

# Aldehydes Ketones & Carboxylic Acid

## 1 Mark Questions

Q1. Name the reaction & the reagent used for the conversion of acid chlorides to the corresponding aldehydes.

Ans. Name: Rosenmund's reaction Reagent:  $H_2$  in the presence of Pd (supported over  $BaSO_4$ ).

Q2. Suggest a reason for the large difference in the boiling points of Butanol & butanal, although they have same solubility in water.

Ans. Butanol has strong intermolecular H-bonding while butanal has weak dipole-dipole interaction.

Q3. What type of Aldehydes undergo Cannizaro reaction?

Ans. Aromatic & aliphatic aldehydes which do not contain  $\alpha$ -hydrogens.

Q4. Give Fehling solution test for identification of aldehyde gp (only equations). Name the thealdehyde which does not give Fehlibng's soln. test.

Ans.  $R-CHO + 2 Cu^{2+} + 5 OH^- \rightarrow RCOO^- + Cu_2O + 3 H_2O$

Benzaldehyde does not give Fehling soln. test. (Aromatic aldehydes do not give this test.)

Q5. What makes acetic acid a stronger acid than phenol?

Ans. Greater resonance stabilization of acetate ion over phenoxide ion.

Q6. Why  $HCOOH$  does not give HVZ (Hell Volhard Zelinsky) reaction but  $CH_3COOH$ ?

Ans.  $CH_3COOH$  contains  $\alpha$ -hydrogens & hence give HVZ reaction but  $HCOOH$  does not contain  $\alpha$ -hydrogens & hence does not give HVZ reaction.

Q7. During preparation of esters from a carboxylic acid & an alcohol in the presence of an acid catalyst, water or the ester formed should be removed as soon as it is formed.

Ans. To shift the equilibrium in the forward direction, the water or ester formed should be removed as fast as it is formed.

## 2/3 Mark Questions

Q1. Arrange the following compounds in increasing order of their boiling points. Explain by giving reasons.

Ans.  $\text{CH}_3\text{CH}_2\text{CH}_3 < \text{CH}_3\text{OCH}_3 < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{O}$

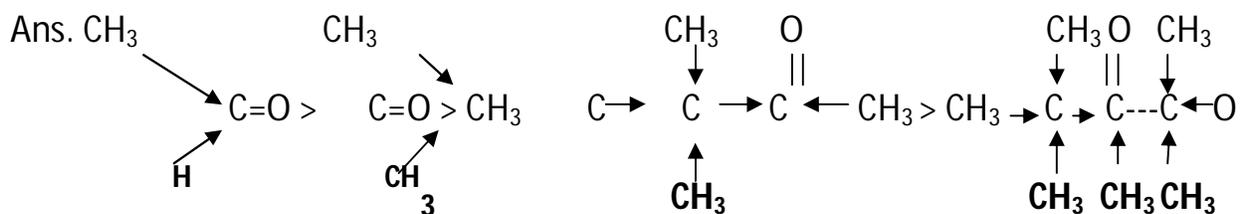
Q2. Which acid of each pair shown here would you expect to be stronger?  $\text{CH}_3\text{CO}_2\text{H}$  or  $\text{FCH}_2\text{CO}_2\text{H}$

Ans. Due to lesser electron density in the O-H bond & greater stability of  $\text{FCH}_2\text{COO}^-$  ion over  $\text{CH}_3\text{COO}^-$  ion.  $\text{FCH}_2\text{COOH}$  is a stronger acid than  $\text{CH}_3\text{COOH}$ .

Q3. Which acid is stronger & why?

Ans.  $\text{F}_3\text{C}-\text{C}_6\text{H}_4-\text{COOH}$  is a much stronger acid than  $\text{CH}_3-\text{C}_6\text{H}_4-\text{COOH}$ .

Q4. Arrange the following compounds in increasing order of their reactivity towards HCN. Explain it with proper reasoning.



Acetaldehyde

Acetone

Tert-butyl methyl ketone

Di-tert-butyl ketone

## 5 Mark Questions

Q1. Explain why o- hydroxybenzaldehyde is a liquid at room temperature while p- hydroxybenzaldehyde is a high melting solid.

Ans. Due to intermolecular H-bonding ortho-hydroxy benzaldehyde exists as discrete molecule whereas due to intermolecular H- Bonding, p- hydroxybenzaldehyde exists as associated molecules. To break these intermolecular H-bonds, a large amount of energy is needed. Consequently, p- hydroxybenzaldehyde has a much higher m.p. & b.p. than that of o- hydroxybenzaldehyde. As a result, o- hydroxybenzaldehyde is a liquid at room temperature while p- hydroxybenzaldehyde is a high melting solid.

Q2 An organic compound with molecular formula  $\text{C}_9\text{H}_{10}\text{O}$  forms 2,4 DNP derivatives, reduces tollen'[s reagent and undergoes canizzaro's reaction. On vigorous oxidation it gives 1,2- Benzenedicarboxylic acid. Identify the compound.

**Ans**

- **As compound with molecular formula  $C_9H_{10}O$  gives 2,4 DNP test and reduce tollen's reagent it must be an aldehyde.**
- **Since it undergoes cannizaro's reaction therefore -CHO group is directly attached to Benzene ring.**
- **On vigorous oxidation , it gives 1,2 benzenedicarboxylic acid therefore it is an ortho substituted benzaldehyde.(2-ethyl benzaldehyde)**