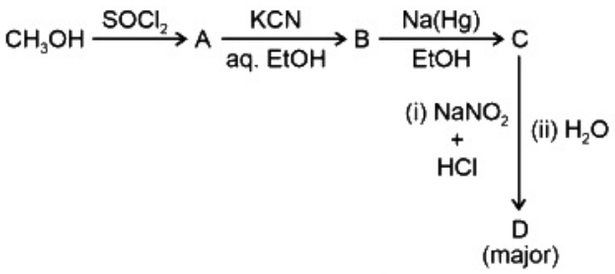
Alcohols, Phenols And Ethers

Question1

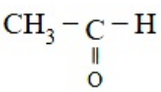
The major product D formed in the following reaction sequence is:



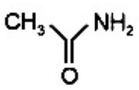
[NEET 2024 Re]

Options:

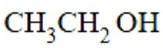
A.



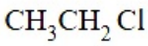
B.



C.

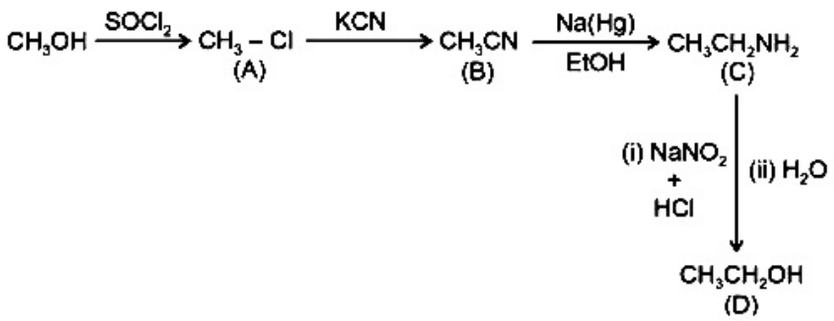


D.



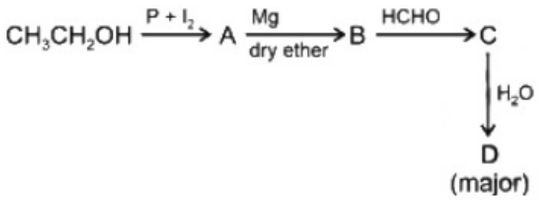
Answer: C

Solution:



Question2

Identify D in the following sequence of reactions:



[NEET 2024 Re]

Options:

A.

n-propyl alcohol

B.

isopropyl alcohol

C.

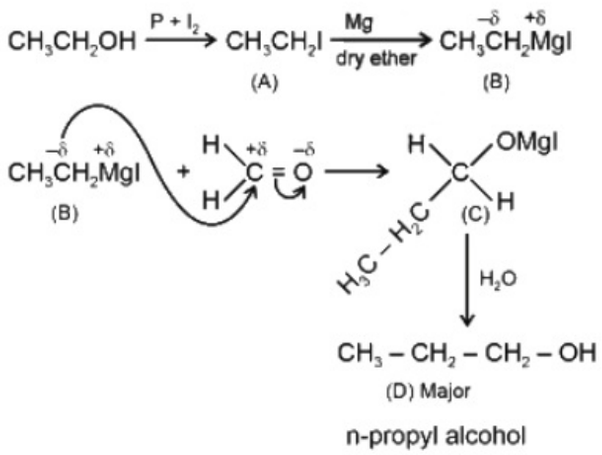
propanal

D.

propionic acid

Answer: A

Solution:



Question3

Which one of the following alcohols reacts instantaneously with Lucas reagent?

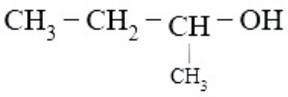
[NEET 2024]

Options:

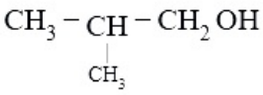
A.

$CH_3 - CH_2 - CH_2 - CH_2OH$

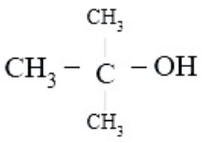
B.



C.



D.



Answer: D

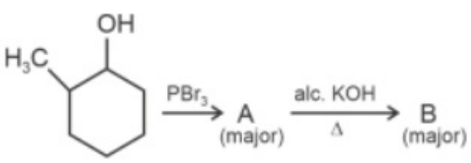
Solution:

Tertiary alcohols react instantaneously with Lucas reagent and gives immediate turbidity.

In case of tertiary alcohols, they form halides easily with Lucas reagent (conc. HCl and $ZnCl_2$)

Question4

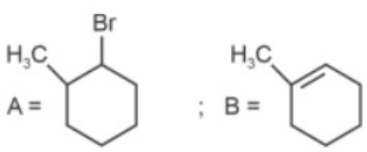
Major products A and B formed in the following reaction sequence, are



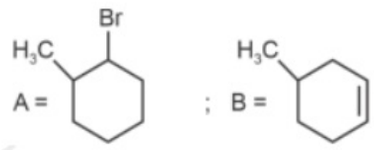
[NEET 2024]

Options:

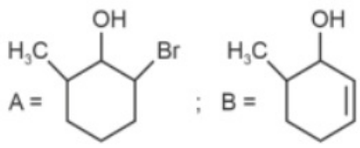
A.



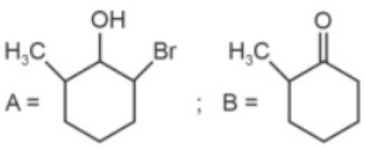
B.



C.

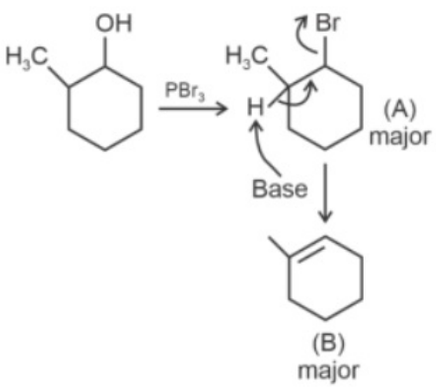


D.



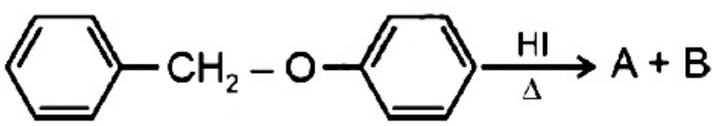
Answer: A

Solution:



Question5

Consider the following reaction:

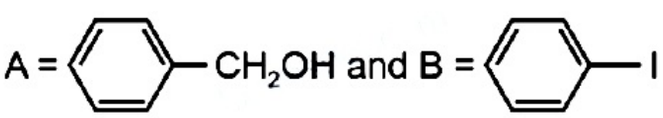


Identify products A and B.

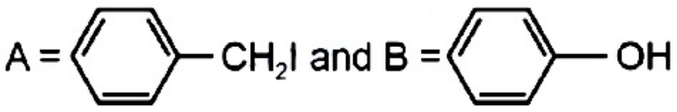
[NEET 2023]

Options:

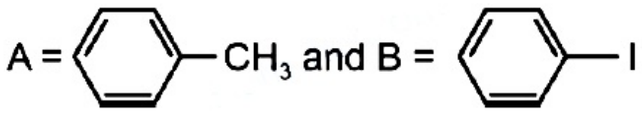
A.



B.



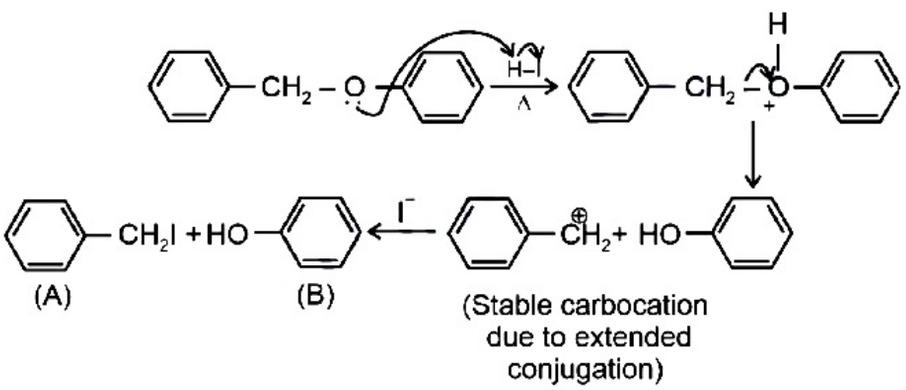
C.



D.

Answer: B

Solution:



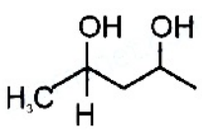
Question6

Which amongst the following will be most readily dehydrated under acidic conditions?

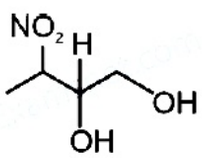
[NEET 2023]

Options:

A.



B.



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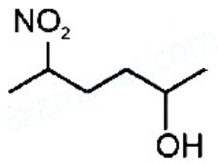
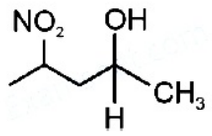
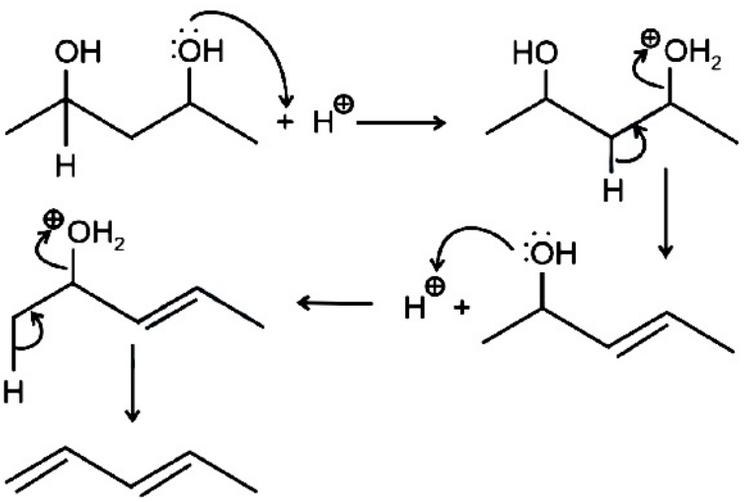


D.



