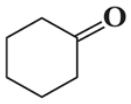
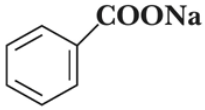
Ch 8- Aldehydes Ketones and Carboxylic acids

CBSE 2017

1. (*a*) Write the product(s) in the following reactions: CBSE-2017

(*i*)  + HCN ⟶ ?

(*ii*)  + NaOH $\xrightarrow[\Delta]{CaO}$?

(*iii*) $CH_3—CH=CH—CN \xrightarrow[(b)\ H_2O]{(a)\ DIBAL\text{-}H}$?

(*b*) Give simple chemical tests to distinguish between the following pairs of compounds:

(*i*) Butanal and Butan-2-one

(*ii*) Benzoic acid and Phenol [5]

Or

(*a*) Write the reactions involved in the following:

(*i*) Etard reaction

(*ii*) Stephen reduction

(*b*) How will you convert the following in not more than two steps:

(*i*) Benzoic acid to Benzaldehyde

(*ii*) Acetophenone to Benzoic acid

(*iii*) Ethanoic acid to 2-Hydroxyethanoic acid

CBSE 2018

1. How do you convert the following? CBSE-2018 2

(*a*) Ethanal to Propanone

(*b*) Toluene to Benzoic acid

Or

Account for the following: 2

(*a*) Aromatic carboxylic acids do not undergo Friedel-Crafts reaction.

(*b*) pK_a value of 4-nitrobenzoic acid is lower than that of benzoic acid.

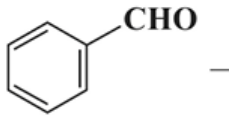
2. (A), (B) and (C) are three non-cyclic functional isomers of a carbonyl compound with molecular formula C_4H_8O. Isomers (A) and (C) give positive Tollens' test whereas isomer (B) does not give Tollens' test but gives positive Iodoform test. Isomers (A) and (B) on reduction with Zn(Hg)/conc. HCl give the same product (D). 3

(*a*) Write the structures of (A), (B), (C) and (D).

(*b*) Out of (A), (B) and (C) isomers, which one is least reactive towards addition of HCN? CBSE-2018

CBSE 2019

1. **Complete the following reactions:** CBSE-2019

(*i*) 

(*ii*) $(C_6H_5CH_2)_2Cd + 2CH_3COCl \longrightarrow$

(*iii*) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH \xrightarrow[(ii)\ H_2O]{(i)\ Br_2/Red\ P_4}$

OR

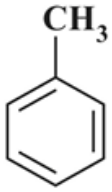
Write chemical equations for the following reactions:

(*i*) **Propanone is treated with dilute $Ba(OH)_2$.**

(*ii*) **Acetophenone is treated with Zn(Hg)/Conc. HCl**

(*iii*) **Benzoyl chloride is hydrogenated in presence of $Pd/BaSO_4$.**

2. Complete the reaction - CBSE- 2019

(*ii*) 

$\xrightarrow[(ii)\ H_3O^+/\Delta]{(i)\ CrO_3/(CH_3CO)_2O}$ **A** $\xrightarrow{H_2N-NH_2}$ **B**

CBSE 2020

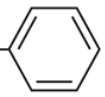
1. **Assertion (A): Oxidation of ketones is easier than aldehydes.** CBSE-2020

Reason (R): C—C bond of ketones is stronger than C—H bond of aldehydes.

(D) 'A' is wrong but 'R' is true because aldehydes can be oxidised more easily than ketones.

2. (*a*) **Write the products formed when benzaldehyde reacts with the following reagents:**

(*i*) **CH_3CHO in presence of dilute NaOH** CBSE-2020

(*ii*) H_2N-NH- 

(*iii*) **Conc. NaOH**

(*b*) **Distinguish between following:**

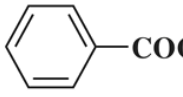
(*i*) $CH_3-CH=CH-CO-CH_3$ **and** $CH_3-CH_2-CO-CH=CH_2$

(*ii*) **Benzaldehyde and Benzoic acid.** **3+(1+1)=5**

Or

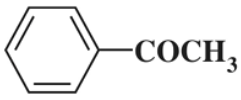
(*a*) **Write the final products in the following:**

