

CBSE Class 12 Chemistry Chapter 12 Aldehydes, Ketones, and Carboxylic Acids Worksheet with Answer– Set 2

Q1. Fehling solution test is used in the determination of

- (a) Ketonic group
- (b) Alcoholic group
- (c) Aldehydic group
- (d) All of the above

Answer:

(c) Fehling solution test is used in the determination of aldehydic group.

Q2. Name a reagent that can be used to test acetaldehyde and acetone.

- (a) Grignard reagent
- (b) Tollen's reagent
- (c) Fehling's solution
- (d) All of the above

Answer:

(a) Grignard reagent can be used to test acetaldehyde and acetone.

Q3. An aldehyde on oxidation gives

- (a) An alcohol
- (b) A ketone
- (c) A carboxylic acid
- (d) None of the above

Answer:

(c) An aldehyde on oxidation gives a carboxylic acid.

Q4. A ketone on reduction gives

- (a) Primary alcohol
- (b) Secondary alcohol
- (c) Tertiary alcohol
- (d) None of the above

Answer:

(b) A ketone on reduction gives secondary alcohol.

Q5. Which of the following compound can be oxidised to prepare ethyl methyl ketone?

- (a) Tertiary butyl alcohol
- (b) Butanal
- (c) Ethoxy methane
- (d) None of the above

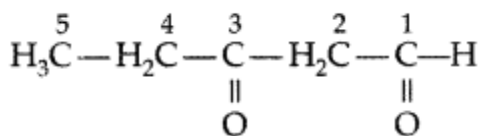
Answer:

(a) Tertiary butyl alcohol can be oxidised to prepare ethyl methyl ketone.

Q6. Deduce the structure of 3-oxo pentanal.

Answer:

The structure of 3-oxo pentanal is drawn below.



3-oxo pentanal

Q7. What is the IUPAC name of $\text{C}_6\text{H}_5 - \text{CH} = \text{CH} - \text{CHO}$.

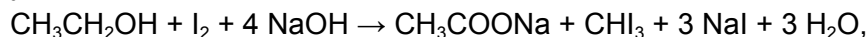
Answer:

The IUPAC name of $\text{C}_6\text{H}_5 - \text{CH} = \text{CH} - \text{CHO}$ is 3-phenyl prop-2-enal.

Q8. How will you distinguish between benzoic acid and ethyl benzoate?

Answer:

We can differentiate between benzoic acid and ethyl benzoate by the iodoform test. Boiling ethyl benzoate with an excess NaOH solution gives ethyl alcohol which, on heating with iodine, gives a yellow precipitate of iodoform.



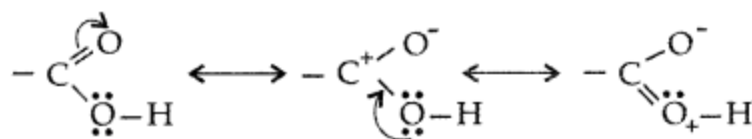
While benzoic acid does not give the iodoform test.



Q9. Why do carboxylic acids not give distinctive reactions to the carbonyl group?

Answer:

Carboxylic acids do not give distinctive reactions to the carbonyl group because carboxylic carbon is less electrophilic than carbonyl carbon as the resonance stabilises it.



Q10. Why is propanal more reactive than propanone in nucleophilic addition reactions?

Answer:

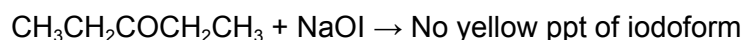
Propanal is more reactive than propanone in nucleophilic addition reactions because of the smaller + I effect of one alkyl group in propanal than the larger + I effect of two alkyl groups in propanone. The magnitude of positive charge on the carbonyl carbon is more in propanal than propanone. Thus, propanal is more reactive than propanone in nucleophilic addition reactions.

Q11. How will you distinguish between pentan-2-one and pentan-3-one?

Answer:

We can distinguish between pentan-2-one and pentan-3-one using the iodoform test.

Pentan-2-one, a methyl ketone, gives a positive iodoform test. While pentan-3-one, not being a methyl ketone, does not give the iodoform test.



Q12. Why is carboxylic acid has a higher boiling point than aldehyde, ketone and alcohol?

