



## CHEMISTRY

### BOOKS - U-LIKE CHEMISTRY (HINGLISH)

### ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

#### Ncert Intext Questions

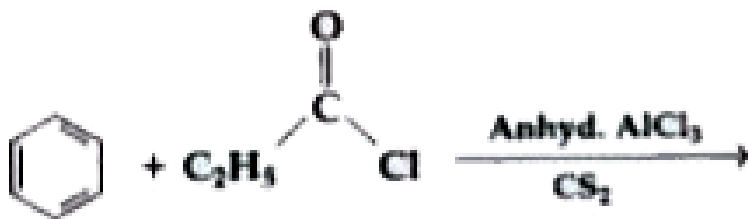
1. Write the structures of the following compounds :

- (i)  $\alpha$  - Methoxypropionaldehyde
- (ii) 3- Hydroxybutant
- (iii) 2- Hydroxycyclopentanecarbaldehyde
- (iv) 4-Oxopentanal.
- (v) Di-sec butyl ketone
- (vi) 4 - Fluoroacetophenone.

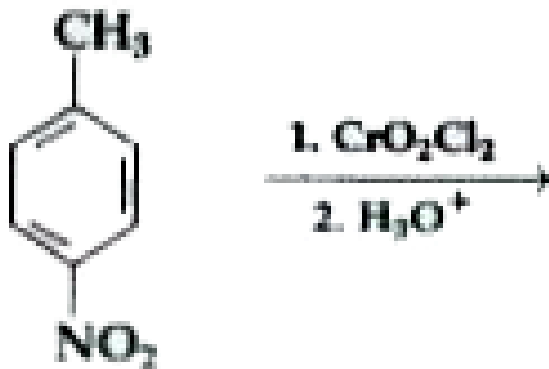
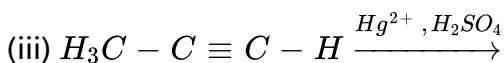
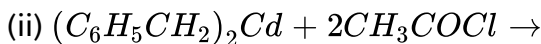


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2. Write the structures of products of the following reactions :

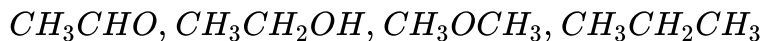


(i)



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3. Arrange the following compounds in increasing order of their boiling points :



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4. Arrange the following in increasing order of their reactivity in nucleophilic addition reactions :

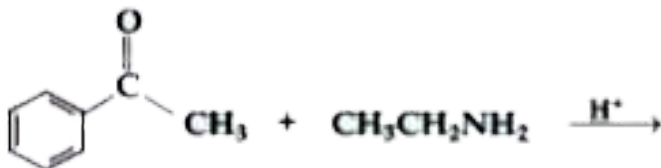
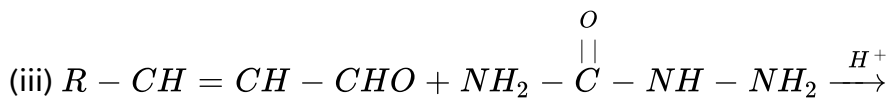
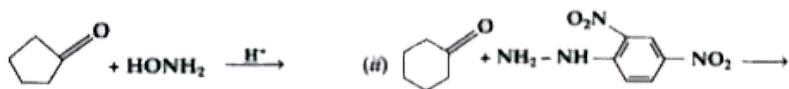
(i) Ethanal, Propanal, Propanone, Butanone.

(ii) Benzaldehyde, p - Tolualdehyde, p - Nitrobenzaldehyde, Acetophenone.

[Hint : Consider steric effect and electronic effect.]

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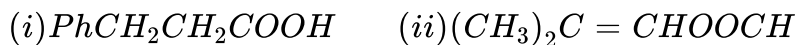
5. Predict the products of the following reactions :

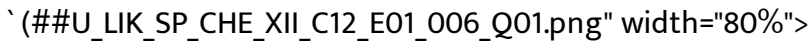




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6. Give the IUPAC names of the following compounds:







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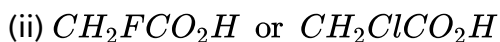
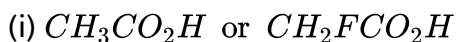
7. Show how each of the following compounds can be converted to benzoic acid :

(i) Ethylbenzene (ii) Acetophenone (iii) Bromobenzene (iv) Phenylethene (Styrene).

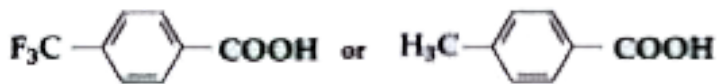


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8. Which acid of each pair shown here would you expect to be stronger?



(iii)  $CH_2FCH_2CH_2CO_2H$  or  $CH_3CHFCH_2CO_2H$



(iv)

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## Ncert Textbook Exercises

1. What is meant by the following terms? Give an example of the reaction in each case.

(i) Cyanohydrin      (ii) Acetal

(iii) Semicarbazone      (iv) Aldol

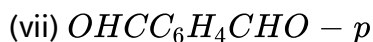
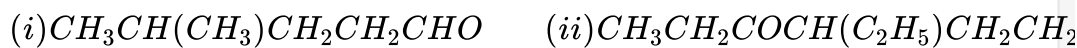
(v) Hemiacetal      (vi) Oxime

(vii) Ketal      (viii) Imine

(ix) 2, 4-DNP-derivative      (x) Schiff's base .

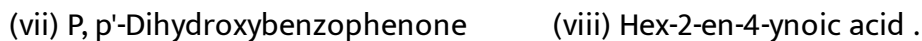
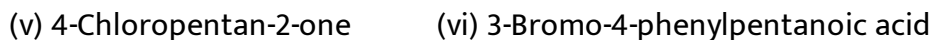
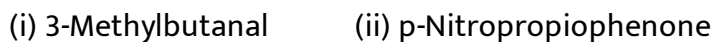
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2. Name the following compounds according to IUPAC system of nomenclature :



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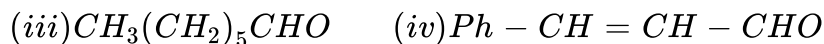
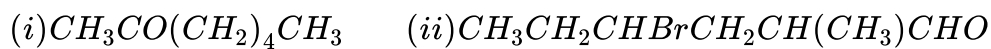
3. Draw the structures of the following compounds :



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4. Write the IUPAC names of the following ketones and aldehydes.

Wherever possible, give also common names .



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5. Draw structures of the following derivatives:

(i) The 2,4-dinitrophenylhydrazone of benzaldehyde (iii)

Acetaldehydedimethyl acetal

(iv) The semicarbazone of cyclobutanone

(v) The ethylene ketal of hexan-3-one

(vi) The methyl hemiacetal of formaldehyde



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6. Predict the products formed when cyclohexanecarbaldehyde reacts with following reagents :

- (i)  $PhMgBr$  and then  $H_3O^+$       (ii) Tollens' reagent  
(iii) Semicarbazide and weak acid      (iv) Excess ethanol and acid  
(v) Zinc amalgam and dilute hydrochloric acid.

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7. Which of the following compounds would undergo aldol condensation, which the Cannizzaro reaction and which neither ? Write the structures of the expected products of aldol condensation and Cannizzaro reaction.

