

CHAPTER 19

Alcohols, Phenols and Ethers

Section-A

JEE Advanced/ IIT-JEE

A Fill in the Blanks

- Ethanol vapour is passed over heated copper and the product is treated with aqueous NaOH. The final product is (1983 - 1 Mark)
- The acidity of phenol is due to the of its anion. (1984 - 1 Mark)
- Formation of phenol from chlorobenzene is an example of aromatic substitution. (1989 - 1 Mark)
- Phenol is acidic because of resonance stabilization of its conjugate base, namely (1990 - 1 Mark)
- Aliphatic ethers are purified by shaking with a solution of ferrous salt to remove which are formed on prolonged standing in contact with air. (1992 - 1 Mark)
- Glycerine contains one hydroxy group. (1997 - 1 Mark)

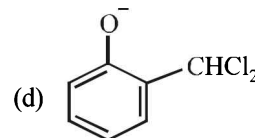
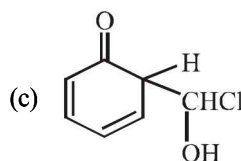
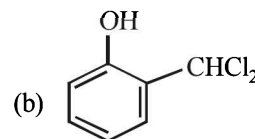
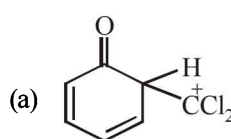
B True / False

- Sodium ethoxide is prepared by reacting ethanol with aqueous sodium hydroxide. (1986 - 1 Mark)

C MCQs with One Correct Answer

- Ethyl alcohol is heated with conc H_2SO_4 the product formed is (1980)
 - $\text{H}_3\text{C}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{OC}_2\text{H}_5$
 - C_2H_6
 - C_2H_4
 - C_2H_2
- Which of the following is basic (1980)
 - $\text{CH}_3-\text{CH}_2-\text{OH}$
 - $\text{OH}-\text{CH}_2-\text{CH}_2-\text{OH}$
 - $\text{H}-\text{O}-\text{O}-\text{H}$
 - $\text{H}_3\text{C}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{OH}$
- The compound which reacts fastest with Lucas reagent at room temperature is (1981 - 1 Mark)
 - butan-1-ol
 - butan-2-ol
 - 2-methylpropan-1-ol
 - 2-methylpropan-2-ol
- A compound that gives a positive iodoform test is (1982 - 1 Mark)
 - 1-pentanol
 - 2-pentanone
 - 3-pentanone
 - pentanal
- Diethyl ether on heating with conc. HI gives two moles of (1983 - 1 Mark)
 - ethanol
 - iodoform
 - ethyl iodide
 - methyl iodide

- An industrial method of preparation of methanol is : (1984 - 1 Mark)
 - catalytic reduction of carbon monoxide in presence of $\text{ZnO}-\text{Cr}_2\text{O}_3$
 - by reacting methane with steam at 900°C with a nickel catalyst
 - by reducing formaldehyde with lithium aluminium hydride
 - by reacting formaldehyde with aqueous sodium hydroxide solution
- When phenol is treated with excess bromine water, it gives: (1984 - 1 Mark)
 - m*-Bromophenol
 - o*- and *p*-Bromophenol
 - 2,4-Dibromophenol
 - 2,4,6-Tribromophenol
- HBr reacts fastest with : (1986 - 1 Mark)
 - 2-methylpropan-2-ol
 - propan-1-ol
 - propan-2-ol
 - 2-methylpropan-1-ol
- Which of the following compounds is oxidised to prepare methyl ethyl ketone? (1987 - 1 Mark)
 - 2-Propanol
 - 1-Butanol
 - 2-Butanol
 - t*-Butyl alcohol
- Phenol reacts with bromine in carbon disulphide at low temperature to give (1988 - 1 Mark)
 - m*-bromophenol
 - o*- and *p*-bromophenol
 - p*-bromophenol
 - 2,4,6-tribromophenol
- Chlorination of toluene in the presence of light and heat followed by treatment with aqueous NaOH gives (1990 - 1 Mark)
 - o*-Cresol
 - p*-Cresol
 - 2,4-Dihydroxytoluene
 - Benzoic acid
- When phenol is reacted with CHCl_3 and NaOH followed by acidification, salicylaldehyde is obtained. Which of the following species are involved in the above mentioned reaction as intermediate? (1995S)

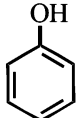


13. The compound that will react most readily with NaOH to form methanol is (2001S)

- (a) $(\text{CH}_3)_4\text{N}^+\text{I}^-$ (b) CH_3OCH_3
(c) $(\text{CH}_3)_3\text{S}^+\text{I}^-$ (d) $(\text{CH}_3)_3\text{CCl}$

14. 1-Propanol and 2-propanol can be best distinguished by (2001S)

