

NEET Important Questions with Solutions from Alcohols, Phenols and Ethers

Q.1. The solvent used in the conversion of alcohol to alkyl halide through SOCl_2 is

- A) pyridine.
- B) ether.
- C) chloroform.
- D) benzene.

Answer: pyridine.

Solution: As it turns out, this reaction's stereochemistry can change to inversion if we add a mild base such as pyridine.

The stereochemistry remains the same if we add only SOCl_2 , but it changes in the presence of pyridine as the mechanism gets converted into a $\text{S}_{\text{N}}2$ mechanism.

Q.2. Which of the following compounds have the lowest boiling point?

- A) n-butyl alcohol
- B) isobutyl alcohol
- C) tert-butyl alcohol
- D) sec-butyl alcohol

Answer: tert-butyl alcohol

Solution: Tert-butyl alcohol has the lowest boiling point because in tert-butyl alcohol, there is less interaction (weak Van der Waal due to less surface area) between tert-butyl alcohol and similarly, there is less hydrogen bonding interaction between them.

Q.3. Alcohols can be prepared by _____.

- A) alkaline hydrolysis of alkyl halide
- B) treatment of olefin with conc. H_2SO_4 , followed by hydrolysis
- C) reduction of carbonyl compounds
- D) all of these

Answer: all of these



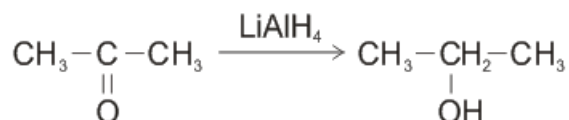
Solution: Alkaline hydrolysis of alkyl halide undergoes nucleophilic substitution reaction.



Treatment of olefin with concentrated H_2SO_4 followed by hydrolysis follows an electrophilic addition mechanism.



Reduction of carbonyl group follows nucleophilic addition reaction.

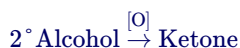


Q.4. The oxidation of the alcohols depends upon the _____.

- A) number of carbon atoms of alcohol
- B) -OH group of alcohols
- C) number of hydrogen atoms attached to alcoholic carbon
- D) hydrogen bonding in alcohol

Answer: number of hydrogen atoms attached to alcoholic carbon

Solution: For the oxidation to take place, the α - carbon to the alcohol group must have at least 1 hydrogen. We know that:



Q.5. _____ is used as the starting material for the preparation of iodoform.

- A) Methyl alcohol
- B) Ethyl alcohol
- C) n-Propyl alcohol
- D) n-Butyl alcohol

Answer: Ethyl alcohol

Solution: Ethyl alcohol, on treatment with iodine and NaOH, gives iodoform.



Q.6. In both the Dow's process and Raschig's processes, for the manufacture of phenol, the _____.

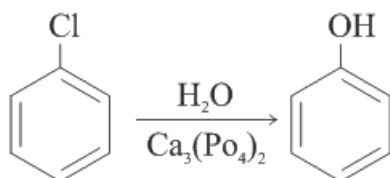
- A) conversion of benzene to phenol is involved
- B) conversion of chlorobenzene to phenol is involved
- C) conversion of benzene sulphonic acid to phenol is involved
- D) conversion of toluene to phenol is involved



Answer: conversion of chlorobenzene to phenol is involved

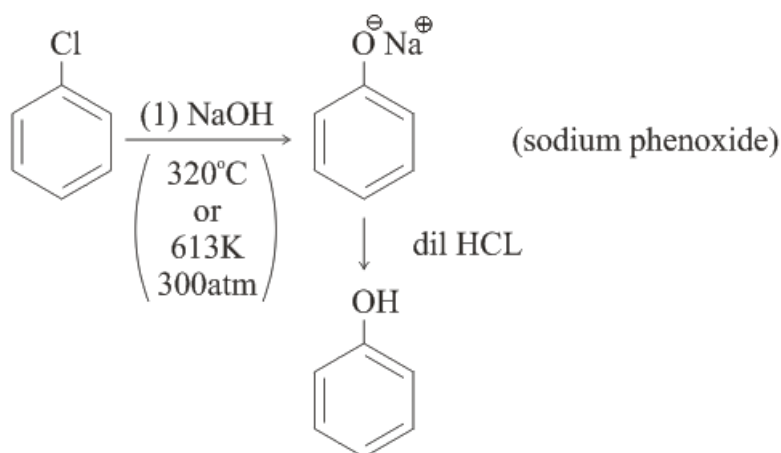
Solution: Raschig method:

The conversion of chlorobenzene to phenol. Chlorobenzene reacts with water (steam) in the presence of calcium phosphate.



