

CBSE Class 12 Chemistry Chapter 11 Alcohols, Phenols, and Ethers Worksheet with Answer – Set 3

Q1. Which reagents can not be used to oxidise primary alcohols to aldehydes?

- (a) Acidic KMnO₄
- (b) Anhydrous CrO₃
- (c) Both (a) and (b)
- (d) None of the above

Answer:

(a) Acidic KMnO₄ can not be used to oxidise primary alcohols to aldehydes.

Q2. Name a reagent that can be used to oxidise alcohol to aldehyde?

- (a) NaBH₄
- (b) LiAlH₄
- (c) PCC
- (d) None of the above

Answer:

- (c) PCC can be used to oxidise alcohol to aldehyde.
- Q3. Which of the following compound has two hydroxyl groups?
- (a) Picric acid
- (b) o- Cressol
- (c) Both (a) and (b)
- (d) None of the above

Answer:

(b) (o) - Cressol has two hydroxyl groups.

Q4. What happens when phenol is treated with dihydrogen in the presence of the nickel catalyst?

- (a) Benzene
- (b) Cyclo hexanol
- (c) Toluene
- (d) None of the above



Answer:

(b) Cyclo hexanol is formed when phenol is treated with dihydrogen in the presence of the nickel catalyst.

Q5. Name a reagent that is used to convert chloro ethane to diethyl ether.

- (a) Sodium ethoxide
- (b) Sodium hydroxide
- (c) Sulphuric Acid
- (d) None of the above

Answer:

- (a) Sodium ethoxide is used to convert chloro ethane to diethyl ether.
- Q6. Write the IUPAC name of the compound mentioned below.

Answer:

The IUPAC name of the compound mentioned above is 5- Ethyl Hept- 2,4- diol.

Q7. Draw the structure of 2-Methyl Butan-2ol.

Answer:

The structure of 2-Methyl Butan-2ol is mentioned below.

$$\overset{\mathrm{CH}_3}{\underset{\overset{|}{\operatorname{CH}_3} \longrightarrow \overset{|}{\operatorname{CH}_2 \operatorname{CH}_2 \operatorname{CH}_3}}_{\underset{OH}{\overset{|}{\operatorname{OH}}}}$$

Q8. Identify the compound formed in the reaction mentioned below.

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$$\begin{array}{c} OH \\ + HNO_3 \underbrace{\text{conc.}}_{\text{H}_2\text{SO}_4} \end{array} + H_2O \end{array}$$

Answer:

Picric acid, i.e. 2, 4, 6- tri nitro phenol, is formed when phenol reacts with the nitric acid in the presence of the concentrated sulphuric acid.

Q9. Why does ethanol have a higher boiling point than methoxy methane?

Answer:

Ethanol has a higher boiling point than methoxy methane because ethanol forms an intermolecular hydrogen bond due to the presence of the OH group, while methoxy methane does not.

Q10. What is Kolbe's reaction?

Answer:

The Kolbe's or Kolbe–Schmitt reaction is a carboxylation chemical reaction that proceeds by heating sodium phenoxide with carbon dioxide under 100 atmospheric pressure and 125 °C and then treating the product with sulfuric acid.

The final product formed is an aromatic hydroxy acid, also known as salicylic acid (an aspirin precursor).



Q11. Why does phenol give electrophilic substitution reactions?

Answer:

Phenol gives electrophilic substitution reactions because due to the presence of the OH group, it has greater electron density than benzene.

Q12. What is the IUPAC name of the glycerol? Draw its structure.

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Answer:

The IUPAC name of the glycerol is Propan- 1, 2, 3-triol.

Structure of Glycerol:





Q13. Why ortho- Nitro phenol is steam volatile while para- Nitro phenol is less volatile?

Answer:

Ortho nitrophenol is more volatile than para nitrophenol because O-Nitrophenol has intramolecular hydrogen bonding, whereas para nitrophenol has intermolecular hydrogen bonding. Thus, it boils relatively at a higher temperature.

Q14. Why is ortho- nitrophenol less soluble in water than para- and meta-nitro phenols?

Answer:

Ortho-nitrophenol is less soluble in water than para- and meta-nitro phenols because ortho- nitrophenol forms intramolecular hydrogen bonding, due to which its OH group is not available to form a hydrogen bond with water. Hence ortho nitrophenol is sparingly soluble in water, while meta and para nitrophenol is soluble as it forms intermolecular hydrogen bonding with water.



Q15. Compound C_2H_6O has two isomers, X and Y. On reaction with HI, X gives alkyl iodide and water while Y gives alkyl iodide and alcohol. Identify compounds X and Y.

Answer:

Here, A = Ethanol (C_2H_5OH) B = Methoxy methane (CH_3OCH_3)

Q16. What happens when sodium ethoxide and ethyl chloride are heated together?

Answer:

Ether is formed when sodium ethoxide and ethyl chloride are heated together. Reaction: $C_2H_5ONa + C_2H_5CI \rightarrow C_2H_5OC_2H_5 + NaCl$

Q17. Convert phenol to anisole.

Answer:

We can convert phenol to anisole in two steps.

Step 1: Phenol reacts with sodium hydroxide to form sodium phenoxide ion.

Step 2: Sodium phenoxide ion reacts with methyl bromide to form the resulting product, i.e. anisole.



Q18. Convert ethanol to propan-2-ol.

Answer:

We can convert ethanol to propan-2-ol in three steps.

Step 1: Oxidation with PCC: Ethanol oxidises in the presence of PCC to form ethanal. $CH_3CH_2OH + PCC \rightarrow CH_3CHO$

Step 2: Grignard reaction: Ethanal reacts with methyl magnesium bromide to form a corresponding product.

 $CH_3CHO + CH_3MgI \rightarrow CH_3CH (OMgI)CH_3$

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Step 3: Hydrolysis reaction: On hydrolysis, a substitution reaction takes place leading to the formation of the required product. CH₃CH (OMgI)CH₃ + H₂O \rightarrow CH₃CH(OH) CH₃

Q19. Why lewis acid is not required in the bromination of phenol?

Answer:

Lewis acid is not required in the bromination of phenol because the oxygen atom of phenol itself polarises the bromine molecule to form Br⁺ ions. Further, the +R-effect of the OH group makes phenol highly activated towards electrophilic substitution reactions.

Q20. Draw all the isomeric structures of alcohol with the molecular formula $C_5H_{12}O$.

Answer:

The isomeric structures of alcohol with the molecular formula $C_5H_{12}O$ are mentioned below.

S. No.	Structure of the Alcohol	IUPAC Name
1.	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ OH	Pentanol
2.	CH ₃ CH (CH ₃) CH ₂ CH ₂ OH	2-Methyl Butanol
3.	CH ₃ CH ₂ CH (CH ₃) CH ₂ OH	3-Methyl Butanol
4.	CH ₃ C (CH ₃)(CH ₃) CH ₂ OH	2,2- Dimethyl Propanol
5.	CH ₃ CH ₂ CH ₂ CH(OH)CH ₃	Pentan-2-ol
6.	CH ₃ CH ₂ CH(OH)CH ₂ CH ₃	Pentan-3-ol
7.	CH ₃ CH (OH) CH (CH ₃) CH ₃	3- Methyl Butan-2-ol
8.	CH ₃ CH ₂ C(OH)(CH ₃) CH ₃	2- Methyl Butan-2-ol