- (a) oxidation with alkaline KMnO_4 followed by reaction with Fehling solution
(b) oxidation with acidic dichromate followed by reaction with Fehling solution
(c) oxidation by heating with copper followed by reaction with Fehling solution
(d) oxidation with concentrated H_2SO_4 followed by reaction with Fehling solution

15.  + $\text{C}_2\text{H}_5\text{I} \xrightarrow[\text{Anhydrous } (\text{C}_2\text{H}_5\text{OH})]{^-\text{OC}_2\text{H}_5} ?$ (2003S)

- (a) $\text{C}_6\text{H}_5\text{OC}_2\text{H}_5$ (b) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$
(c) $\text{C}_6\text{H}_5\text{OC}_6\text{H}_5$ (d) $\text{C}_6\text{H}_5\text{I}$

16. The product of acid catalyzed hydration of 2-phenylpropene is (2004S)

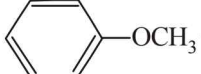
- (a) 3-phenyl-2-propanol (b) 1-phenyl-2-propanol
(c) 2-phenyl-2-propanol (d) 2-phenyl-1-propanol





17. The best method to prepare cyclohexene from cyclohexanol is by using (2005S)

- (a) Conc. $\text{HCl} + \text{ZnCl}_2$ (b) Conc. H_3PO_4
(c) HBr (d) Conc. HCl

18. The increasing order of boiling points of the below mentioned alcohols is (2006 - 3M, -1)

- (I) 1,2-dihydroxybenzene (II) 1,3-dihydroxybenzene
(III) 1,4-dihydroxybenzene (IV) Hydroxybenzene
(a) $\text{I} < \text{II} < \text{IV} < \text{III}$ (b) $\text{I} < \text{II} < \text{III} < \text{IV}$
(c) $\text{IV} < \text{II} < \text{I} < \text{III}$ (d) $\text{IV} < \text{I} < \text{II} < \text{III}$

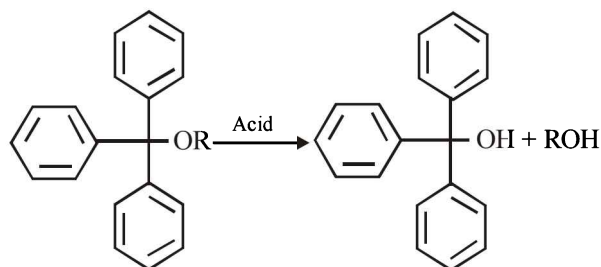
19. In the reaction  $\xrightarrow{\text{HBr}}$ the products are

- (a)  and H_2 (2010)
(b)  and CH_3Br
(c)  and CH_3OH
(d)  and CH_3Br

20. For the identification of β -naphthol using dye test, it is necessary to use (JEE Adv. 2014)

- (a) Dichloromethane solution of β -naphthol
(b) Acidic solution of β -naphthol
(c) Neutral solution of β -naphthol
(d) Alkaline solution of β -naphthol

21. The acidic hydrolysis of ether (X) shown below is fastest when (JEE Adv. 2014)

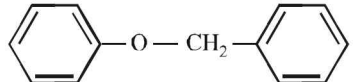


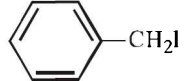


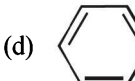
- (a) One phenyl group is replaced by a methyl group
(b) One phenyl group is replaced by a *para*-methoxyphenyl group
(c) Two phenyl groups are replaced by two *para*-methoxyphenyl groups
(d) No structural change is made to X

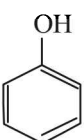
D MCQs with One or More Than One Correct

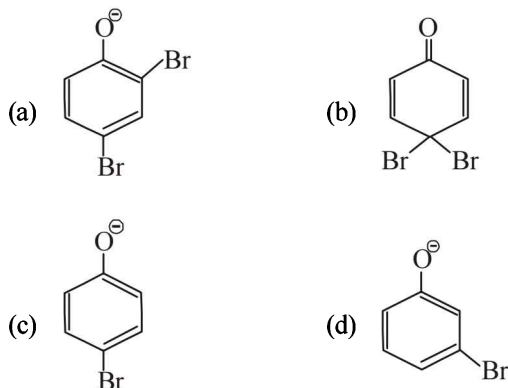
1. The reaction of $\text{CH}_3\text{CH}=\text{CH}-\text{C}_6\text{H}_4-\text{OH}$ with HBr gives (1998 - 2 Marks)

- (a) $\text{CH}_3\text{CHBrCH}_2-\text{C}_6\text{H}_4-\text{OH}$
(b) $\text{CH}_3\text{CH}_2\text{CHBr}-\text{C}_6\text{H}_4-\text{OH}$
(c) $\text{CH}_3\text{CHBrCH}_2-\text{C}_6\text{H}_3(\text{Br})-\text{OH}$
(d) $\text{CH}_3\text{CH}_2\text{CHBr}-\text{C}_6\text{H}_3(\text{Br})-\text{OH}$