Answer: A

Solution:



Question7

RM gX + CO_2 $\xrightarrow[\text{ether}]{\text{dry}}$ Y $\xrightarrow{H_3O^+}$ RCOOH

What is Y in the above reaction?
[NEET-2022]

Options:

A. $RCOO^{-}M\,g^{+}X$

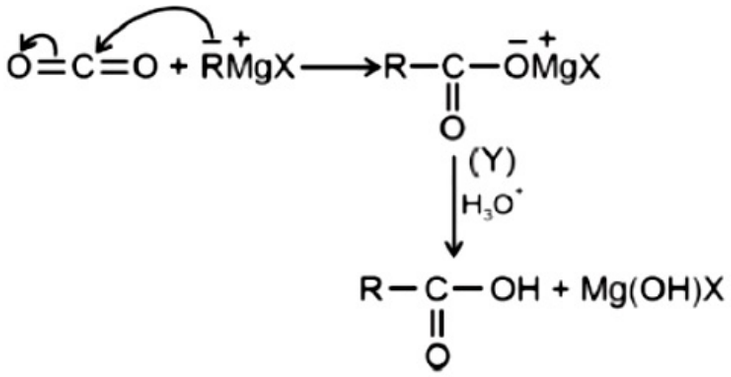
B. $R_3CO^{-}M\,g^{+}X$

C. $RCOO^{-}X^{+}$

D. $(RCOO)_2M\,g$

Answer: A

Solution:



Here Y is $RCOO^{-}Mg^{-}X$

Question8

Given below are two statements:
Statement I:
In Lucas test, primary, secondary and tertiary alcohols are distinguished on the basis of their reactivity with conc. $HCl + ZnCl_2$, known as Lucas Reagent.
Statement II:
Primary alcohols are most reactive and immediately produce turbidity at room temperature on reaction with Lucas Reagent.
In the light of the above statements, choose the most appropriate answer from the options given below:
[NEET-2022]

Options:

A. Both Statement I and Statement II are correct

B. Both Statement I and Statement II are incorrect

C. Statement I is correct but Statement II is incorrect

D. Statement I is incorrect but Statement II is correct

Answer: C

Solution:

Primary, secondary and tertiary alcohols can be differentiated by their reaction with

- 3° alcohol $\xrightarrow{ZnCl_2 - HCl}$ Immediate turbidity at room temperature
- 2° alcohol $\xrightarrow{ZnCl_2 - HCl}$ Turbidity after 5 minutes at room temperature
- 1° alcohol $\xrightarrow{ZnCl_2 - HCl}$ Do not gives turbidity at room temperature

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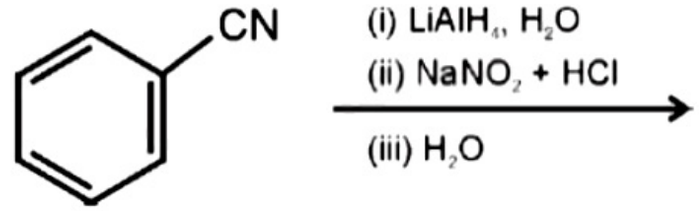
Question9

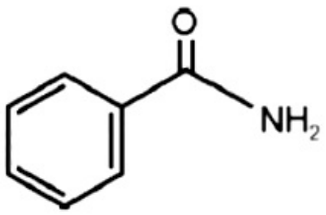
The product formed from the following reaction sequence is



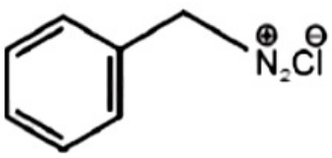
[NEET-2022]

Options:

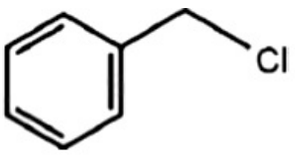
A.



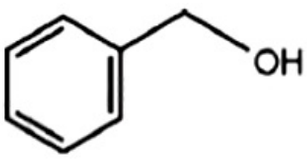
B.



C.

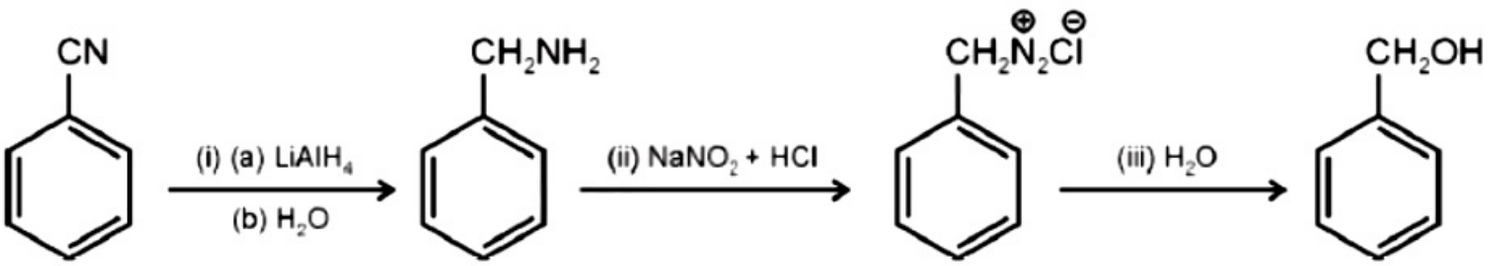


D.



Answer: D

Solution:



Question10

Match the reagents (List - I) with the product(List - Il) obtained from phenol

List-1	List-2
(a) (i) NaOH (ii) CO_2(iii) H^+	(i) Benzoquinone
(b) (i) Aqueous NaOH +$CHCl_3$ (ii) H^+	(ii) Benzene
(c) Zn dust, Δ	(iii) Salicyl aldehyde
(d)$Na_2Cr_2O_7$, H_2SO_4	(iv) Salicylic acid

Choose the correct answer from the options given below:
[NEET Re-2022]

Options:

A. (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)

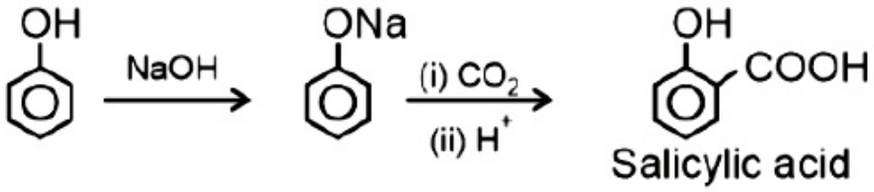
B. (a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)

C. (a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)

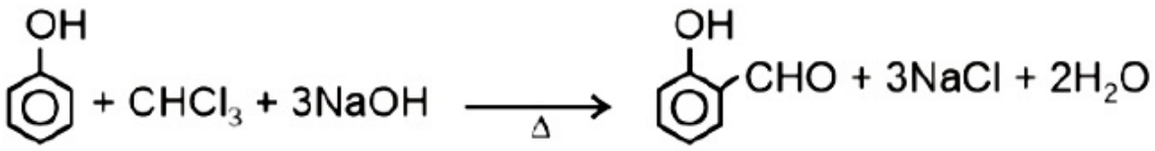
D. (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

Answer: D

Solution:

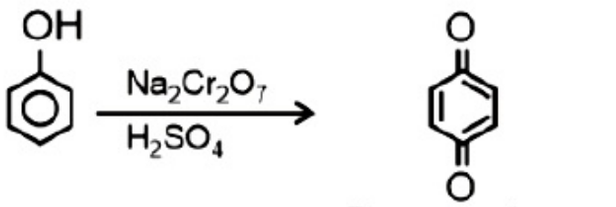


Salicylic acid



Salicyladehyde

Benzene



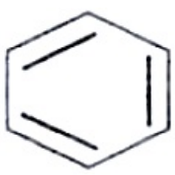
Benzoquinone

Question11

Which one of the following reaction sequence is incorrect method to prepare phenol? [NEET Re-2022]

Options:

A.

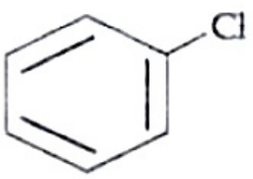


, oleum, NaOH, H_3O^+

B. Aniline, $NaNO_2$ + HCl, H_2O, heating

C. Cumene, O_2, H_3O^+

D.

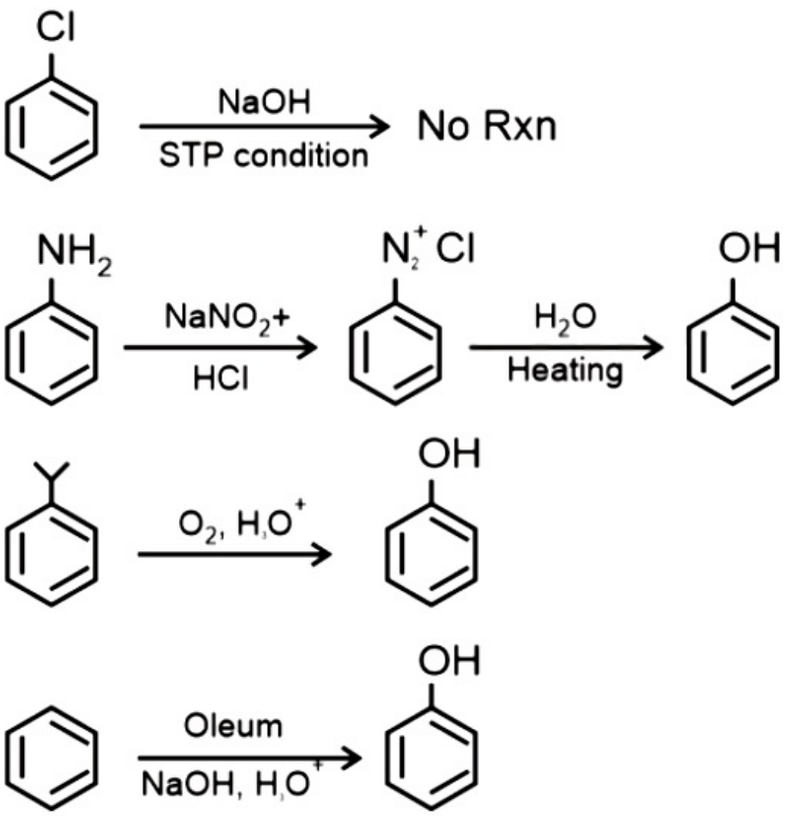


, NaOH, STP condition

Answer: D

Solution:

Solution:



Question12

List - I (Reaction)	List - II (Product formed)
(a) Gabriel synthesis	(i) Benzaldehyde
(b) Kolbe synthesis	(ii) Ethers
(c) Williamson synthesis	(iii) Primary amines
(d) Etard reaction	(iv) Salicylic acid

Choose the correct answer from the options given below [NEET Re-2022]

Options:

A. (a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)

B. (a) - (iii), (b) - (i), (c) - (ii), (d) - (iv)

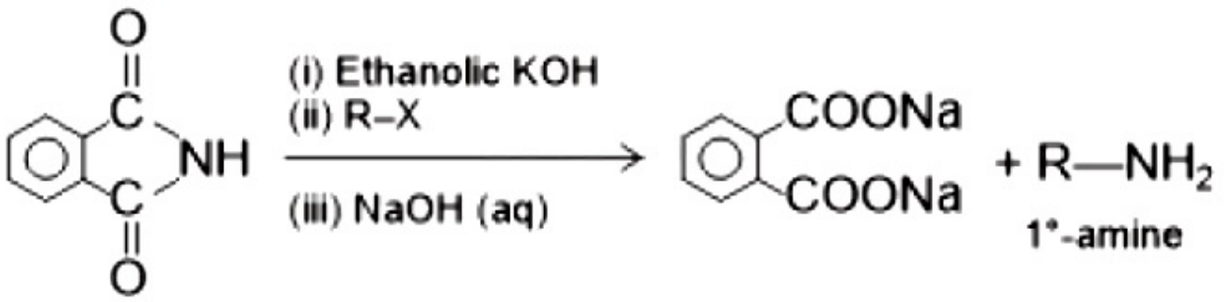
C. (a) - (ii), (b) - (iii), (c) - (i), (d) - (iv)

D. (a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)

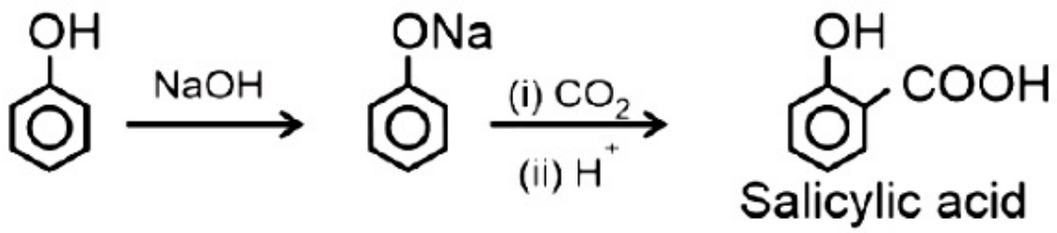
Answer: A

Solution:

(a)Gabriel synthesis



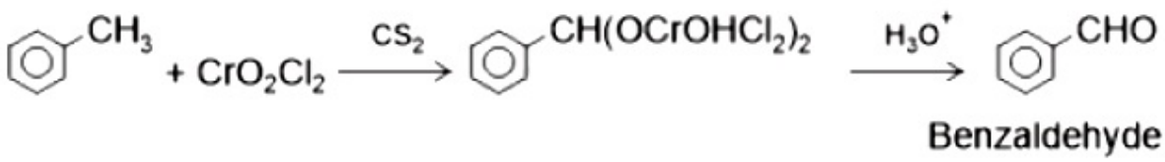
(b)Kolbe synthesis



(c) WIlliamson synthesis

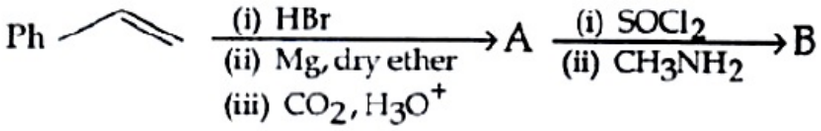
$$R-X+R^{'}ONa \longrightarrow \underset{\text{ether}}{R^{'}OR}+NaX$$

(d) Etard reaction



Question13

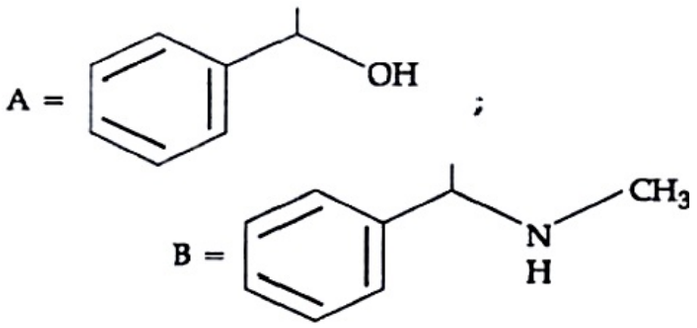
The products A and B in the following reaction sequence are :



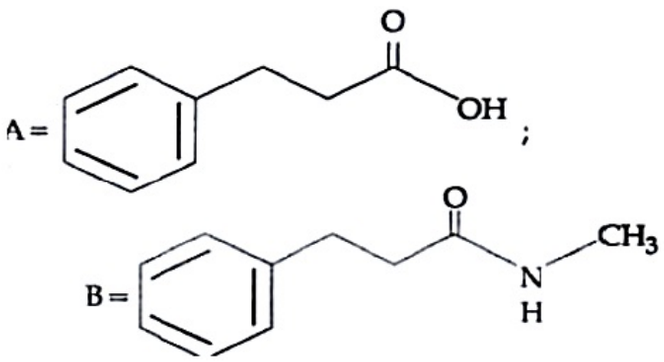
[NEET Re-2022]

Options:

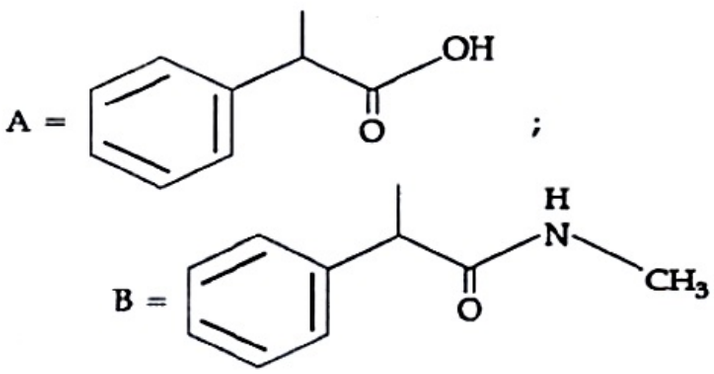
A.



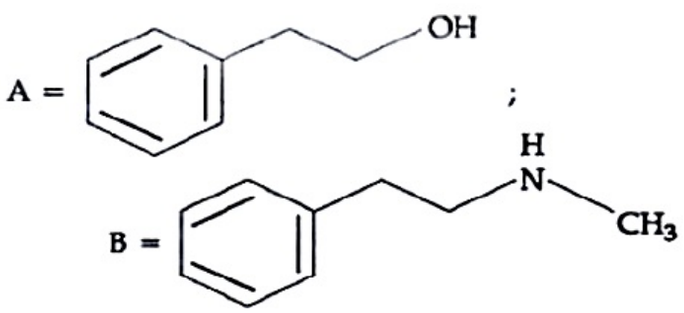
B.



C.

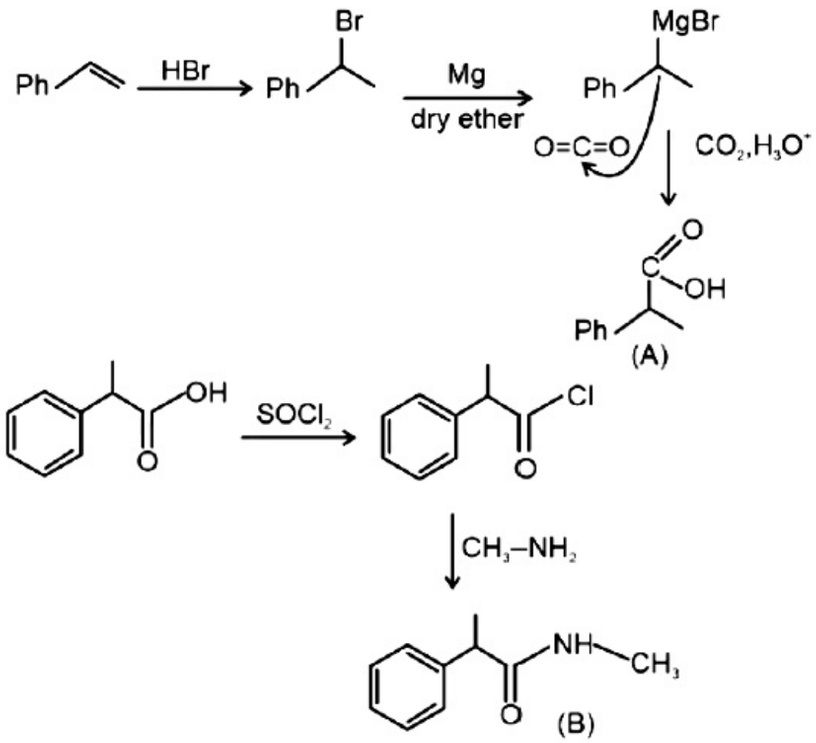


D.



Answer: C

Solution:



Question14

The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene. This product formation is based on? [NEET 2021]

Options:

A. Saytzeff's Rule

B. Hund's Rule

C. Hofmann Rule

D. Huckel's Rule

Answer: A

Solution:

Major product formed in dehydrohalogenation reaction of 2-bromopentane is pent-2-ene because according to Saytzeff's rule, in dehydrohalogenation reactions, the preferred product is that alkene which has greater number of alkyl group(s) attached to the doubly bonded carbon atoms.

$$CH_3-CH_2-CH_2-\underset{|}{\overset{Br}{CH}}-CH_3 \xrightarrow{OH^-} \underset{Pent-2-ene(81\%)}{CH_3-CH_2-CH=CH-CH_3} + \underset{Pent-1-ene(19\%)}{CH_3-CH_2-CH_2-CH=CH_2}$$

Question15

The compound which shows metamerism is :

[NEET 2021]

Options:

A. C_5H_{12}

B. C_3H_8O

C. C_3H_6O

D. $C_4H_{10}O$

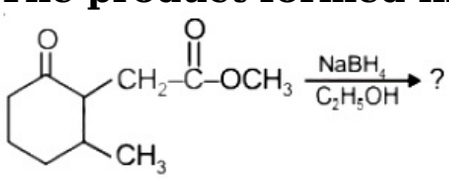
Answer: D

Solution:

Solution:
Compounds with formula $C_4H_{10}O$ can be ethers which may exhibit metamerism. For example
$CH_3-CH_2-O-CH_2-CH_3$,$CH_3-O-\underset{\underset{CH_3}{|}}{CH}-CH_3$
and $CH_3-O-CH_2-CH_2-CH_3$ are metamers as structure of alkyl chains are different around the functional group.

Question16

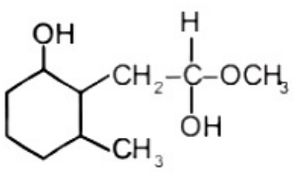
The product formed in the following chemical reaction is:



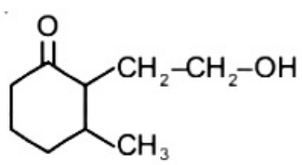
[NEET 2021]

Options:

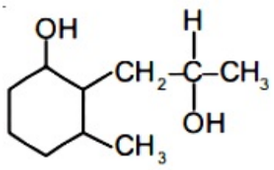
A.



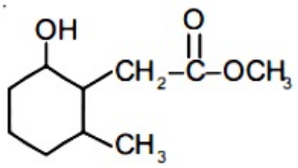
B.



C.



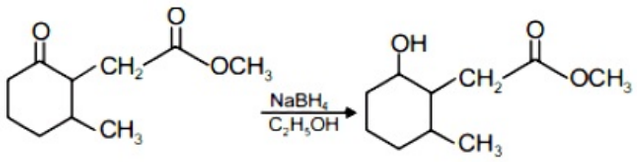
D.



Answer: D

Solution:

Solution:
N aBH $_4$ is a reducing agent. If reduces carbonyl group into alcohols but does not reduce esters.

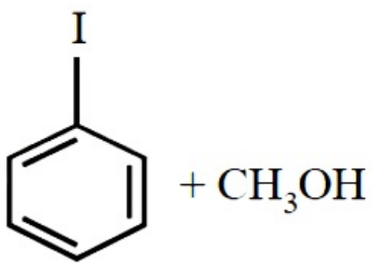


Question17

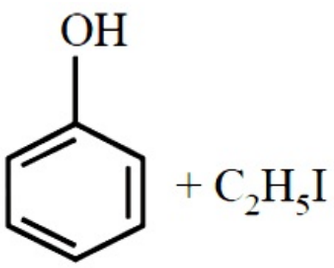
Anisole on cleavage with HI gives [2020]

Options:

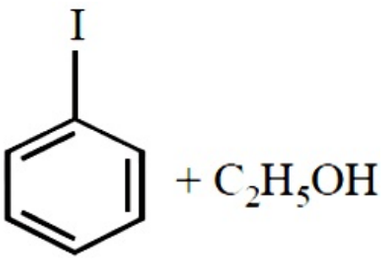
A.



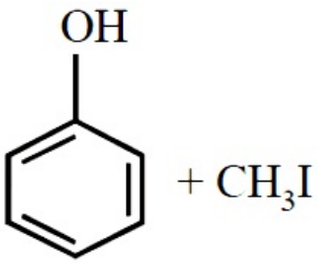
B.



C.



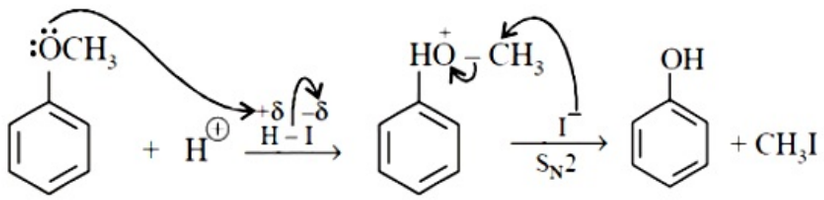
D.



