

OPEN STUDENT FOUNDATION

Chapters: 8

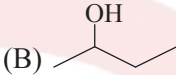
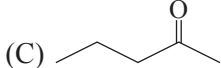
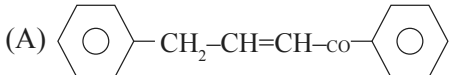
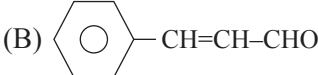
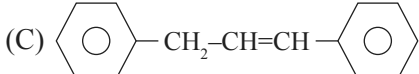
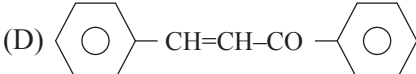
STD:12th Chemistry PRACTICE SHEET 8

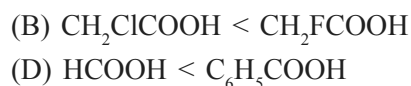
Date : 29/02/24

Section A

● Choose correct answer from the given options. [Each carries 1 Mark]

[10]

- Which one is the common name of the compound $\text{CH}_2 = \text{CH} - \text{CHO}$?
 (A) Prop-2-Enal (B) Mesityl oxide (C) Acrolein (D) Proponal-1-ene
- Which of the following compounds will not give "Iodoform" by reaction with "Sodium hypo iodide"?
 (A) $\text{CH}_3 - \text{CHO}$ (B) 
 (C) 
 (D) $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}_2 - \text{CH}_3$
- $\text{P} \xrightarrow{\text{KMnO}_4/\text{KOH}} \text{Q} \xrightarrow[\Delta]{\text{Sodalime}} \text{R} \xrightarrow[\text{Anhyrous AlCl}_3]{\text{CH}_3\text{Cl}} \text{S}$ If P and S are toluene; Q and R are _____ and _____ respectively
 (A) Benzoic acid, Benzene (B) Benzaldehyde, Benzoic Acid
 (C) Benzaldehyde, sodium benzoate (D) Benzene, Benzoic Acid
- Which of the following order of acidic strength is incorrect ?
 (A) $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{COOH} > \text{C}_6\text{H}_5-\text{COOH} > \text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{COOH}$
 (B) $\text{CH}_3-\text{CH}_2-\underset{\text{Cl}}{\text{CH}}-\text{COOH} > \text{CH}_3-\underset{\text{Cl}}{\text{CH}}-\text{CH}_2-\text{COOH} > \underset{\text{Cl}}{\text{CH}_2}-\text{CH}_2-\text{CH}_2-\text{COOH}$
 (C) $\text{Cl}_3\text{C COOH} > \text{Cl}_2 \text{CHCOOH} > \text{Cl CH}_2 \text{COOH}$
 (D) $\text{HCOOH} > \text{CH}_3 \text{COOH} > \text{C}_6\text{H}_5\text{COOH}$
- Which of the following acid is strong acid ?
 (A) 4-Nitro benzoic acid (B) Benzoic acid
 (C) 3-Nitro benzoic acid (D) 2-Nitro benzoic acid
- Which of the following reactions convert Acetone into hydrocarbon having same number of carbon atoms ?
 (A) Wolff-kishner Reaction (B) Hoffmann Reaction
 (C) Grignard Reaction (D) Reduction with LiAlH_4
- What is the formula of Acrole in ?
 (A) $\text{CH}_2 = \text{CH} - \text{CHO}$ (B) $\text{CH}_2 = \text{CH} - \text{CN}$
 (C) $\text{CH}_2 = \text{CH} - \text{COOH}$ (D) $\text{CH}_2 = \text{CH} - \text{CONH}_2$
- What is the main product obtained by the cross-aldol condensation of benzene carbaldehyde and 1-phenyl ethane-1-one ?
 (A) 
 (B) 
 (C) 
 (D) 
- Which reagent is required to convert cyclohexanol to cyclohexanone ?
 (A) DIBAL-H (B) $\text{O}_3/\text{H}_2\text{O} - \text{Zn dust}$ (C) Anhydrous CrO_3 (D) PCC
- Which is the incorrect order of increasing acidic strength for the following ?



