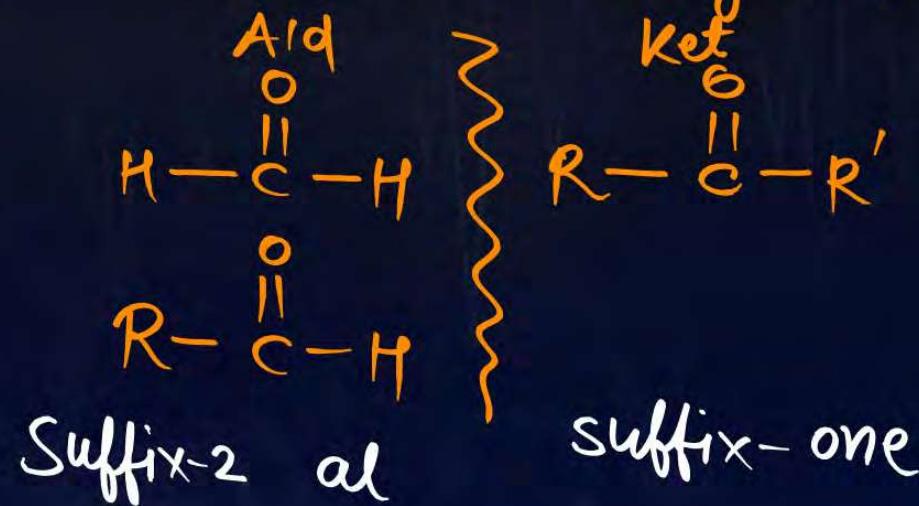




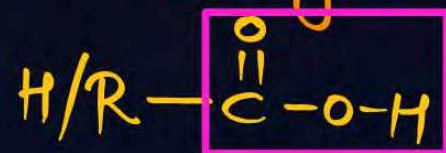
## **General Introduction**



## Ald | Ket → Carbonyl comp



## Carboxylic acid

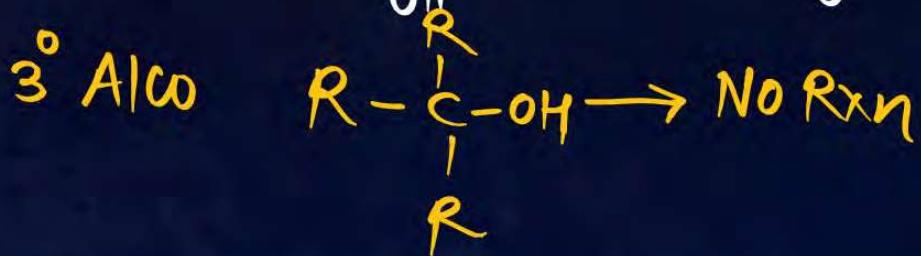
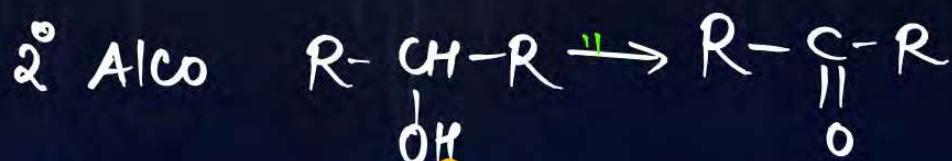
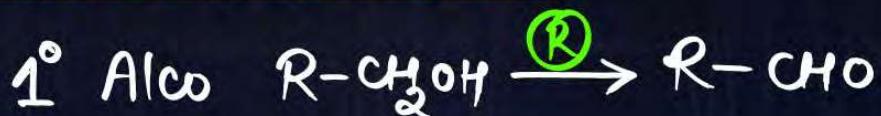


Suffix-2 oic acid

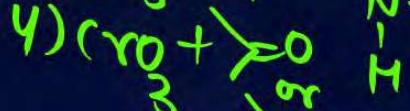
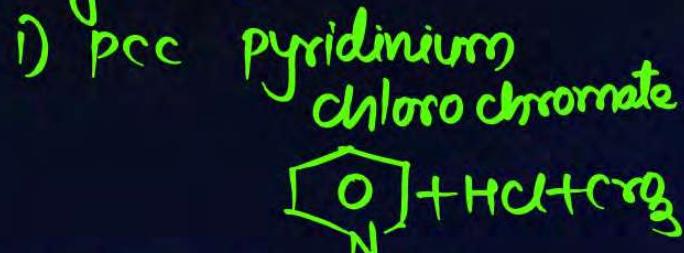


## Methods of Preparation of Aldehydes & Ketones

### 1. By oxidation of alcohols:



Reagent  $\text{R}(\text{MOA})$



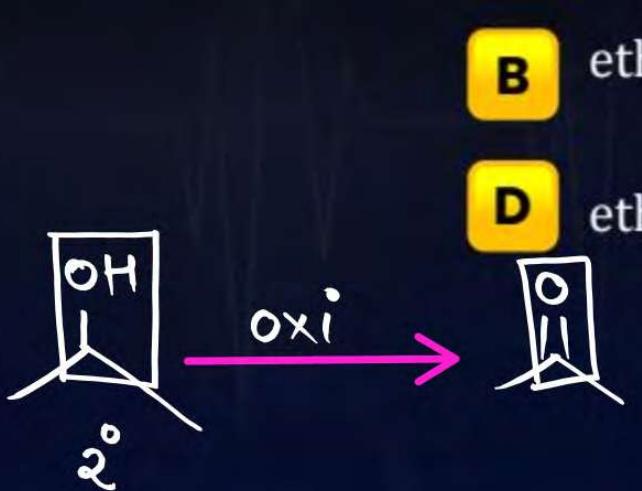
C.Q. 01



Aldehydes are first oxidation products of:

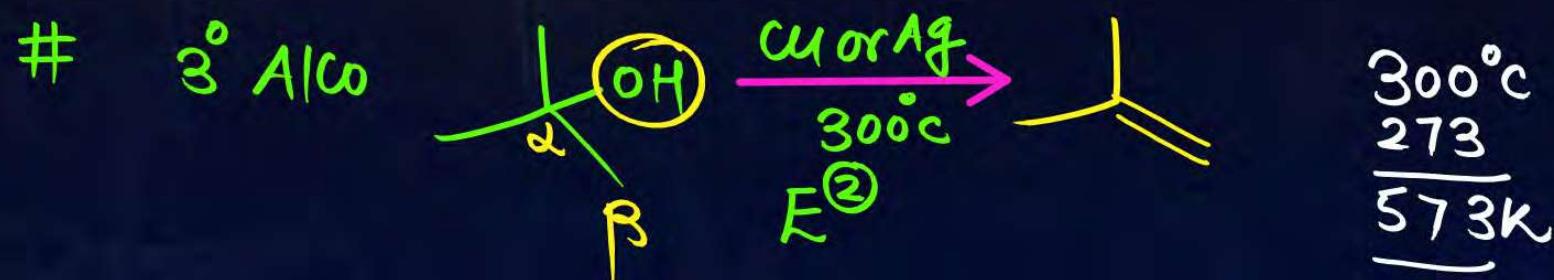
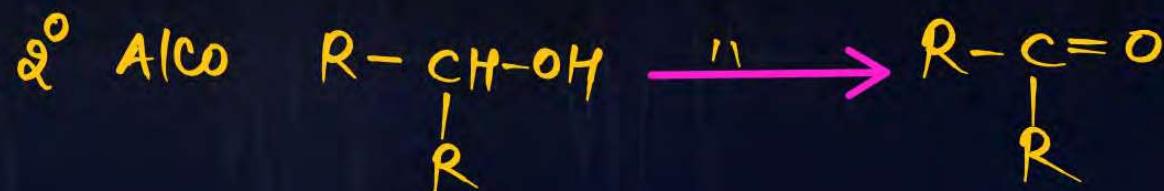
- A primary alcohols ✓
- B secondary alcohols
- C tertiary alcohols
- D monohydric alcohols

C.Q. 02

**Isopropyl alcohol on oxidation forms:****A** acetone ✓**C** acetaldehyde**B** ether**D** ethylene

## 2. By dehydrogenation of alcohols:

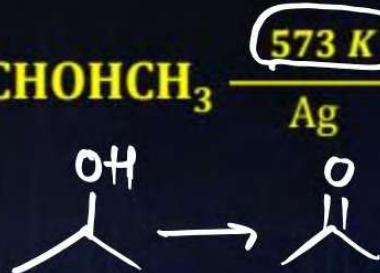
PW



C.Q. 03



The product of reaction  $\text{CH}_3\text{CHOHCH}_3 \xrightarrow[\text{Ag}]{573\text{ K}} \text{P}$  is:

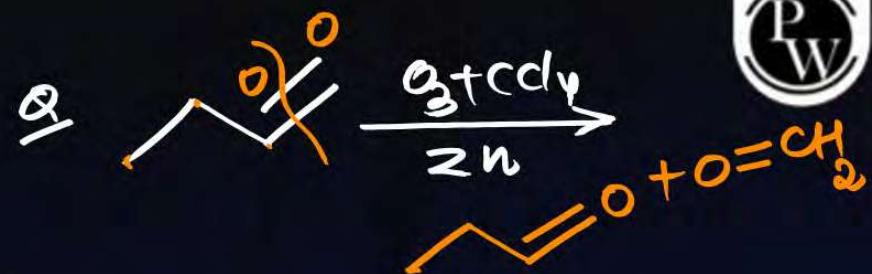


- A**  $\text{CH}_3\text{CH}_2\text{CH}_3$
- B**  $\text{CH}_3\text{COCH}_3$
- C**  $\text{CH}_3\text{CH}_2\text{COOH}$
- D**  $\text{CH}_3\text{CH}_2\text{CHO}$

### 3. From hydrocarbons:

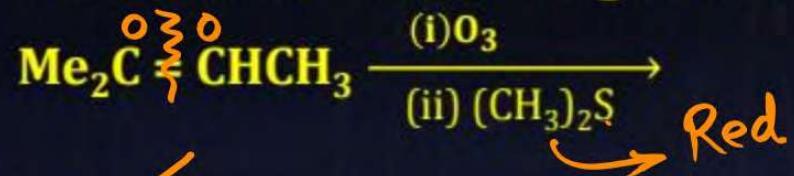
#### A. By ozonolysis of alkenes:

Reductive       $O_3 + CCl_4$   
 $(Zn)$  or  $(Zn + H_2O)$   
or  $(MgS)$



C.Q. 04

Products of the following reaction are:



- A Me<sub>2</sub>CO + CH<sub>3</sub>CHO
- B Me<sub>2</sub>CO + CH<sub>3</sub>COOH
- C CH<sub>3</sub>CHO + CH<sub>3</sub>COOH
- D 2Me<sub>2</sub>CO

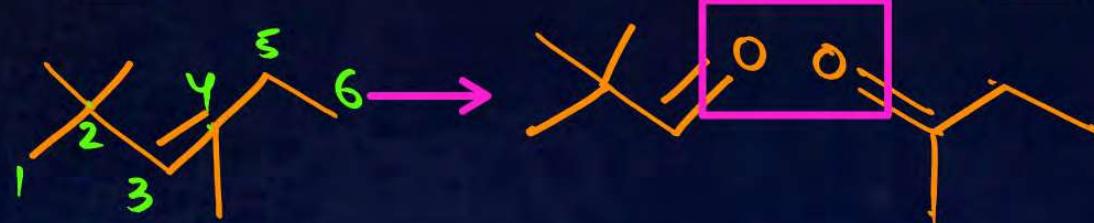
- A Me<sub>2</sub>CO + CH<sub>3</sub>CHO
- B Me<sub>2</sub>CO + CH<sub>3</sub>COOH
- C CH<sub>3</sub>CHO + CH<sub>3</sub>COOH
- D 2Me<sub>2</sub>CO