- (i) Methanal      (ii) 2-Methylpentanal  
(iii) Benzaldehyde      (iv) Benzophenone  
(v) Cyclohexanone      (vi) 1-Phenylpropanone  
(vii) Phenylacetaldehyde      (viii) Butan-1-ol  
(ix) 2, 2-Dimethylbutanal.

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8. How will you convert ethanal into the following compounds ?

(i) Butane -1, 3 - diol

(ii) But -2- enal

(iii) But -2- enoic acid.

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9. Write structural formulas and names of four possible aldol condensation products from propanal and butanal. In each case, indicate which aldehyde acts as nucleophile and which as electrophile.

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10. An organic compound with the molecular formula  $C_9H_{10}O$  forms 2, 4 - DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1, 2 - benzenedicarboxylic acid. Identify the compound.

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11. An organic compound (A) (molecular formula  $C_8H_{16}O_2$ ) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives but - 1 - ene. Write equations for the reactions involved.

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12. Arrange the following compounds in increasing order of their property as indicated :

(i) Acetaldehyde, Acetone, Di - tery - butyl ketone, Methyl tert - butyl ketone (reactivity towards HCN)

$CH_3CH_2CH(Br)CH_2COOH$ ,  $(CH_3)_2CHCOOH$ ,  $CH_3CH_2CH_2COOH$ (

(iii) Benzoic acid, 4 - Nitrobenzoic acid, 3, 4 - Dinitrobenzoic acid, 4 - Methoxybenzoic acid (acid strength).

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**13.** Give simple chemical tests to distinguish between the following pairs of compounds :

- (i) Propanal and Propanone
- (ii) Acetophenone and Benzophenone
- (iii) Phenol and Benzoic acid
- (iv) Benzoic acid Ethyl benzoate
- (v) Pentan -2- one and Pentan -3- one
- (vi) Benzaldehyde and Acetophenone
- (vii) Ethanal and Propanal.



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**14.** How will you prepare the following compounds from benzene ? You may use any inorganic reagent and any organic reagent having not more than one carbon atom.

- (i) Methyl benzoate
- (ii) m - Nitrobenzoic acid
- (iii) p - Nitrobenzoic acid

- (iv) Phenylacetic acid
- (v) p - Nitrobenzaldehyde.

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**15.** How will you bring about the following conversions in not more than two steps ?

- (i) Propanone to Propene
- (ii) Benzoic acid to Benzaldehyde
- (iii) Ethanol to 3 - Hydroxybutanal
- (iv) Benzene to m - Nitroacetophenone
- (v) Benzaldehyde to Benzophenone
- (vi) Bromobenzene to 1 - Phenylethanol
- (vii) Benzaldehyde to 3 - Phenylpropan -1- ol
- (viii) Benzaldehyde to  $\alpha$  - Hydroxyphenylacetic acid
- (ix) Benzoic acid to m - Nitrobenzyl alcohol.

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**16.** Describe the following :

- (i) Acetylation
- (ii) Cannizzaro reaction
- (iii) Cross aldol condensation
- (iv) Decarboxylation

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**17.** Complete each synthesis by giving missing starting material, reagent or products :



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**18.** Give plausible explanation for each of the following

- (i) Cyclohexanone forms cyanohydrin in good yield but 2, 2, 6-trimethylcyclohexanone does not.
- (ii) There are two  $-NH_2$  groups in semicarbazide. However, only one is involved in the formation of semicarbazones.

(iii) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed

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19. An organic compound contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollens' reagent but forms an addition compound with sodium hydrogensulphite and gives positive iodoform test. On vigorous oxidation, it gives ethanoic and propanoic acid. Write the possible structure of the compound

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20. Although phenoxide ion has more number of resonating structures than carboxylate ion, carboxylic acid is a stronger acid than phenol. Why?

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## Case Based Source Based Integrated Questions

1. The IUPAC names of open chain aliphatic aldehydes and ketones are derived from the names of the corresponding alkanes by replacing the ending -e with -al and -one respectively. In case of aldehydes the longest carbon chain is numbered starting from the carbon of the aldehyde group while in case of ketones the numbering begins from the end nearer to the carbonyl group. The substituents are prefixed in alphabetical order along with numerals indicating their positions. When the aldehyde group is attached to a ring, the suffix carbaldehyde is added after the full name of the cycloalkane. The numbering of the ring carbon atoms start from the carbon atom attached to the aldehyde group. The name of the simplest aromatic aldehyde carrying the aldehyde group on a benzene ring is benzenecarbaldehyde. However, the common name benzaldehyde is also accepted by IUPAC. Other aromatic aldehydes are hence named as substituted benzaldehydes.

How do we derive the names of open chain aliphatic aldehydes and ketones ?



2. The IUPAC names of open chain aliphatic aldehydes and ketones are derived from the names of the corresponding alkanes by replacing the ending -e with -al and -one respectively. In case of aldehydes the longest carbon chain is numbered starting from the carbon of the aldehyde group while in case of ketones the numbering begins from the the end nearer to the carbonyl group. The substituents are prefixed in alphabetical order along with numerals indicating their positions one . when the aldehyde group is attached to a ring, the suffix carbaldehyde is added after the full name of the cycloalkane. The numbering of the ring carbon atoms start from the carbon atom attached to the aldehyde group. The name of the simplest aromatic aldehyde carrying the aldehyde group on a benzene ring is benzenecarbaldehyde. However, the common name benzaldehyde is also accepted by IUPAC. Other aromatic aldehydes are hence named as substituted benzaldehydes.

How is the carbon chain numbered in case of ketones according to IUPAC nomenclature ?





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Name the compound given below according to IUPAC system .



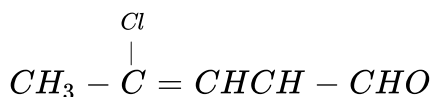
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How do we name aromatic aldehydes ?

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5. The IUPAC names of open chain aliphatic aldehydes and ketones are derived from the names of the corresponding alkanes by replacing the ending -e with -al and -one respectively. In case of aldehydes the longest carbon chain is numbered starting from the carbon of the aldehyde group while in case of ketones the numbering begins from the end nearer to the carbonyl group. The substituents are prefixed in alphabetical order along with numerals indicating their positions. When the aldehyde group is attached to a ring, the suffix carbaldehyde is added after the full name of the cycloalkane. The numbering of the ring carbon atoms start from the carbon atom attached to the aldehyde group. The name of the simplest aromatic aldehyde carrying the aldehyde group on a benzene ring is benzenecarbaldehyde. However, the common name benzaldehyde is also accepted by IUPAC. Other aromatic aldehydes are hence named as substituted benzaldehydes.

Name the following compound as per IUPAC system ?



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6. Methanal is a gas at room temperature. Ethanal is a volatile liquid. Other aldehydes and ketones are liquid or solid at room temperature. The boiling points of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular masses. It is due to weak molecular association in aldehydes and ketones arising out of the dipole - dipole interactions. Also, their intermolecular hydrogen bonding. The lower members of aldehydes and ketones such as methanal ethanal and propanone are miscible with water in all proportions, because they form hydrogen bond with water.



However, the solubility of aldehydes and ketones decreases rapidly on increasing the length of alkyl chain. All aldehydes and ketones are fairly soluble in organic solvents like benzene, ether methanol, chloroform, etc. The lower aldehydes have sharp pungent odours. As the size of the molecule increases, the odour becomes less pungent and more fragrant. In fact, many flavouring agents.