(*i*) $\begin{matrix} CH_3 \\ CH_3 \end{matrix}\!\!>\!C=O \xrightarrow[Conc.\ HCl]{Zn/Hg}$

(*ii*) 

(*iii*) $CH_2=CH-CH_2-CN \xrightarrow[(b)\ H_3O^+]{(a)\ DIBAL-H}$

(*b*) **Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:**

CH_3COCH_3, HCHO, CH_3CHO, 

(*c*) **Draw the structure of 2, 4 DNP derivative of acetaldehyde.** **3+1+1=5**

CBSE 2021

1. An organic compound 'X' with the molecular formula $C_5H_{10}O$ forms 2,4-DNP derivative, does not reduce Tollens' reagent but gives positive iodoform test on heating with I_2 in the presence of NaOH. Compound 'X' gives ethanoic acid and propanoic acid on vigorous oxidation. Write the

(i) Structure of the compound 'X'.

(ii) Structure of the product obtained when compound 'X' reacts with 2,4-DNP reagent.

(iii) Structures of the products obtained when compound 'X' is heated with I_2 in the presence of NaOH. **1 × 3 = 3**

2. (a) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction. : **1**

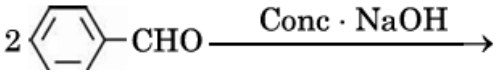
CH_3COCH_3, CH_3CHO, HCHO, $C_6H_5COCH_3$

(b) Give a simple chemical test to distinguish between Ethanal and Propanone. **1**

(c) Why carboxylic acid does not give nucleophilic addition reactions like aldehydes and ketones ? **1**

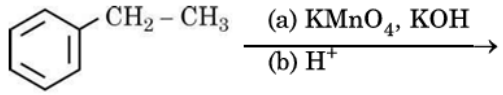
(d) (i) Why α-hydrogen of aldehydes and ketones are acidic in nature ?

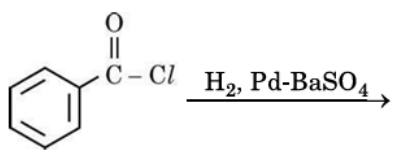
(ii) Write the products in the following : **1 + 1 = 2**



OR

Write the major products of the following reactions :

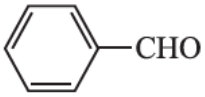
(i)  **1**

(ii)  **1**

CBSE 2023

1. Which of the following does not give Cannizzaro reaction? CBSE - 2023 .

(a) $(CH_3)_3C—CHO$ (b) $(CH_3)_2CH—CHO$

(c)  (d) HCHO

2. Aldehydes and ketones react with hydroxylamine to form CBSE-2023 .

(a) hydrazones (b) cyanohydrins

(c) semicarbazones (d) oxime

3. Do the following conversions in not more than two steps: CBSE-2023 .

(a) CH_3CN to $CH_3—\overset{\overset{O}{\|}}{C}—CH_3$ (b)  to

4. The carbon—oxygen double bond is polarised in aldehydes and ketones due to higher electronegativity of oxygen relative to carbon. Therefore, they undergo nucleophilic addition reactions with a number of nucleophiles such as HCN, $NaHSO_3$, alcohols, ammonia derivatives and Grignard reagents. Aldehydes are easily oxidised by mild oxidising agents as compared to ketones. The carbonyl group of carboxylic acid does not give reactions of aldehydes and ketones. Carboxylic acids are considerably more acidic than alcohols and most of simple phenols. CBSE-2023 .

Answer the following:

(a) Write the name of the product when an aldehyde reacts with excess alcohol in presence of dry HCl.

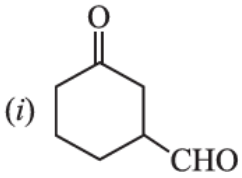
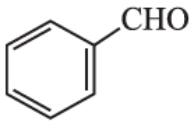
(b) Why carboxylic acid is a stronger acid than phenol?

(c) (i) Arrange the following compounds in increasing order of their reactivity towards CH_3MgBr:

CH_3CHO, $(CH_3)_3C—\overset{\overset{O}{\|}}{C}—CH_3$, $CH_3—\overset{\overset{O}{\|}}{C}—CH_3$

(ii) Write a chemical test to distinguish between propanal and propanone.

