CBSE Class 12 Chemistry Chapter 12 Aldehydes, Ketones, and Carboxylic Acids Worksheet with Answer– Set 5

Q1. Which of the following olefin will yield propanal and formaldehyde on ozonolysis?
(a) Butene
(b) Pentene
(c) Hexene
(d) None of the above

Answer:

(a) Butene will yield propanal and formaldehyde on ozonolysis.

Q2. What is the molecular formula of the chlorinated acetone produced in the distillation with bleaching powder?
(a) CCl_3COCCl_3
(b) CCl_3COCH_3
(c) $CH_2ClCOCH_3$
(d) None of the above

Answer:

(b) The molecular formula of the chlorinated acetone produced in the distillation with bleaching powder is CCl_3COCH_3.

Q3. Chloral belongs to the class of
(a) Ketone
(b) Aldehyde
(c) Carboxylic Acid
(d) None of the above

Answer:

(b) Chloral belongs to the class of aldehyde.

Q4. The class of compounds that are reduced to primary alcohols and also responds to Fehling's solution test are known as
(a) Aromatic carboxylic acid
(b) Aliphatic ketone

(c) Aliphatic aldehyde
(d) None of the above

Answer:

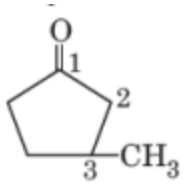
(c) Aliphatic aldehyde are reduced to primary alcohols and also responds to Fehling's solution test.

Q5. Which of the following reaction is used to detect the presence of the carbonyl group?
(a) Reaction with hydrazine
(b) Reaction with phenylhydrazine
(c) Reaction with hydroxyl amine
(d) All of the above

Answer:

(d) Reaction with hydrazine, phenylhydrazine, and hydroxyl amine are used to detect the presence of the carbonyl group.

Q6. What are the IUPAC and the common name of the following compound?



Answer:

The IUPAC and the common name of the above compound is 3-Methyl cyclo pentanone and β-Methyl cyclo pentanone, respectively.

Q7. What will happen if two moles of benzaldehyde are treated with concentrated sodium hydroxide?

Answer:

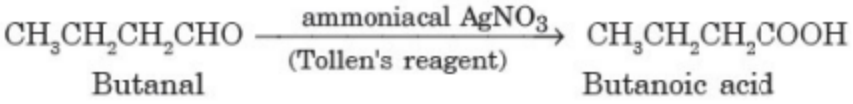
If two moles of benzaldehyde are treated with concentrated sodium hydroxide, benzyl alcohol and sodium benzoate are formed.

$C_6H_5CHO + C_6H_5CHO + Conc\ NaOH \rightarrow C_6H_5CH_2OH + C_6H_5COONa$

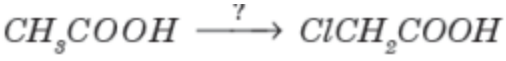
Q8. Convert butanal to butanoic acid.

Answer:

We can convert butanal to butanoic acid by reacting it with the tollen's reagent, i.e. ammoniacal $AgNO_3$ solution.



Q9. Identify the reagent.



Answer:

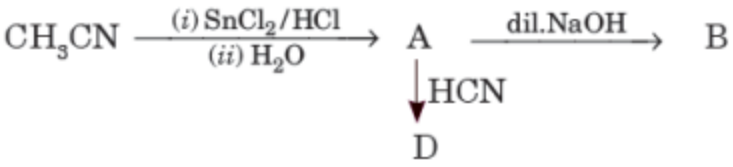
The reagent used in the above reaction is chlorine in the presence of red phosphorous.

Q10. Discuss the reaction for the preparation of the benzoic acid from ethyl benzene?

Answer:

We can prepare benzoic acid from ethyl benzene by oxidising it with potassium per magnet.