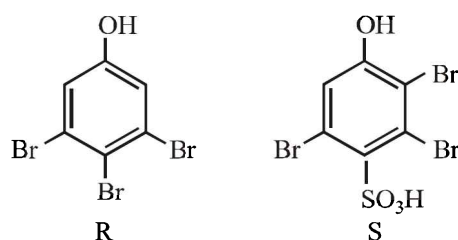
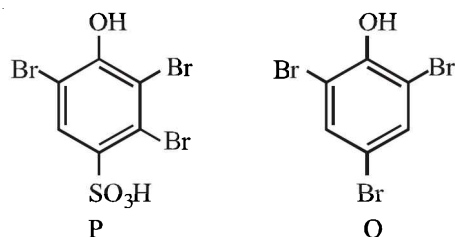
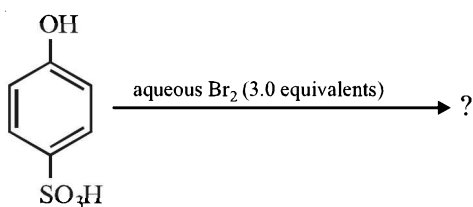
2. The ether  when treated with HI produces (1999 - 3 Marks)

- (a)  (b) 
(c)  (d) 

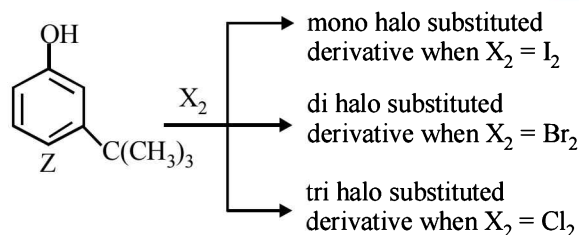
3. In the reaction  the intermediate (s) is (are) (2010)



4. The major product(s) of the following reaction is(are) (JEE Adv. 2013)

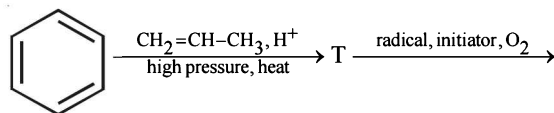


- (a) P (b) Q
(c) R (d) S
5. The correct combination of names for isomeric alcohols with molecular formula $C_4H_{10}O$ is/are (JEE Adv. 2014)
- (a) Tert-butanol and 2-methylpropan-2-ol
(b) Tert-butanol and 1, 1-dimethylethan-1-ol
(c) n-butanol and butan-1-ol
(d) Isobutyl alcohol and 2-methylpropan-1-ol
6. The reactivity of compound Z with different halogens under appropriate conditions is given below: (JEE Adv. 2014)

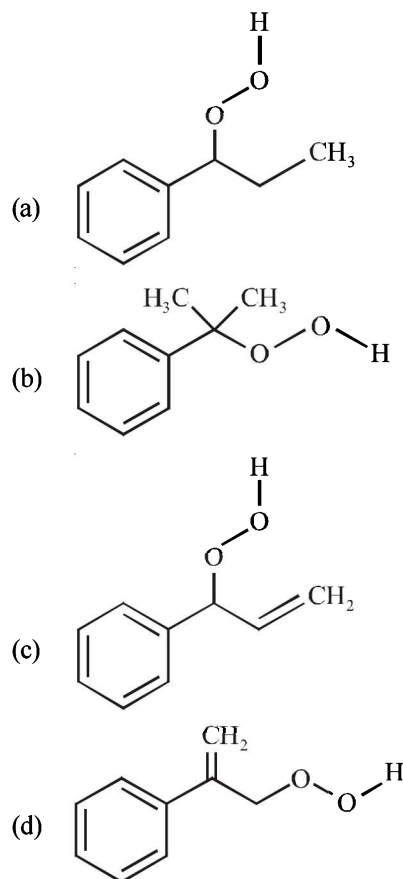


The observed pattern of electrophilic substitution can be explained by

- (a) The steric effect of the halogen
(b) The steric effect of the *tert*-butyl group
(c) The electronic effect of the phenolic group
(d) The electronic effect of the *tert*-butyl group
7. The major product U in the following reactions is



(JEE Adv. 2015)



E Subjective Problems

1. An organic liquid (A), containing C, H and O with boiling point : 78°C , and possessing a rather pleasant odour, on heating with concentrated sulphuric acid gives a gaseous product (B) – with the empirical formula, CH_2 . 'B' decolourises bromine water as well as alkaline KMnO_4 solution and takes up one mole of H_2 (per mole of 'B') in the presence of finely divided nickel at high temperature. Identify the substances 'A' and 'B'. (1979)