(c) Write the main product in the following:

(i)  $\xrightarrow{[Ag(NH_3)_2]^+}$ (ii)  $\xrightarrow{H_2NCONHNH_2}$

5 (a) Explain why : *3×1=3*

(i) Carboxyl group in benzoic acid is meta directing.

(ii) Sodium bisulphite is used for the purification of aldehydes and ketones.

(iii) Carboxylic acids do not give characteristic reactions of carbonyl group.

OR

(b) **An organic compound 'A', having the molecular formula C_3H_8O on treatment with Cu at 573 K, gives 'B'. 'B' does not reduce Fehling's solution but gives a yellow precipitate of the compound 'C' with** I_2/NaOH. Deduce the structures of A, B and C. *3*

CBSE 2024

1. How will you bring about the following conversions ? (any ***three***) *3×1=3*

CBSE - 2024

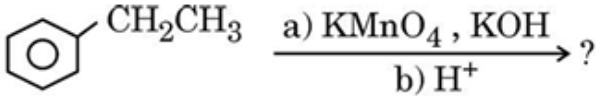
(a) Benzoic acid to Benzaldehyde

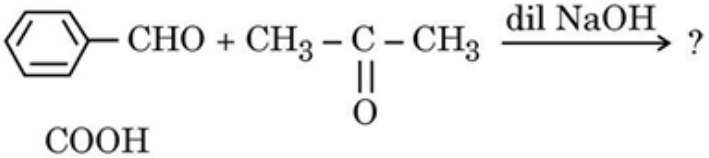
(b) Ethanal to Propanone

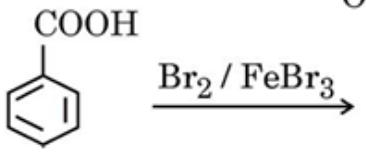
(c) Acetophenone to Benzoic acid

(d) Bromobenzene to 1-Phenylethanol

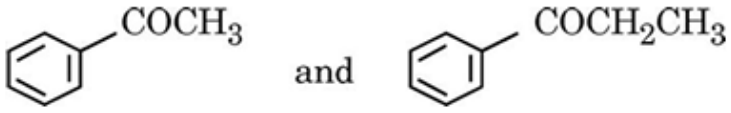
2. (i) Write the major product(s) in the following reactions : CBSE-2024

(1) 

(2) 

(3) 

(ii) Give simple chemical tests to distinguish between the following pairs of compounds :

(1) 

(2) Pentanal and Pentan-3-one *3+2=5*

OR

(b) (i) Give reasons for the following :

(1) In semicarbazide, only one $-NH_2$ group is involved in the formation of semicarbazone.

(2) Acetaldehyde is more reactive than acetone towards addition of HCN.

(ii) (1) Arrange the following in decreasing order of their acidic strength :

CH_3COOH, O_2N-CH_2-COOH, $HCOOH$

(2) Name the reagent in the following reaction :

$$CH_3-CH=CH-CH_2-CN \xrightarrow{?} CH_3-CH=CH-CH_2-CHO$$

(iii) Write the reaction involved in Hell-Volhard-Zelinsky reaction.

2+2+1=5

CBSE 2025

1. The acid formed when propyl magnesium bromide is treated with CO_2 followed by acid hydrolysis is : CBSE - 2025

(A) C_3H_7COOH (B) C_2H_5COOH

(C) CH_3COOH (D) C_3H_7OH

2. Would you expect benzaldehyde to be more reactive or less reactive in nucleophilic addition reactions than propanal ? Justify your answer. 2025 · **2**

3. (A) (a) Carry out the following conversions : CBSE - 2025 **(2 + 3 = 5)**

(i) Ethanal to But-2-enal

(ii) Propanoic acid to ethane

(b) An alkene A with molecular formula C_5H_{10} on ozonolysis gives a mixture of two compounds B and C. Compound B gives positive Fehling test and also reacts with iodine and NaOH solution. Compound C does not give Fehling solution test but forms iodoform. Identify the compounds A, B and C.