Answer: D

Solution:

Solution:

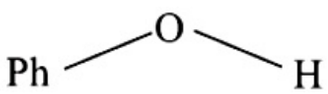


Question18

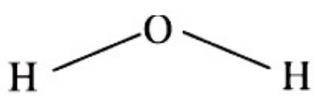
The compound that is most difficult to protonate is (NEET 2019)

Options:

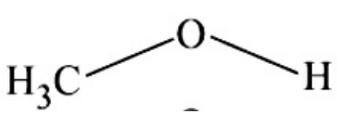
A.



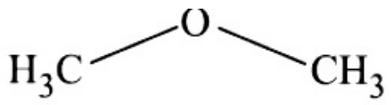
B.



C.



D.



Answer: A

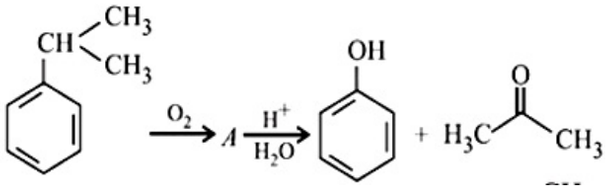
Solution:

Solution:

In $\mathrm{Ph-\ddot{O}-H}$, the lone pair of oxygen is in conjugation with phenyl group so, it is least basic among the given compounds and is most difficult to protonate.

Question19

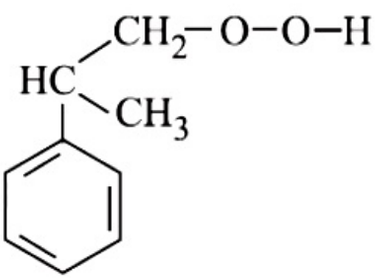
The structure of intermediate A in the following reaction is



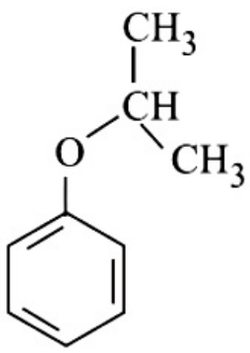
(NEET 2019)

Options:

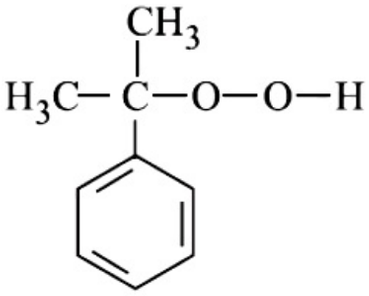
A.



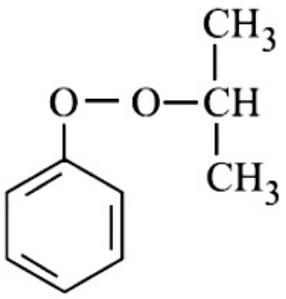
B.



C.



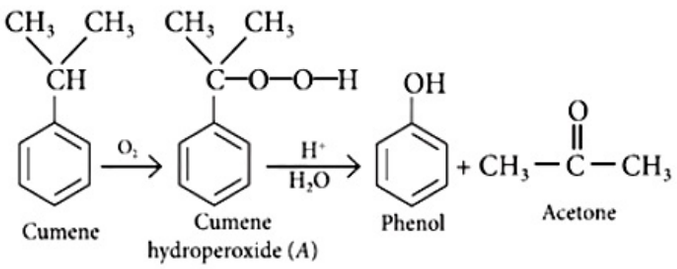
D.



Answer: C

Solution:

Solution:



Question20

When vapours of a secondary alcohol is passed over heated copper at 573K, the product formed is (Odisha NEET 2019)

Options:

A. a carboxylic acid

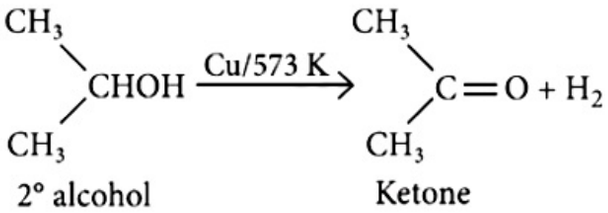
B. an aldehyde

C. a ketone

D. an alkene

Answer: C

Solution:



Question21

The major products C and D formed in the following reactions respectively are

$$H_3C - CH_2 - CH_2 - O - C(CH_3)_3 \xrightarrow{\text{excess HI}} C + D$$

(Odisha NEET 2019)

Options:

A. $H_3C - CH_2 - CH_2 - I$ and $I - C(CH_3)_3$

B. $H_3C - CH_2 - CH_2 - OH$ and $I - C(CH_3)_3$

C. $H_3C - CH_2 - CH_2 - I$ and $HO - C(CH_3)_3$

D. $H_3C - CH_2 - CH_2 - OH$ and $HO - C(CH_3)_3$

Answer: A

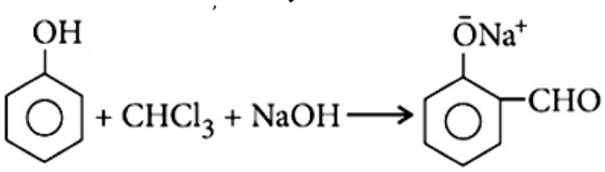
Solution:

Ethers are readily attacked by HI to give an alkyl halide and alcohol. But when heated with excess of HI, the product alcohol first formed reacts further with HI to form the corresponding alkyl iodide.

$$R - O - R' + \underset{\text{(excess)}}{2\,HI} \xrightarrow{\text{Heat}} RI + R'I + H_2O$$

Question22

In the reaction,



the electrophile involved is

(NEET 2018)

Options:

A. dichloromethyl cation $\left(\overset{+}{C}HCl_2\right)$

B. formyl cation ($\overset{+}{C}HO$)

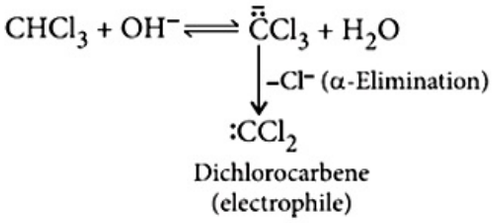
C. dichloromethyl anion $\left(\bar{C}HCl_2\right)$

D. dichlorocarbene ($:CCl_2$)

Answer: D

Solution:

Solution:
It is Reimer-Tiemann reaction. The electrophile formed is dichlorocarbene ($:CCl_2$) which is formed according to the following mechanism:

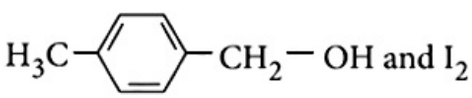


Question23

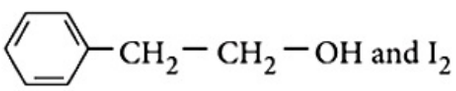
**Compound A, $C_8H_{10}O$, is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell. A and Y are
respectively
(NEET 2018)**

Options:

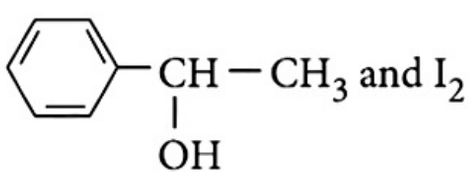
A.



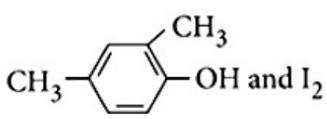
B.



C.



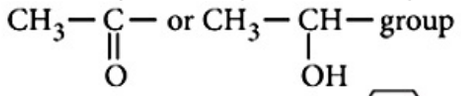
D.



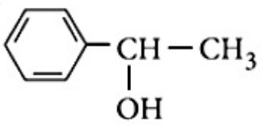
Answer: C

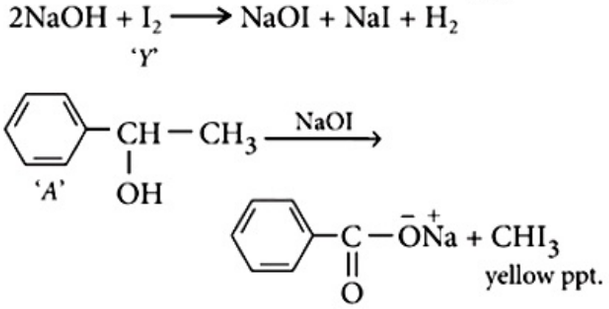
Solution:

As the compound is giving yellow precipitate with NaOI that shows it is undergoing haloform reaction. Haloform reaction is shown by the compounds having



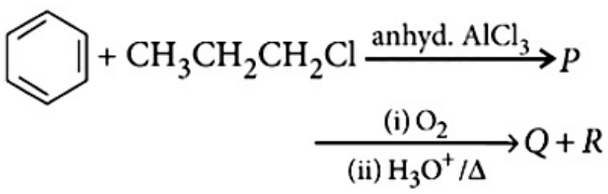
Hence, the compound *A* is





Question24

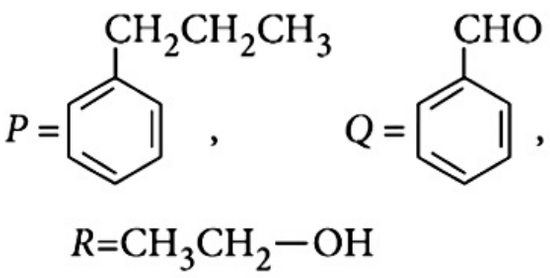
Identify the major products P, Q and R in the following sequence of reactions:



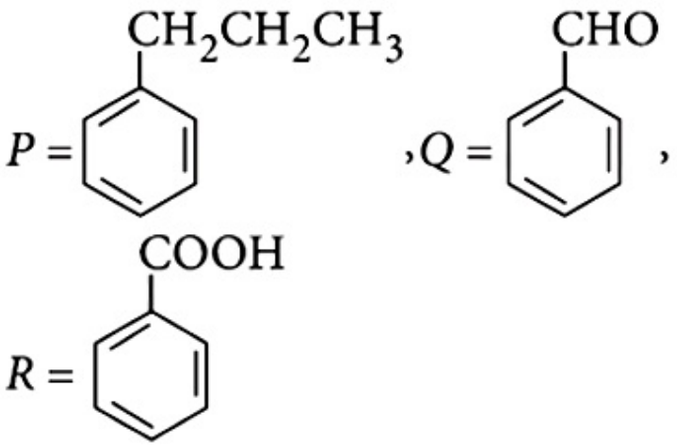
(NEET 2018)

Options:

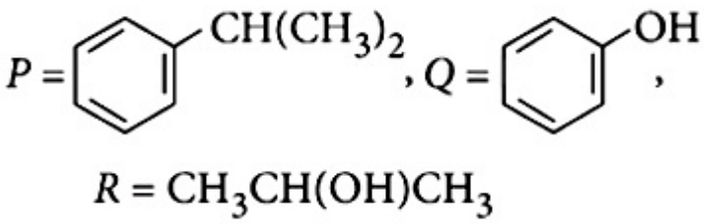
A.



B.

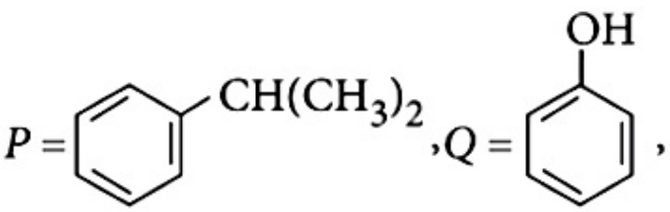


C.