Section B

- Write the answer of the following questions. [Each carries 2 Marks] [10]
1. Explain the preparation of aldehydes and ketones by ozonolysis of alkenes with suitable example.
 2. Explain Rosenmund reduction in brief.
 3. Explain nucleophilic addition reaction of aldehydes and ketones with sodium hydrogensulphite (NaHSO_3).
 4. What is meant by the following terms? Give an example of the reaction in each case. Schiff's base
 5. Explain the Tollens' test to distinguish aldehydes from ketones with equation.

Section C

- Write the answer of the following questions. [Each carries 3 Marks] [12]
6. Explain aldol condensation with suitable example.
 7. Explain with chemical reactions, the reaction of carboxylic acids with ammonia.
 8. Explain with equations, the nucleophilic addition reaction of aldehydes and ketones with Grignard's reagent ($\text{R}'\text{-Mg-X}$).
 9. Explain the preparation of benzaldehyde by Etard and Gatterman-Koch reaction.

Section D

- Write the answer of the following questions. [Each carries 4 Marks] [12]
10. Write only equations to obtain 1° , 2° and 3° alcohols from aldehydes and ketones.
 11. Draw structures of the following derivatives.
 - (i) The 2, 4-dinitrophenylhydrazone of benzaldehyde
 - (ii) Cyclopropanone oxime
 - (iii) Acetaldehydedimethylacetal
 - (iv) The semicarbazone of cyclobutanone
 - (v) The ethylene ketal of hexan-3-one
 - (vi) The methyl hemiacetal of formaldehyde
 12. An organic compound (A) (molecular formula $\text{C}_8\text{H}_{16}\text{O}_2$) 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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STD:12th Chemistry PRACTICE SHEET 8

Date : 29/02/24

Section A

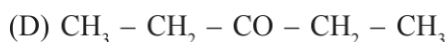
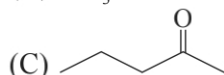
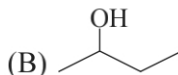
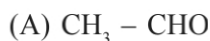
● Choose correct answer from the given options. [Each carries 1 Mark]

[10]

1. Which one is the common name of the compound $\text{CH}_2 = \text{CH} - \text{CHO}$?
 (A) Prop-2-Enal (B) Mesityl oxide (C) Acrolein (D) Proponal-1-ene

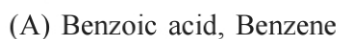
➡ Ans : (C)

2. Which of the following compounds will not give "Iodoform" by reaction with "Sodium hypo iodide"?



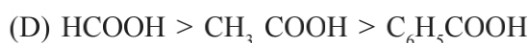
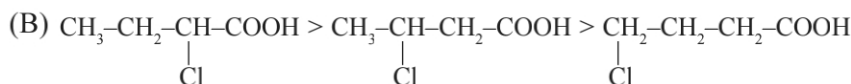
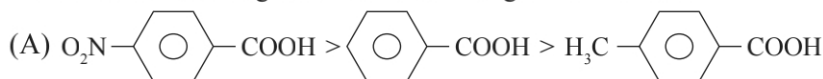
➡ Ans : (D)

3.
$$\text{P} \xrightarrow{\text{KMnO}_4/\text{KOH}} \text{Q} \xrightarrow[\Delta]{\text{Sodalime}} \text{R} \xrightarrow[\text{Anhyrous AlCl}_3]{\text{CH}_3\text{Cl}} \text{S}$$
 If P and S are toluene; Q and R are _____ and _____ respectively



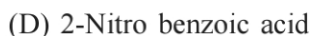
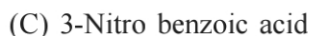
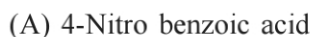
➡ Ans : (A)

4. Which of the following order of acidic strength is incorrect ?



➡ Ans : (D)

5. Which of the following acid is strong acid ?



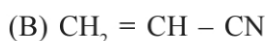
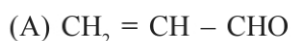
➡ Ans : (D)