2. A compound (X) containing C, H and O is unreactive towards sodium. It does not add bromine. It also does not react with Schiff's reagent. On refluxing with an excess of hydriodic acid, (X) yields only one organic product (Y). On hydrolysis, (Y) yields a new compound (Z) which can be converted into (Y) by reaction with red phosphorus and iodine. The compound (Z) on oxidation with potassium permanganate gives a carboxylic acid. The equivalent weight of this acid is 60. What are the compounds (X), (Y) and (Z)? Write chemical equations leading to the conversion of (X) to (Y). (1981 - 3 Marks)

3. Outline the reaction sequence for the conversion of

(i) 1-propanol from 2-propanol (in three steps)

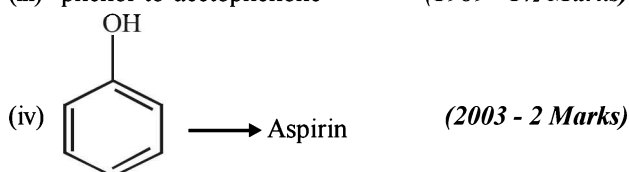
(1982 - 1 Mark)

(ii) ethyl alcohol to vinyl acetate. (in not more than 6 steps)

(1986 - 3 Marks)

(iii) phenol to acetophenone

(1989 - 1½ Marks)



4. State with balanced equations what happens when :

(i) acetic anhydride reacts with phenol in presence of a base. (1982 - 1 Mark)

(ii) Ethylene glycol is obtained by the reaction of ethylene with potassium permanganate. (1991 - 1 Mark)

5. Give reasons for the following :

(i) Sodium metal can be used for drying diethyl ether but not ethanol. (1982 - 1 Mark)

(ii) Phenol is an acid but it does not react with sodium bicarbonate. (1987 - 1 Mark)

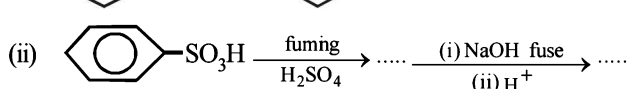
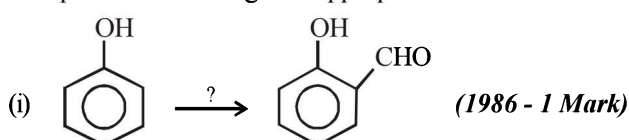
(iii) Acid catalysed dehydration of *t*-butanol is faster than that of *n*-butanol. (1998 - 2 Marks)

6. An alcohol A, when heated with conc. H_2SO_4 gives an alkene B. When B is bubbled through bromine water and the product obtained is dehydrohalogenated with excess of sodamide, a new compound C is obtained. The compound C gives D when treated with warm dilute H_2SO_4 in presence of HgSO_4 . D can also be obtained either by oxidizing A with KMnO_4 or from acetic acid through its calcium salt. Identify A, B, C and D. (1983 - 4 Marks)

7. A compound of molecular formula $\text{C}_7\text{H}_8\text{O}$ is insoluble in water and dilute sodium bicarbonate but dissolves in dilute aqueous sodium hydroxide. On treatment with bromine water, it readily gives a precipitate of $\text{C}_7\text{H}_5\text{OBr}_3$. Write down the structure of the compound. (1985 - 2 Marks)

8. Give a chemical test/suggest a reagent to distinguish between methanol and ethanol. (1985 - 1 Mark)

9. Complete the following with appropriate structures :

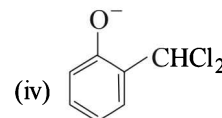
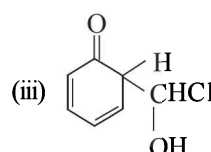
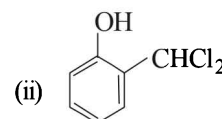
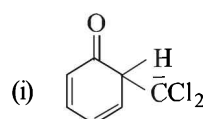


10. Compound 'X' (molecular formula, $\text{C}_5\text{H}_8\text{O}$) does not react appreciably with Lucas reagent at room temperature but gives a precipitate with ammonical silver nitrate. With excess of MeMgBr , 0.42 g of 'X' gives 224 ml of CH_4 at STP. Treatment of 'X' with H_2 in presence of Pt catalyst followed by boiling with excess HI, gives *n*-pentane. Suggest structure for 'X' and write the equation involved. (1992 - 1 Mark)

(1992 - 5 Marks)

11. When *t*-butanol and *n*-butanol are separately treated with a few drops of dilute KMnO_4 , in one case only the purple colour disappears and a brown precipitate is formed. Which of the two alcohols gives the above reaction and what is the brown precipitate? (1994 - 2 Marks)

12. When phenol is reacted with CHCl_3 and NaOH followed by acidification, salicylaldehyde is obtained. Which of the following species are involved in the above mentioned reaction as intermediates? (1995 - 2 Marks)