$R = CH_3CH(OH)CH_3$

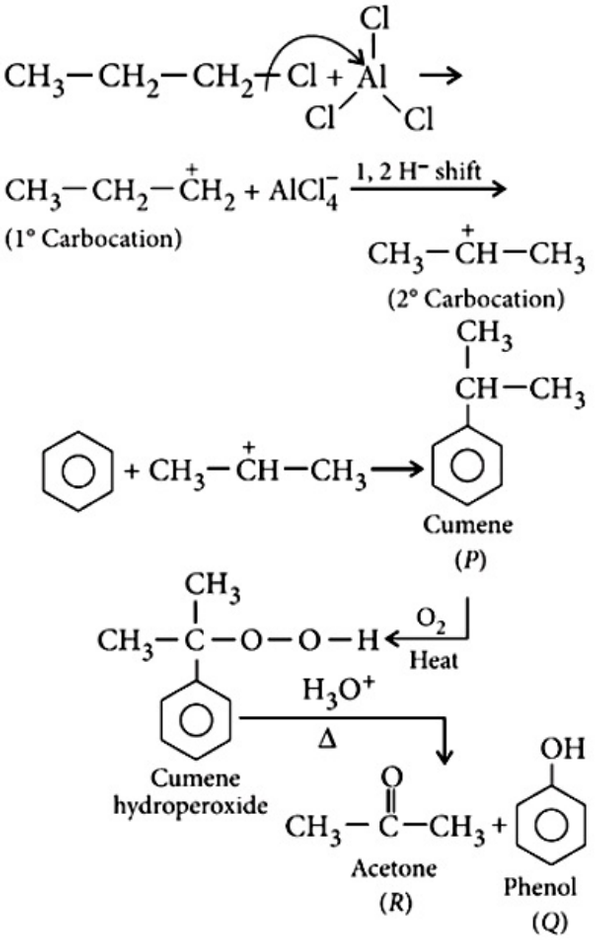
D.



$R = CH_3 - CO - CH_3$

Answer: D

Solution:



Question25

The heating of phenyl methyl ether with HI produces (NEET 2017)

Options:

A. iodobenzene

B. phenol

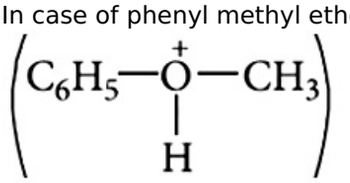
C. benzene

D. ethyl chloride.

Answer: B

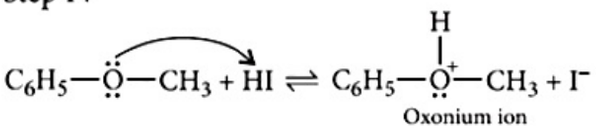
Solution:

In case of phenyl methyl ether, methyl phenyl oxonium ion



is formed by protonation of ether. The $O - CH_3$ bond is weaker than $O - C_6H_5$ bond as $O - C_6H_5$ has partial double bond character. Therefore, the attack by I^- ion breaks $O - CH_3$ bond to form CH_3I.

Step I :



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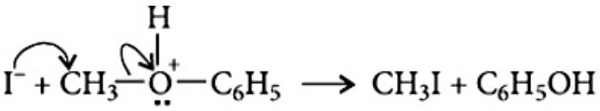
Step II :

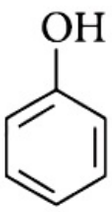


Question26

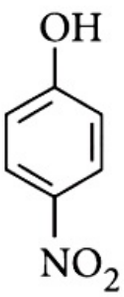
Which one is the most acidic compound? (NEET 2017)

Options:

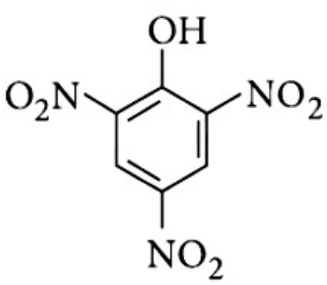
A.



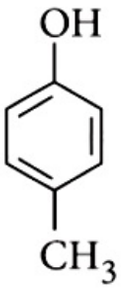
B.



C.



D.



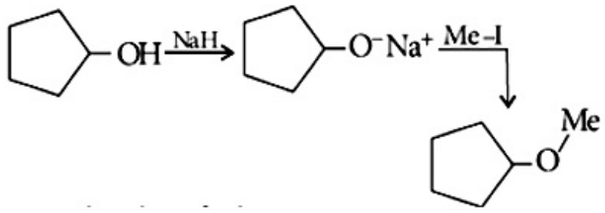
Answer: C

Solution:

Solution:
Electron withdrawing groups increase the acidity while electron donating groups decrease the acidity of phenol.

Question27

The reaction



can be classified as (NEET-I 2016)

Options:

A. dehydration reaction

B. Williamson alcohol synthesis reaction

C. Williamson ether synthesis reaction

D. alcohol formation reaction

Answer: C

Solution:

Solution:
Williamson's ether synthesis reaction involves the treatment of sodium alkoxide with a suitable alkyl halide to form an ether.

Question28

Reaction of phenol with chloroform in presence of dilute sodium hydroxide finally introduces which one of the following functional group? (2015)

Options:

A. $-COOH$

B. $-CHCl_2$

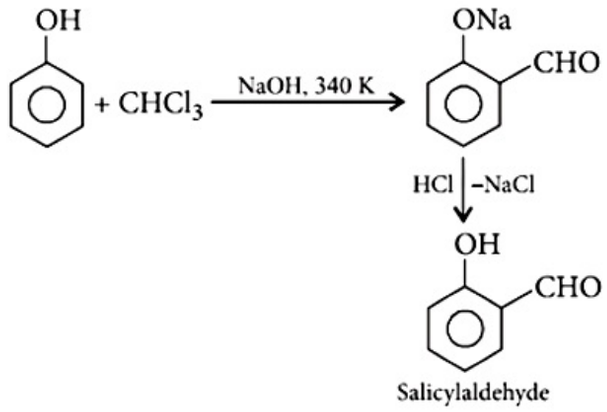
C. $-CHO$

D. $-CH_2Cl$

Answer: C

Solution:

This is Reimer-Tiemann reaction.



Question29

Which of the following reaction(s) can be used for the preparation of alkyl halides ?

(I) $CH_3CH_2OH + HCl \xrightarrow{anh.\ ZnCl_2}$

(II) $CH_3CH_2OH + HCl$ --------

(III) $(CH_3)_3COH + HCl$ --------

(IV) $(CH_3)_2COH + HCl \xrightarrow{anh.\ ZnCl_2}$

(2015)

Options:

A. (I) and (II) only

B. (IV) only

C. (III) and (IV) only

D. (I), (III) and (IV) only

Answer: D

Solution:

1 ° and 2° alcohols react with HCl in presence of anhydrous $ZnCl_2$ as catalyst while in case of 3° alcohols $ZnCl_2$ is not required

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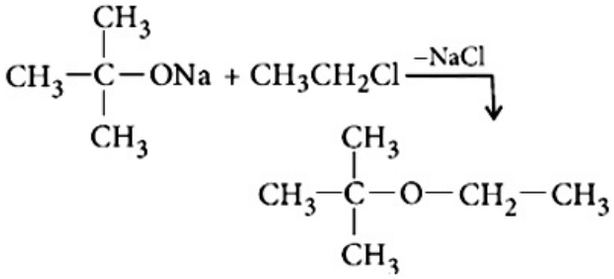
Question30

The reaction,



is called
(2015 Cancelled)

Options:

A. Etard reaction

B. Gattermann-Koch reaction

C. Williamson synthesis

D. Williamson continuous etherification process

Answer: C

Solution:

Solution:
Williamson synthesis is the best method for the preparation of ethers.

Question31

Among the following sets of reactants which one produces anisole? (2014)

Options:

A. $CH_3CHO; RMgX$

B. C_6H_5OH ; $NaOH$; CH_3I

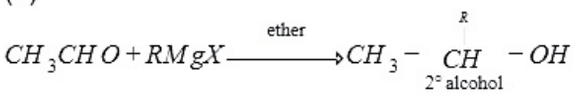
C. C_6H_5OH ; neutral $FeCl_3$

D. $C_6H_5CH_3$; CH_3COCl ; $AlCl_3$

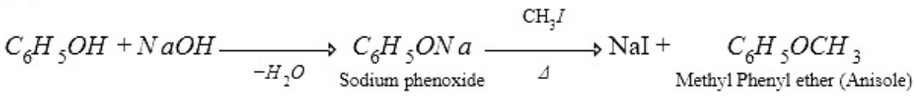
Answer: B

Solution:

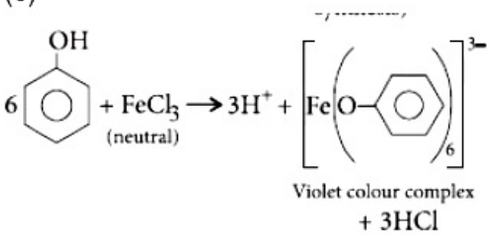
(a)



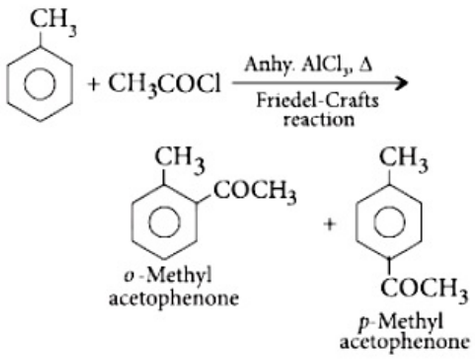
(b)



(c)



(d)



Question32

Which of the following will not be soluble in sodium hydrogen carbonate?
(2014)

Options:

A. 2,4,6-Trinitrophenol

B. Benzoic acid

C. o-Nitrophenol

D. Benzenesulphonic acid

Answer: C

Solution:

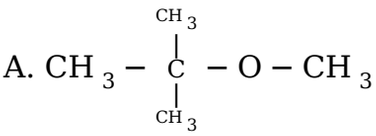
The reaction is as follows:
Acid + $NaHCO_3$--------Sodium salt of acid + $\underset{\text{(soluble)}}{H_2CO_3}$

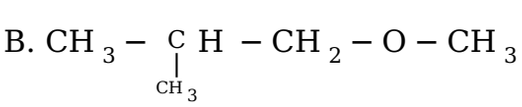
Among all the given compounds, o-nitrophenol is weaker acid HCO_3^-, Hence, it does not react with $NaHCO_3$.

Question33

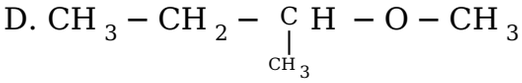
Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?
(2013 NEET)

Options:

A. 

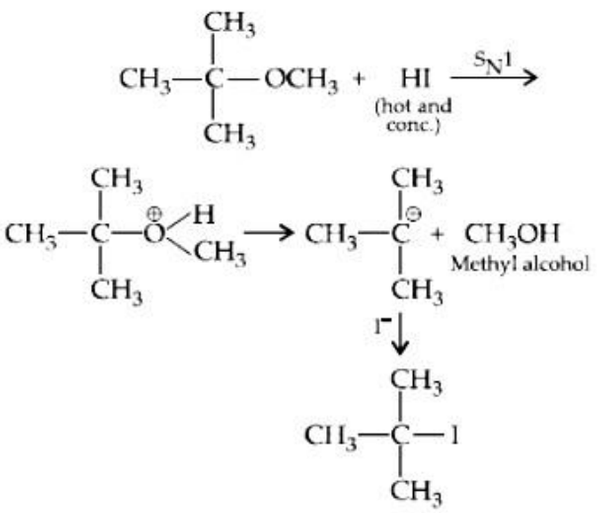
B. 