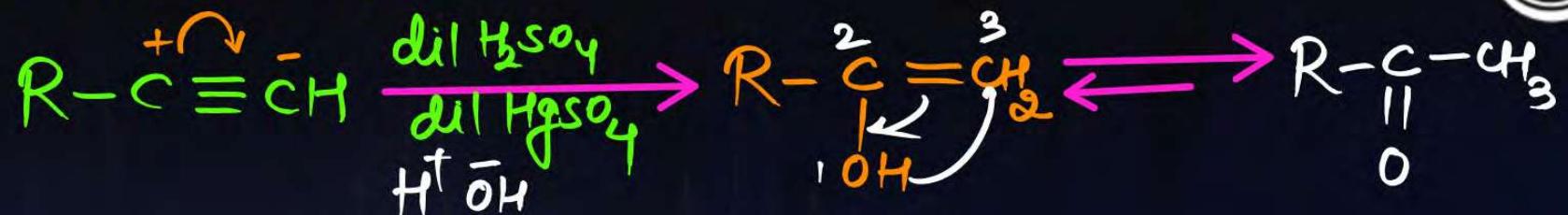
C.Q. 05



An alkene of molecular formula  $C_9H_{18}$  on ozonolysis gives 2, 2-dimethylpropanal and butan-2-one, then the alkene is:

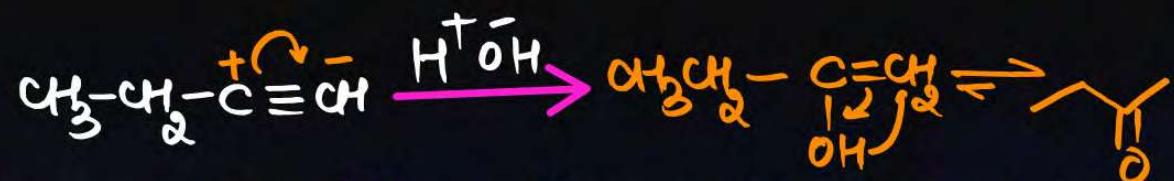
- A 2, 2, 4-trimethylhex-3-ene
- B 2, 2, 6-trimethylhex-3-ene
- C 2, 3, 4-trimethylhex-2-ene
- D 2, 2, 4-trimethylhex-2-ene



**B. By hydration of alkynes:**

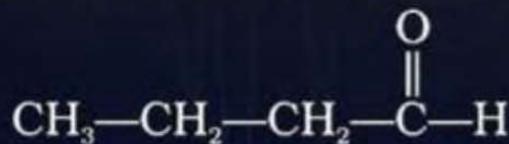
C.Q. 06 (NCERT Exemplar)

P  
W

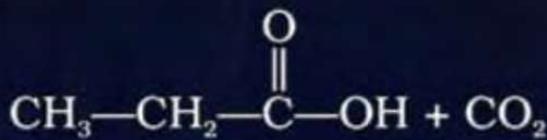


Addition of water to alkynes occurs in acidic medium and in the presence of  $\text{Hg}^{2+}$  ions as a catalyst. Which of the following products will be formed on addition of water to but-1-yne under these conditions.

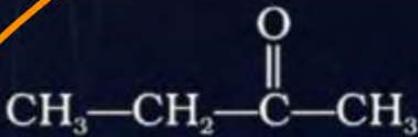
A



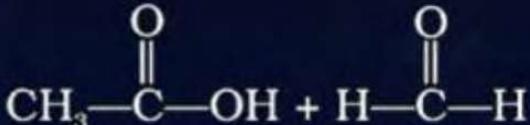
C



B



D



C.Q. 07



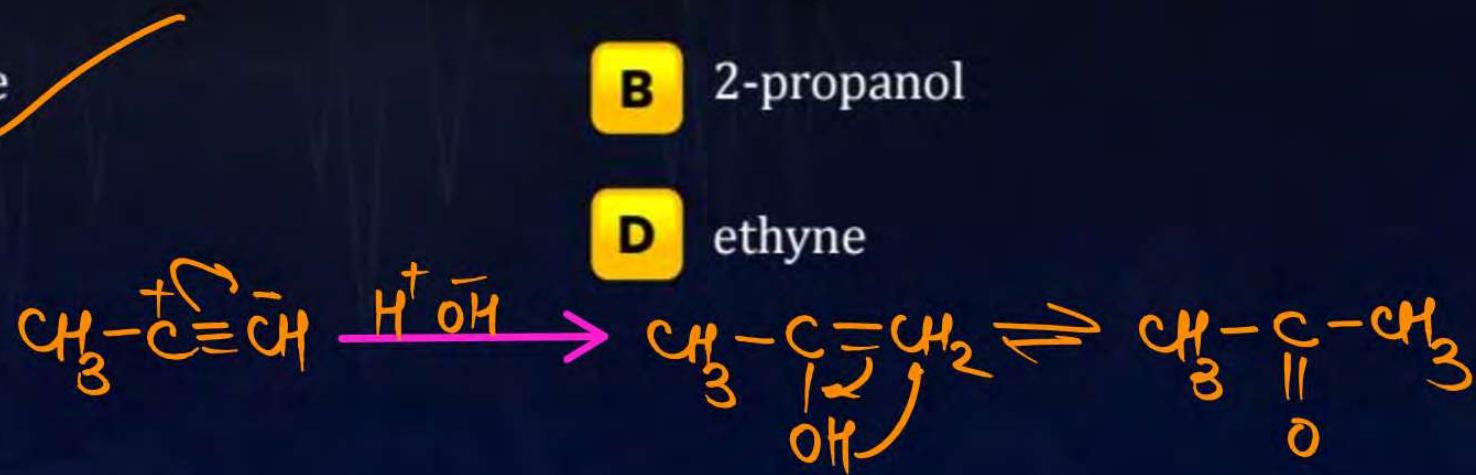
When propyne is treated with aqueous  $\text{H}_2\text{SO}_4$  in presence of  $\text{HgSO}_4$ , the major product is:

A propanone

C ethanal

B 2-propanol

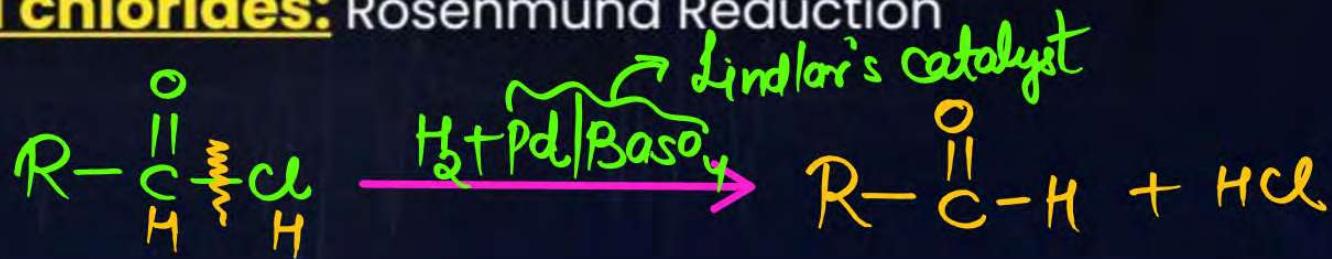
D ethyne



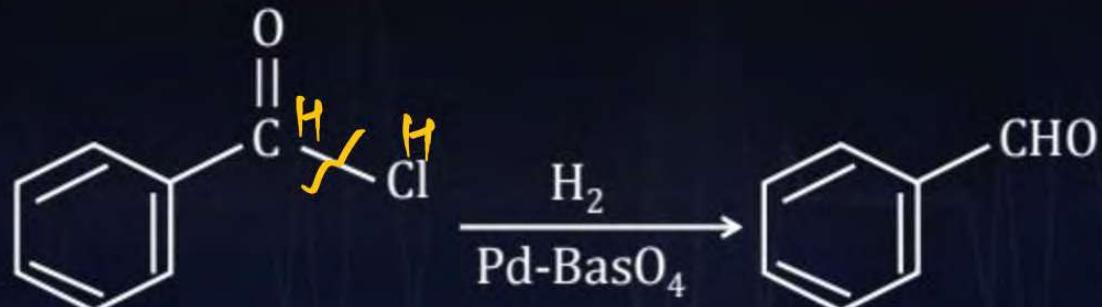


## Methods of Preparation of Aldehydes

### 1. From acyl chlorides: Rosenmund Reduction



C.Q. 08 (JEE Mains 30th January 2024, Morning Shift)

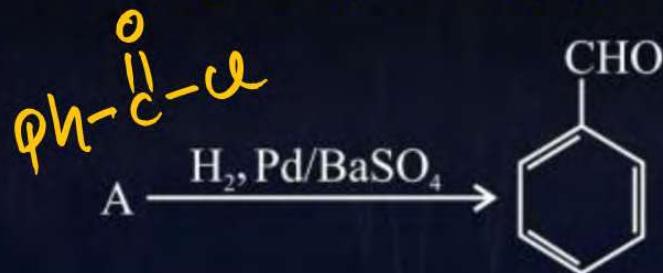


This reduction reaction is known as:

- A Rosenmund reduction
- B Wolff-Kishner reduction
- C Stephen reduction
- D Etard reduction

C.Q. 09 (NEET 2020)

Identify compound (A) in the following reaction:



A Toluene

C Benzoic acid

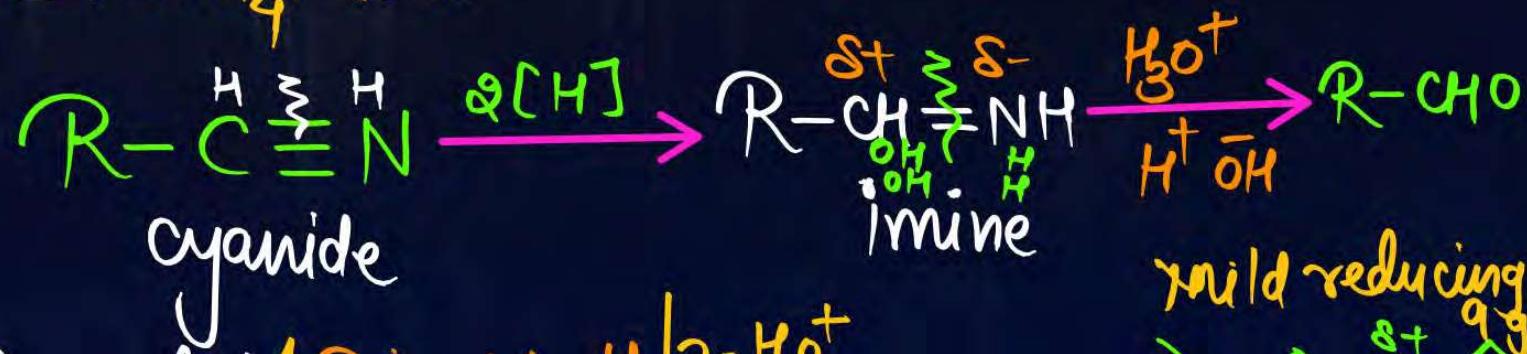
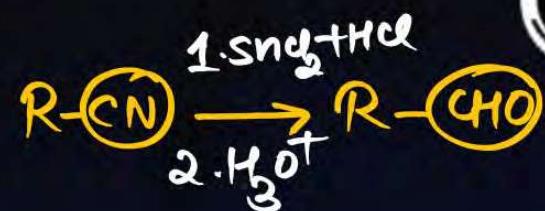
B Acetophenone