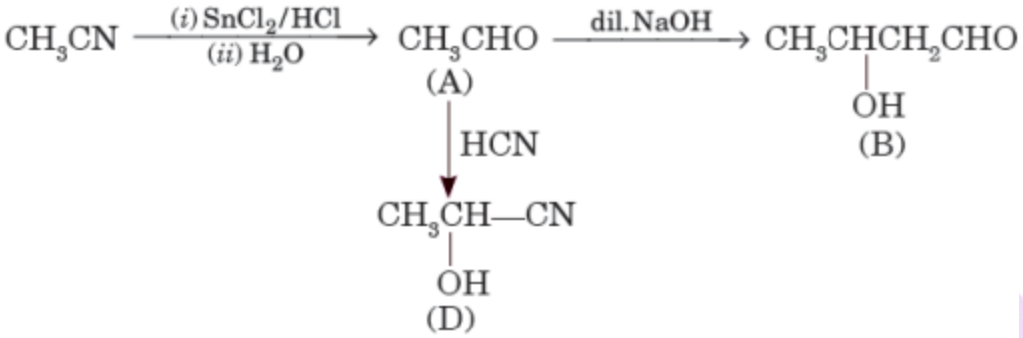
Q11. Write the structure of A, B and D in the following reaction.



Answer:

Here,
A = Ethanal
B = 3-Hydroxy Butanal

D = 2-Hydroxy Propane nitrile.



Q12. Why does aromatic carboxylic acid not undergo Friedel crafts reaction?

Answer:

Aromatic carboxylic acid does not experience Friedel crafts reaction because the -COOH group is deactivating, and the catalyst aluminium chloride gets bonded to the carboxyl group. Therefore, aromatic carboxylic acid does not undergo Friedel crafts reaction.

Q13. What is glacial acetic acid? Why is it so named?

Answer:

Glacial acetic acid is a 100 % acetic acid solution free from water. The melting point of pure anhydrous acetic acid is 17° C. It is solid below this temperature and looks like a cube of ice. Thus, it is named glacial acetic acid.

Q14. Acetic acid can be halogenated in the presence of red phosphorous and chlorine, but formic acid can not be halogenated in the same way. Justify.

Answer:

Acetic acid can be halogenated in the presence of red phosphorous and chlorine, but formic acid can not be halogenated in the same way because acetic acid has alpha hydrogen. It undergoes a Hell Volhard Zelinsky (HVZ) reaction in the presence of chlorine and red phosphorous to yield a halogenated product.
$CH_3COOH + Red\ P + Cl_2 \rightarrow (Cl)\ CH_2\ COOH$

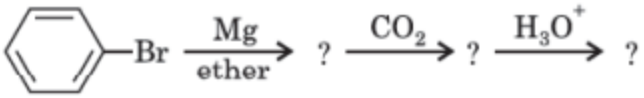
In contrast, formic acid has no alpha hydrogen. Therefore it does not undergo Hell Volhard Zelinsky (HVZ) reaction in the presence of chlorine and red phosphorous to yield a halogenated product.
$HOOH + Red\ P + Cl_2 \rightarrow$ No Reaction

Q15. Why is the pKa value of 4-nitro benzoic acid lower than that of benzoic acid?

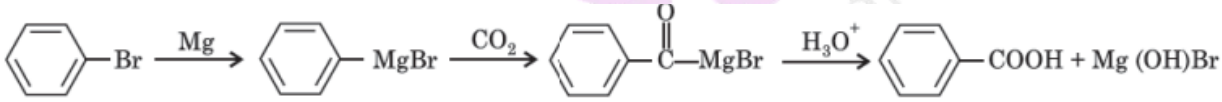
Answer:

The pKa value of 4-nitro benzoic acid is lower than that of benzoic acid because the nitro group is the strong electron-withdrawing group, stabilising the carboxylate anion, thereby strengthening the acid. Therefore, 4-nitro benzoic acid is more acidic than benzoic acid, and its pKa value is less.

Q16. Complete the following reaction.