6. Which of the following reactions convert Acetone into hydrocarbon having same number of carbon atoms ?



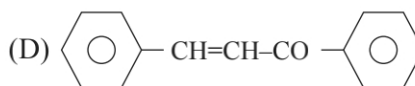
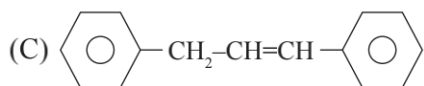
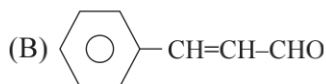
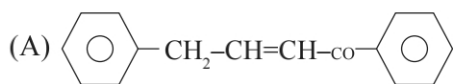
➡ Ans : (A)

7. What is the formula of Acrole in ?



➡ Ans : (A)

8. What is the main product obtained by the cross-aldol condensation of benzene carbaldehyde and 1-phenyl ethane-1-one ?

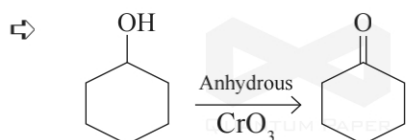


Ans : (D)

9. Which reagent is required to convert cyclohexanol to cyclohexanone ?

- (A) DIBAL-H (B) O_3/H_2O - Zn dust (C) Anhydrous CrO_3 (D) PCC

Ans (C)



10. Which is the incorrect order of increasing acidic strength for the following ?

- (A) $CH_2FCH_2CH_2COOH < CH_3CHFCH_2COOH$ (B) $CH_2ClCOOH < CH_2FCOOH$
 (C) $CH_3COOH < CH_2ClCOOH$ (D) $HCOOH < C_6H_5COOH$

Ans : (D)

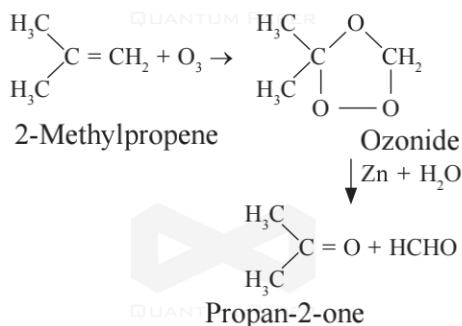
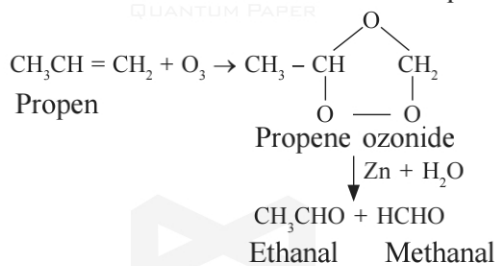
Section B

● Write the answer of the following questions. [Each carries 2 Marks]

[10]

1. Explain the preparation of aldehydes and ketones by ozonolysis of alkenes with suitable example.

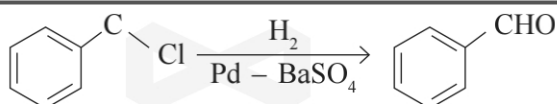
⇨ Ozonolysis : Ozonolysis of alkenes involves the addition of ozone molecule to alkene to form ozonide by $Zn-H_2O$ to smaller molecules. This reaction is highly useful in detecting the position of the double bond in alkenes or other unsaturated compounds.



2. Explain Rosenmund reduction in brief.

⇨ Acyl chloride (acid chloride) is hydrogenated over catalyst, palladium on barium sulphate. This reaction is called Rosenmund reduction.

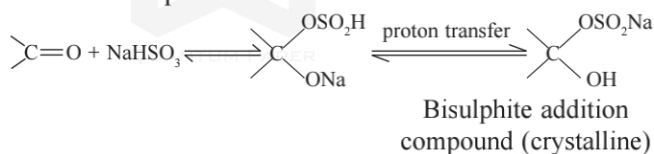




Benzoyl Chloride Benzaldehyde

3. Explain nucleophilic addition reaction of aldehydes and ketones with sodium hydrogensulphite (NaHSO₃).

⇒ Addition of sodium hydrogensulphite : Sodium hydrogensulphite adds to aldehydes and ketones to form the addition products.