D Benzoyl chloride

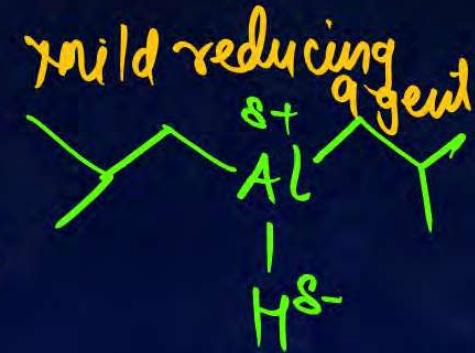
## 2. From nitriles and esters:

i) from Nitrile ÷ Stephen's Red<sup>n</sup>

Reagent ÷ 1.  $\text{SnCl}_2 + \text{HCl}$   
 2.  $\text{H}_3\text{O}^+$  or steam

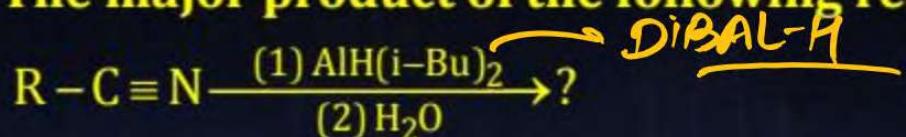


# Alternate Reagent ÷ 1. DIBAL-H | 2.  $\text{H}_3\text{O}^+$   
 (Di isobutyl aluminium hydride)



C.Q. 10 [09 June, JEE Mains 2019 (Shift-I)]

The major product of the following reaction is:

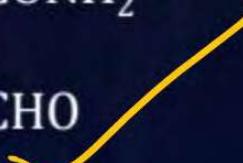


A RCOOH

B RCONH<sub>2</sub>

C RCHO

D RCH<sub>2</sub>NH<sub>2</sub>

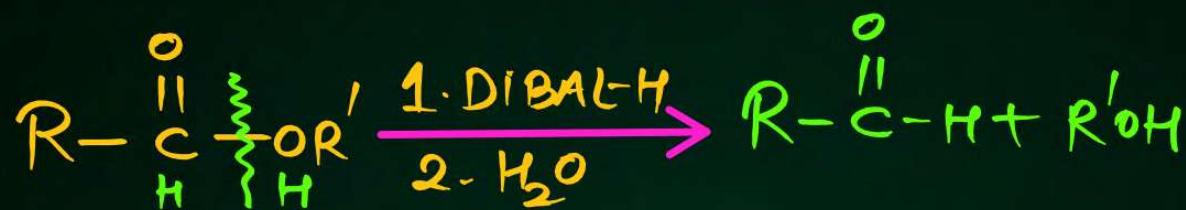


Other Rvns

DIBALH

Ester  $\xrightarrow{\text{DIBAL-H}}$  Ald

$\text{C}_6\text{H}_5\text{CO}_2\text{C}_6\text{H}_5 \xrightarrow{\text{DIBAL-H}} \text{C}_6\text{H}_5\text{CHO}$

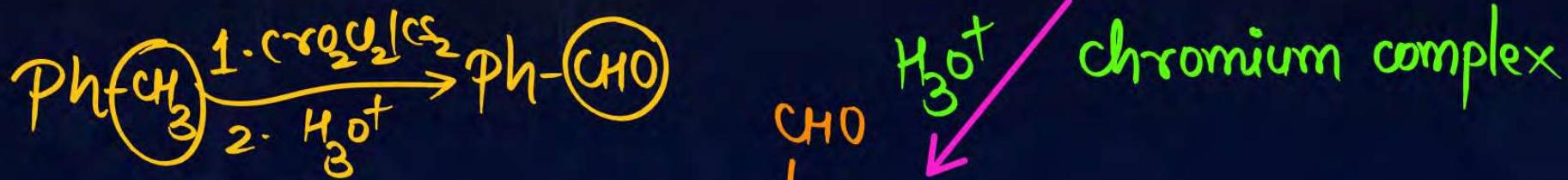
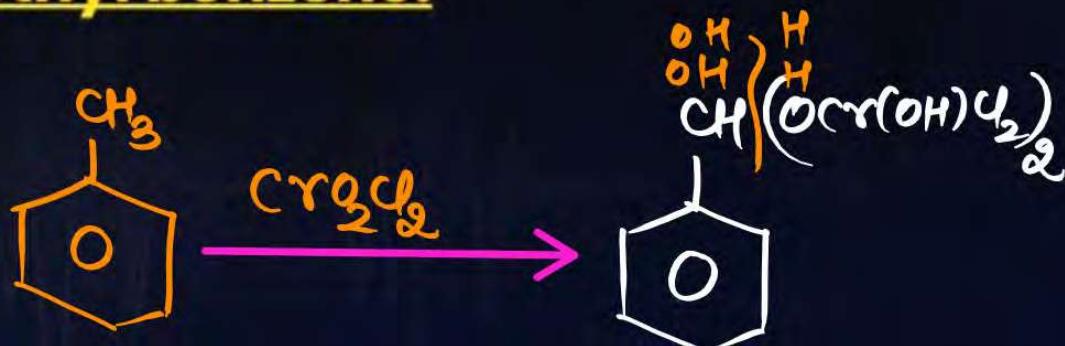


### 3. From hydrocarbons:

#### A. By oxidation of methyl benzene:

a) Estand Reac<sup>n</sup>

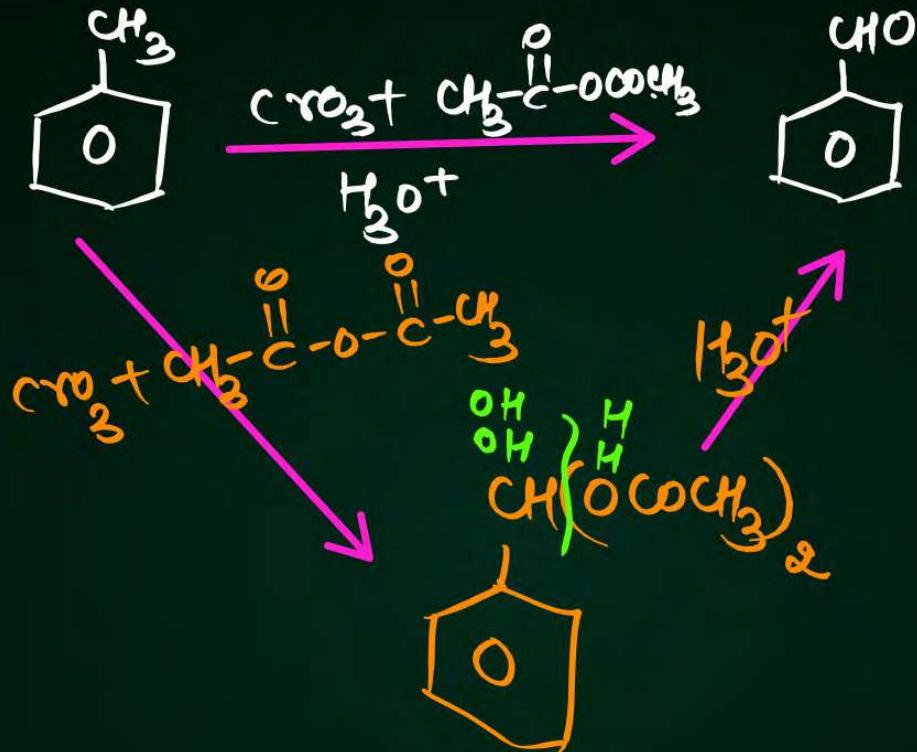
1.  $\text{CrO}_2\text{Cl} / \text{CS}_2$
2.  $\text{H}_3\text{O}^+$



$\text{H}_3\text{O}^+$

chromium complex

Alternate  
of  
Ettard

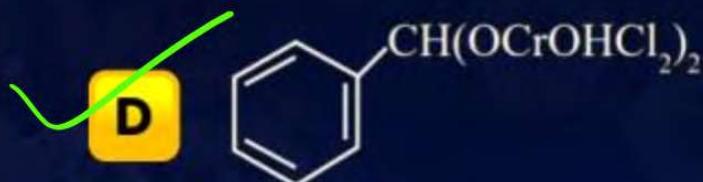
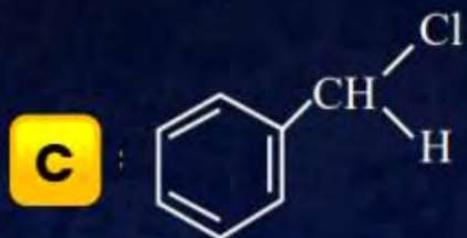
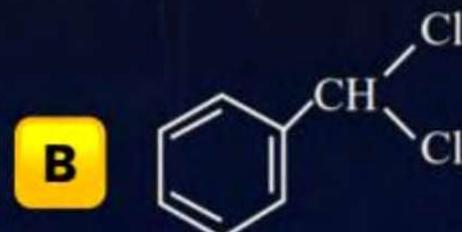
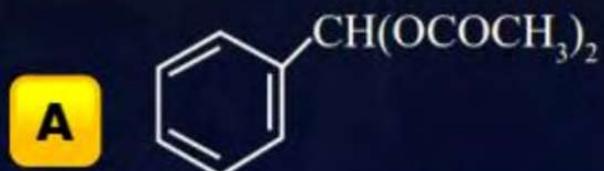
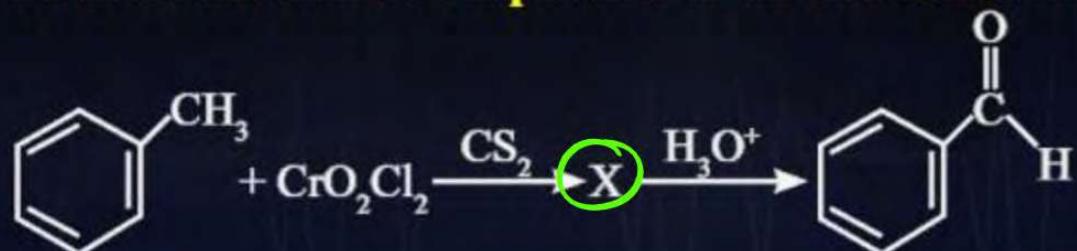


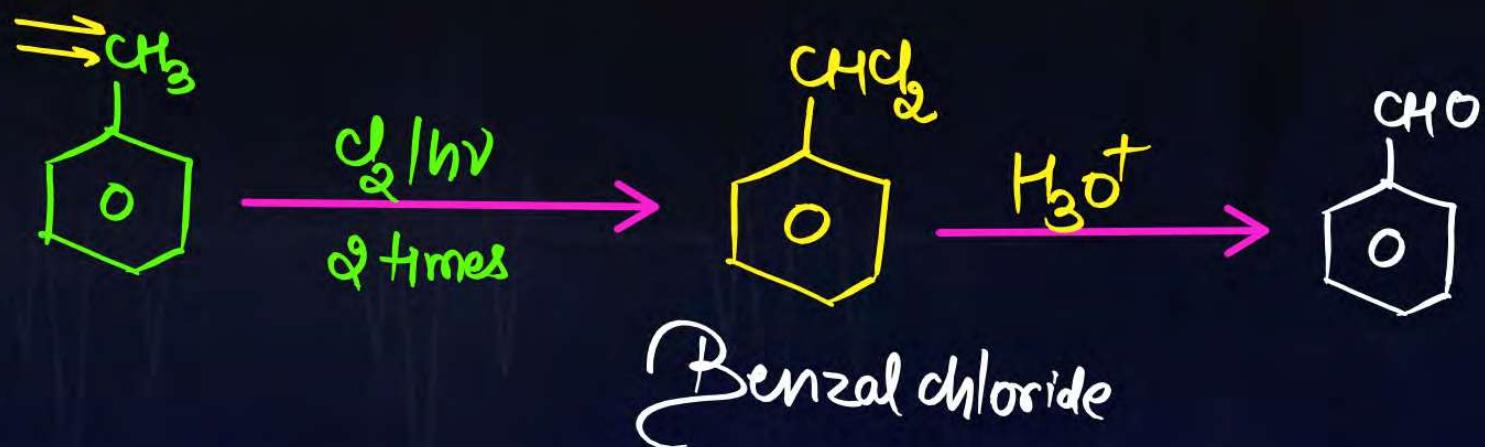
Benzylidene diacetate

C.Q. 11 (NEET 2021)