OR

(B) An organic compound (A) (molecular formula $C_8H_{16}O_2$) was hydrolysed with dilute sulphuric acid to get a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives But-l-ene. Identify (A), (B) and (C) and write chemical equations for the reactions involved. CBSE - 2025 · **5**

4. What will be formed after oxidation reaction of secondary alcohol with chromic anhydride (CrO_3) ? CBSE - 2025

(A) Aldehyde (B) Ketone

(C) Carboxylic acid (D) Ester

5. (A) Explain the following reactions and write chemical equation involved : **3 × 1 = 3**

(a) Wolff-Kishner reduction

(b) Etard reaction

(c) Cannizzaro reaction CBSE - 2025 ·

OR

(B) Write the structures of A, B and C in the following sequence of reactions : **2 × 1½ = 3**

(a) $CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow{H_2,\ Pd\text{-}BaSO_4} B \xrightarrow{H_2N\text{–}NH_2} C$

(b) $CH_3CN \xrightarrow[2.\ H_2O]{1.(DIBAL\text{–}H)} A \xrightarrow{Dil.\ NaOH} B \xrightarrow{\Delta} C$

6. (A) (a) Give IUPAC name of $CH_3 - CH = CH - CHO$. 1

(b) Give a simple chemical test to distinguish between propanal and propanone. 1

(c) How will you convert the following : 3

(i) Toluene to benzoic acid

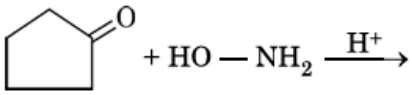
(ii) Ethanol to propan–2–ol

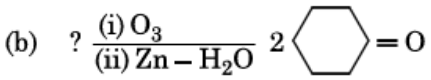
(iii) Propanal to 2–hydroxy propanoic acid

CBSE - 2025.

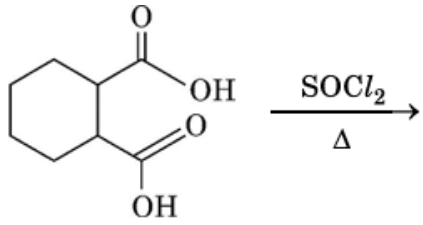
OR

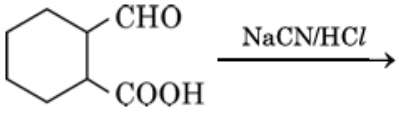
(B) Complete each synthesis by giving missing starting material, reagent or products : $5 \times 1 = 5$

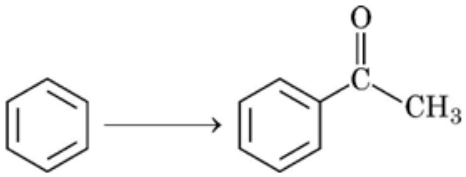
(a) 

(b) 

CBSE - 2025.

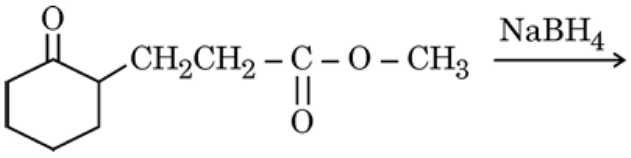
(c) 

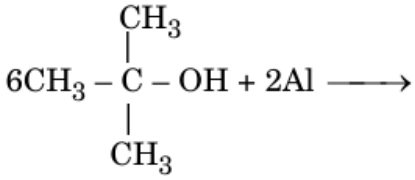
(d) 

(e) 

7. Write the structures of the main products of the following reactions : 2

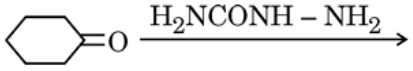
CBSE - 2025.

(a) 

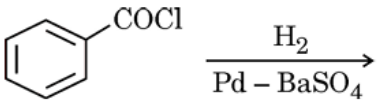
(b) 

8. An aromatic compound 'A' with molecular formula C_8H_8O gives positive 2,4-DNP test. It gives yellow precipitate. of compound 'B' on treatment with sodium hypoiodite. Compound 'A' does not react with Tollen's or Fehling's reagent; on drastic oxidation with $KMnO_4$ it forms a carboxylic acid 'C'. Elucidate the structures of A, B and C. Also give their IUPAC names. CBSE-2025.