Bisulphite addition compound (crystalline)

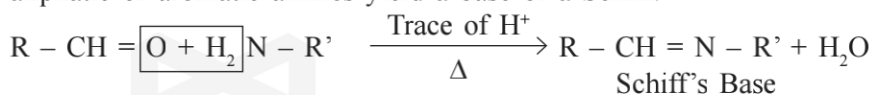
⇒ The position of the equilibrium lies largely to the right hand side for most aldehydes and to the left for most ketones due to steric reasons.

⇒ The hydrogensulphite addition compound is water soluble and can be converted back to the original carbonyl compound by treating it with dilute mineral acid or alkali.

⇒ Therefore, these are useful for separation and purification of aldehydes.

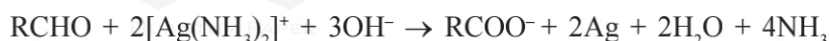
4. What is meant by the following terms ? Give an example of the reaction in each case. Schiff's base

⇒ Schiff's base : Aldehydes and ketones in the presence of a residue of acid on treatment with primary aliphatic or aromatic amines yield a base of a Schiff.



5. Explain the Tollens' test to distinguish aldehydes from ketones with equation.

⇒ Tollens' test : On warming an aldehyde with freshly prepared ammoniacal silver nitrate solution (Tollens' reagent), a bright silver mirror is produced due to the formation of silver metal. The aldehydes are oxidised to corresponding carboxylate anion. The reaction occurs in alkaline medium.



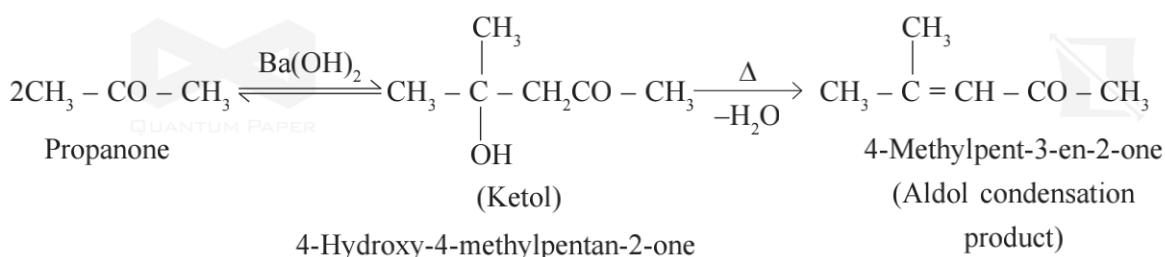
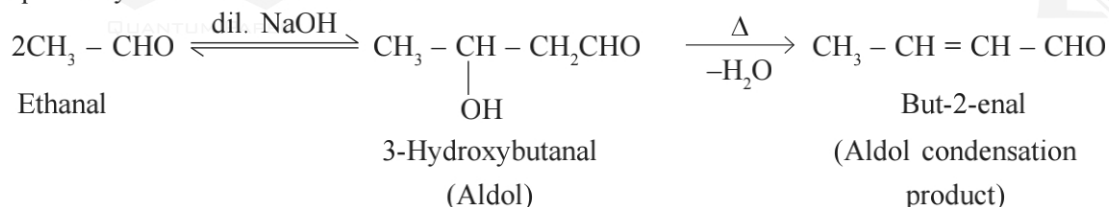
Section C

● Write the answer of the following questions. [Each carries 3 Marks]

[12]