Dows process:

The chlorobenzene is treated with NaOH in harsh conditions, i.e., high temperature and pressure to give phenol.



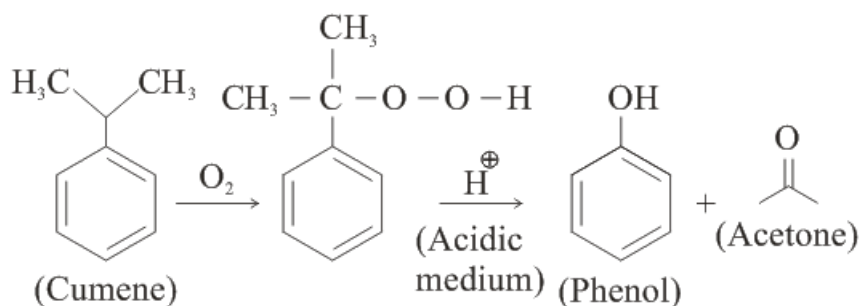
Q.7. Which is the commercial method for the manufacture of phenol?

- A) Cumene process
- B) From benzene sulphonic acid
- C) Raschig's process
- D) Dow's process

Answer: Cumene process



Solution: The cumene process, also called cumene hydroperoxide rearrangement, is the best method for phenol preparation since no harsh conditions like high temperature/pressure are required.

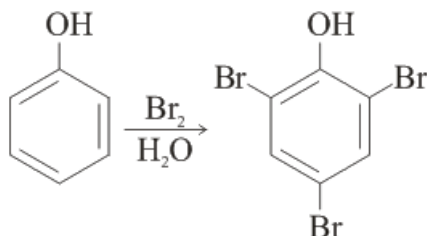


Q.8. Phenol on treatment with bromine water gives ____.

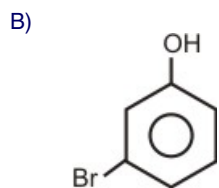
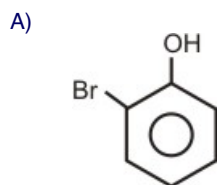
- A) o-bromophenol
- B) p-bromophenol
- C) a mixture of ortho and para bromophenol
- D) 2,4,6-tribromophenol

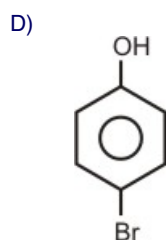
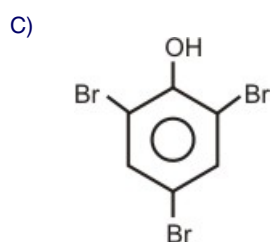
Answer: 2,4,6-tribromophenol

Solution: Bromination, in the presence of polar protic solvent like water, gives tribromoproduct since the protic solvents phenol converts to phenoxides and activates the ring to a greater extent giving tribromoproduct.

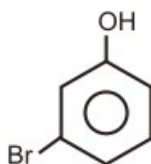


Q.9. The bromination of phenol, will not give ____.





Answer:



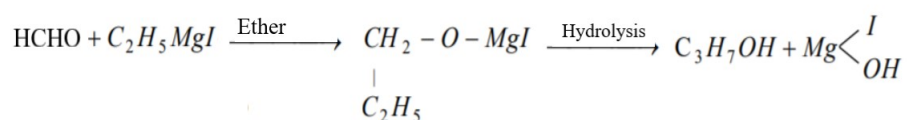
Solution: Since, in the Phenol – OH group is the e^- donating group, therefore, it activates the ring and increases the e^- density at the ortho and para position only. Therefore, only the O/P products are observed and no meta product is obtained.

Q.10. C_2H_5MgI reacts with $HCHO$ to form last product _____.

- A) CH_3CHO
- B) C_3H_7OH
- C) CH_3COCH_3
- D) C_2H_5OH

Answer: C_3H_7OH

Solution: Ethyl magnesium iodide reacts with formaldehyde in the presence of dry ether followed by the hydrolysis to form propanol by the following reaction.



Q.11. Ethanol is used in the preparation of _____.

- A) DDT
- B) tincture iodine
- C) pain killer medicines
- D) benzene hexachloride

Answer: tincture iodine



Solution: Ethanol with iodine molecule is used for the preparation of tincture iodine that is used as antibacterial and antiseptic.

Q.12. Methyl alcohol is used _____.