9. (a) (i) Complete the following reactions by writing the structure of the main products : CBSE-2025

(I)  *1*

(II) $(CH_3)_2Cd + 2CH_3COCl \longrightarrow$ *1*

(III)  *1*

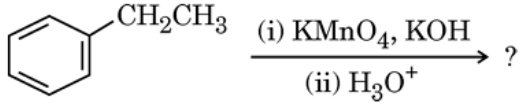
(ii) Give simple chemical test to distinguish between the following pairs of compounds :

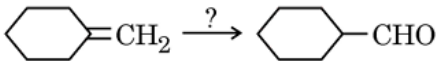
(I) Ethyl benzoate and benzoic acid *1*

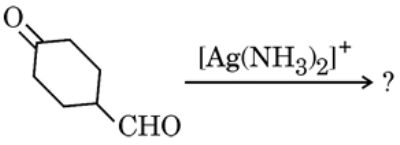
(II) Propanal and propanone *1*

OR

(b) (i) Complete each synthesis by giving missing starting material, reagent or products :

(I)  *1*

(II)  *1*

(III)  *1*

(ii) Carry out the following conversions :

(I) Benzaldehyde to Benzophenone

(II) Benzaldehyde to 3-phenyl propanol

10. CH_3CH_2OH can be converted to CH_3CHO by : CBSE-2025.

(A) catalytic hydrogenation

(B) treatment with $LiAlH_4$

(C) treatment with PCC

(D) treatment with $KMnO_4$

11. Which of the following aldehydes will undergo Cannizzaro reaction ? CBSE - 2025.

(A) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CHO$

(B) $(CH_3)_3C\ CHO$

(C) $CH_3 - CH_2 - CHO$

(D) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CHO$

12. CH_3CH_2CHO and CH_3CH_2COOH can be distinguished by : CBSE - 2025.

(A) Sodium bicarbonate test

(B) Hinsberg test

(C) Iodoform test

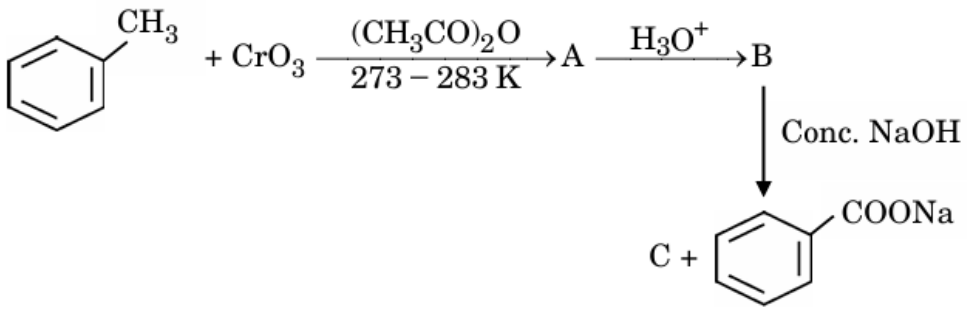
(D) Lucas test

13. (a) How can acetaldehyde be prepared from acetyl chloride ? *1*

(b) Propanal is more reactive than propanone towards nucleophilic addition reaction. Give reason. CBSE - 2025. *1*

14. A compound (A) with molecular formula C_4H_5N on reduction with DIBAL-H followed by hydrolysis, gives a compound (B). Compound (B) gives positive Tollens' test but does not give iodoform test. Compound (B) can also be obtained when ethanal is treated with dilute NaOH followed by heating. Identify (A) and (B). Write the reactions of (A) with DIBAL-H followed by hydrolysis. CBSE - 2025. *3*

15. (a) (i) Identify A, B and C in the following reactions : CBSE - 2025.



(ii) Give reasons for the following :

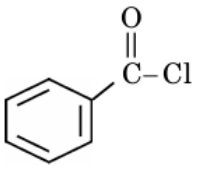
(I) Carboxylic acids do not give the characteristic reactions of carbonyl group.

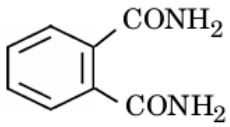
(II) Ethanoic acid is a stronger acid than ethanol. *3+2=5*

OR

(b) (i) Write the product(s) in the following reactions :

(I) $2CH_3COOH \xrightarrow[\text{heat}]{P_4O_{10}}$

(II)  $+ (CH_3)_2Cd \rightarrow$

(III)  $\xrightarrow{\text{strong heating}}$

(ii) Write the reaction involved in the following reactions :

(I) Wolff-Kishner Reduction

(II) Decarboxylation Reaction