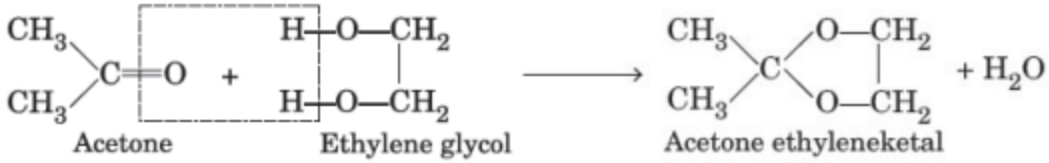
Answer:



Q17. What are ketals and hemiacetals? Give an example.

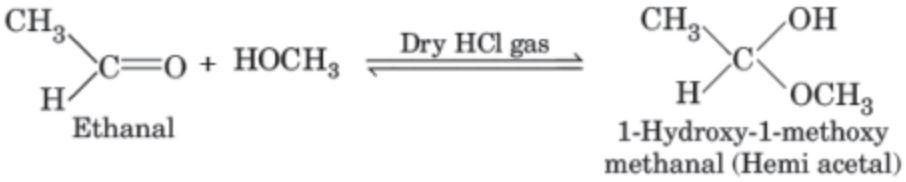
Answer:

Ketals: Gem-di alkoxy alkanes are known as ketals. The two alkoxy groups are present on the same carbon within the chain in these compounds. These are produced by the reaction of ketone with ethylene glycol in the presence of dry HCl gas.



Dilute mineral acids readily hydrolyse them to regenerate the original ketones. Therefore, ketals are used to protect keto groups in organic synthesis.

Hemiacetals: Gem-alkoxy alcohols are known as hemiacetals. These are obtained by adding one molecule of monohydric alcohol to an aldehyde in the presence of dry HCl gas.



Ethanal

1-Hydroxy-1-methoxy methanal (Hemi acetal)

Q18. What is acetylation reaction?

Answer:

The replacement of active hydrogen of alcohols, phenols or amines with acetyl group to form corresponding esters or amides is known as acetylation. It is carried out using acid chlorides or anhydrides in the presence of a base such as a pyridine, dimethyl aniline, etc. For example,

$CH_3COCl + CH_3CH_2OH + Pyridine \rightarrow CH_3COOC_2H_5 + HCl$

$(CH_3CO)_2O + C_6H_5OH \rightarrow CH_3COOC_6H_5 + CH_3COOH$

Q19. How will you make the following conversion?

(a) Ethanoic acid to propanoic acid

(b) Ethene to succinic acid

Answer:

(a) We can convert ethanoic acid to propanoic acid in four steps.

1. Ethanoic acid is reduced to ethanol in the presence of lithium aluminium hydroxide.
2. HVZ reaction, leading to conversion of ethanol to ethyl bromide.
3. Substitution of bromide with cyanide in the presence of potassium cyanide.
4. Hydrolysis of cyanide to carboxylic acid leads to the formation of the required product.

Ethanoic acid — Ethanol — Propanoic acid

(b) We can convert ethene to succinic acid in three steps.

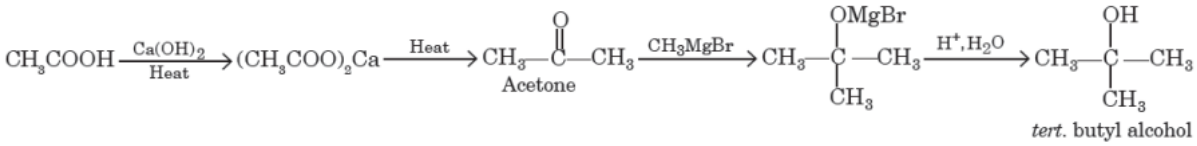
1. Bromination of ethene to di bromide.
2. Substitution of bromide with cyanide in the presence of potassium cyanide.
3. Hydrolysis of cyanide to carboxylic acid leads to the formation of the required product.

Succinic acid

Q20. How will you convert acetic acid to
(a) Tertiary butyl alcohol
(b) Glycine

Answer:

(a) We can convert acetic acid to tertiary butyl alcohol in the following steps.



(b) We can convert acetic acid to glycine by the Hell Volhard Zelinsky (HVZ) reaction, i.e. reacting it with chlorine and red phosphorous followed by ammonolysis.