Why are the boiling points of aldehydes and ketones are higher than hydrocarbons and ethers of comparable mass ?



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Lower members of aldehydes and ketones are miscible with water in all proportion. Explain.



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**8.** Methanal is a gas at room temperature. Ethanal is a volatile liquid. Other aldehydes and ketones are liquid or solid at room temperature. The boiling points of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular masses. It is due to weak molecular association in aldehydes and ketones arising out of the dipole - dipole interactions. Also, their intermolecular hydrogen bonding. The lower members of aldehydes and ketones such as methanal ethanal and propanone are miscible with water in all proportions, because they form hydrogen bond with water.



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molecule increases, the odour becomes less pungent and more fragrant .

It fact, many flavouring agents .

Which of the following solvents are likely to dissolve all aldehydes and ketones?

water , benzene , ethanol , carbon tetrachloride



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Which members of aldehydes and ketones are likely to be fragrant?



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Arrange the solubility of the following compounds in water in decreasing order:

n-Butane, Acetone, Propan-1-ol.



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**11.** Aldehydes react with one equivalent of monohydric alcohol in the presence of dry hydrogen chloride to yield alkoxyalcohol intermediate, known as hemiacetals, which further react with one more molecule of alcohol to give a gem-dialkoxy compound known as acetal. Ketones react with ethylene glycol under similar conditions to form cyclic products known as ethylene glycol ketals. Dry hydrogen chloride protonates the oxygen of the carbonyl compounds and therefore, increases the

electrophilicity of the carbonyl carbon facilitating the nucleophilic attack of ethylene glycol. Acetals and ketals are hydrolysed with aqueous mineral acids to yield corresponding aldehydes and ketones respectively.

What is the role of dry HCl in the formation of hemiacetal by aldehydes using a primary alcohol?



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Write the reaction showing hydrolysis of ketal to obtain ketone

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## Multiple Choice Questions

1. Phthaldehyde has

- A. no carboxylic group
- B. one carboxylic group.
- C. two carboxylic groups
- D. three carboxylic groups.

**Answer: C**

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2. Ozonolysis of propene gives

- A. only formaldehyde.
- B. only acetaldehyde.
- C. formaldehyde and acetaldehyde.
- D. propionaldehyde.

**Answer: C**



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3. Conversion of benzoyl chloride to benzaldehyde using

$H_2 / Pd - BaSO_4$  is an example of

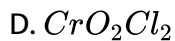
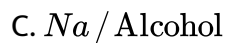
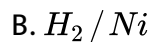
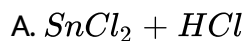
- A. Stephen's reaction.
- B. Kolbe's reaction.
- C. Rosenmund's reaction.
- D. Etard's reaction.

**Answer: C**



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4. The reagent can be converted to benzaldehyde by

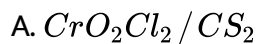


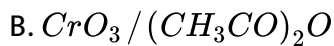
**Answer: D**



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5. Toluene can be converted to benzaldehyde by





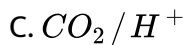
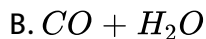
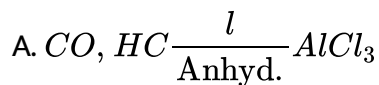
C. side chain halogenation/hydrolysis

D. All the above.

**Answer: D**

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6. The reagents used for the conversion of benzene to benzaldehyde are



D. None of these

**Answer: A**

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7. Aromatic ketones can be obtained from benzene using

- A. Friedel Crafts alkylation
- B. Friedel Crafts acylation.
- C. Reimer Tiemann
- D. Cannizzaro's reaction.

**Answer: B**



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8. Acetone is soluble in water because of

- A. covalent bonding
- B. ionic bonding.
- C. hydrogen bonding
- D. van der Waal's forces.

**Answer: C**



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**9. Aldehydes and ketones give**

- A. Electrophilic reaction
- B. Electrophilic addition reaction
- C. Nucleophilic addition reactions.
- D. Nucleophilic substitution reaction.

**Answer: C**



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**10. Ketones react with X to give ketal X. is**

- A. glycerol.

B. glycol.

C. ethyl alcohol

D. methanol.

**Answer: B**



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11. Phenylhydrazine can be used to test for

A. carboxyl group.

B. carbonyl group.

C. alcoholic group.

D. nitrile group.

**Answer: B**



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12. Schiff's base is substituted

- A. imine
- B. amine
- C. nitro
- D. nitrile

**Answer: A**



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13. Which of the following will not respond to Tollen's reagent test?

- A.  $HCHO$
- B.  $CH_3OH$
- C.  $CH_3CHO$
- D.  $HCOOH$

**Answer: B**



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**14.** Iodoform reaction is used to detect

A.  $HCO$  group

B.  $C_6H_5CHO$

C.  $CH_3C_6H_4CHO$

D.  $CH_3CHO$

**Answer: B**



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**15.** Aldol reaction is given by aldehydes and ketones having at least one

A.  $\alpha$  – hydrogen.

B.  $\beta$  – hydrogen.

C.  $\gamma$  – hydrogen.

D. no hydrogen atom.

**Answer: A**

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**16.** Which of the following does not give Cannizzaro reaction?

A.  $HCHO$

B.  $C_6H_5CHO$

C.  $CH_3C_6H_4CHO$

D.  $CH_3CHO$

**Answer: D**

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17. Which of the following statements is incorrect.

Formaldehyde, is used to

- A. preserve biological specimens.
- B. prepare bakelite.
- C. prepare polymeric products
- D. prepare fertilisers.

**Answer: D**



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18. Common name of  $HOOC - (CH_2)_4 - COOH$  is

- A. glutaric acid.
- B. adipic acid.
- C. succinic acid.
- D. malonic acid.

**Answer: B**

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19.  $RCH_2OH$  on treatment with Jones reagent gives

A.  $RCHO$

B.  $R - OH$

C.  $RCOOH$

D. no reaction

**Answer: C**

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Assertion Reason Questions



1. Assertion (A): Esters and anhydrides are derivatives of carboxylic acids.

Reason (R) : Aldehydes and ketones are widespread in plants and animal kingdom.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: B**



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2. Assertion (A) : The IUPAC name of benzaldehyde is benzene carbaldehyde.

Reason (R) : The carbon-oxygen double bond is polarised due to higher electronegativity of carbon relative to oxygen.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: C**



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3. Assertion (A) : For the preparation of aldehydes on industrial scale, alcohol vapours are passed over heavy metal catalysts (Ag or Cu).

Reason (R) : Ozonolysis of alkenes followed by reaction with Zn dust and water gives aldehydes.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
- C. Assertion (A) is correct, but Reason (R) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: B**

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4. Assertion (A) : Side chain halogenation of alkyl benzenes followed by hydrolysis gives aromatic ketones.

Reason (R) : Gatterman-Koch reaction is used to prepare benzaldehyde from benzene using  $CO / HC \frac{l}{A} nhy. AlCl_3$ .

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
- C. Assertion (A) is correct, but Reason (R) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: D**

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5. Assertion (A) : Ethanal is soluble in water in all proportions due to the formation of hydrogen bonding.

Reason (R) : Aldehydes and ketones undergo electrophilic addition reactions.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: C**

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**6.** Assertion (A) : Carboxylic acids show acidic properties.

