Millions and Practice



(Chapter 11)(Alcohols Phenols and Ethers)

Intext Questions

Question 11.1:

Classify the following as primary, secondary and tertiary alcohols:

(i)

(ii)
$$H_2C = CH - CH_2OH$$

(iv)

(v)

(vi)

$$CH = CH - C - OH$$

$$CH_3$$

$$CH_3$$

Answer

Primary alcohol \rightarrow (i), (ii), (iii)

Secondary alcohol \rightarrow (iv), (v)

Tertiary alcohol \rightarrow (vi)

Question 11.2:

Identify allylic alcohols in the above examples.

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Answer

The alcohols given in (ii) and (vi) are allylic alcohols.

Question 11.3:

Name the following compounds according to IUPAC system.

(i)

$$CH_2OH$$
 $CH_3-CH_2-CH-CH-CH-CH$
 $CH_3-CH_2-CH-CH-CH-CH$
 CH_2CI
 CH_3

(ii)

(iii)

$$H_2C = CH - CH - CH_2 - CH_2 - CH_3$$

OH

$$CH_3 - C = C - CH_2OH$$

$$CH_3 - B_F$$

Answer

- (i) 3-Chloromethyl-2-isopropylpentan-1-ol
- (ii) 2, 5-Dimethylhexane-1, 3-diol
- (iii) 3-Bromocyclohexanol
- (iv) Hex-1-en-3-ol
- (v) 2-Bromo-3-methylbut-2-en-1-ol

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Question 11.4:

Show how are the following alcohols prepared by the reaction of a suitable Grignard reagent on methanal?

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(ii)

Answer

(i)

(ii)

Question 11.5:

Write structures of the products of the following reactions:

$$CH_3 - CH = CH_2 \xrightarrow{H_2O/H^+}$$

(ii)



(iii)

Answer

(i)

$$CH_3 - CH = CH_2 \xrightarrow{H_2O/H^+} CH_3 - CH - CH$$
Propene OH

Propene-2-ol

(ii)

$$\bigcirc ^{O}_{CH_2-C-OCH_3} - \bigcirc ^{OH}_{NaBH_4} \rightarrow \bigcirc ^{OH}_{CH_2-C-OCH_3}$$

Methyl (2 - oxocyclohexyl) ethanoate

Methyl (2 - hydroxycyclohexyl) ethanoate

(iii)

Question 11.6:

Give structures of the products you would expect when each of the following alcohol reacts Willion Stars Practice with (a) HCl-ZnCl₂ (b) HBr and (c) SOCl₂.

- (i) Butan-1-ol
- (ii) 2-Methylbutan-2-ol

Answer

(a)

(i)

$$CH_3 - CH_2 - CH_2 - CH_2 - OH \xrightarrow{HCI-ZnCI_2}$$
 No reaction
Butan $-1-ol$





Primary alcohols do not react appreciably with Lucas' reagent (HCl-ZnCl₂) at room temperature.

(ii)

$$CH_{3}-CH_{2}- \begin{matrix} OH \\ I \\ CH_{3} \end{matrix} \xrightarrow{HCI-ZnCI_{2}} CH_{3} -CH_{2}- \begin{matrix} CI \\ I \\ CH_{3} \end{matrix} + H_{2}O$$

2 - Methylbutan - 2 - ol (3°)

Tertiary alcohols react immediately with Lucas' reagent.

(b)

(i)

$$CH_3CH_2CH_2CH_2OH + HBr \xrightarrow{-H_2O} CH_3CH_2CH_2CH_2Br$$

Butan -1 - ol 1-Bromobutane

(ii)

OH
$$CH_3 - CH_2 - C - CH_3 + HBr$$
 $CH_3 - CH_2 - C - CH_3 + H_2O$
 CH_3
 CH_3

2 - Methylbutan - 2 - ol (3°)

(c)

(i)

$$CH_3CH_2CH_2CH_2OH + SOCl_2 \longrightarrow CH_3CH_2CH_2CH_2CI + SO_2 + HCI$$

Butan-1-ol l-chlorobutane

(ii)

2 - Methylbutan - 2 - ol

Question 11.7:

Predict the major product of acid catalysed dehydration of

(i) 1-methylcyclohexanol and



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(ii) butan-1-ol

Answer

i. OH CH₃
$$\xrightarrow{\text{Dehydration}}$$
 $\xrightarrow{\text{CH}_3}$ $+$ H₂O $-$ Methylcyclohexanol $-$ Methylcyclohexanol (Major product)

(ii)

$$CH_{3}CH_{2}CH_{2}CH_{2}OH \xrightarrow{Dehydration} CH_{3}CH = CHCH_{3} + H_{2}O$$
Butan-1-ol
But-2-ene
(Major product)

Question 11.8:

Ortho and para nitrophenols are more acidic than phenol. Draw the resonance structures of the corresponding phenoxide ions.

Answer

Resonance structure of the phenoxide ion





Resonance structures of p-nitrophenoxide ion

Resonance structures of m-nitrophenoxide ion

Millionstars Practice It can be observed that the presence of nitro groups increases the stability of phenoxide ion.

Question 11.9:

Write the equations involved in the following reactions:

- (i) Reimer-Tiemann reaction
- (ii) Kolbe's reaction

Answer



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Reimer-Tiemann reaction

ii. Kolbe's reaction

Question 11.10:

Write the reactions of Williamson synthesis of 2-ethoxy-3-methylpentane starting from ethanol and 3-methylpentan-2-ol.

Answer

In Williamson synthesis, an alkyl halide reacts with an alkoxide ion. Also, it is an S_N2 reaction. In the reaction, alkyl halides should be primary having the least steric hindrance. Hence, an alkyl halide is obtained from ethanol and alkoxide ion from 3methylpentan-2ol.

Hence, an alkyl halide is obtained from ethanol and alkoxide ion from 3methylpentan-2-lol.
$$C_2H_5OH \xrightarrow{HBr} C_2H_5Br$$
 Ethanol Bromoethane
$$CH_3 - CH_2 - CH - CH - CH_3 \xrightarrow{Na} CH_3 - CH_2 - CH - CH - ONa$$

$$CH_3 - OH_2 - CH_3 - OH_3 -$$

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Question 11.11:

Which of the following is an appropriate set of reactants for the preparation of 1methoxy-4-nitrobenzene and why?

(ii)

Answer

Mondelshare Set (ii) is an appropriate set of reactants for the preparation of 1-methoxy-4nitrobenzene.

1 - Methoxy - 4 - nitrobenzene

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Williams Practice In set (i), sodium methoxide (CH₃ONa) is a strong nucleophile as well as a strong base. Hence, an elimination reaction predominates over a substitution reaction.

Question 11.12:

Predict the products of the following reactions:

(i)
$$CH_3 - CH_2 - CH_2 - O - CH_3 + HBr \rightarrow$$

(ii)

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(iii)

$$OC_2H_5$$
 $Conc.H_2O_4$
 $Conc.HNO_3$

(CH_3) $_3C-OC_2H_5$
 III
 III
 $CH_3-CH_2-CH_2-O-CH_3$
 III
 III

tert-Butyliodide

tert-Butyl ethyl ether

Ethanol