C. $CH_3 - CH_2 - CH_2 - CH_2 - O - CH_3$

D. 

Answer: A

Solution:



Question34

Number of isomeric alcohols of molecular formula $C_6H_{14}O$ which give positive iodoform test is
(Karnataka NEET 2013)

Options:

A. three

B. four

C. five

D. two.

Answer: B

Solution:

The iodoform test is positive for alcohols with formula $R - CH(OH) - CH_3$.
Among $C_6H_{14}O$ isomers, the ones with positive iodoform test are:

1. $\underset{2-\text{Hexanol}}{CH_3 - CH_2 - CH_2 - CH_2 - CH(OH) - CH_3}$
2. $\underset{3-\text{Methyl}-2-\text{pentanol}}{CH_3 - CH_2 - CH(CH_3) - CH(OH) - CH_3}$
3. $\underset{3\text{- Methyl-2-pentanol}}{(CH_3)_2 - CH_2 - CH(OH) - CH_3}$
4. $\underset{3,\ 3\ \text{- Dimethyl-2- butanol}}{(CH_3)_3C - CH(OH) - CH_3}$

Question35

In the following sequence of reactions

$$CH_3 - Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow[ether]{LiAlH_4} C$$

the end product (C) is
(2012)

Options:

A. acetone

B. methane

C. acetaldehyde

D. ethyl alcohol

Answer: D

Solution:

$$CH_3Br \xrightarrow{KCN} \underset{(A)}{CH_3CN} \xrightarrow{H_3O^+} \underset{(B)}{CH_3COOH} \xrightarrow[ether]{LiAlH_4} \underset{(C)}{CH_3CH_2OH}$$

Question36

Which of the following compounds can be used as antifreeze in

automobile radiators?
(2012 Mains)

Options:

A. Methyl alcohol

B. Glycol

C. Nitrophenol

D. Ethyl alcohol

Answer: B

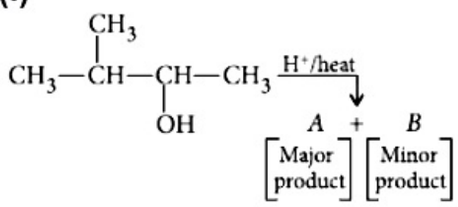
Solution:

Glycol can be used as antifreeze in automobile radiators.
It lowers the freezing point of water and prevents the automobile engine from bursting due to expansion when water freezes.
It provides a wide temperature range in which the mixture remains in the liquid phase.

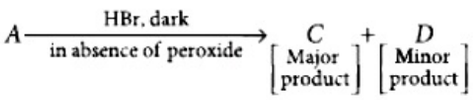
Question37

In the following reactions

(i)



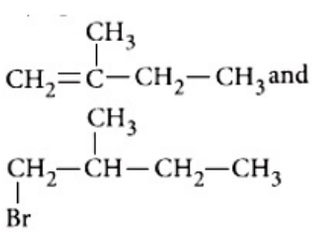
(ii)



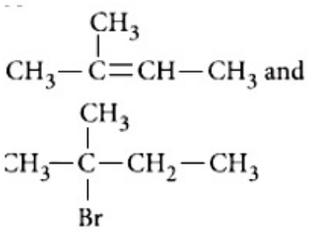
the major products (A) and (C) are respectively
(2011)

Options:

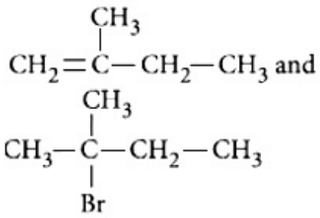
A.



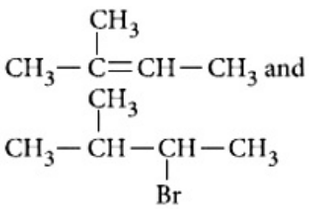
B.



C.

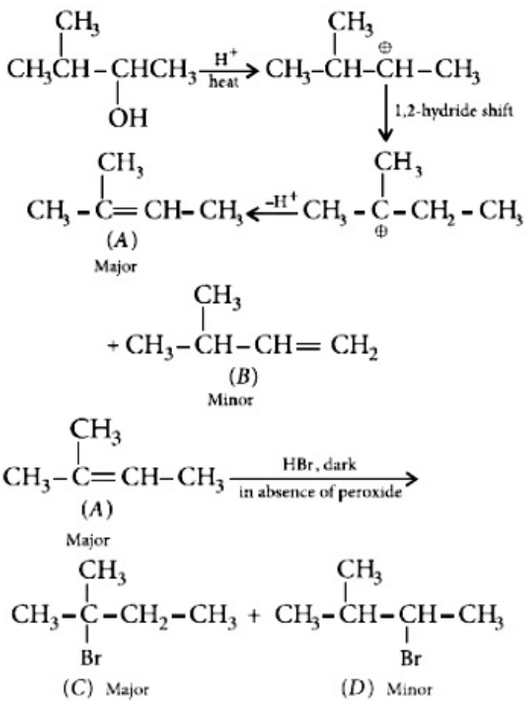


D.



Answer: B

Solution:



Question38

Given are cyclohexanol (I), acetic acid (II), 2,4,6-trinitrophenol (III) and phenol (IV). In these the order of decreasing acidic character will be (2010)

Options:

A. III > II > IV > I

B. II > III > I > IV

C. II > III > IV > I

D. III > IV > II > I

Answer: A

Solution:

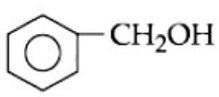
Solution:
III > II > IV > I
Since phenols and carboxylic acids are more acidic than aliphatic alcohols, we find that cyclohexanol (I) is least acidic. Out of the two given phenols, III is more acidic than IV. This is because of the presence of three highly electron withdrawing $-NO_2$ groups on the benzene ring which makes the O— Hbond extremely polarized. This facilitates the release of H as H+. Thus, III > IV.
In acetic acid the electrons with drawing $-\overset{O}{\overset{\|}{C}}-$ in the $-COOH$ group polarises the O— H bond and increases the acidic strength. Acetic acid is therefore more acidic than phenol or cyclohexanol.
∴ The order is III > II > IV > I.

Question39

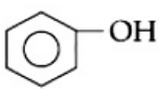
Which of the following compounds has the most acidic nature? (2010)

Options:

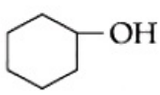
A.



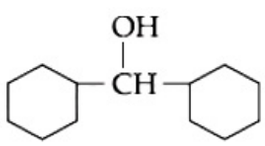
B.



C.



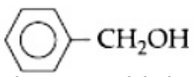
D.



Answer: B

Solution:

Solution:
Phenol is most acidic of all the given compounds. In phenol, the electron withdrawing phenyl ring polarizes the O— H bond thereby facilitating the release of H as H^+ and hence phenol is most acidic.
In the



electron withdrawing effect of phenylring is somewhat diminished by the $-CH_2$ group and it is therefore less acidic than phenol. In (c) and (d), — OH group is attached to alkyl groups which, due to their +I effect reduce the polarity of — OH bond and so the acidic strength is low.

Question40

Among the following four compounds
(i) Phenol (ii) Methyl phenol
(iii) Meta-nitrophenol (iv) Para-nitrophenol
The acidity order is
(2010 Mains)

Options:

A. (iv) > (iii) > (i) > (ii)

B. (iii) > (iv) > (i) > (ii)

C. (i) > (iv) > (iii) > (ii)

D. (ii) > (i) > (iii) > (iv)

Answer: A

Solution:

Solution:
In phenols, the presence of electron releasing groups decrease the acidity, whereas presence of electron withdrawing groups increase the acidity, compared to phenol. Among the meta and para-nitrophenols, the latter is more acidic as the presence of $-NO_2$ group at para position stabilises the phenoxide ion to a greater extent than when it is present at meta position. Thus, correct order of acidity is :
Para-nitrophenol > meta-nitrophenol > phenol > methyl phenol
(iv) (iii) (i) (ii)

Question41

When glycerol is treated with excess of HI, it produces
(2010 Mains)

Options:

A. 2-iodopropane

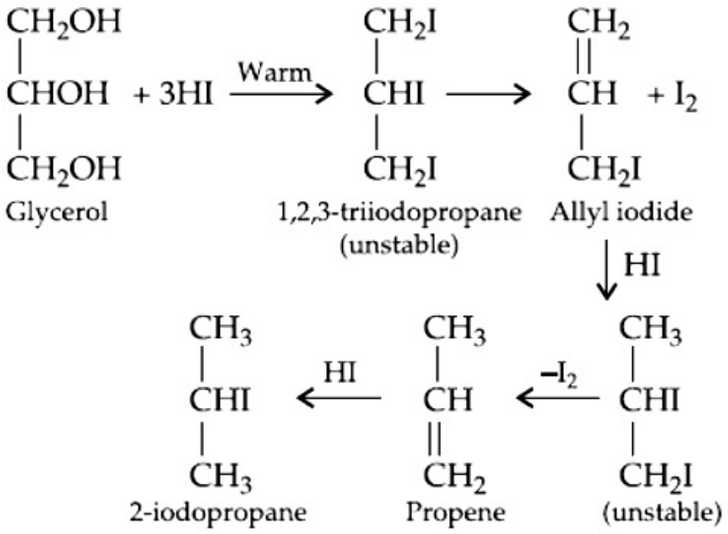
B. allyl iodide

C. propene

D. glycerol triiodide

Answer: A

Solution:



Question42

Following compounds are given

(i) CH_3CH_2OH

(ii) CH_3COCH_3

(iii) $CH_3 - \underset{\underset{CH_3}{|}}{C}HOH$

(iv) CH_3OH

Which of the above compound(s), on being warmed withiodine solution and NaOH , will give iodoform?
(2010 Mains)

Options:

A. (i), (iii) and (iv)

B. Only (ii)

C. (i), (ii) and (iii)

D. (i) and (ii)

Answer: C

Solution:

Solution:
Methyl alcohol does not respond to the iodoform test. The iodoform test is exhibited by ethyl alcohol, acetaldehyde,acetone, methyl ketones, those alcohols which possess $CH_3CH(OH)-$ group,acetophenone,α - hydroxypropionic acid,keto acid,2 - aminoalkanes,etc.

Question43

Match the compounds given in List I with their characteristic reactions given in List II. Select the correct option.

