5 + \text{HI} \rightarrow$   
 (a)  + Phenol  
 (b)  +  $\text{CH}_3\text{I}$   
 (c)  + Benzyl alcohol  
 (d)  +  $\text{CH}_3\text{I}$  1
- 87 Which of the following compounds will react with sodium hydroxide solution in water? (a)  $\text{C}_6\text{H}_5\text{OH}$  (b)  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$   
 (c)  $(\text{CH}_3)_3\text{COH}$  (d)  $\text{C}_2\text{H}_5\text{OH}$  1
- 88 Mark the correct increasing order of reactivity of the following compounds with  $\text{HBr}/\text{HCl}$ .  
  
 (i) (ii) (iii)  
 (a) (i) < (ii) < (iii) (b) (ii) < (i) < (iii)  
 (c) (ii) < (iii) < (i) (d) (iii) < (ii) < (i) 1
- 89 Arrange the following compounds in increasing order of boiling point. Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol [NCERT Exemplar Problem]  
 (a) Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol  
 (b) Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol  
 (c) Pentan-1-ol, butan-2-ol, butan-1-ol, propan-1-ol  
 (d) Pentan-1-ol, butan-1-ol, butan-2-ol, propan-1-ol 1
- 90 Phenol can be distinguished from ethanol by the reactions with \_\_\_\_\_. [NCERT Exemplar Problem]  
 (a)  $\text{Br}_2/\text{water}$  (b) Na  
 (c) Neutral  $\text{FeCl}_3$  (d) All the above 1

91



1

Which of the following are benzylic alcohols?

92 Match the items of column I with items of column II.

Column I

Column II

(i) Antifreeze used in car engine

(a) Neutral ferric chloride

(ii) Solvent used in perfumes

(b) Glycerol

(iii) Starting material for picric acid

(c) Methanol

(iv) Wood spirit

(d) Phenol

(v) Reagent used for detection of phenolic group

(e) Ethylene glycol

(vi) By product of soap industry used in cosmetics

( f ) Ethanol

1

93 Match the items of column I with items of column II.

Column I

Column II

(i) Methanol

(a) Conversion of phenol to o-hydroxysalicylic acid

(ii) Kolbe's reaction

(b) Ethyl alcohol

(iii) Williamson's synthesis

(c) Conversion of phenol to salicylaldehyde

(iv) Conversion of 2° alcohol to ketone

(d) Wood spirit

(v) Reimer-Tiemann reaction

(e) Heated copper at 573K

(vi) Fermentation

(f) Reaction of alkyl halide with sodium alkoxide

1

94 In the following question a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Assertion and reason both are correct and reason is correct explanation of assertion.

(b) Assertion and reason both are wrong statements.

(c) Assertion is correct statement but reason is wrong statement.

1

(d) Assertion is wrong statement but reason is correct statement.

(e) Both assertion and reason are correct statements but reason is not correct explanation of assertion.

Assertion: Like bromination of benzene, bromination of phenol is also carried out in the presence of Lewis acid.

Reason: Lewis acid polarises the bromine molecule.

95 Ethanol is \_\_\_\_\_ acid than phenol. 1

96 Propene reacts with  $B_2H_6$  followed by alkaline hydrolysis to give \_\_\_\_\_ . 1

97 Pure phenols are colourless but turn pink due to oxidation. [True/False] 1

98 Phenol react with  $K_2Cr_2O_7/H_2SO_4$  to form p-benzo quinone. [True/False] 1

99 Arrange the following in the order of dehydration of alcohols: 1

THE END