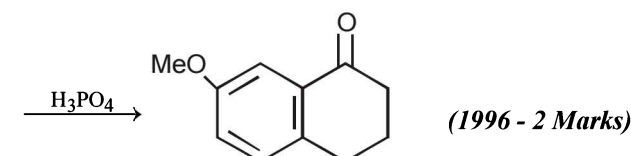
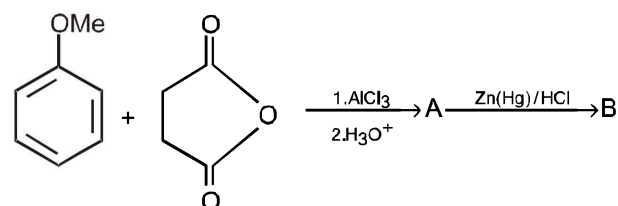


13. 3,3-Dimethylbutan-2-ol loses a molecule of water in the presence of concentrated sulphuric acid to give tetramethylethylene as a major product. Suggest a suitable mechanism. (1996 - 2 Marks)

14. A compound D ($\text{C}_8\text{H}_{10}\text{O}$) upon treatment with alkaline solution of iodine gives a yellow precipitate. The filtrate on acidification gives a white solid E ($\text{C}_7\text{H}_6\text{O}_2$). Write the structures of D and E and explain the formation of E. (1996 - 2 Marks)

15. An optically active alcohol A ($\text{C}_6\text{H}_{10}\text{O}$) absorbs two moles of hydrogen per mole of A upon catalytic hydrogenation and gives a product B. The compound B is resistant to oxidation by CrO_3 and does not show any optical activity. Deduce the structures of A and B. (1996 - 2 Marks)

16. Predict the structures of the intermediates/products in the following reaction sequence :



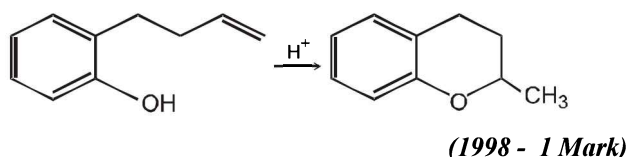
(1996 - 2 Marks)

17. 2, 2-Dimethyloxirane can be cleaved by acid (H^+). Write mechanism. (1997 - 2 Marks)

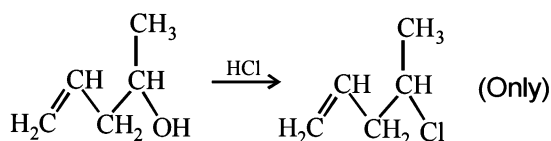
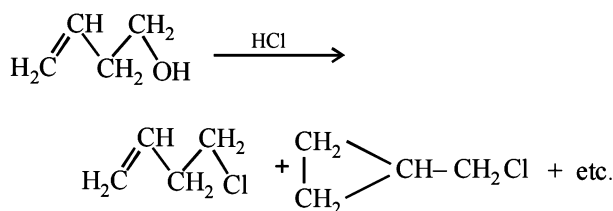
18. Which of the following is the correct method for synthesising methyl-t-butyl ether and why?

- (i) $(CH_3)_3CBr + NaOMe \rightarrow$
 (ii) $CH_3Br + NaO-t-Bu \rightarrow$ (1997 - 2 Marks)

19. Write the intermediate steps for each of the following reaction.



20. Explain briefly the formation of the products giving the structures of the intermediates. (1999 - 3 Marks)



21. A biologically active compound, bombykol ($C_{16}H_{30}O$) is obtained from a natural source. The structure of the compound is determined by the following reactions.

(2002 - 5 Marks)

- (a) On hydrogenation, bombykol gives a compound A, $C_{16}H_{34}O$, which reacts with acetic anhydride to give an ester;
 (b) Bombykol also reacts with acetic anhydride to give another ester, which on oxidative ozonolysis (O_3/H_2O_2) gives a mixture of butanoic acid, oxalic acid and 10-acetoxydecanoic acid.

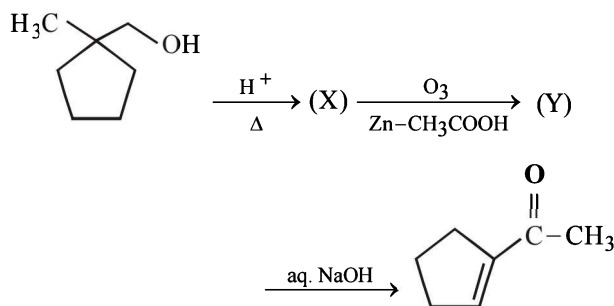
Determine the number of double bonds in bombykol. Write the structures of compound A and bombykol. How many geometrical isomers are possible for bombykol?