- A) for dry cleaning
- B) preparation of perfumes and varnishes
- C) as an antifreeze agent for automobile radiators
- D) in all of these

Answer: in all of these

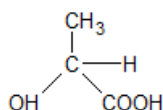
Solution: Methyl alcohol is used for dry cleaning, preparation of perfumes and varnishes as an antifreeze agent for automobile radiators.

Q.13. Which of the following compound(s) is/are optically active?

- A) $\text{CH}_3\text{CHOHCOOH}$
- B) $\text{CH}_3\text{CH}_2\text{COOH}$
- C) $\text{HOOCCH}_2\text{COOH}$
- D) CH_3COCOOH

Answer: $\text{CH}_3\text{CHOHCOOH}$

Solution: 2 – hydroxypropanoic acid is an optically active compound.



In this compound, carbon has four different priorities attached to it and is called stereo genic centre.

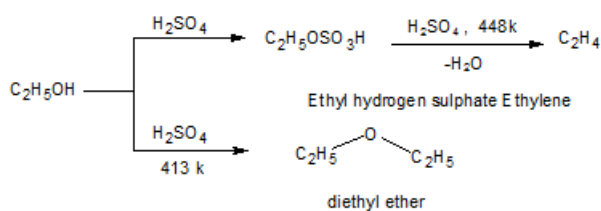
Q.14. Ethyl alcohol, when treated with H_2SO_4 , gives _____

- A) ethylene
- B) ethyl hydrogen sulphate
- C) diethyl ether
- D) all of these

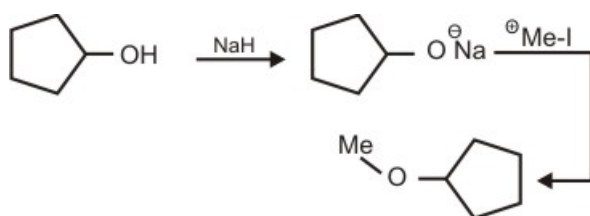
Answer: all of these



Solution: When the reaction condition changes, ethyl alcohol gives different products with the reaction of H_2SO_4 .



Q.15. The reaction can be classified as _____.



- A) Dehydration reaction
- B) Williamson alcohol synthesis reaction
- C) Williamson ether synthesis reaction
- D) Alcohol formation reaction

Answer: Williamson ether synthesis reaction

Solution: The given reaction is Williamson ether synthesis reaction.

Williamson synthesis is a laboratory method to prepare both symmetrical and asymmetrical ethers. In this method, alkyl halides are reacted with sodium alkoxide. Sodium alkoxide is formed when alcohol is reacted with some sodium salt.



This reaction involves attack of an alkoxide ion on the primary halide.

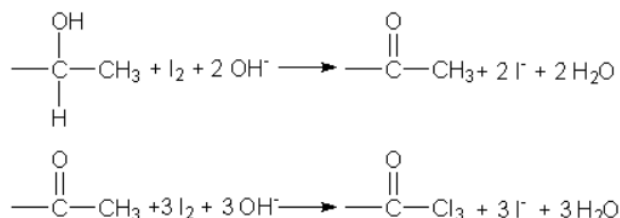
Q.16. Which of the following will give yellow precipitate with I_2/NaOH ?

- A) $\text{ICH}_2\text{COCH}_2\text{CH}_3$
- B) $\text{CH}_3\text{COOCOCH}_3$
- C) CH_3CONH_2
- D) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$

Answer: $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$



Solution: When Iodine and sodium hydroxide are added to a compound that contains either a ketone with group $-\text{COCH}_3$ or a secondary alcohol with $-\text{CH}(\text{OH})\text{CH}_3$ group, a pale yellow precipitate of iodoform or triiodomethane is formed. This reaction is known as iodoform reaction and it is used to identify the presence of ketone and alcohol, having this group.



Q.17. This does not convert a ketone to an alcohol:

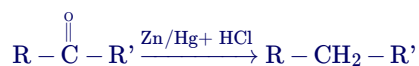
- A) $\text{Zn}/\text{Hg} + \text{HCl}$
- B) $\text{H}_2/\text{Raney Ni}$
- C) LiAlH_4
- D) $\text{Na}/\text{Hg} + \text{H}_2\text{O}$

Answer: $\text{Zn}/\text{Hg} + \text{HCl}$

Solution: Reduction of ketone generally results in the formation of secondary alcohol. This can be achieved by using various reducing agents like $\text{H}_2/\text{Raney Ni}$, LiAlH_4 and $\text{Na}/\text{Hg} + \text{H}_2\text{O}$.