PW

The intermediate compound 'X' in the following chemical reaction is:

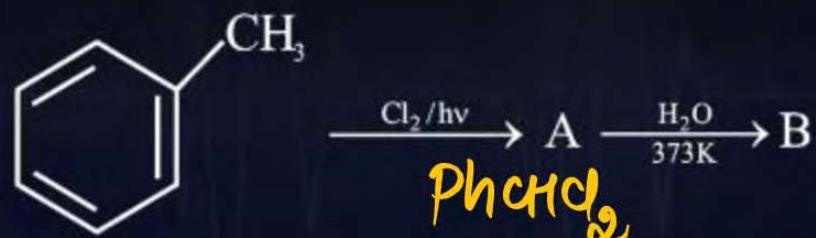


**B. By side chain chlorination followed by hydrolysis:**

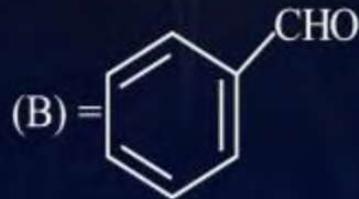
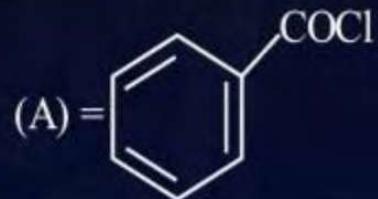
C.Q. 12 (JEE Mains 1st Feb 2024, Morning Shift)

PW

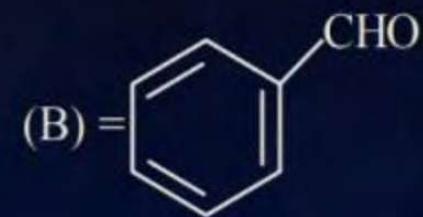
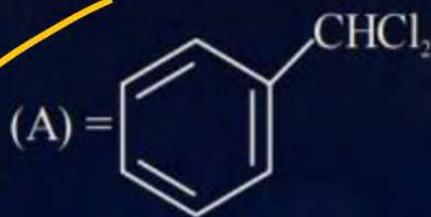
Identify A and B in the following sequence of reaction.



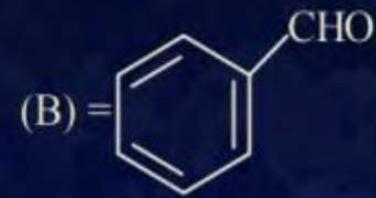
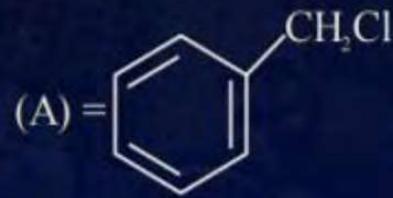
A



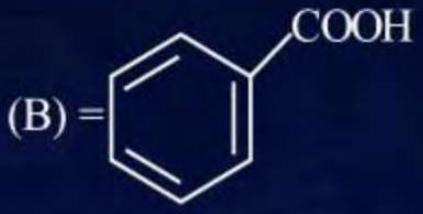
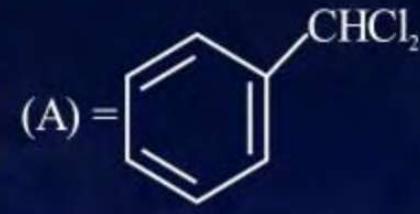
B



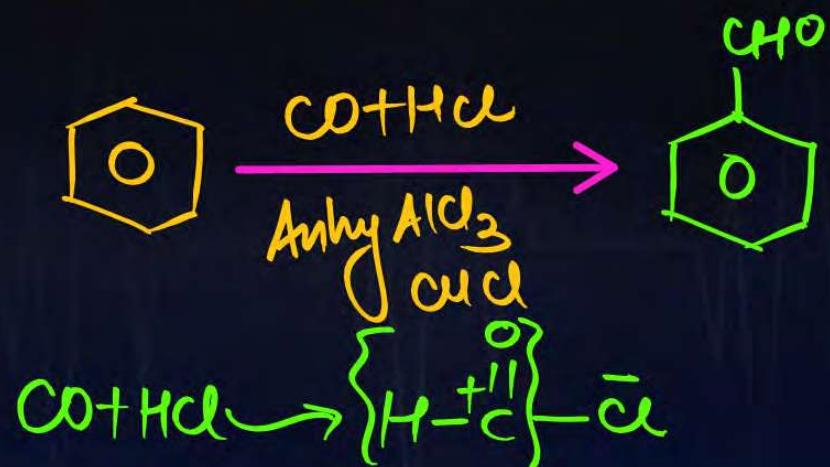
C



D

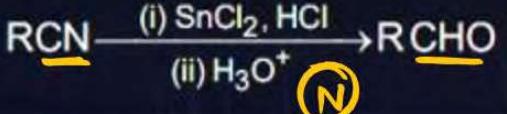
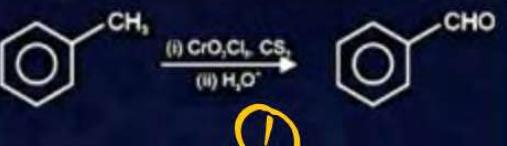
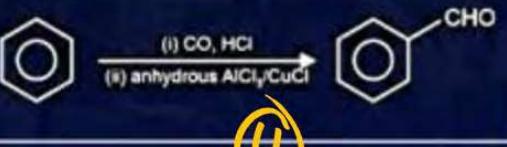


### C. By Gatterman-Koch Reaction:



C.Q. 13 (JEE Mains 2025, 24 January Shift-2)

Match the List-I with List-II.

	List-I		List-II
(A)		(I)	Etard reaction
(B)		(II)	Gatterman-Koch reaction
(C)		(III)	Rosenmund reduction
(D)		(IV)	Stephen reaction

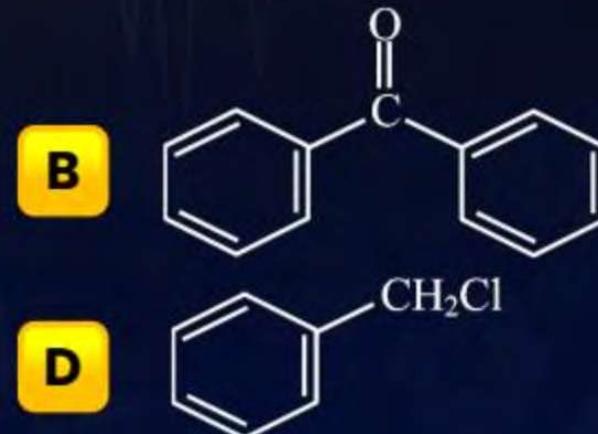
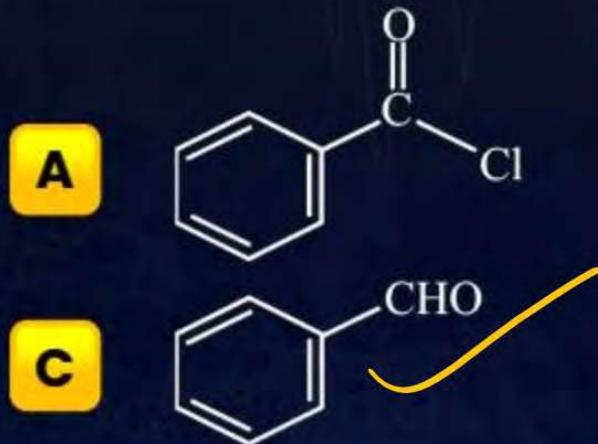
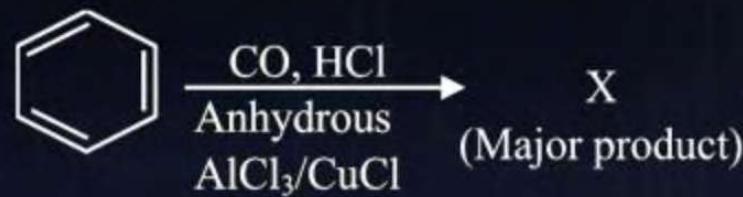
Choose the correct answer from the options given below:

- A** (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
- B** (A)-(IV), (B)-(III), (C)-(I), (D)-(II) 
- C** (A)-(I), (B)-(III), (C)-(II), (D)-(IV)
- D** (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

C.Q. 14 (JEE Mains 9th April 2024, Morning Shift)

PW

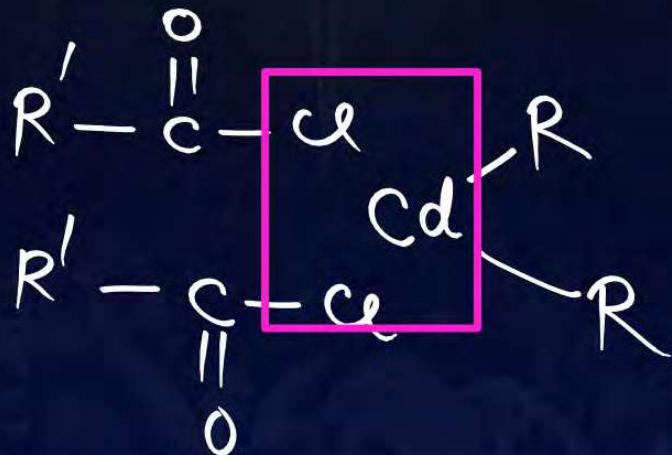
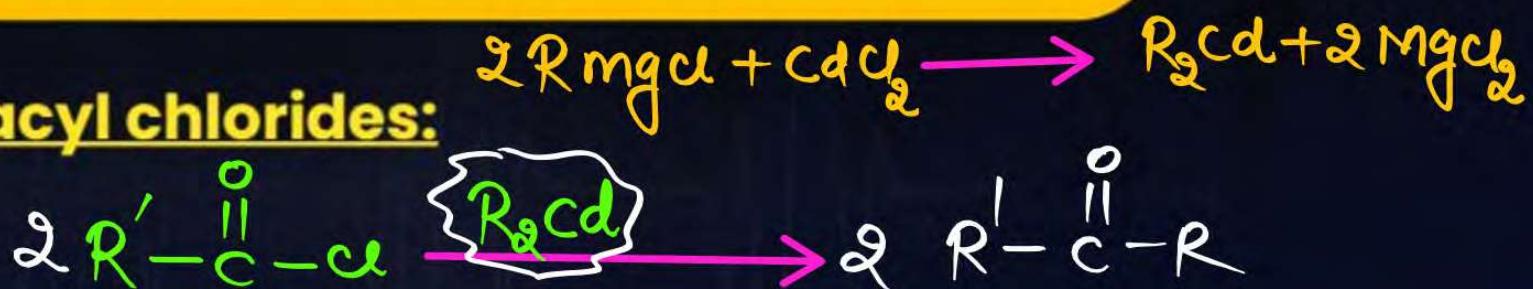
Identify major product "X" formed in the following reaction:





## Methods of Preparation of Ketones

### 1. From acyl chlorides:



C.Q. 15



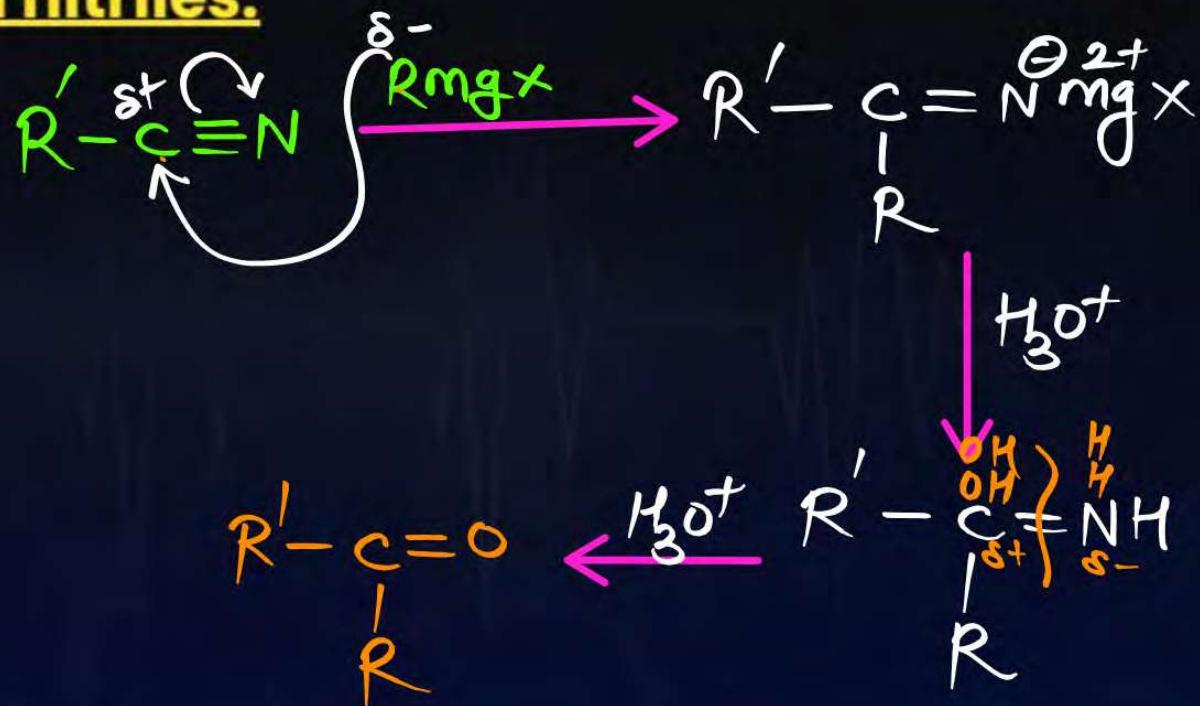
Dialkyl cadmium reacts with a compound to form a ketone. The compound is:

A an acid

C an ester

- B an acid chloride

D carbon monoxide

**2. From nitriles:**

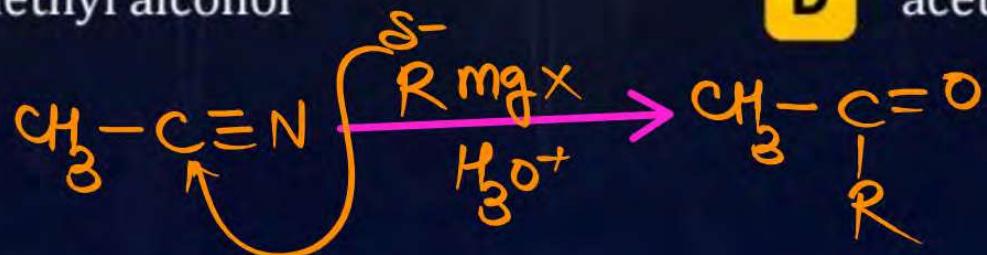
C.Q. 16 (AIIMS 1999)

PW

Which produces ketone on treatment with Grignard reagent?

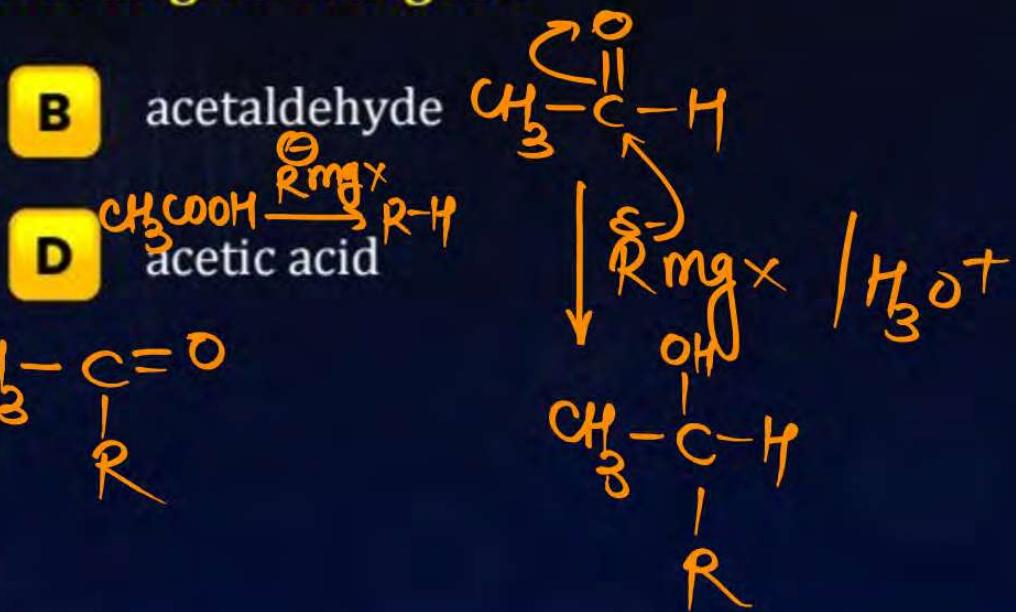
A methyl cyanide

C  $\text{CH}_3\text{OH} \xrightarrow{\text{R}^{\ominus}\text{Mg}^{\times}} \text{R}-\text{H}$   
methyl alcohol



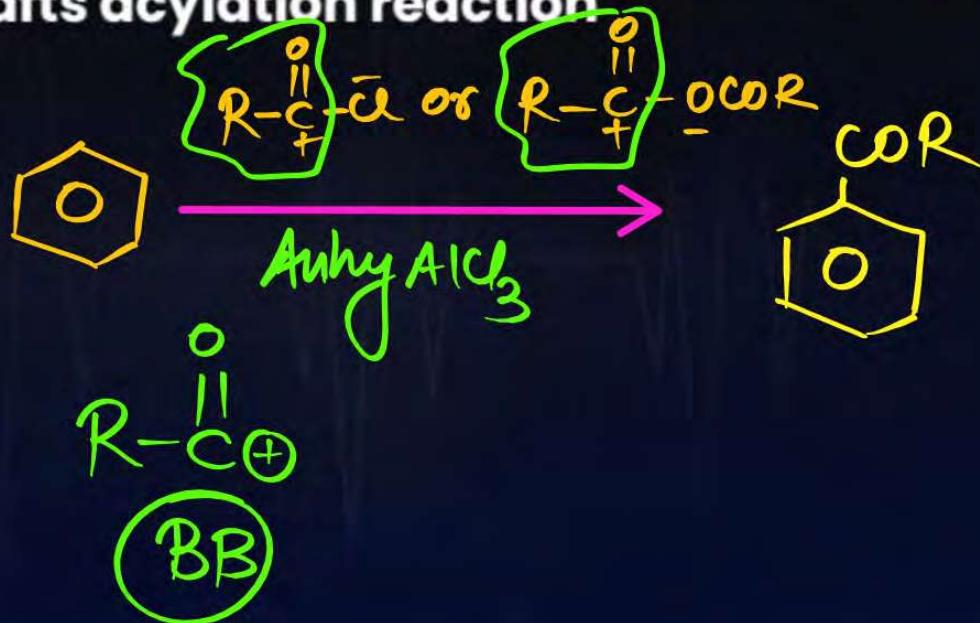
B acetaldehyde

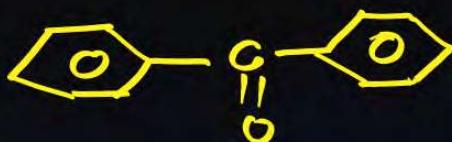
D  $\text{CH}_3\text{COOH} \xrightarrow{\text{R}^{\ominus}\text{Mg}^{\times}} \text{R}-\text{H}$   
acetic acid



### 3. From benzene or substituted benzenes:

#### Friedel-Crafts acylation reaction



**C.Q. 17 (NCERT Exemplar)**

Benzophenone can be obtained by \_\_\_\_\_.

- A  $\text{Ph}-\overset{\text{II}}{\underset{\oplus}{\text{C}}}-\text{Cl} + \text{C}_6\text{H}_5\text{O}_2^-$  Benzoyl chloride + Benzene + AlCl<sub>3</sub>
- B Benzoyl chloride + Diphenyl cadmium
- C Both (A) & (B)  $\text{Ph}-\overset{\text{II}}{\underset{\oplus}{\text{C}}}-\text{Cl} + (\text{Ph})_2\text{Cd}$
- D Benzene + Carbon monoxide + ZnCl<sub>2</sub>