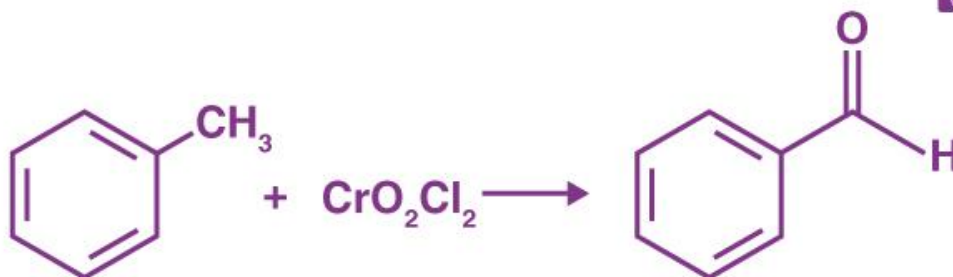
Answer:

Carboxylic acid has a higher boiling point than aldehyde, ketone, and alcohol because the -COOH group of carboxylic acids is capable of forming intermolecular hydrogen bonding forming a dimer, while alcohols, aldehydes and ketones can not.

Q13. What is etard reaction?

Answer:

The Etard reaction is a chemical reaction that involves the direct oxidation of an aromatic or heterocyclic bound methyl group to an aldehyde using chromyl chloride. For example, Oxidation of toluene to benzaldehyde.



Q14. Why is 4-nitrobenzoic acid more acidic than benzoic acid?

Answer:

4-nitrobenzoic acid is more acidic than benzoic acid because of the electron-withdrawing nature of the nitro (-NO_2) group.

Q15. Why is acetaldehyde more reactive than methoxy methane towards hydrogen cyanide?

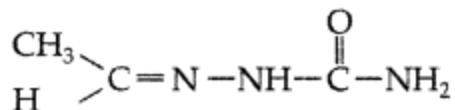
Answer:

Acetaldehyde is more reactive than methoxy methane towards hydrogen cyanide because the carbonyl carbon of acetaldehyde is more electrophilic than methoxy methane due to only one electron-donating methyl group.

Q16. Draw the structure of the semicarbazone of ethanal.

Answer:

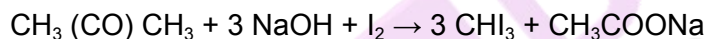
The structure of the semicarbazone of ethanal is given below.



Q17. Molecules A and B are the two functional isomers of compound $\text{C}_3\text{H}_6\text{O}$. On heating with sodium hydroxide and iodine, isomer B forms a yellow iodoform precipitate, whereas isomer A does not form any yellow iodoform precipitate. Write the chemical formulae of molecules A and B.

Answer:

The given compound has molecular formula $\text{C}_3\text{H}_6\text{O}$. One of its functional isomers, i.e., B, shows the iodoform test, which can be only revealed by compounds having methyl ketone so that compound B will be Acetone or 2-propanone. Its functional isomer A will be propanal.

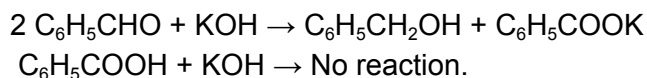


The chemical formula of compound B is CH_3CHO .

Q18. How will you distinguish between benzaldehyde and benzoic acid?

Answer:

We can determine benzaldehyde and benzoic acid by reacting with potassium hydroxide. Benzaldehyde has no alpha hydrogen atom. Therefore, it undergoes Cannizzaro's reaction. At the same time, benzoic acid does not give a Cannizzaro reaction.



Q19. Why electrophilic substitution in benzoic acid occurs at the meta position?

Answer:

Electrophilic substitution in benzoic acid occurs at the meta position because the benzene ring of benzoic acid undergoes electrophilic substitution reactions such as nitration, sulphonation etc. Since

the —COOH group in benzene is an electron-withdrawing group. Therefore it is meta directing group. Thus, electrophilic substitution in benzoic acid occurs at the meta position.

Q20. (a) Write down functional isomers of a carbonyl compound with molecular formula $\text{C}_3\text{H}_6\text{O}$.

(b) Which isomer of $\text{C}_3\text{H}_6\text{O}$ will give a fast reaction with HCN ? Give a reason for your answer.

(c) What will affect the product's concentration if a potent acid is added to the reaction mixture?

Answer:

(a) Functional isomers of $\text{C}_3\text{H}_6\text{O}$ containing carbonyl group are $\text{CH}_3\text{CH}_2\text{CHO}$ (Propanal) and CH_3COCH_3 (Propanone).

(b) Propanal $\text{CH}_3\text{CH}_2\text{CHO}$ will react fast with HCN because less steric hindrance and electronic factors increase its electrophilicity.

(c) If a strong acid is added to the reaction mixture, the reaction is inhibited because the production of CN^- ions is prevented.