6. Explain aldol condensation with suitable example.

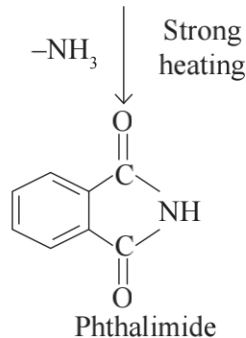
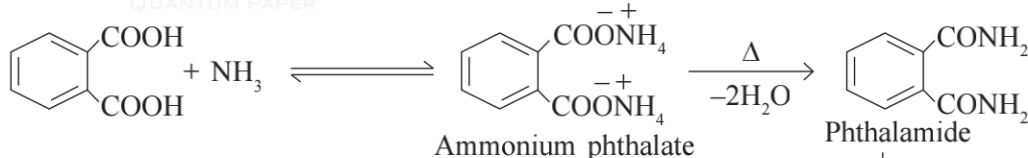
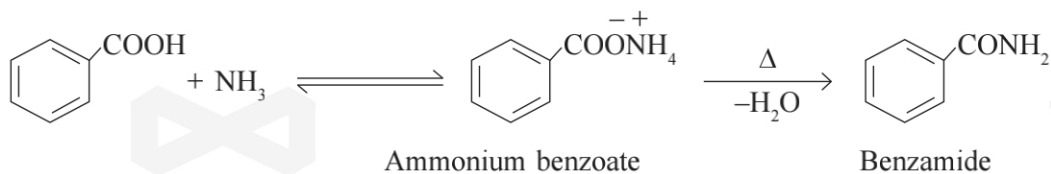
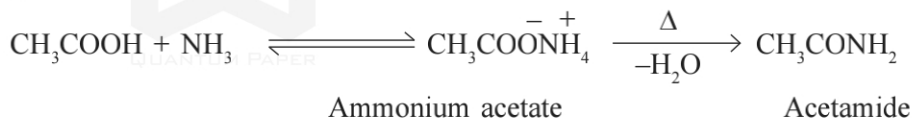
⇒ Aldol condensation : Aldehydes and ketones having at least one α-hydrogen undergo a reaction in the presence of dilute alkali as catalyst to form β-hydroxy aldehydes (aldol) or β-hydroxy ketones (ketol), respectively. This is known as Aldol reaction.



⇒ The name aldol is derived from the names of the two functional groups, aldehyde and alcohol, present in the products. The aldol and ketol readily lose water to give α , β -unsaturated carbonyl compounds which are aldol condensation products and the reaction is called Aldol condensation. Though ketones give ketols (compounds containing a keto and alcohol groups), the general name aldol condensation still applies to the reactions of ketones due to their similarity with aldehydes.

7. Explain with chemical reactions, the reaction of carboxylic acids with ammonia.

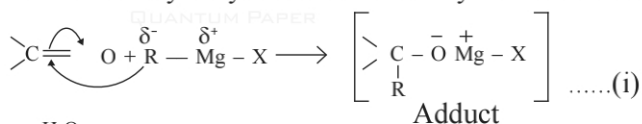
⇒ Carboxylic acids react with ammonia to give ammonium salt which on further heating at high temperature give amides. For example :



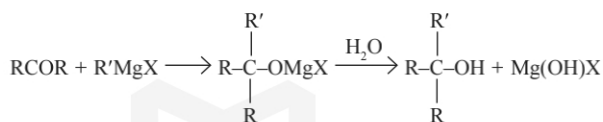
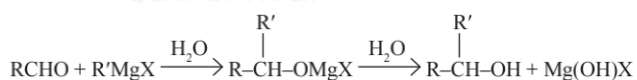
8. Explain with equations, the nucleophilic addition reaction of aldehydes and ketones with Grignard's reagent ($\text{R}'\text{-Mg-X}$).

⇒ Alcohols are produced by the reaction of Grignard reagents with aldehydes and ketones.

⇒ The first step of the reaction is the nucleophilic addition of Grignard reagent to the carbonyl group to form an adduct. Hydrolysis of the adduct yields an alcohol.



⇒ The overall reactions using different aldehydes and ketones are as follows :



⇒ You will notice that the reaction produces a primary alcohol with methanal, a secondary alcohol with other aldehydes and tertiary alcohol with ketones.