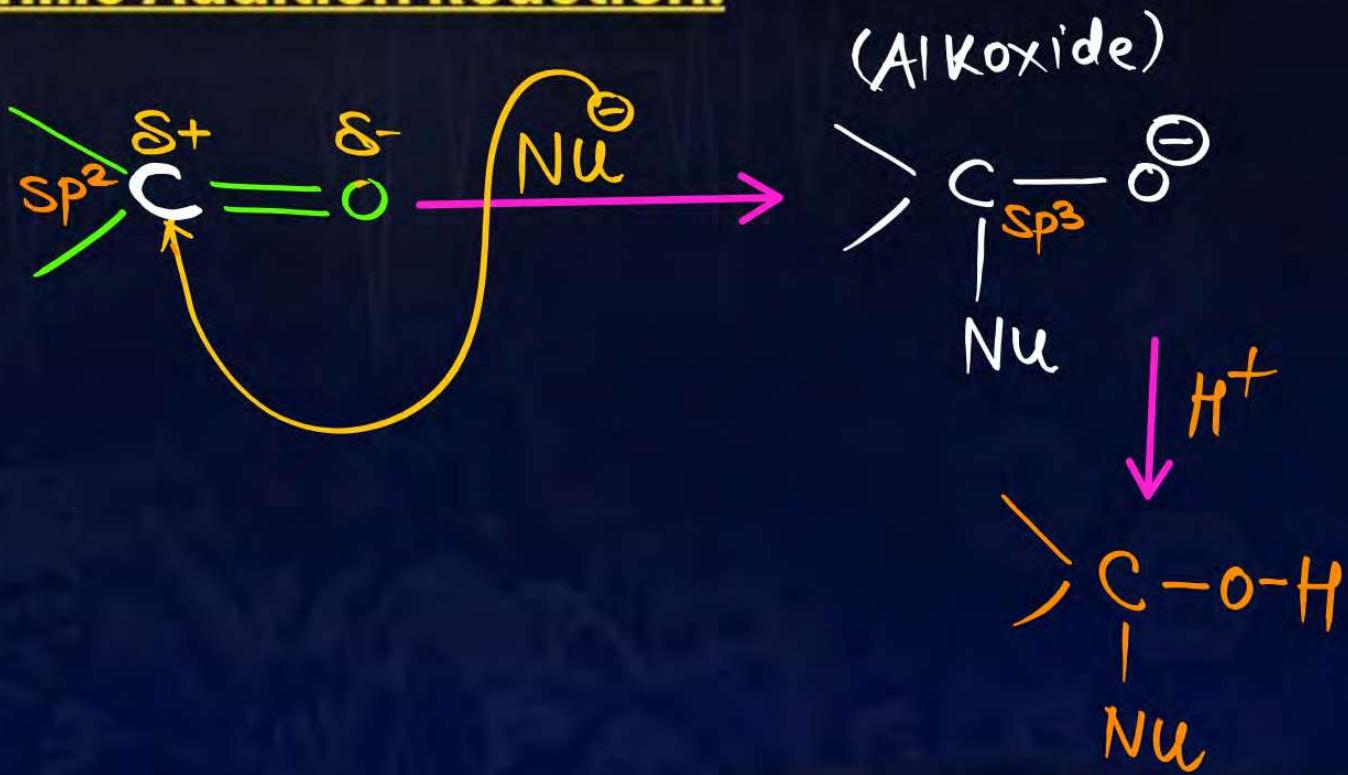




## Chemical Properties of Aldehydes & Ketones



### 1. Nucleophilic Addition Reaction:

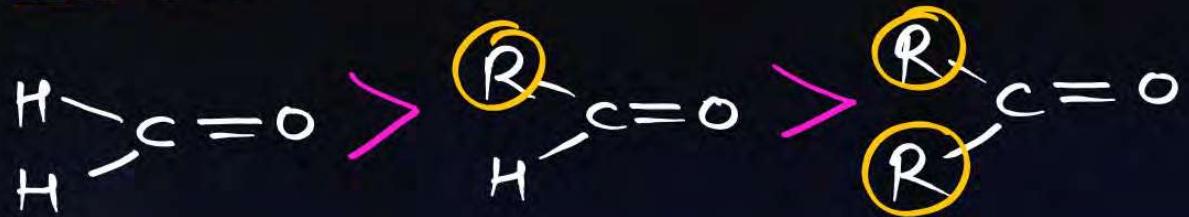


**OP Points**

1. A nucleophile attacks the electrophilic carbon atom of the polar carbonyl group from a direction approximately perpendicular to the plane of  $sp^2$  hybridized orbitals of carbonyl carbon.
2. The hybridization of carbon changes from  $sp^2$  to  $sp^3$  in this process and a tetrahedral alkoxide intermediate is produced.
3. This intermediate captures a proton from the reaction medium to give the electrically neutral product.
4. The net result is addition of  $Nu^-$  and  $H^+$  across the carbon oxygen double bond.

Reactivity:# Ald > Ket① Steric factor:

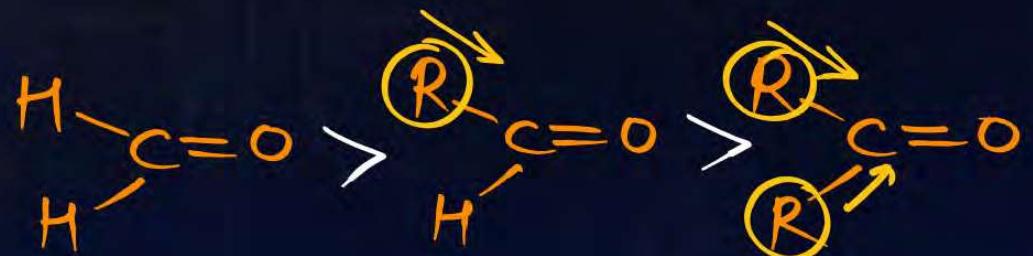
$$ROR \propto \frac{1}{S \cdot H}$$

② Electronic factor:

$ROR \propto \text{Electrophilicity}$   
 $\delta^+ \text{C}$

$\propto -M, -H, -I$

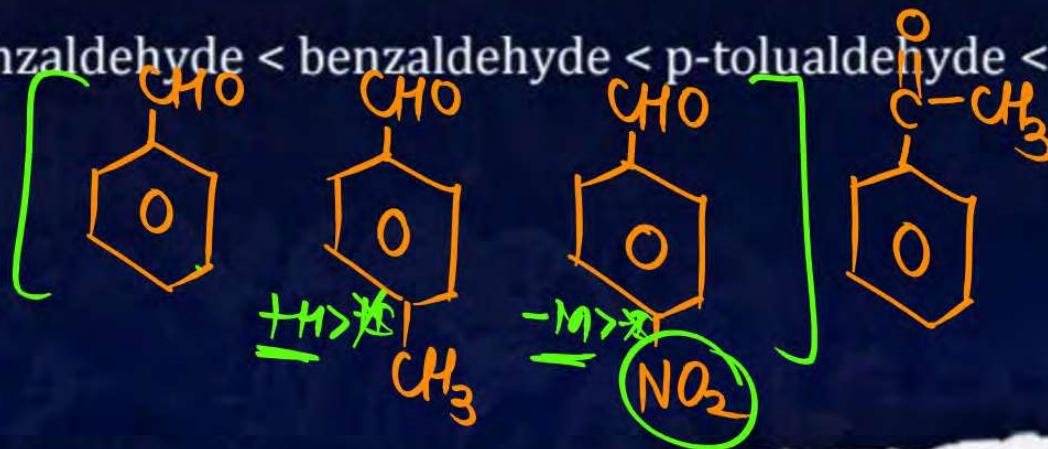
$$\propto \frac{1}{+M, +H, +I}$$



C.Q. 18 (JEE Mains 2025, 24 January Shift-1)

Which of the following arrangements with respect to their reactivity in nucleophilic addition reaction is correct?

- A acetophenone < p-tolualdehyde < benzaldehyde < p-nitrobenzaldehyde
- B acetophenone < benzaldehyde < p-tolualdehyde < p-nitrobenzaldehyde
- C benzaldehyde < acetophenone < p-nitrobenzaldehyde < p-tolualdehyde
- D p-nitrobenzaldehyde < benzaldehyde < p-tolualdehyde < acetophenone



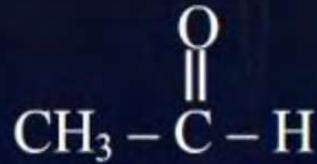
C.Q. 19 (JEE Mains 6<sup>th</sup> April 2024, Morning Shift)

Which among the following aldehydes is most reactive towards nucleophilic addition reactions?

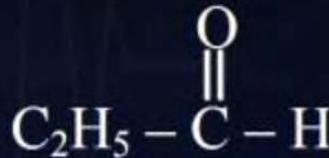
A



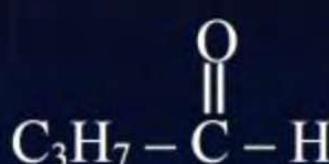
C



B



D



C.Q. 20



Select the correct option based on statements below:

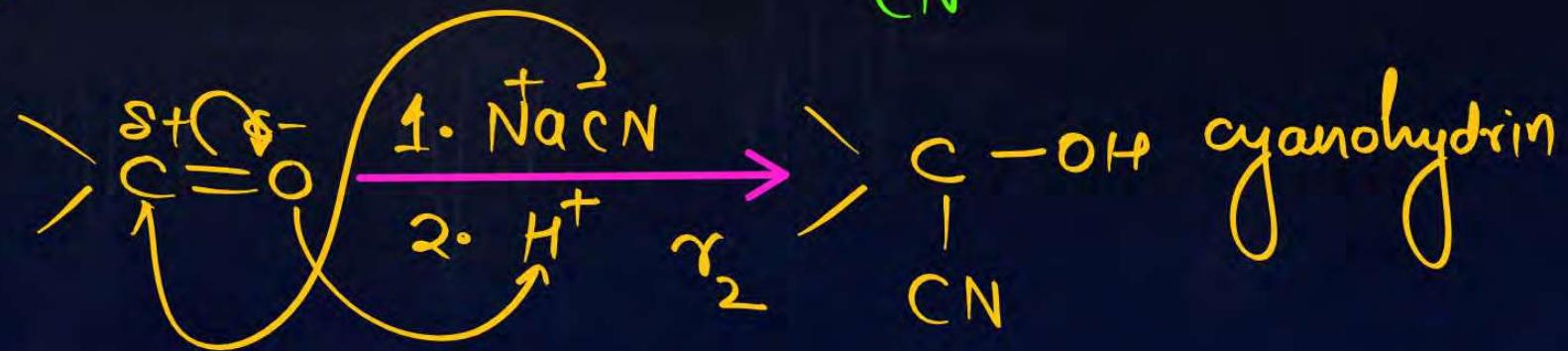
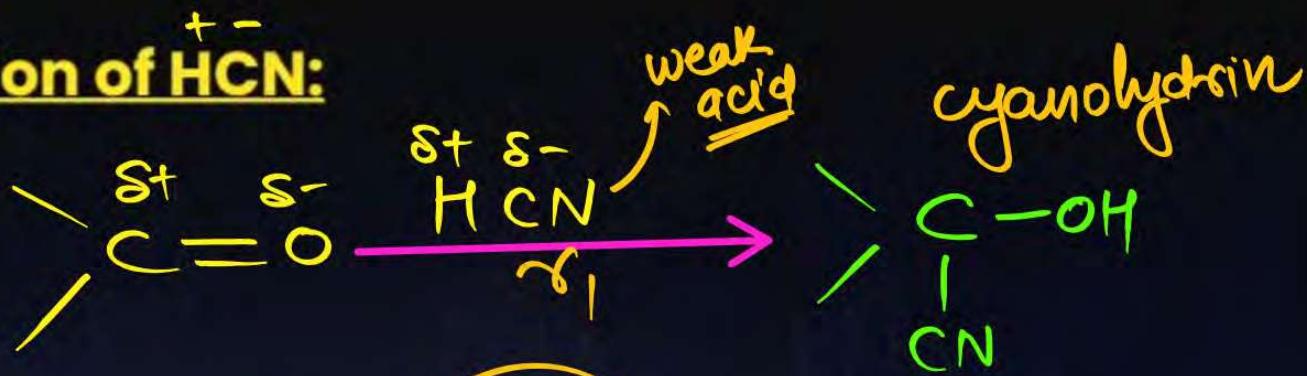
Assertion (A): Aldehydes are more reactive than ketones in nucleophilic addition reactions. (Ald > Ket) NAP

(Electrophilicity ↑)

Reason (R): The magnitude of positive charge present on the carbonyl carbon of aldehydes is more than that of ketones.

- A Both (A) and (R) are true and (R) is the correct explanation of (A).
- B Both (A) and (R) are true but (R) is not the correct explanation of (A).
- C (A) is true but (R) is false.
- D Both (A) and (R) are false.

### A. Addition of HCN:



$\gamma_1 \cdot \gamma_2 \quad (\gamma_1 < \gamma_2)$

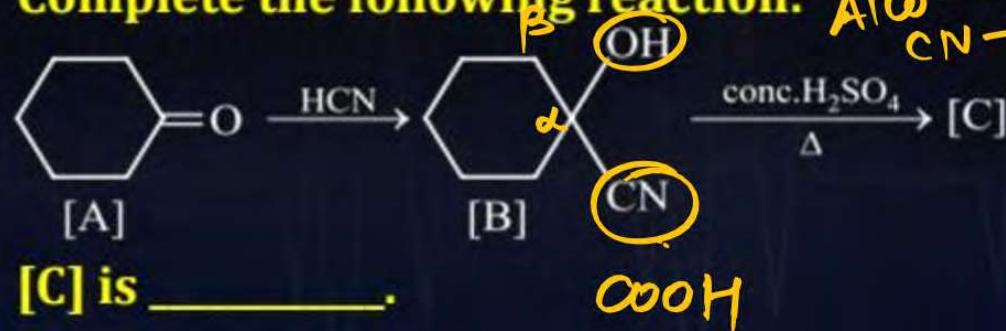
**OP Points**

1. Aldehydes and ketones react with hydrogen cyanide (HCN) to yield cyanohydrins.
2. This reaction occurs very slowly with pure HCN. Therefore, it is catalyzed by a base and the generated cyanide ion (CN<sup>-</sup>) being a stronger nucleophile readily adds to carbonyl compounds to yield corresponding cyanohydrin.