But when reduction of ketone is done in the presence of $\text{Zn}/\text{Hg} + \text{HCl}$, it is reduced to alkane. This reaction is known as Clemmensen reduction.



Q.18. Phenol $\xrightarrow{\text{Zn dust}}$ X $\xrightarrow[\text{Anhydrous AlCl}_3]{\text{CH}_3\text{Cl}}$ Y $\xrightarrow{\text{Alk KMnO}_4}$ Z

The product Z is _____.

- A) benzaldehyde
- B) benzoic acid
- C) benzene
- D) toluene

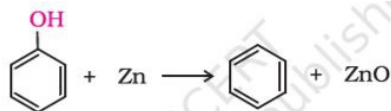
Answer: benzoic acid



Solution: Benzoic acid is formed as the final product.

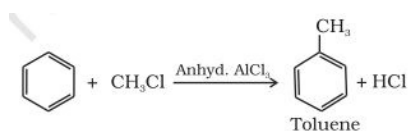
X:

When phenol is reacted with zinc dust, it gets reduced to benzene.



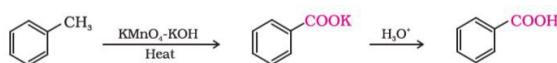
Y:

When benzene is treated with an alkyl halide in the presence of anhydrous aluminium chloride, alkyl benzene is formed. This reaction is known as Friedel-craft's Alkylation.



Z:

Aromatic carboxylic acids can be prepared by vigorous oxidation of alkylbenzenes with chromic acid or acidic or alkaline potassium permanganate. The entire side chain is oxidised to the carboxyl group irrespective of the length of the side chain.



Q.19. Williamson's synthesis is used for the preparation of _____.

- A) acid
- B) ester
- C) ether
- D) alcohol

Answer: ether

Solution: Williamson's synthesis involves S_N2 attack of an alkoxide ion on primary alkyl halide to form ether.

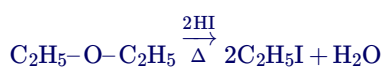
Q.20. Diethyl ether on heating with concentrated HI gives two moles of:

- A) Ethanol
- B) Iodoform
- C) Ethyl iodide
- D) Methyl iodide

Answer: Ethyl iodide

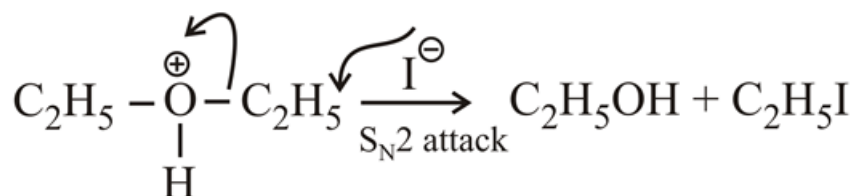


Solution:

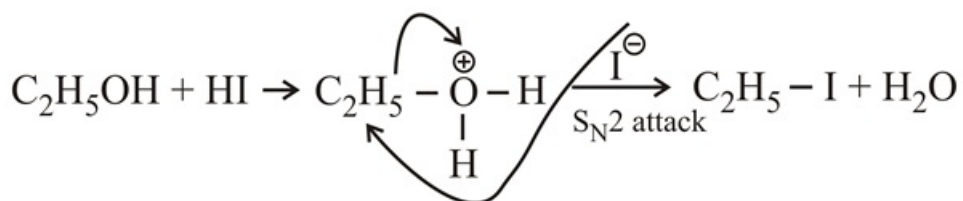


$\text{S}_{\text{N}}2$ reaction takes place through the formation of the oxonium ion.

First, HI dissociates into H^{\oplus} & I^{\ominus} and protonates ether to form ethanol and ethyl iodide.

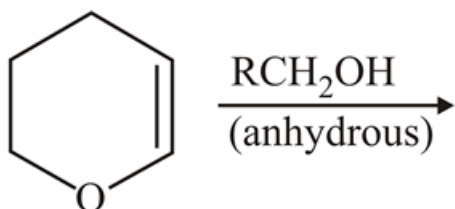


Now, 2nd molecule of HI will cause nucleophilic substitution in the ethanol molecule.



Nucleophilic substitution will be taking place as ethanol is a primary alcohol and I^{\ominus} is a good nucleophile.