Reason (R) : The carboxylate ion after the removal of proton from carboxylic acids gets stabilised by resonance.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: A**



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7. Assertion (A) : Aromatic carboxylic acids do not undergo Friedel Crafts reaction.

Reason (R) :  $AlCl_3$  is Lewis acid and gets bounded to carboxyl group.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: A**



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8. Assertion (A) : Aldehydes are converted into aldols in the presence of concentrated alkali.

Reason (R) : Tollen's reagent can distinguish between aldehydes and ketones but Fehling reagent cannot.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: D**



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9. Assertion (A) : Higher carboxylic acids are practically insoluble in water.

Reason (R) : Carboxylic acids dissociate in water to give resonance stabilised carboxylic anions and hydronium ion.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: B**



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10. Assertion (A) , Carboxylic acids having an  $\alpha$ -hydrogen are halogenated at  $\alpha$ -position on treatment with  $Cl_2$  or  $Br_2$  in the presence of red



phosphorus.

Reason (R) : Aromatic carboxylic acids do not react with ammonia.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: C**

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### Fill In The Blanks

1. Aromatic \_\_\_\_\_ can be prepared by vigorous oxidation of alkyl benzenes with chromic acid.

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2. Acid chlorides when hydrolysed with water give \_\_\_\_\_.

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3. Simple aliphatic acids having upto four carbon atoms are \_\_\_\_\_ in water.

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4. Carboxylic acids dissociate in water to give \_\_\_\_\_ stabilised carboxylate anions and hydronium ion.

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5. Effect of the following groups in increasing acidity is in the order \_\_\_\_\_.

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6. Presence of electron withdrawing group on the phenyl of aromatic carboxylic acid \_\_\_\_\_ their acidity.

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7. Carboxylic acids are esterified with alcohols or phenols in the presence of a \_\_\_\_\_.

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Very Short Answer Questions

1.  $(CH_3)_3C - CHO$  does not undergo aldol condensation. Comment.

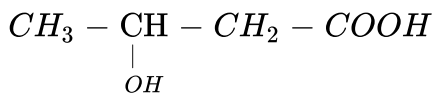
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2. Write the IUPAC name of the given compound :



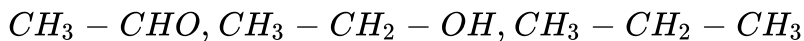
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3. Write the IUPAC name of the compound :



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4. Rearrange the following compounds in the increasing order of their boiling points :





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5. Draw the structure of 3 - methylbutanal.



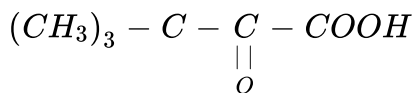
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6. Write the IUPAC name of



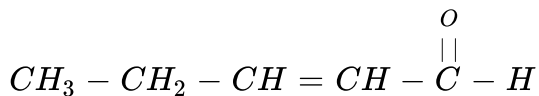
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7. Give the IUPAC name of the following compounds :



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8. Write the IUPAC name of the following :



 [View Text Solution](#)

9. Write IUPAC name of



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10. Arrange the following compounds in an increasing order of their reactivity in nucleophilic addition reaction : ethanal, propanal, propanone, butanone.

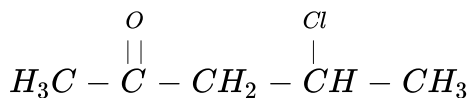
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11. Give two important uses of formalin.



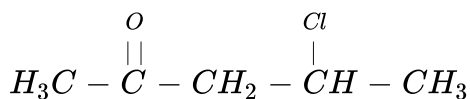
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12. What IUPAC name would you give to the following compound ?



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13. What IUPAC name would you give to the following compound?



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14. Which product is obtained when ethylbenzene is oxidised with alkaline

$KMnO_4$ ?



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15. Draw the structural formula of 1 - phenylpropan -1- one molecule.

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16. Write the structural formula of 1 - phenylpentan -1- one.

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17. Write the IUPAC name of the following compound :



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18. Write the structure of 3 - oxopentanal.

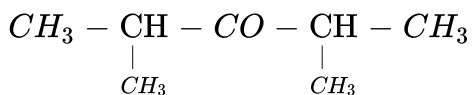
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19. Draw the structure of the compound whose IUPAC name is 4-chloropentan-2-one.

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20. Write the IUPAC name of the compound :



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21. Name the following compounds according to the IUPAC system :



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22. Write the IUPAC name of  $\text{CH}_3\text{COCH}_2\text{COCH}_3$

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23. Mention a chemical property in which methanoic acid differs from acetic acid.

 [View Text Solution](#)

24. How is acetone obtained from ethanol?

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25. Draw the structural formula of hex-2-en-4-ynoic acid.

 [View Text Solution](#)

26. Write IUPAC name of 

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27. Write the chemical equation for the following chemical reactions :

Benzonitrile is converted to acetophenone.

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28. Complete the following reaction :

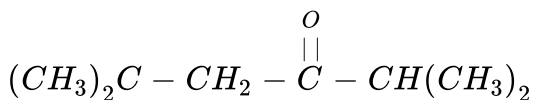


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29. Write IUPAC name of 

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30. Give IUPAC name of the following compound :



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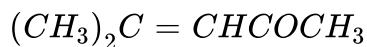
31. Write the IUPAC name of  $CH_3CH(CH_3)CH_2C(CH_3)_2COCH_3$

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32. Give one chemical test to distinguish between acetaldehyde and benzaldehyde.

 [View Text Solution](#)

33. Write the IUPAC name of the following :



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34. Write IUPAC name of 

 [View Text Solution](#)

35. Write the IUPAC name of the following :



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36. Give the IUPAC name of the compound



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37. What is obtained when carboxylic acid is dehydrated with  $P_2O_5$ ?

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38. Give the common name of first member of aldehyde series.

 [View Text Solution](#)

39. The formula of a ketone is  $(C_6H_5)_2CO$ . Give its name.

 [View Text Solution](#)

40. What is the common name of the compound prop-2-enal ?

 [View Text Solution](#)

41. Name the product obtained by reductive ozonolysis of ethene.

 [View Text Solution](#)

42. Benzoyl chloride on reduction with  $H_2$  in the presence of  $Pd - BaSO_4$  gives benzaldehyde. What is this reaction known as ?

 [View Text Solution](#)

43. Nitriles react with  $SnCl_2$  and  $HCl$  followed by hydrolysis give aldehydes. What is this reaction known as ?

 [View Text Solution](#)

44. Name the product obtained when toluene is chlorinated in the presence of light and the intermediate product is hydrolysed with water.

 [View Text Solution](#)

45. Methanal, ethanal and propanone are miscible with water in all proportions. What is this due to ?

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46. Name an important use of naturally occurring aldehydes and ketones.

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47. Which reaction can be used to convert propanone to propane ?

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48. Two moles of ethanal in the presence of dil.  $NaOH$  gives 3-hydroxybutanal. What is this reaction known as ?

 [View Text Solution](#)

49. Reaction of a compound with conc.  $KOH$  gives methanol and potassium formate. Name the compound.

 [View Text Solution](#)

50. What is the name given to 40 % solution of formaldehyde ?

 [View Text Solution](#)



51. What is the name given to higher members of aliphatic carboxylic acids ?

 [View Text Solution](#)

52. Two carboxylic acid groups are attached to benzene at ortho positions. What is the common name of the compound obtained ?