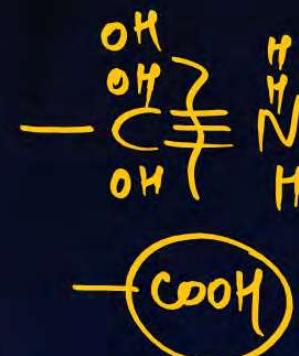
C.Q. 21 (NEET 2023)

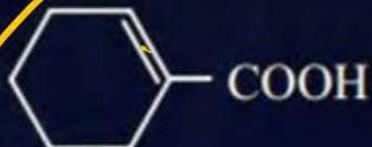
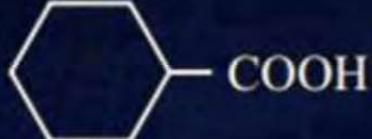
Complete the following reaction:

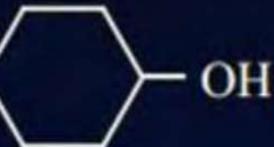
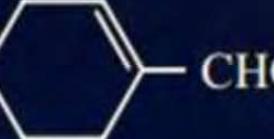
**[C]** is \_\_\_\_\_.

$\xrightarrow[\Delta]{\text{conc. H}_2\text{SO}_4}$  [C]

*A1Co  $\xrightarrow{\text{dehydration}}$   
 CN  $\xrightarrow{\text{hydrolysis}}$*



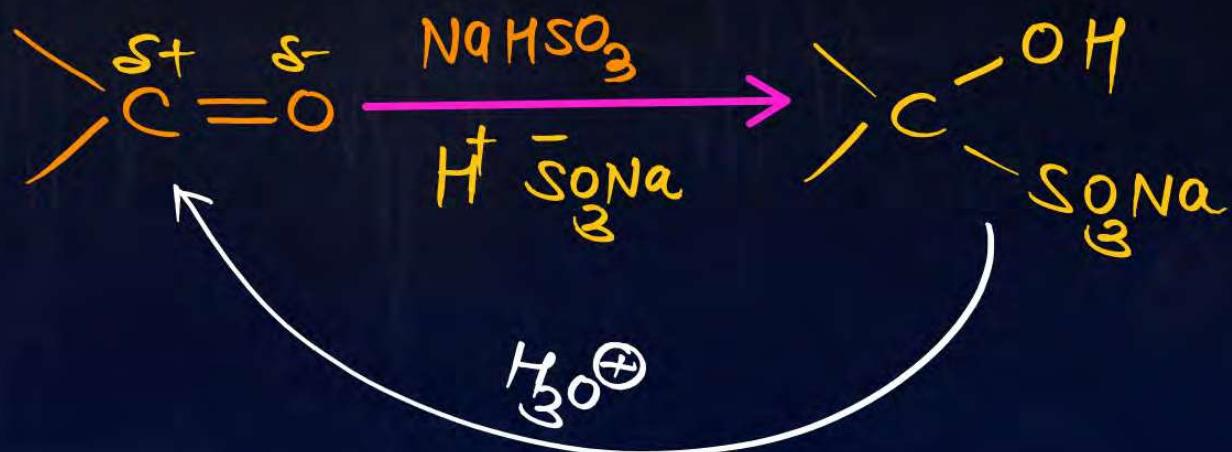
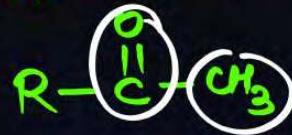
- A** 
- C** 

- B** 
- D** 

**B. Addition of  $\text{NaHSO}_3$ :**

Given by  $\div$   
1) All Ald  
2) Methyl Ket

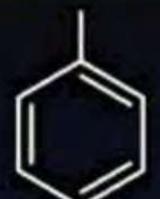
HCHO & RCHO



## OP Points

1. Sodium hydrogen Sulphite adds to aldehydes and ketones to form the addition products. All aldehydes and methyl ketones give this test.
2. 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.
3. The hydrogen Sulphite addition compound is water soluble and can be converted back to the original carbonyl compound by treating it with dilute mineral acid or alkali.
4. Therefore, these are useful for separation and purification of aldehydes.

C.Q. 22 (JEE Mains 2025, 22 January Shift-2)



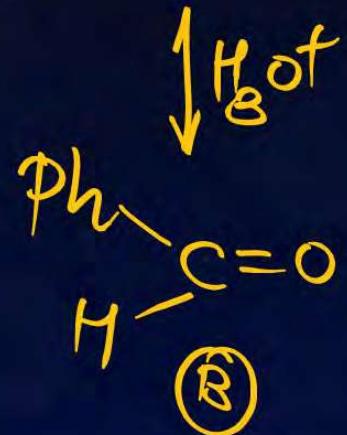
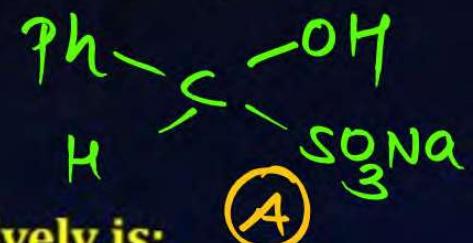
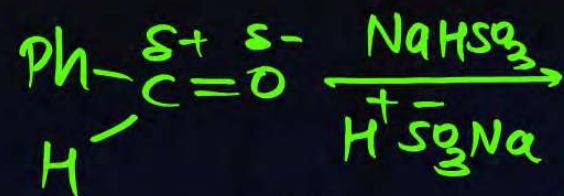
Toluene  
(excess)



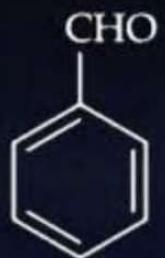
(i)  $\text{CrO}_2\text{Cl}_2, \text{CS}_2$   
(ii)  $\text{H}_3\text{O}^+$   
(iii)  $\text{NaHSO}_3$

Residue (A) +  $\text{H}_3\text{O}^+$  → Compound (B)

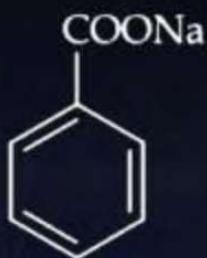
Structure of residue (A) and compound (B) formed respectively is:



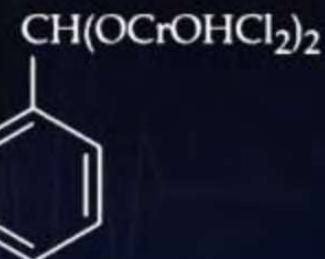
[A]



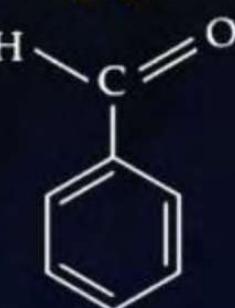
[B]



[A]



[B]

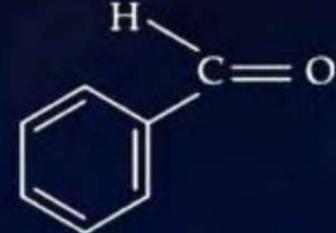
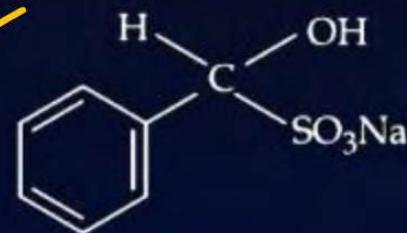
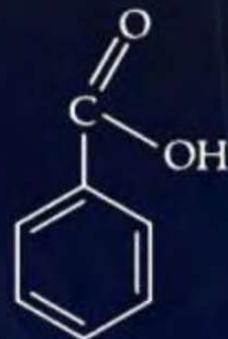
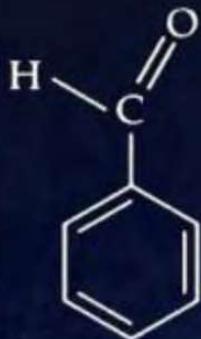


A

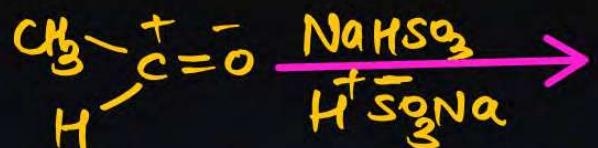
C

B

D

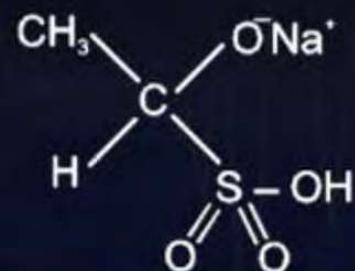


C.Q. 23

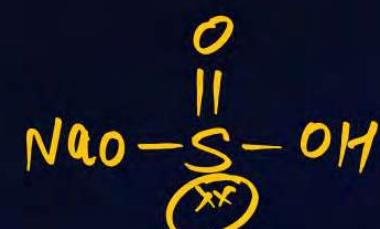
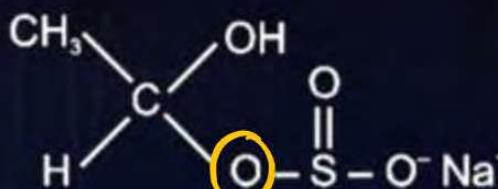


Acetaldehyde on reaction with sodium hydrogen sulphite produces

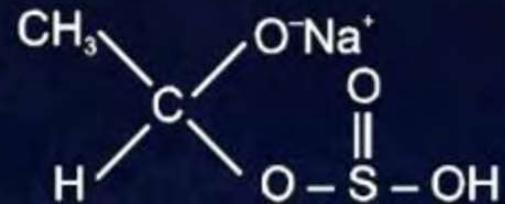
A



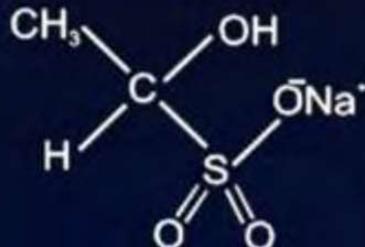
B



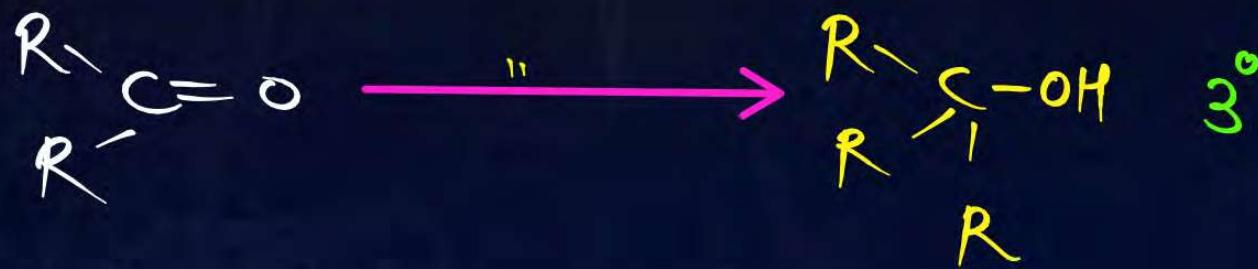
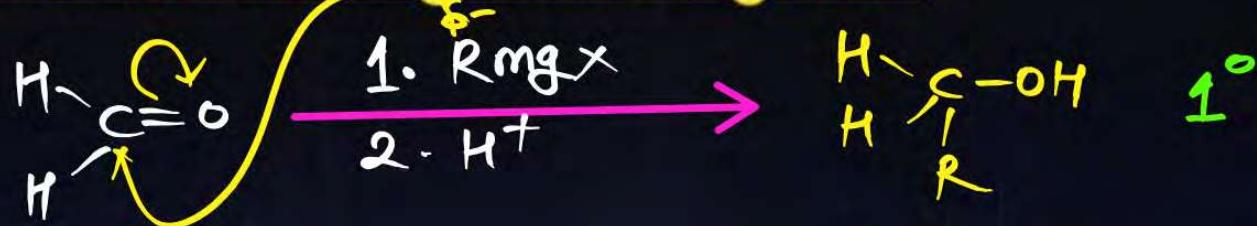
C