22. An organic compound (P) of molecular formula $C_5H_{10}O$ is treated with dil. H_2SO_4 to give two compounds (Q) and (R) both of which respond iodoform test. The rate of reaction of (P) with dil. H_2SO_4 is 10^{10} faster than the reaction of ethylene with dil. H_2SO_4 . Identify the organic compounds, (P), (Q) and (R) and explain the extra reactivity of (P).

(2004 - 4 Marks)

23. Identify (X) and (Y) in the following reaction sequence.

(2005 - 2 Marks)



F Match the Following

Following question has matching lists. The codes for the lists have choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

1. Match the chemical conversions in List I with the appropriate reagents in List II and select the correct answer using the code given below the lists : (JEE Adv. 2013)

List I

List II

- P \xrightarrow{Cl} \rightarrow 1. (i) $Hg(OAc)_2$; (ii) $NaBH_4$
 Q \xrightarrow{ONa} \rightarrow 2. $NaOEt$
 R \rightarrow 3. $Et-Br$
 S \rightarrow 4. (i) BH_3 ; (ii) $H_2O_2/NaOH$

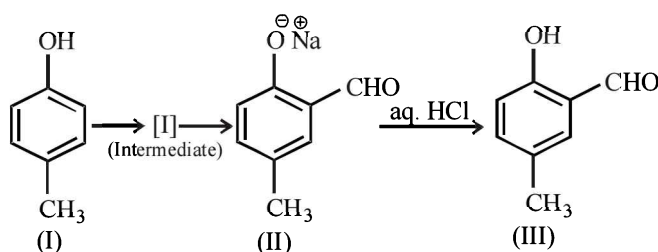
Codes :

	P	Q	R	S
(a)	2	3	1	4
(b)	3	2	1	4
(c)	2	3	4	1
(d)	3	2	4	1

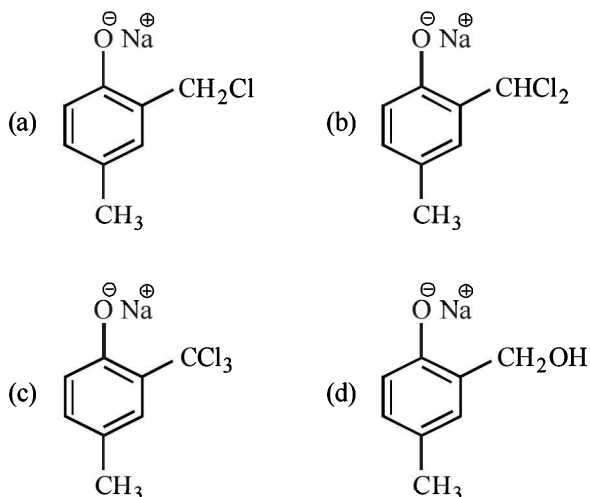
G Comprehension Based Questions

PASSAGE-I

Riemer-Tiemann reaction introduces an aldehyde group, on to the aromatic ring of phenol, ortho to the hydroxyl group. This reaction involves electrophilic aromatic substitution. This is a general method for the synthesis of substituted salicylaldehyde as depicted below.

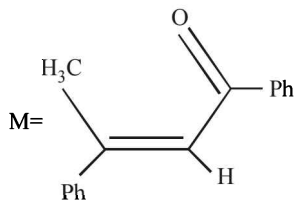


1. Which one of the following reagents is used in the above reaction ? (2007)
 (a) aq. NaOH + CH₃Cl (b) aq. NaOH + CH₂Cl₂
 (c) aq. NaOH + CHCl₃ (d) aq. NaOH + CCl₄
2. The electrophile in the reaction is (2007)
 (a) :CHCl (b) ⁺CHCl₂
 (c) :CCl₂ (d) CCl₃
3. The structure of the intermediate I is (2007)

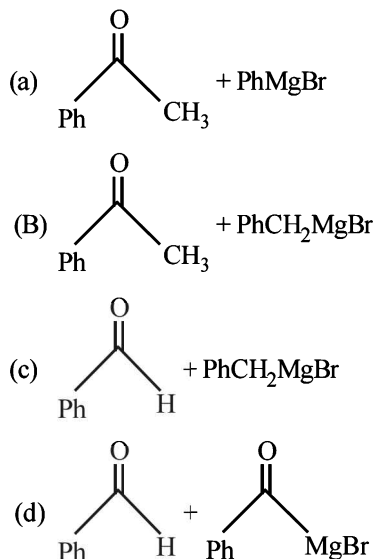


PASSAGE-2

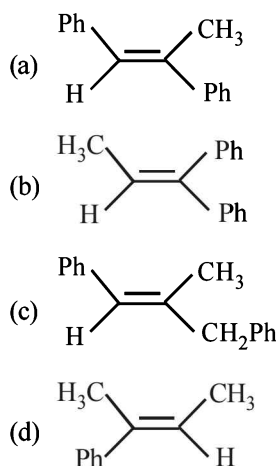
A tertiary alcohol H upon acid catalysed dehydration gives a product I. Ozonolysis of I leads to compounds J and K. Compound J upon reaction with KOH gives benzyl alcohol and compound L, whereas K on reaction with KOH gives only M.