List-I (Compounds)	List-II (Reactions)
A. $CH_3(CH_2)_3NH_2$	(i) Alkaline hydrolysis
B. $CH_3 \equiv CH$	(ii) With KOH (alcohol) and $(CHCl_3)$ produces bad smell
C. $CH_3CH_2COOCH_3$	(iii) Gives white ppt. with ammoniacal $AgNO_3$
D. $CH_3CH(OH)CH_3$	(iv) With Lucas reagent cloudiness appears after 5 minutes

(Mains 2010)

Options:

A. A-(ii), B-(i), C-(iv), D-(iii)

B. A-(iii), B-(ii), C-(i), D-(iv)

C. A-(ii), B-(iii), C-(i), D-(iv)

D. A-(iv), B-(ii), C-(iii), D-(i)

Answer: C

Question44

Consider the following reaction:

$$\text{Ethanol} \xrightarrow{PBr_3} X \xrightarrow{\text{alc. KOH}} Y \xrightarrow[(ii)H_2O,\ \text{heat}]{(i)H_2SO_4,\ \text{room temperature}} Z$$

the product Z is
(2009)

Options:

A. $CH_3CH_2 - O - CH_2 - CH_3$

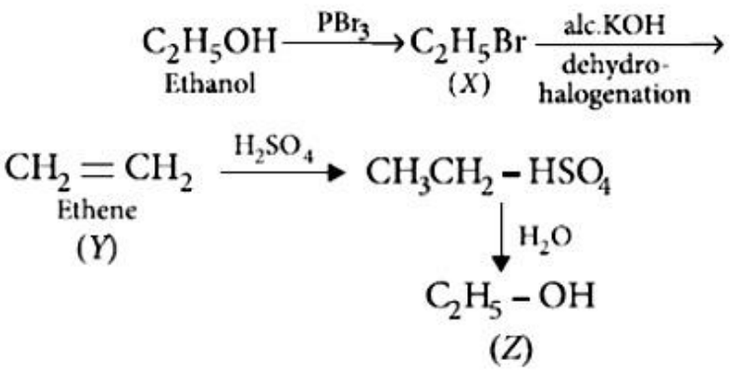
B. $CH_3 - CH_2 - O - SO_3H$

C. CH_3CH_2OH

D. $CH_2 = CH_2$

Answer: C

Solution:



Question45

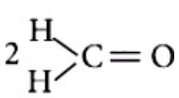
$H\,OCH_2 \cdot CH_2OH$ on heating with periodic acid gives
(2009)

Options:

A. $2H\,COOH$

B. $\overset{CH\,O}{|}\\ C\;H\,O$

C.



D. $2CO_2$

Answer: C

Solution:

When 1,2-diol like ethylene glycol is treated with HIO_4, each alcoholic group is oxidised to a carbonyl group by HIO_4

Since in glycol, both the - OH groups are terminal, so oxidation would yield two formaldehyde molecules.

$$\begin{matrix} CH_2-OH \\ | \\ CH_2-OH \end{matrix} \xrightarrow{HIO_4} 2\,HCHO$$

Question46

Consider the following reaction:

Phenol $\xrightarrow{\text{Zn dust}}$ **X** $\xrightarrow[\text{anhyd. } AlCl_3]{CH_3Cl}$ **Y** $\xrightarrow{\text{alkaline } KMnO_4}$ **Z**

the product Z is
(2009)

Options:

A. benzaldehyde

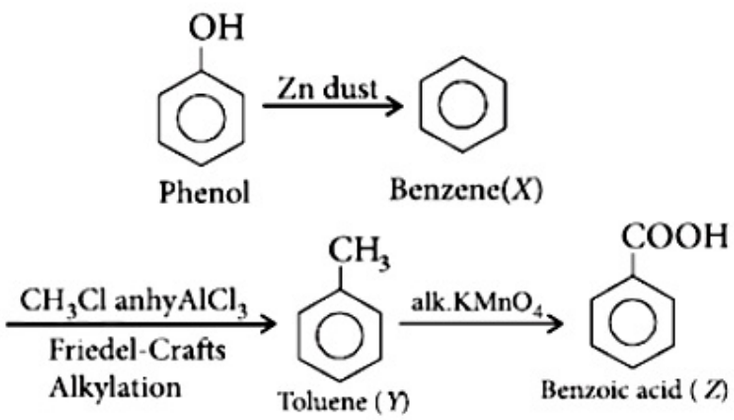
B. benzoic acid

C. benzene

D. toluene

Answer: B

Solution:



Question47

In the reaction

$$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-O-CH_2-CH_3+HI \xrightarrow{\text{heated}}$$

Which of the following compounds will be formed?
(2007)

Options:

A.

$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_3 + CH_3CH_2OH$

B.

$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2OH + CH_3CH_3$

C.

$CH_3 - \underset{CH}{\overset{CH_3}{|}} - CH_2OH + CH_3 - CH_2 - I$

D.

$CH_3 - \underset{CH}{\overset{CH_3}{|}} - CH_2 - I + CH_3CH_2OH$

Answer: C

Solution:

When isobutyl ethyl ether reacts with HI, it forms isobutyl alcohol and ethyl iodide as a product.

$$CH_3 - \underset{H}{\overset{CH_3}{C}} - CH_2 - O - CH_2 - CH_3 + HI \xrightarrow{\text{Heated}} CH_3 - \underset{H}{\overset{CH_3}{C}} - CH_2 - OH + CH_3 - CH_2 - I$$

Question48

The general molecular formula, which represents the homologous series of alkanols is
(2006)

Options:

A. $C_nH_{2n+2}O$

B. $C_nH_{2n}O_2$

C. $C_nH_{2n}O$

D. $C_nH_{2n+1}O$

Answer: A

Solution:

All alcohols follow the general formula $C_nH_{2n+2}O$.

$CH_3OH\,[CH_{2}O]_{n=1}$; $C_2H_5OH\,[C_2H_{(2\times2)+2}O]_{n=2}$

Question49

Ethylene oxide when treated with Grignard reagent yields (2006)

Options:

A. primary alcohol

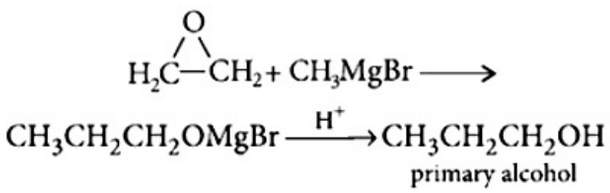
B. secondary alcohol

C. tertiary alcohol

D. cyclopropyl alcohol

Answer: A

Solution:



Question50

The major organic product in the reaction is $CH_3 - O - CH(CH_3)_2 + HI \rightarrow$ products (2006)

Options:

A. $CH_3I + (CH_3)_2CHOH$

B. $CH_3OH + (CH_3)_2CHI$

C. $ICH_2OCH(CH_3)_2$

D. $CH_3O\underset{\underset{I}{|}}{C}(CH_3)_2$

Answer: A

Solution:

With cold HI, a mixture of alkyl iodide and alcohol is formed. In the case of mixed ethers, the halogen atom attaches to a smaller and less complex alkyl group.
$CH_3OCH(CH_3)_2 + HI \rightarrow CH_3I + (CH_3)_2CHOH$

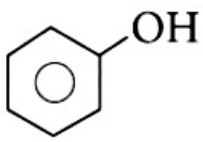
Question51

Which one of the following compounds is most acidic? (2005)

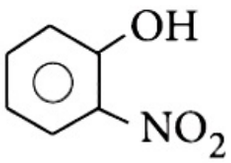
Options:

A. $Cl - CH_2 - CH_2 - OH$

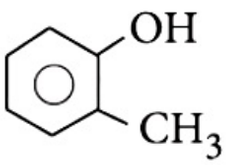
B.



C.



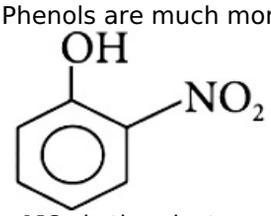
D.



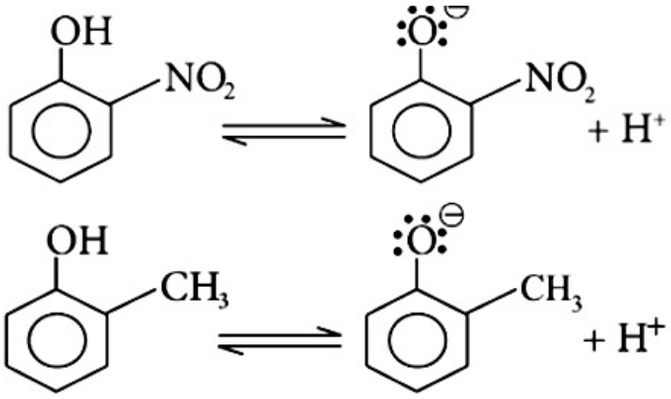
Answer: C

Solution:

Phenols are much more acidic than alcohols, due to the stabilisation of phenoxide ion by resonance.



$-NO_2$ is the electron withdrawing group and helps in stabilizing the negative charge on the oxygen hence equilibrium shifts in forward direction and more H^+ remove easily. Hence, it is most acidic.



$-CH_3$ is the electron donating group.
Hence electron density increases on the oxygen and destabilizes the product. Thus, equilibrium shifts in backward direction.

Question52

Which one of the following will not form a yellow precipitate on heating with an alkaline solution of iodine?
(2004)

Options:

A. $CH_3CH(OH)CH_3$

B. $CH_3CH_2CH(OH)CH_3$

C. CH_3OH

D. CH_3CH_2OH

Answer: C

Solution:

Formation of a yellow precipitate on heating a compound with an alkaline solution of iodine is known as iodoform reaction. Methyl alcohol does not respond to this test. Iodoform test is exhibited by ethyl alcohol, acetaldehyde, acetone, methyl ketones and those alcohols which possess $CH_3CH(OH)-$ group.

Question53

n -Propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent?
(2002)

Options:

A. PCl_5

B. Reduction

C. Oxidation with potassium dichromate

D. Ozonolysis

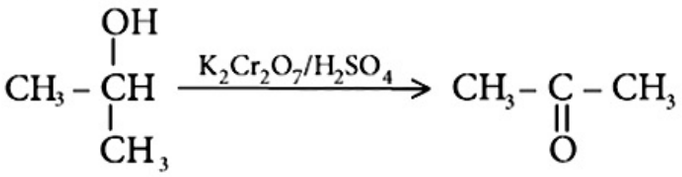
Answer: C

Solution:

n -Propyl alcohol on oxidation with potassium dichromate gives an aldehyde which on further oxidation gives an acid. Both aldehyde and acid contain the same number of C atoms as the original alcohol.

$$CH_3CH_2CH_2OH \xrightarrow[K_2Cr_2O_7 / H_2SO_4]{25^\circ C} CH_3CH_2CHO \xrightarrow{K_2Cr_2O_7 / H_2SO_4} CH_3CH_2COOH$$

Isopropyl alcohol on oxidation gives a ketone with the same number of C atoms as the original alcohol.



Question54

When phenol is treated with $CHCl_3$ and NaOH, the product formed is (2002)

Options:

A. benzaldehyde

B. salicylaldehyde

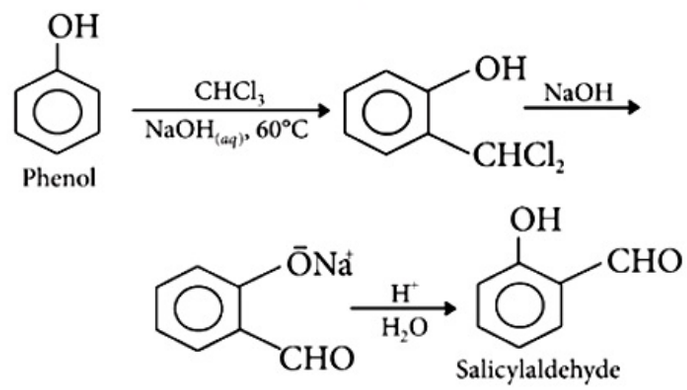
C. salicylic acid

D. benzoic acid.

Answer: B

Solution:

This reaction is called Reimer-Tiemann reaction.



Question55

Which of the following is correct?
(2001)

Options:

A. On reduction, any aldehyde gives secondary alcohol.

B. Reaction of vegetable oil with H_2SO_4 gives glycerine.

C. Alcoholic iodine with NaOH gives iodoform.

D. Sucrose on reaction with NaCl gives invert sugar.

Answer: C

Solution:

$C_2H_5OH + 4I_2 + NaOH \rightarrow CHI_3 + NaI + HCOONa + H_2O$
Iodoform is a pale yellow solid which crystallises in hexagonal plates.