 [View Text Solution](#)

53. Chromium trioxide in acidic medium acts as oxidising agent. What is this reagent known as ?

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Short Answer Questions

1. How do you convert the following:

a. Ethanal to Propanone b. Toluene to Benzoic acid

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2. Write the equations involved in the following reactions:

(i) Wolff-Kishner reduction (ii) Etard reaction.

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

a. Propene to Acetone

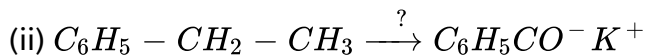
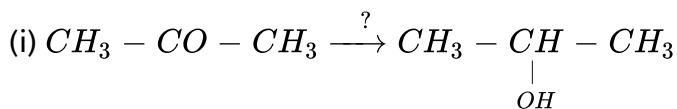
b. Propanoic acid to 2-hydroxypropanoic acid.

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4. An organic compound X having molecular formula  $C_4H_8O$  gives orange-red ppt. with 2,4-DNP reagent. It does not reduce Tollen's but gives yellow ppt. of iodoform on heating with NaOI. Compound X on reaction with  $LiAlH_4$  gives compound Y which undergoes dehydration reaction on heating with conc.  $H_2SO_4$  to form but-2-ene. Identify the compounds X and Y.

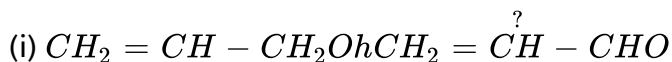
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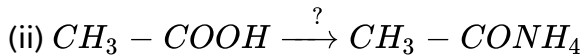
5. Name the reagents used in the following reactions:



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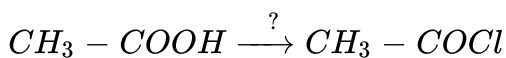
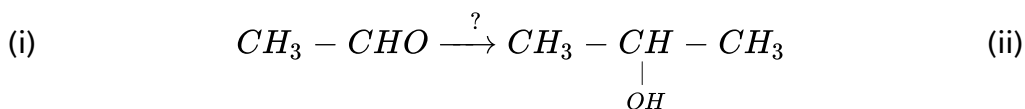
6. Write the reagents required in the following reactions:





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7. Name the reagents used in the following reactions:



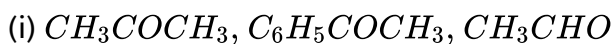
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8. Describe the following reactions:

(i) Cannizzaro's reaction. (ii) Cross aldol reaction.

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9. Arrange the following compounds in increasing order of their property as indicated:



(ii)  $Cl - CH_2 - COOH$ ,  $F - CH_2 - COOH$ ,  $CH_3 - COOH$  (acidic character)

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**10.** Do the following conversions:

(i) Methyl bromide to acetone.

(ii) Benzyl chloride to 2-phenylacetic acid.

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**11.** State chemical tests to distinguish between the following pairs of compounds:

(i) Propanal and propanone. (ii) Phenol and benzoic acid.

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**12.** Write chemical equations for the following reactions:

(i) Action of con. NaOH on 2,2-dimethylpropanal

(ii) Action of dil NaOH on propanal.

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**13.** Write chemical tests to distinguish between the following pairs of compounds:

(i) Acetophenone and benzophenone

(ii) Ethanal and propanal.

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**14.** State reasons for the following situations:

(i) Monochloroethanoic acid is a weaker acid than dichloro ethanoic acid.

(ii) Benzoic acid is a stronger acid than ethanoic acid.

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15. Give chemical tests to distinguish between the following pairs of compounds:

(i) Propanoyl chloride and propanoic acid.

(ii) Benzaldehyde and acetophenone.

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16. Why do carboxylic acids have higher boiling points than alcohol of comparable molecular mass?

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17. Give chemical tests to distinguish between the following pairs of compounds :

(i) Propanal and propanone

(ii) Benzaldehyde and benzoic acid.

 [View Text Solution](#)

**18.** Write chemical equations to illustrate each of the following reactions

(i) Acylation reaction (ii) Rosemund reduction.

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**19.** How are the following conversions carried out?

(i) Ethanol to 1,2-Ethenediol (ii) Phenol to Acetophenone

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**20.** Give chemical tests to distinguish between the following pairs of compounds:

(a) Phenol and Benzoic acid (b) Benzaldehyde and Acetophenone.

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21. Write IUPAC names of the following:



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22. Write the names of the reagents and equations in the conversion of

(i) Phenol to salicylaldehyde (ii) anisole to p-methoxyacetophenone.

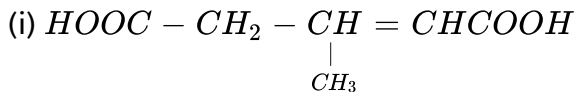
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23. Write one chemical reaction each to exemplify the following:

(i) Rosenmund reduction (ii) Tollens' reagent

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24. Write IUPAC names of the following



(ii) 

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25. Give one test each to distinguish between:

(i) Aqueous solution of acetaldehyde and acetone.

(ii) Aqueous solution of phenol and benzoic acid.

(ii) Aqueous solution of formaldehyde and acetaldehyde.

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26. Write reactions with conditions for the following conversions:

(i) Methyl bromide to acetic acid. (ii) Benzene to toluene.

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27. (i) Most aromatic acids are solids while acetic acid and others of this series are liquids.

(ii) Explain why ketones are less reactive towards nucleophiles than aldehydes.

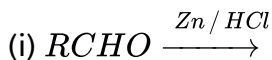
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28. State the sequence of steps to obtain:

a. Acetophenone from benzene b. Acetone from acetyl chloride.

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29. Complete the following reaction equations:



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30. Would you expect benzaldehyde to be more reactive or less reactive in nucleophilic addition reactions than propanal? Explain your answer.

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31. An organic compound A (molecular formula  $C_3H_6O$ ) is resistant to oxidation but forms a compound B ( $C_3H_8O$ ) on reduction. B reacts with HBr to form a bromide C which on treatment with alcoholic KOH forms an alkene D ( $C_3H_6$ ). Deduce the structures of A, B, C and D.

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32. Give one example of the following:

- Wolff-Kishner reduction.
- Write IUPAC names of 
- Convert acetaldehyde to methane.

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**33.** Draw the structure of the following compounds:

(i) 4-Nitropropiofenone.

(ii) 2-Hydroxycyclopentane carbaldehyde.

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**34.** Name the electrophile produced in the reaction of benzene with benzoyl chloride in the presence of anhy.  $AlCl_3$ . Name the reaction also.

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**35.** Write reaction for obtaining:

(i) Acetone from acetic acid. (ii) Benzene from toluence.

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36. Oxidation of ketones involves carbon carbon bond cleavage. Name the products formed on oxidation of 2,5-dimethylhexan-3-one.

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37. Arrange the following in decreasing order of their acidic strength and give reason for your answer:

$CH_3CH_2OH$ ,  $CH_3COOH$ ,  $ClCH_2COOH$ ,  $FCH_2COOH$ ,  $C_6H_5CH_2COOH$

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38. Write the mechanism of addition of HCN to  group.

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39. What products will be formed on reaction of propanal with 2-methylpropanal in the presence of NaOH? Write the name of the reaction

also.

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**40.** Alkenes and carbonyl compounds both contain a  $\pi$  bond but alkenes show electrophilic addition reaction whereas carbonyl compounds show nucleophilic addition reactions. Explain.

