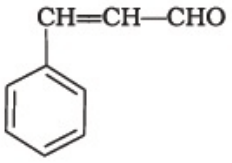
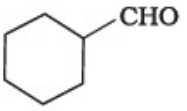
# Aldehydes, Ketones, and Carboxylic Acids

## Short Answer Type Questions

1. Why is there a large difference in the boiling points of butanal and butan-1-ol?
2. Write a test to differentiate between pentan-2-one and pentan-3-one.
3. Give the IUPAC names of the following compounds

(i) 


(ii) 

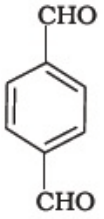

(iii) $CH_3—CH_2—\underset{\underset{O}{\|}}{C}—CH_2—CHO$

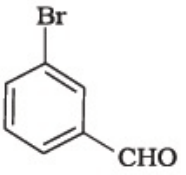
(iv) $CH_3—CH=CH—CHO$

4. Give the structure of the following compounds.
   - (i) 4-Nitro Propiophenone
   - (ii) 2-Hydroxy Cyclopentanecarbaldehyde
   - (iii) Phenyl acetaldehyde

5. Write IUPAC names of the following structures.

(i) 


(ii) 


(iii) 


6. Benzaldehyde can be obtained from benzal chloride. Write reactions for obtaining benzal chloride and then benzaldehyde from it.
7. Name the electrophile produced in the reaction of benzene with benzoyl chloride in the presence of anhydrous $AlCl_3$. Name the reaction also.
8. Oxidation of ketones involves carbon-carbon bond cleavage. Name the products formed on oxidation of 2, 5-dimethylhexane-3-one.
9. Arrange the following in decreasing order of their acidic strength and give reason for your answer.
   $CH_3CH_2OH$, $CH_3COOH$, $ClCH_2COOH$, $FCH_2COOH$, $C_6H_5CH_2COOH$
10. What product will be formed on reaction of propanal with 2-methylpropanal in the presence of NaOH? What products will be formed? Write the name of the reaction also.
    29. Compound 'A' was prepared by oxidation of compound 'B' with alkaline KMnO 4 . Compound 'A' on reduction with lithium aluminium hydride gets converted back to compound 'B'. When compound 'A' is heated with compound B in the presence of $H_2SO_4$ it produces fruity smell of compound C to which family the compounds 'A', 'B' and 'C' belong to?
11. Arrange the following in decreasing order of their acidic strength. Give explanation for the arrangement.
    $C_6H_5COOH$, $FCH_2COOH$, $NO_2CH_2COOH$
12. **Alkenes ($>C=C<$) and carbonyl compounds ($>C=O$), both contain a $\pi$ bond**

**but alkenes show electrophilic addition reactions whereas carbonyl compounds show nucleophilic addition reactions. Explain.**

13. Carboxylic acids contain carbonyl group but do not show the nucleophilic addition reaction like aldehydes or ketones. Why?
14. Identify the compounds A, B and C in the following reaction

$$CH_3—Br \xrightarrow{Mg/ether} (A) \xrightarrow[(ii)\ Water]{(i)\ CO_2} (B) \xrightarrow[\Delta]{CH_3OH/H^+} (C)$$

15. Why are carboxylic acids more acidic than alcohols or phenols although all of them have hydrogen atom attached to a oxygen atom (—O—H)?
16. Complete the following reaction sequence.

$$CH_3—\overset{\overset{O}{\|}}{C}—CH_3 \xrightarrow[(ii)\ H_2O]{(i)\ CH_3MgBr} (A) \xrightarrow[Ether]{Na\ metal} (B) \xrightarrow{CH_3—Br} (C)$$

17. Ethylbenzene is generally prepared by acetylation of benzene followed by reduction and not by direct alkylation. Think of a possible reason.
18. Can Gattermann-Koch reaction be considered similar to Friedel Craft's acylation? Discuss.

## Long Answer Type Questions

1. An alkene 'A' (Mol. formula $C_5H_{10}$) on ozonolysis gives a mixture of two compounds 'B' and 'C'. Compound 'B' gives positive Fehling's test and also forms iodoform on treatment with $I_2$ and NaOH. Compound 'C' does not give Fehling's test but forms iodoform. Identify the compounds A, B and C. Write the reaction for ozonolysis and formation of iodoform from B and C.
2. An aromatic compound 'A' (Molecular formula $C_8H_8O$) gives positive 2, 4-DNP test. It gives a yellow precipitate of compound 'B' on treatment with iodine and sodium hydroxide solution. Compound 'A' does not give Tollen's or Fehling's test. On drastic oxidation with potassium permanganate it forms a carboxylic acid 'C' (Molecular formula $C_7H_6O_2$), which is also formed along with the yellow compound in the above reaction. Identify A, B and C and write all the reactions involved.
3. Write down functional isomers of a carbonyl compound with molecular formula $C_3H_6O$. Which isomer will react faster with HCN and why? Explain the mechanism of the reaction also. Will the reaction lead to the completion with the conversion of whole reactant into product at reaction conditions? If a strong acid is added to the reaction mixture what will be the effect on concentration of the product and why?
4. When liquid 'A' is treated with a freshly prepared ammoniacal silver nitrate solution, it gives bright silver mirror. The liquid forms a white crystalline solid on treatment with sodium hydrogensulphite. Liquid 'B' also forms a white crystalline solid with sodium hydrogensulphite but it does not give test with ammoniacal silver nitrate. Which of the two liquids is aldehyde? Write the chemical equations of these reactions also.