Question56

Ethyl chloride is converted into diethyl ether by
(1999)

Options:

A. Perkins reaction

B. Grignard reaction

C. Wurtz synthesis

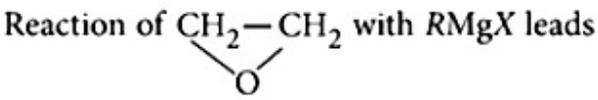
D. Williamson's synthesis.

Answer: D

Solution:

$C_2H_5 - Cl + Na - O - C_2H_5 \rightarrow C_2H_5 - O - C_2H_5 + NaCl$
The above reaction is called as Williamson's synthesis.

Question57

Reaction of  with $RMgX$ leads

to the formation of
(1998)

Options:

A. RCH_2CH_2OH

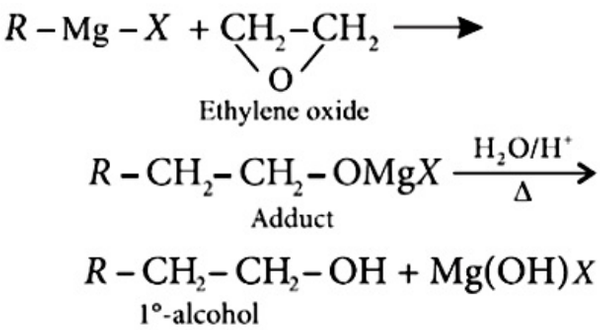
B. $RCHOHCH_3$

C. $RCHOHR$

D. 

Answer: A

Solution:



Question58

Which one of the following compounds is resistant to nucleophilic attack by hydroxyl ions?
(1998)

Options:

A. Diethyl ether

B. Acetonitrile

C. Acetamide

D. Methyl acetate

Answer: A

Solution:

Diethyl ether is a saturated compound, so it is resistant to nucleophilic attack by a hydroxyl ion (OH^-).
Other compounds have unsaturation and the unsaturated 'C' atom bears partial +ve charge, therefore they undergo easy nucleophilic attack by OH^- ion.

Question59

When 3,3 -dimethyl-2-butanol is heated with H_2SO_4, the major product obtained is
(1995)

Options:

A. 2,3 -dimethyl- 2 -butene

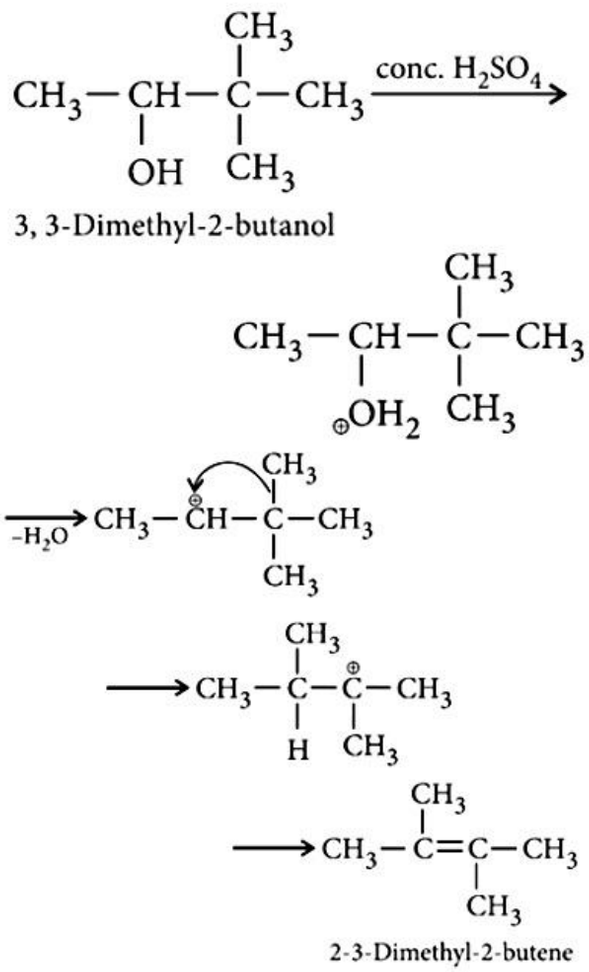
B. cis and trans isomers of 2,3 -dimethyl2-butene

C. 2,3 -dimethyl- 1 -butene

D. 3,3 -dimethyl- 1 -butene.

Answer: A

Solution:



Question60

On heating glycerol with conc. H_2SO_4, a compound is obtained which has bad odour. The compound is (1994)

Options:

A. acrolein

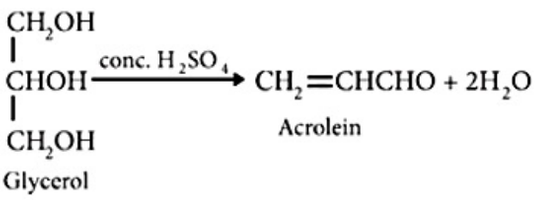
B. formic acid

C. allyl alcohol

D. glycerol sulphate.

Answer: A

Solution:



Question61

The compound which does not react with sodium is (1994)

Options:

A. CH_3COOH

B. $CH_3CHOHCH_3$

C. C_2H_5OH

D. CH_3OCH_3

Answer: D

Solution:

Ethers are very inert. The chemical inertness of ethers is due to absence of active group in their molecules. since

$CH_3 - O - CH_3$ is inert and it does not contain active group, therefore it does not react with sodium.

Question62

Ethanol and dimethyl ether form a pair of functional isomers. The boiling point of ethanol is higher than that of dimethyl ether, due to the presence of
(1993)

Options:

A. H-bonding in ethanol

B. H-bonding in dimethyl ether

C. CH_3 group in ethanol

D. CH_3 group in dimethyl ether.

Answer: A

Question63

Increasing order of acid strength among p -methoxyphenol, p -methylphenol and p -nitrophenol is
(1993)

Options:

A. p -nitrophenol, p -methoxyphenol, p -methylphenol

B. p -methylphenol, p -methoxyphenol, p -nitrophenol

C. p -nitrophenol, p -methylphenol, p -methoxyphenol

D. p -methoxyphenol, p -methylphenol, p -nitrophenol.

Answer: D

Solution:

$-OCH_3$, $-CH_3$ are electron donating groups and decrease the acidic character of phenols. $-NO_2$, $-CN$ are electron withdrawing groups and tend to increase the acidic character.

Thus, the order is
p -methoxyphenol <p -methylphenol <p -nitrophenol

Question64

Which one of the following on oxidation gives a ketone? (1993)

Options:

A. Primary alcohol

B. Secondary alcohol

C. Tertiary alcohol

D. All of these

Answer: B

Solution:

2° alcohols on oxidation give ketones, 1° alcohols form aldehydes.

Question65

What is formed when a primary alcohol undergoes catalytic dehydrogenation? (1993)

Options:

A. Aldehyde

B. Ketone

C. Alkene

D. Acid

Answer: A

Solution:

Primary alcohol undergoes catalytic dehydrogenation to give aldehyde.

Question66

How many isomers of $C_5H_{11}OH$ will be primary alcohols? (1993)

Options:

A. 5

B. 4

C. 2

D. 3

Answer: B

Solution:

4 -isomers are possible for $C_5H_{11}OH$.

(i) $CH_3CH_2CH_2CH_2CH_2OH$

(ii) $CH_3CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$

(iii) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2OH$

(iv) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2OH$

Question67

Methanol is industrially prepared by (1992)

Options:

A. oxidation of CH_4 by steam at 900°C

B. reduction of HCHO using $LiAlH_4$

C. reaction of HCHO with a solution of NaOH

D. reduction of CO using H_2 and $ZnO - Cr_2O_3$.

Answer: D

Solution:

$$CO + 2H_2 \xrightarrow{ZnO - Cr_2O_3} CH_3OH$$

Question68

HBr reacts fastest with (1992)

Options:

A. 2 -methylpropan-1-ol

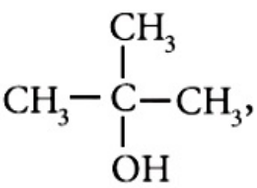
B. methylpropan- 2 -ol

C. propan-2-ol

D. propan-1-ol.

Answer: B

Solution:



generates 3° carbocation which is very stable intermediate, thus it will react more rapidly with HBr.

Question69

When phenol is treated with excess bromine water. It gives (1992)

Options:

A. m -bromophenol

B. o - and p -bromophenols

C. 2,4 -dibromophenol

D. 2,4,6 -tribromophenol

Answer: D

Solution:

Phenol on reaction with excess bromine water gives 2,4,6 -tribromophenol.

Question70

The compound which reacts fastest with Lucas reagent at room temperature is
(1989)

Options:

A. butan-1-ol

B. butan-2-ol

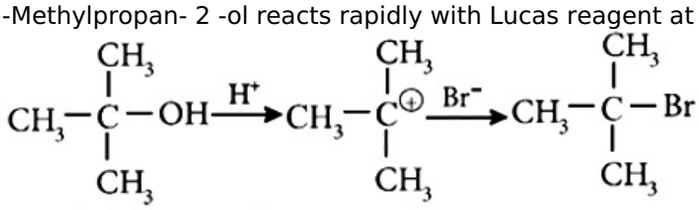
C. 2 -methylpropan- 1 -ol

D. 2 -methylpropan- 2 -ol.

Answer: D

Solution:

2-Methylpropan- 2 -ol reacts rapidly with Lucas reagent at room temperature.



2-Methyl-2-propanol

Question71

Which one of the following compounds will be most readily attacked by an electrophile?
(1989)

Options:

A. Chlorobenzene

B. Benzene

C. Phenol

D. Toluene

Answer: C

Solution:

Solution:
-OH group being electron donor increases the electron density in phenol. Thus, the electron density in phenol is higher than that of toluene, benzene and chlorobenzene.

Question72

Propene, $CH_3CH = CH_2$ can be converted into 1 -propanol by oxidation. Indicate which set of reagents amongst the following is ideal for the above conversion?
(1989)

Options:

A. $KMnO_4$ (alkaline)

B. Osmium tetroxide (OsO_4 / CH_2Cl_2)

C. B_2H_6 and alk. H_2O_2

D. O_3 / Zn

Answer: C

Solution:

Solution:

$$CH_3CH = CH_2 \xrightarrow[\text{Hydrobration}]{BH_3,\ THF} (CH_3CH_2CH_2)_3B \xrightarrow[OH^-]{H_2O_2} CH_3CH_2CH_2OH$$

Question73

Phenol is heated with $CHCl_3$ and aqueous KOH when salicylaldehyde is produced. This reaction is known as
(1989,1988)

Options:

A. Rosenmund's reaction

B. Reimer-Tiemann reaction

C. Friedel-Crafts reaction

D. Sommelet reaction.

Answer: B

Solution:

Solution:
Treatment of phenol with $CHCl_3$ and aqueous hydroxide introduces - CHO group, onto the aromatic ring generally ortho to the - OH group. This reaction is known as Reimer Tiemann reaction.

Question74

Lucas reagent is
(1988)

Options:

A. conc. HCl and anhydrous $ZnCl_2$

B. conc. HNO and hydrous $ZnCl_2$

C. conc. HCl and hydrous $ZnCl_2$

D. conc. HNO_3 and anhydrous $ZnCl_2$.

Answer: A

Question75

Which one is formed when sodium phenoxide is heated with ethyl iodide?
(1988)

Options:

A. Phenetole

B. Ethyl phenyl alcohol

C. Phenol

D. None of these

Answer: A

Solution:

Phenetole is formed when sodium phenoxide is heated with ethyl iodide.