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**41.** Why are carboxylic acids more acidic than alcohols or phenols although all of them have hydrogen linked to an oxygen atom?

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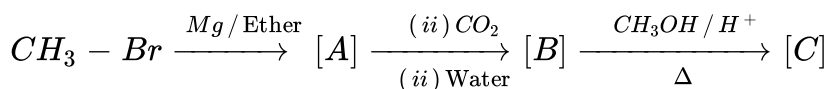
**42.** Carboxylic acids contain a carbonyl group but do not show the nucleophilic addition reaction like aldehydes or ketones. Why?

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43. Carboxylic acids do not give reactions of aldehydes and ketones, why?

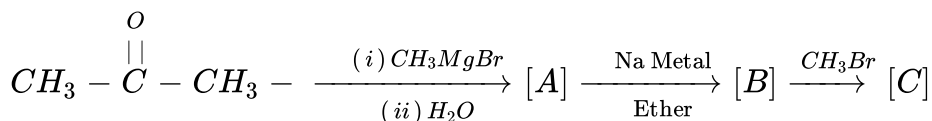
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44. Identify the compounds A,B and C in the following reaction:



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45. Complete the following reaction sequence:



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46. How is the following conversion carried out: Acetic acid to ethanamine?





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**47.** Account for the following:

(i) Formaldehyde gives Cannizzaro's reaction whereas acetaldehyde does not.

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



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**48.** Convert:

(i) Ethanoic acid to propanoic acid.

(ii) Ethanol to propanone.



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**49.** An organic compound A which has characteristic odour, on treatment with NaOH forms two compounds B and C. compound B has the molecular formula  $C_7H_8O$  which on oxidation gives back compound A.

Compound C is the sodium salt of an acid which when heated with soda lime yields an aromatic hydrocarbon D. Deduce the structure of A,B,C and D.

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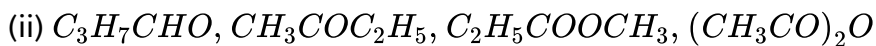
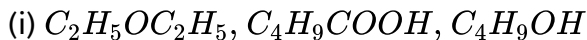
50. An organic compound A has the molecular formula  $C_5H_{10}O$ . It does not reduce Fehling's solution but forms a bisulphite compound. It also positive iodoform test. What are possible structures of A? Explain your reasoning which helped to arrive at the structures.

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51. The boiling points of aldehydes and ketones are lower than that of the corresponding alcohols and acids. Why?

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52. Arrange the following in increasing order of boiling points:



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53. A compound A with molecular formula  $C_5H_{10}O$  gave a positive 2,4-DNP test but a negative Tollens reagent test. It was oxidised to carboxylic acid B with molecular formula  $C_3H_6O_2$  when treated with alkaline  $KMnO_4$  under vigorous condition. Sodium salt of B gave a hydrocarbon C on Kolbe's electrolytic reduction. Identify A, B and C and write the chemical equations for the reaction.

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54. Why is acetic acid stronger than phenol whereas formic acid is stronger than acetic acid?

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55. How will you convert  $CH_3COOH$  into (i) Ethane (ii) Ethanol?

 [View Text Solution](#)



The IUPAC names of compound A is .....and B is .....

 [View Text Solution](#)

57. Distinguish between:

(i) ethyl alcohol and acetaldehyde (ii)  $C_6H_6COCH_3$  and  $C_6H_5CH_2CHO$

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58. Bring out the following conversions:

a. Toluene to Benzaldehyde b. Acetylene to acetaldehyde

c. Formaldehyde to Methyl alcohol d. Propanoic acid to Acetic acid.

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59. Bring out the following conversion:

a. Acetyl chloride to Acetaldehyde b. Ethanol to Acetaldehyde

c. Acetic acid to Acetaldehyde d. 2-Butanol to 2-Butanone.

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60. How will you convert toluene to m-nitrobenzoic acid?

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## Long Answer Questions I

1. (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

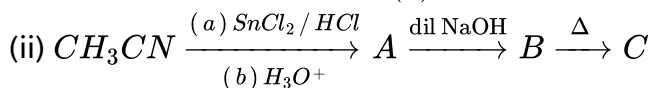
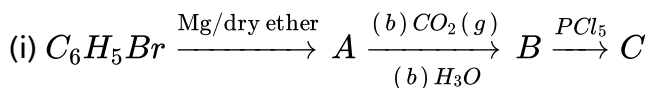
positive Tollens' test whereas isomer (B) does not give Tollens' test but gives positive Iodoform test. Isomers (A) and (B) on reduction with  $Zn(Hg)/conc. HCl$  give the same product (D).

(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  $HCN$  ?

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2. Write structures of compounds A, B and C in each of the following reactions :



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3. Give reasons :

(a) Propanone is less reactive than ethanal towards nucleophilic addition

reactions.

(b)  $O_2N - CH_2 - COOH$  has lower pKa value than  $CH_3COOH$

(c)  $(CH_3)_2CH - CHO$  undergoes aldol condensation whereas  $(CH_3)_3C - CHO$  does not.

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4. Give reasons :

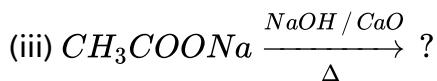
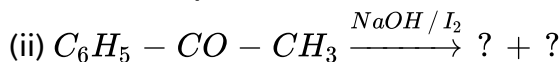
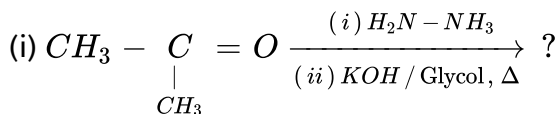
(i) The  $\alpha$ -hydrogen atoms of aldehydes and ketones are acidic in nature.

(ii) Propanone is less reactive than ethanal towards addition of HCN.

(iii) Benzoic acid does not give Friedel-Crafts reaction.

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5. Predict the products of the following reactions :





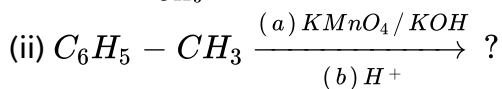
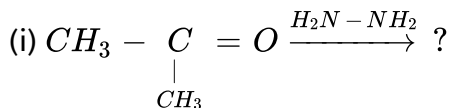
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6. Complete the following reaction statements by giving the missing starting material, reagent or product as required.



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7. Predict the products of the following reactions :



(iii) 



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8. How would you account for the following :

(i) Aldehydes are more reactive than ketones towards nucleophiles.



(ii) The boiling points of aldehydes and ketones are lower than those of corresponding acids.

(iii) Aldehydes and ketones undergo a number of addition reactions.

 [View Text Solution](#)

**9.** An organic compound (A) has a characteristic odour. On treatment with NaOH, it forms compounds (B) and (C). Compound (B) has molecular formula  $C_7H_8O$  which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda-lime, it yields an aromatic compound (D). Deduce the structures of (A), (B), (C) and (D). Write the sequence of reactions involved.

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**10.** How can the following conversions be carried out ?

(i) Ethanol to Acetone

(ii) Benzene to Acetophenone

(iii) Benzoic acid to Benzaldehyde.



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11. Explain the mechanism of nucleophilic addition to a carbonyl group and give one example of such addition reactions.



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12. Write balanced chemical equations for the following reactions :

(i) Thionyl chloride reacts with benzoic acid.