4. Compound H is formed by the reaction of (2008)



5. The structure of compound I is (2008)



6. The structure of compounds J, K and L respectively, are – (2008)
 (a) PhCOCH₃, PhCH₂COCH₃ and PhCH₂COO⁻K⁺
 (b) PhCHO, PhCH₂CHO and PhCOO⁻K⁺
 (c) PhCOCH₃, PhCH₂CHO and CH₃COO⁻K⁺
 (d) PhCHO, PhCOCH₃ and PhCOO⁻K⁺

Assertion & Reason Type Questions

1. Read the following statement and explanation and answer as per the options given below : (1988 - 2 Marks)

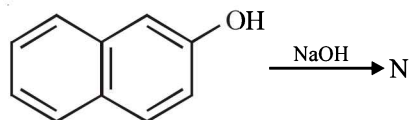
Statement (S) : Solubility of *n*-alcohols in water decreases with increase in molecular weight.

Explanation (E) : The relative proportion of the hydrocarbon part in alcohols increases with increasing molecular weight which permits enhanced hydrogen bonding with water.

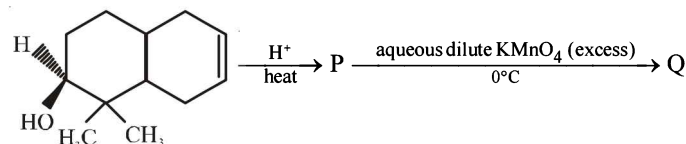
- (a) Both (S) and (E) are correct and (E) is the correct explanation of (S).
 (b) Both (S) and (E) are correct but (E) is not the correct explanation of (S).
 (c) (S) is correct but (E) is wrong.
 (d) (S) is wrong but (E) is correct.

Integer Value Correct Type

1. The number of resonance structures for N is (JEE Adv. 2015)



2. The number of hydroxyl group(s) in Q is (JEE Adv. 2015)



Section-B

JEE Main / AIEEE

- During dehydration of alcohols to alkenes by heating with conc. H_2SO_4 the initiation step is [2003]
 - formation of carbocation
 - elimination of water
 - formation of an ester
 - protonation of alcohol molecule
- Among the following compounds which can be dehydrated very easily is [2004]
 - $$\text{CH}_3\text{CH}_2\overset{\text{CH}_3}{\underset{\text{OH}}{\text{C}}}\text{CH}_2\text{CH}_3$$
 - $$\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{OH}}{\text{C}}\text{HCH}_3$$
 - $$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$$
 - $$\text{CH}_3\text{CH}_2\overset{\text{CH}_3}{\text{C}}\text{HCH}_2\text{CH}_2\text{OH}$$
- The best reagent to convert pent-3-en-2-ol into pent-3-en-2-one is [2005]
 - Pyridinium chloro-chromate
 - Chromic anhydride in glacial acetic acid
 - An acidic dichromate
 - Acidic permanganate
- p-cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form, the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is [2005]
 -
 -
 -
 -
- HBr reacts with $\text{CH}_2=\text{CH}-\text{OCH}_3$ under anhydrous conditions at room temperature to give [2006]
 - $\text{BrCH}_2-\text{CH}_2-\text{OCH}_3$
 - $\text{H}_3\text{C}-\text{CHBr}-\text{OCH}_3$
 - CH_3CHO and CH_3Br
 - BrCH_2CHO and CH_3OH
- Among the following the one that gives positive iodoform test upon reaction with I_2 and NaOH is [2006]
 - $$\text{CH}_3-\overset{\text{CH}_3}{\text{CH}}\text{CH}_2\text{OH}$$
 - PhCHOHCH_3
 - $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$
 - $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$
- The structure of the compound that gives a tribromo derivative on treatment with bromine water is [2006]
 -
 -
 -
 -
- $$\text{C}_6\text{H}_5\text{OH} + \text{CHCl}_3 + \text{NaOH} \longrightarrow \text{C}_6\text{H}_4(\text{O}^-\text{Na}^+)(\text{CHO})$$

The electrophile involved in the above reaction is

 - trichloromethyl anion (CCl_3^-)
 - formyl cation (CHO^+)
 - dichloromethyl cation (CHCl_2^+)
 - dichlorocarbene ($:\text{CCl}_2$)
- In the following sequence of reactions,

$$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{P}+\text{I}_2} \text{A} \xrightarrow[\text{ether}]{\text{Mg}} \text{B} \xrightarrow{\text{HCHO}} \text{C} \xrightarrow{\text{H}_2\text{O}} \text{D}$$

the compound D is [2007]