9. Explain the preparation of benzaldehyde by Etard and Gatterman-Koch reaction.

Section D

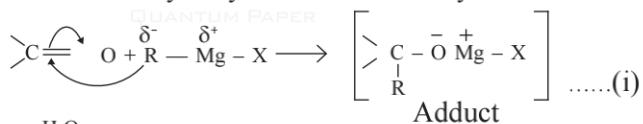
● Write the answer of the following questions. [Each carries 4 Marks]

[12]

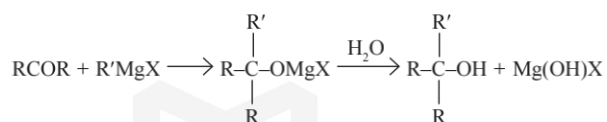
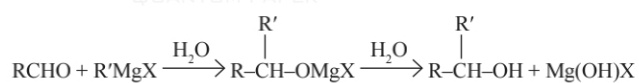
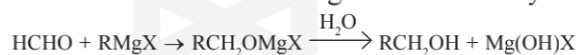
10. Write only equations to obtain 1°, 2° and 3° alcohols from aldehydes and ketones.

⇒ Alcohols are produced by the reaction of Grignard reagents with aldehydes and ketones.

⇒ The first step of the reaction is the nucleophilic addition of Grignard reagent to the carbonyl group to form an adduct. Hydrolysis of the adduct yields an alcohol.



⇒ The overall reactions using different aldehydes and ketones are as follows :



⇒ You will notice that the reaction produces a primary alcohol with methanal, a secondary alcohol with other aldehydes and tertiary alcohol with ketones.

11. Draw structures of the following derivatives.

(i) The 2, 4-dinitrophenylhydrazone of benzaldehyde

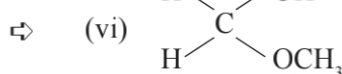
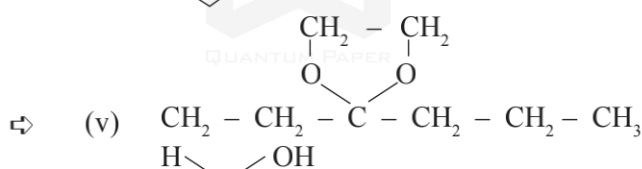
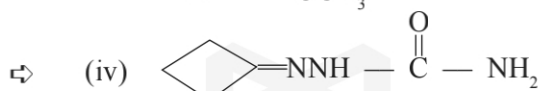
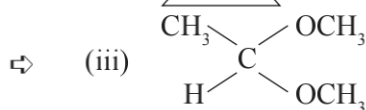
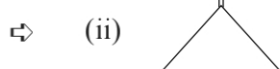
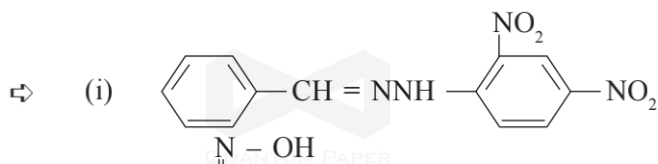
(ii) Cyclopropanone oxime

(iii) Acetaldehydedimethylacetal

(iv) The semicarbazone of cyclobutanone

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

(vi) The methyl hemiacetal of formaldehyde



12. 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.

⇒ A is an organic compound with a molecular formula $C_8H_{16}O_2$. This gives a carboxylic acid (B) and alcohol (C) on hydrolysis with dilute sulphuric acid. Thus, compound A must be an ester.

⇒ Further, oxidation of alcohol (C) with chromic acid gives acid B. Thus, B and C must contain an equal number of carbon atoms.

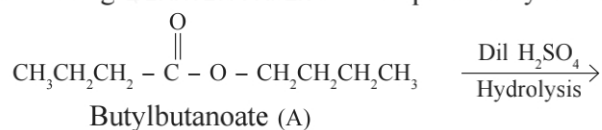
⇒ A total of 8 carbon atoms are present in compound A, each of B and C contain 4 carbon atoms.

⇒ Again, alcohol C gives but-1-ene on dehydration. Therefore, C is of straight-chain and hence, it is butan-1-ol.

⇒ On oxidation, Butan-1-ol gives butanoic acid. Hence, acid B is butanoic acid.

⇒ Hence, the ester with molecular formula $C_8H_{16}O_2$ is butylbutanoate.

⇒ All the given reactions can be explained by the following equations.



Molecular formula = $C_8H_{16}O_2$