(ii) Acetic acid is reacted with red phosphorus and HI.

(iii) Acetic acid is treated with zinc metal.



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13. (a) Write the steps and conditions involved in the following conversions :

(i) Acetophenone to 2-phenyl-2-butanol

(ii) Propene to acetone.

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

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14. An aliphatic compound (A) with a molecular formula  $C_3H_6O$  reacts with phenylhydrazine to give compound (B). Reaction of (A) with  $I_2$  in alkaline solution on warming gives a yellow precipitate (C). Identify the compounds A, B and C.

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15. How would you bring about the following conversions :

(i) Propanal to butanone ?

(ii) Benzaldehyde to benzophenone ?

(iii) Benzoyl chloride to benzonitrile ?

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**16.** Give reasons for the following :

- (a) Carboxylic acids do not give characteristic reactions of carbonyl group.
- (b) Treatment of benzaldehyde with HCN gives a mixture of two isomers which cannot be separated even by careful fractional distillation.
- (c) Sodium bisulphite is used for the purification of aldehydes and ketones.

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**17.** Draw the structure of a carbonyl group and indicate clearly

- (i) the hybridised state of carbon,
- (ii) the  $\sigma$  and  $\pi$  it bonds present and (iii) the electrophilic and nucleophilic centres in it.

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**18.** Write chemical tests to distinguish between :

- (i) Acetaldehyde and Acetone

(ii) Acetic acid and Acetaldehyde

(iii) Phenol and Propanoic acid.

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**19.** Write reactions and conditions for the following conversions :

(i) Ethanol to Propanone

(ii) Benzoyl chloride to Benzaldehyde

(iii) Acetaldehyde to Crotonaldehyde.

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**20.** How can the following be obtained : 2-butanol from ethanol ? State the conditions for the involved reactions.

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**21. Convert :**

(i) Acetophenone to ethylbenzene

(ii) Ethanal to 2-aminoethanoic acid

(iii) Methyl chloride to ethanoic acid.

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**22.** 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.

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**23.** 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.

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24. 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.

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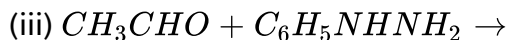
25. Write down functional isomers of a carbonyl compound with molecular formula  $C_3H_6O$ . Which isomer will react faster with HCN and

why ? 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 ?

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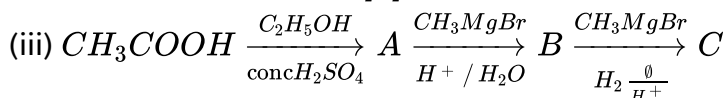
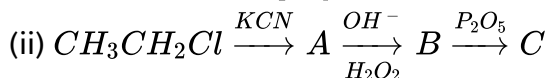
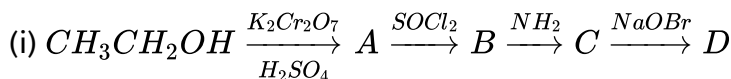
26. Complete the following equations :

(i) ,



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27. Predict the products:







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28. Identify compounds (A) - (I) in the following reactions :



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29. Two moles of organic compound 'A' on treatment with a strong base gives two compounds B and C. Compound 'B' on dehydrogenation with Cu gives 'A' while acidification of 'C' yields carboxylic acid 'D' having molecular formula of  $CH_2O_2$ . Identify the compounds A, B, C and D.

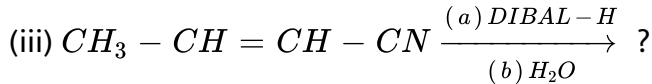


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## Long Answer Questions li

1. (a) Write the product(s) in the following reactions :





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

(i) Butanal and Butan-2-one.

(iii) Benzoic acid and Phenol.

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3. (a) Write the reactions involved in the following :

(i) Etard reaction. (ii) Stephen reduction.

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

(i) Benzoic acid to benzaldehyde. (ii) Acetophenone to benzoic acid.

(iii) Ethanoic acid to 2-hydroxyethenoic acid.

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4. Write the structures of A,B,C,D and E in the following reactions :



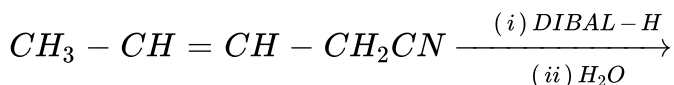
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5. (A) Write the chemical equation for the reaction involved in Cannizzaro reaction.

(b) Draw the structure of the semicarbazone of ethanal.

(c ) Why  $pK_a$  of  $F - CH_2 - COOH$  is lower than that of  $Cl - CH_2 - COOH$  ?

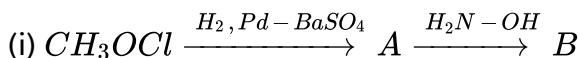
(d) Write the product in the following reaction :

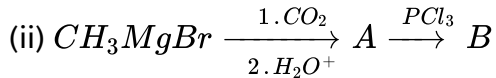


(e ) How can you distinguish between propanal and propanone ?

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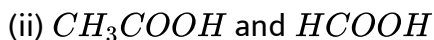
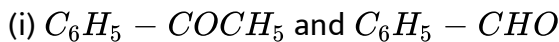
6. Write the structures of A and B in the following reactions :





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7. Distinguish between :



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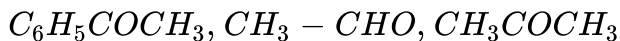
8. Arrange the following in the increasing order of their boiling points :



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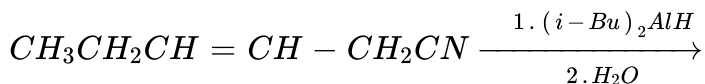
9. (a) Write the chemical reaction involved in Wolff-Kishner reduction.

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



(c) Why carboxylic acid does not give reactions of carbonyl group ?

(d) Write the product in the following reaction :



(e) A and B are two functional isomers of compound  $C_3H_6O$ . On heating with NaOH AND  $I_2$ , isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate. Write the formulae of A and B.



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10. Write the structures of A, B, C and D in the following reactions :



(b) Distinguish between the following :

(i)  $C_6H_5COCH_3$  and  $C_6H_5COCH_2CH_3$

(ii) benzoic acid and phenol



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11. (a) Write the structures of the main products where ethanal ( $CH_3 - CHO$ ) reacts with the following reagents.

(i) HCN (ii)  $H_2N - NH_2 / H^+$  (iii)  $LiAlH_4$

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

$C_6H_5COCH_3$ ,  $CH_3 - CHO$ ,  $CH_3 - CO - CH_3$

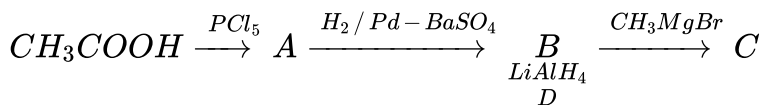
(c) Give a simple chemical test to distinguish between the following pair of compounds :

$CH_3CH_2CHO$  and  $CH_3CHO$



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12. Write the structure of A,B,C and D in the following reactions :



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13. Distinguish between the following :

(a)  $CH_3COCH_2CH_3$  and  $CH_3CH_2CH_2CHO$

(b) Ethanal and ethanoic acid

 [View Text Solution](#)

14. Write the structure of 4-chloropentan-2-one

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15. Write the structures of the main products when  $CH_3CH_2CHO$  reacts with the following :

(a)  $Zn - Hg / \text{conc. HCl}$  (b)  $H_2N - NH_2 / H^+$  (c) HCN

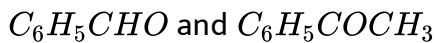
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16. Arrange the following in the decreasing order of their reactivity towards nucleophilic addition reaction :



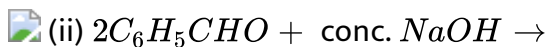
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17. Give simple chemical tests to distinguish between the following pairs of compounds :



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18. Write the products of the following reactions :



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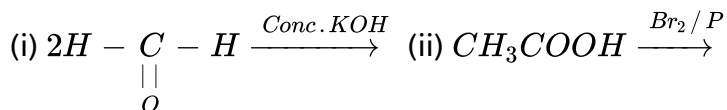


19. Give simple chemical test to distinguish between the following pairs of compounds :

(i) Benzaldehyde and benzoic acid (ii) Propanal and propanone.