 - propanal
 - butanal
 - n-butyl alcohol
 - n-propyl alcohol.
- Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives [2008]
 - 2, 4, 6-trinitrobenzene
 - o-nitrophenol
 - p-nitrophenol
 - nitrobenzene

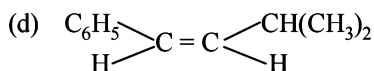
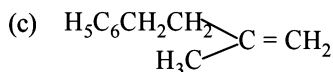
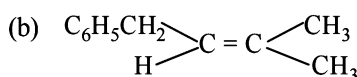
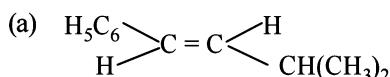
11. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is [2009]

(a) salicylaldehyde (b) salicylic acid
(c) phthalic acid (d) benzoic acid

12. From amongst the following alcohols the one that would react fastest with conc. HCl and anhydrous ZnCl_2 , is [2010]

(a) 2-Butanol (b) 2-Methylpropan-2-ol
(c) 2-Methylpropanol (d) 1-Butanol

13. The main product of the following reaction is $\text{C}_6\text{H}_5\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{CH}_3)_2 \xrightarrow{\text{conc. H}_2\text{SO}_4} ?$ [2010]

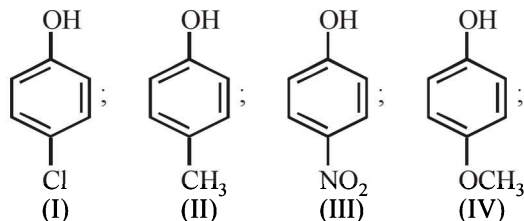


14. Phenol is heated with a solution of mixture of KBr and KBrO_3 . The major product obtained in the above reaction is:

[2011]

(a) 2-Bromophenol (b) 3-Bromophenol
(c) 4-Bromophenol (d) 2, 4, 6-Tribromophenol

15. Arrange the following compounds in order of decreasing acidity: [JEE M 2013]



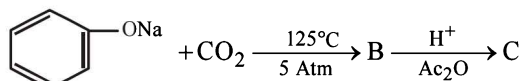
(a) $\text{II} > \text{IV} > \text{I} > \text{III}$ (b) $\text{I} > \text{II} > \text{III} > \text{IV}$
(c) $\text{III} > \text{I} > \text{II} > \text{IV}$ (d) $\text{IV} > \text{III} > \text{I} > \text{II}$

16. An unknown alcohol is treated with the "Lucas reagent" to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism:

[JEE M 2013]

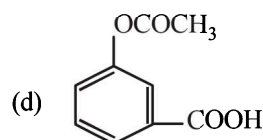
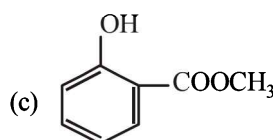
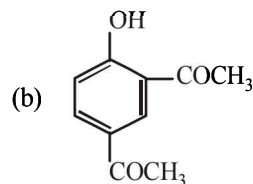
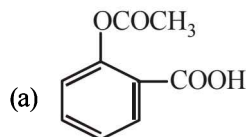
(a) secondary alcohol by $\text{S}_{\text{N}}1$
(b) tertiary alcohol by $\text{S}_{\text{N}}1$
(c) secondary alcohol by $\text{S}_{\text{N}}2$
(d) tertiary alcohol by $\text{S}_{\text{N}}2$

17. Sodium phenoxide when heated with CO_2 under pressure at 125°C yields a product which on acetylation produces C.



The major product C would be

[JEE M 2014]

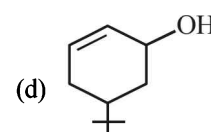
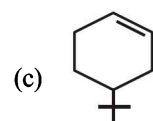
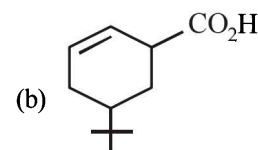
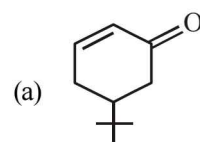
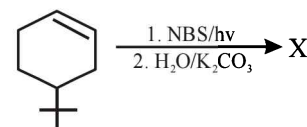


18. Thiol group is present in:

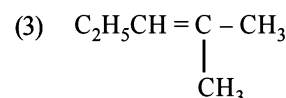
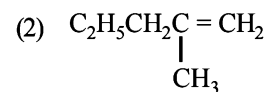
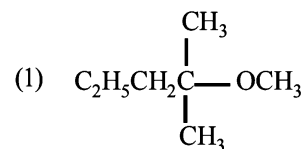
[JEE M 2016]

(a) Cysteine (b) Methionine
(c) Cytosine (d) Cystine

19. The product of the reaction given below is: [JEE M 2016]



20. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields: [JEE M 2016]



(a) (3) only (b) (a) and (b)
(c) All of these (d) (a) and (c)