Q.21. The major product under the acidic conditions of the following reaction is



- A) A hemiacetal
- B) An acetal
- C) An ether
- D) An ester

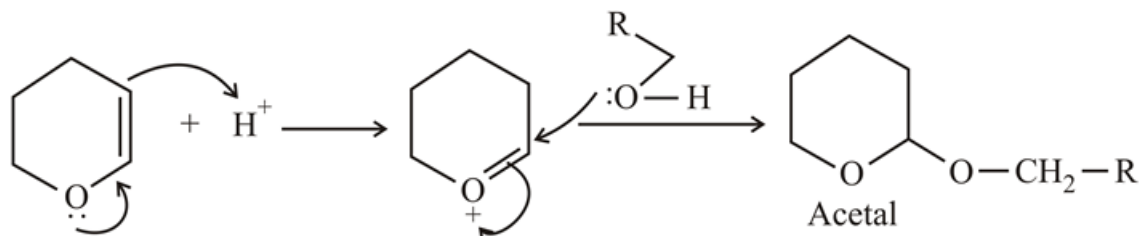
Answer: An acetal



Solution: The reactant is C_5H_8O , also known as 3, 4-dihydropyran.

Dihydropyran is a vinyl ether, which can react with alcohol in acidic conditions to form tetrahydropyranyl ethers. This reaction is useful for protection of alcoholic groups.

In acidic medium, a substituted carbocation is formed. The carbocation is attacked by a nucleophile to form an acetal.



Q.22. Acetaldehyde does not respond to

- A) iodoform test.
- B) Lucas test.
- C) Benedict's test.
- D) Tollens' test.

Answer: Lucas test.

Solution: Tollen's test and Benedict's test are the tests for aldehydes whereas the iodoform test is shown by both aldehydes and ketones having an acetyl group.

Lucas test is used for the confirmation and differentiating between 1° , 2° and 3° alcohols.

Aldehydes and ketones do not respond to Lucas reagent.

Q.23. Proof spirit contains about

- A) 40% alcohol by weight.
- B) 60% alcohol by weight.
- C) 25% alcohol by weight.
- D) 10% alcohol by weight.

Answer: 60% alcohol by weight.

Solution: It is a mixture of alcohol with water which contains about 50 – 60% ethanol at around $60^\circ C$.

It is used to measure the content of ethanol in an alcoholic beverage.

The regulated amount in India is 42.8% V/V.

The regulated amount in US is 50% V/V.

Q.24. Rectified spirit is a mixture of

- A) 95% ethyl alcohol +5% water
- B) 94% ethyl alcohol +4.53 water



- C) 94.4% ethylalcohol +5.43% water
D) 95.87% ethyl alcohol +4.13% water

Answer: 95.87% ethyl alcohol +4.13% water

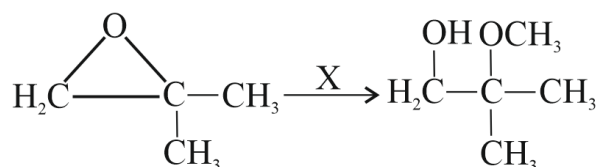
Solution: Ethanol is produced from raw materials such as molasses, a by-product of the sugar industry; starch from corn in case of alcoholic beverages or other sugary fruits.



Distillation of wash gives raw spirit which contains around 90% ethanol.



Q.25. What is X in the following change?

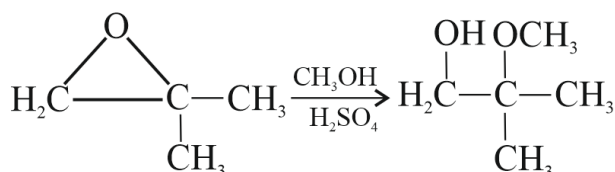


- A) $\text{CH}_3\text{OH}, \text{H}_2\text{SO}_4$
B) $\text{CH}_3\text{OH}, \text{CH}_3\text{O}^-\text{Na}^+$
C) $\text{H}_2\text{O}/\text{H}_2\text{SO}_4$ followed by CH_3OH
D) $\text{CH}_3\text{MgBr}/\text{H}_3\text{O}^+$

Answer: $\text{CH}_3\text{OH}, \text{H}_2\text{SO}_4$

Solution: Epoxides undergo solvolysis on reaction with alcohol under acidic condition and follows S_N1 mechanism. The reaction is a ring opening reaction.

In the given reaction, the more substituted carbon is the site on which the attack of nucleophile (CH_3O^- in this case) takes place. So, in the product the oxygen of the OCH_3 comes from the solvent (CH_3OH) and the oxygen of the OH group come from the epoxide.



Practice more on Alcohols, Phenols and Ethers