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20. Complete the following reactions :



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21. Give simple chemical tests to distinguish between the following pairs of compounds :

(i) Ethanal and propanal (ii) Benzoic acid and phenol.

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22. Write a suitable chemical equation to complete each of the following transformations :

(i) Butan-1-ol to butanoic acid.

(ii) 4- Methylacetophenone to benzene -1,4-dicarboxylic acid.

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23. An organic compound with formula  $C_9H_{10}O$  forms 2,4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro's reaction. On vigorous oxidation it gives 1,2-benzenedicarboxylic acid. Identify the compound.

 [View Text Solution](#)

24. Give chemical tests to distinguish between

(a) Propanal and propanone, (b) Benzaldehyde and acetophenone.

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25. How would you obtain

(a) But-2-enal from ethanal, (b) Butanoic acid from butanol, (c) Benzoic acid from ethylbenzene ?

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26. Describe the following giving linked chemical equations :

(a) Cannizzaro reaction (b) Decarboxylation

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27. Complete the following chemical equations :



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**28.** Illustrate the following name reactions :

(a) Cannizzaro's reaction (b) Clemmensen reduction

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**29.** How would you obtain the following :

(a) But-2-enal from ethanal (b) Butanoic acid from butanol

(c) Benzoic acid from ethylbenzene

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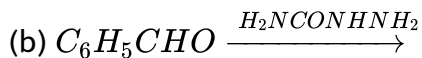
**30.** Give chemical tests to distinguish between the following :

(a) Benzoic acid and ethyl benzoate .

(b) Benzaldehyde and acetophenone .

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31. Complete each synthesis by giving missing reagents or products in the following :



(c) 

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32. Give chemical tests to distinguish between the following pairs of compounds :

(i) Ethanal and Propanal (ii) Phenol and Benzoic acid

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33. How will you bring about the following conversion ?

(i) Benzoic acid to benzaldehyde (ii) Ethanal to but-2-enal

(iii) Propanone to propene

Give complete reaction in each case.



[View Text Solution](#)

**34.** An organic compound (A) which has characteristic odour. On treatment with NaOH it forms two compounds (B) and (C). Compound (B) has molecular formula  $C_7H_8O$  which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda lime it yields an aromatic hydrocarbon (D). Deduce the structure of (A), (B), (C) and (D). Write the sequence of reactions involved.



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**35.** Arrange the following in the increasing order of the property indicated :

(i) Benzoic acid, 4-Nitrobenzoic acid, 3,5-dinitrobenzoic acid, 4-Methoxybenzoic acid (acid strength)

(ii) Acetaldehyde, Acetone, Di-tertbutylketone. Methylterbutyl keton (Reactivity towards HCN).



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36. A compound A on oxidation gives  $B(C_2H_4O_2)$ . A reacts with dil. NaOH and on subsequent heating forms C. C on catalytic hydrogenation gives D. Identify A, B, C, D and write down the reactions involved.

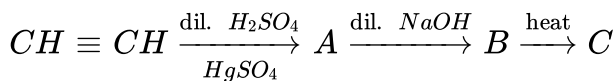
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37. Write chemical equations to carry out the following conversions:

- (i) Benzene to Benzylalcohol.
- (ii) Propane nitrile to 1-phenylpropanone.

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38. Identify A, B and C in the following reaction:



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39. Give reasons:

- (i) p-Nitrobenzoic acid and higher  $K_a$  value than benzoic acid.
- (ii) Acetone is highly soluble in water but benzophenone is not.



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40. An organic compound (A) has molecular formula ( $C_5H_{10}O$ ). It does not reduce Tollen's reagent but forms an orange precipitate with 2, 4-DNP reagent. It forms a carboxylic acid (B) with molecular formula ( $C_3H_6O_2$ ) when treated with alkaline  $KMnO_4$ , yellow precipitate on treatment with NaOH and  $I_2$  under vigorous conditions. On oxidation it gives ethanoic acid and propanoic acid. Sodium salt of (B) gave a hydrocarbon (C) in Kolbe's Electrolytic Reduction. Identify (A), (B) and (C) and write the reactions involved.



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**41.** Predict the products formed in the following cases:

(i) (A) reacts with  $\text{PhMgBr}$  and then hydrolysed.

(ii) (A) reacts with hydrazine and is then heated with  $\text{KOH}$  and ethylene glycol.

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**42.** A ketone A which undergoes haloform reaction gives compound B on reduction. B on heating with sulphuric acid gives compound C, which forms mono-ozonide D. The compound D on hydrolysis in presence of zinc dust gives only acetaldehyde. Write the structures and IUPAC names of A, B and C. Write down the reactions involved.

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**43.** Predict the products formed when cyclohexanecarbaldehyde reacts with following reagents:

(a)  $\text{PhMgBr}$  and then  $\text{H}_3\text{O}^+$ . (b) Tollens' reagent.



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44. Complete each synthesis by giving missing starting material, reagent or products:



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## Self Assessment Test Section A Multiple Choice Questions Choose The Correct Option

1. Assertion (A) : Aldehydes which do not have an  $\alpha$ -hydrogen atom undergo self-oxidation and reduction on treatment with conc. KOH.

Reason (R ) : Primary alcohols on oxidation with alkaline  $KMnO_4$  give aldehydes.

A. Both Assertion (A) and Reason(R ) are correct statements, and

Reason (R ) is the correct explanation of the Assertion (A).

- B. Both Assertion (A) and Reason(R ) are correct statements, and Reason (R ) is not the correct explanation of the Assertion (A).
- C. Assertion (A) is correct, but Reason (R ) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: C**

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2. Assertion (A) : Ethanal on treatment with dilute alkali and subsequent heating gives but-2-enal.

Reason (R ) : Aldehydes and ketones having at least one  $\alpha$ -hydrogen undergo reaction in the presence of dilute alkali to form aldol.

- A. Both Assertion (A) and Reason(R ) are correct statements, and Reason (R ) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason(R ) are correct statements, and Reason (R ) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R ) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: A**

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## Self Assessment Test Section B

1. An organic compound (A) has a characteristic colour, on treatment with NaOH, it forms compound (B) and (C ). Compound (B) has molecular formula  $C_7H_8O$  which on oxidation gives back (A). The compound (C ) is sodium salt of an acid. When (C ) is treated with sodalime, it yields an aromatic compound (D). Deduce the structures of (A), (B), (C ) and (D). Write the sequence of reactions involved.

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