D

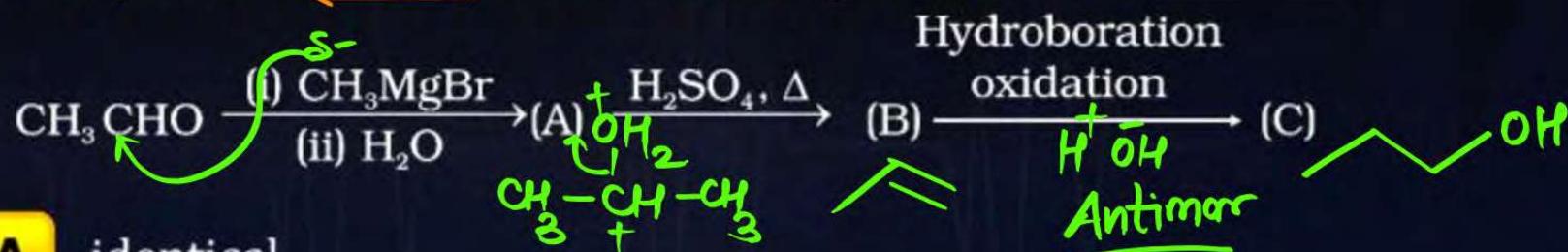


### C. Addition of Grignard reagents:



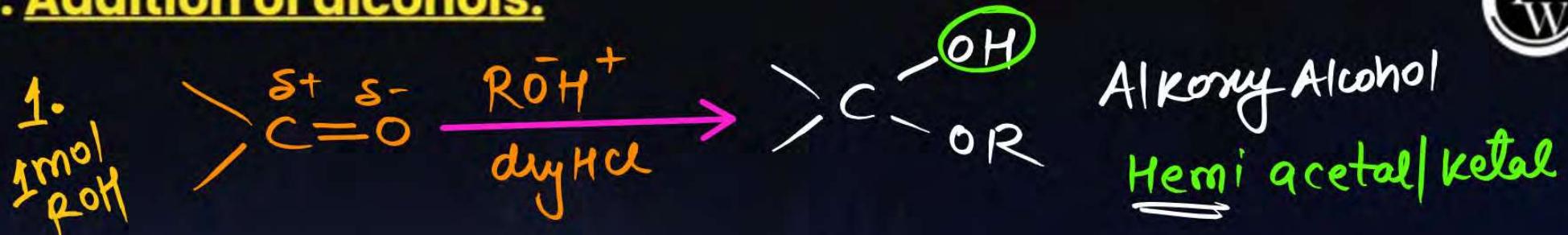
C.Q. 24 (NCERT Exemplar)

Compounds A and C in the following reaction are \_\_\_\_\_.

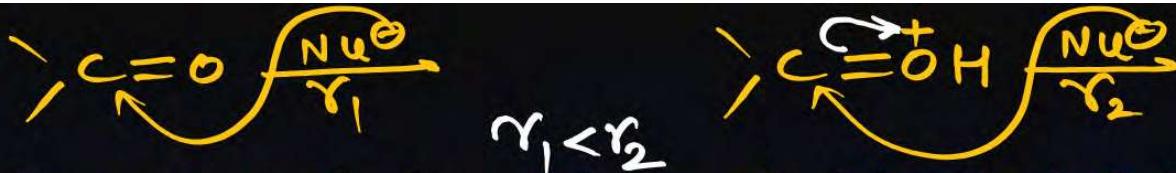


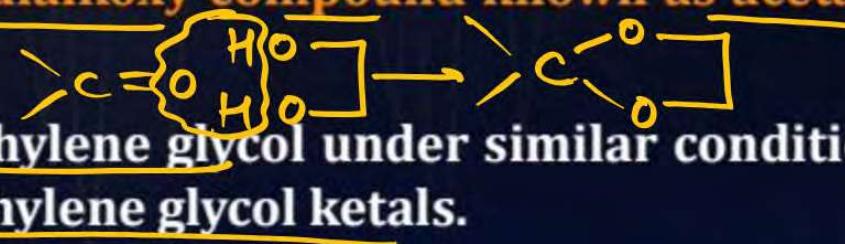
- A identical
- B positional isomers
- C functional isomers
- D optical isomers

### D. Addition of alcohols:



## OP Points



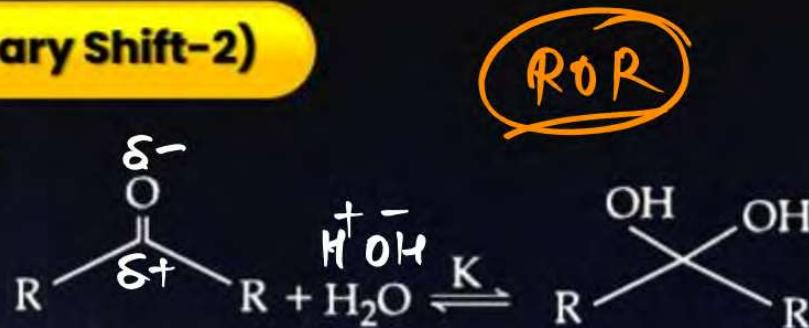
1. Aldehydes react with one equivalent of monohydric alcohol in the presence of dry hydrogen chloride to yield alkoxyalcohol intermediate, known as hemiacetals, which further react with one more molecule of alcohol to give a gem-dialkoxy compound known as acetal as shown in the reaction.  

2. Ketones react with ethylene glycol under similar conditions to form cyclic products known as ethylene glycol ketals.
3. 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.
4. Acetals and ketals are hydrolyzed with aqueous mineral acids to yield corresponding aldehydes and ketones respectively.

C.Q. 25 (JEE Mains 2025, 23 January Shift-2)

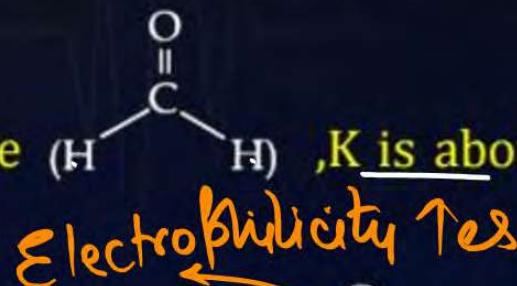
PW

Given below are two statements:

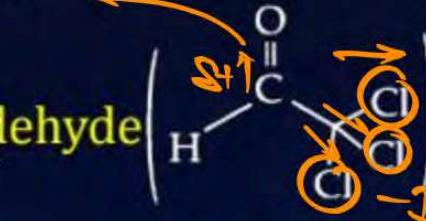
Consider the following reaction



Statement-(I): In the case of formaldehyde ( $\text{H}-\overset{\text{O}}{\underset{\text{H}}{\text{C}}}-\text{H}$ ),  $K$  is about 2280, due to small substituents, hydration is faster.



Statement-(II): In the case of trichloro acetaldehyde  $\left(\text{H}-\overset{\text{O}}{\underset{\text{Cl}}{\text{C}}}-\text{Cl}\right)_3$ ,  $K$  is about 2000 due to -I effect of -Cl.

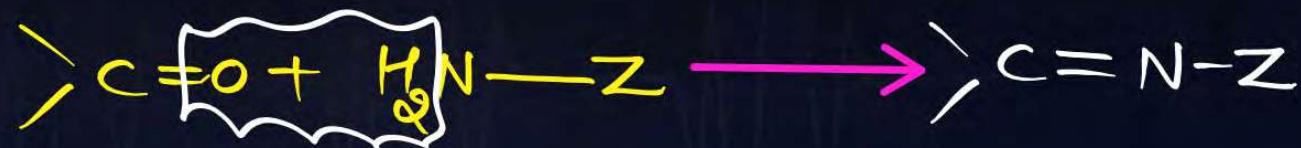


In the light of the above statements, choose the correct answer from the options given below:

- A Statement I is true but Statement II is false.
- B Statement I is false but Statement II is true.
- C Both Statement I and Statement II are false.
- D Both Statement I and Statement II are true.



### E. Addition of ammonia and its derivatives:



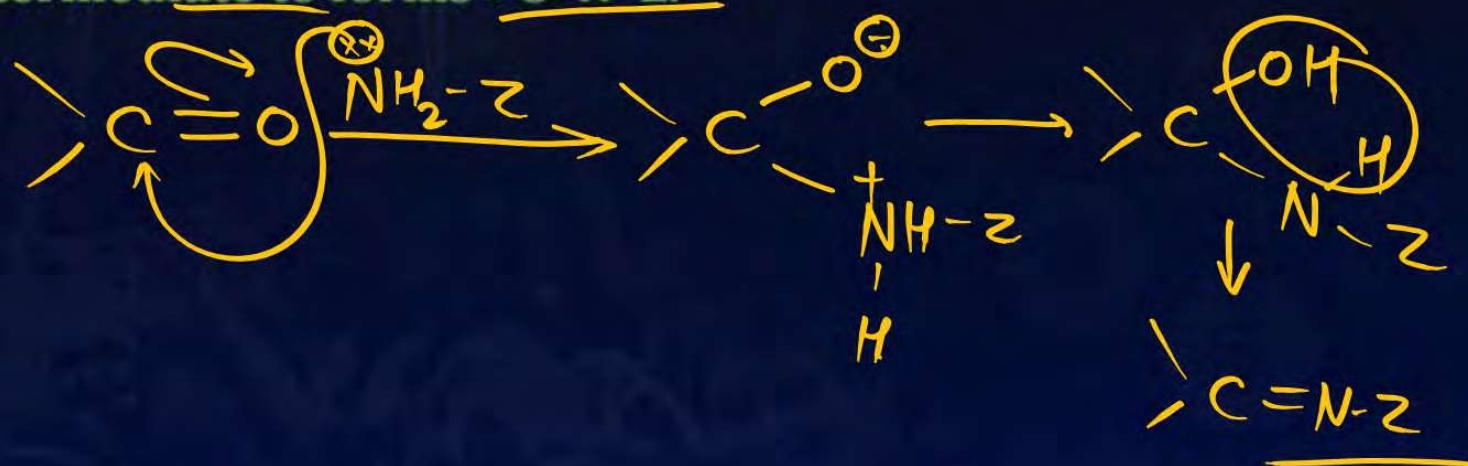
## OP Points

1. Nucleophiles, such as ammonia and its derivatives  $\text{H}_2\text{N}-\text{Z}$  add to the carbonyl group of aldehydes and ketones.

$\text{H}-4s-5s$

2. The reaction is reversible and catalyzed by acid.

3. The equilibrium favours the product formation due to rapid dehydration of the intermediate to forms  $\text{C}=\text{N}-\text{Z}$ .



## Some N-Substituted Derivatives of Aldehydes and Ketones ( $>\text{C}=\text{N}-\text{Z}$ )

P  
W

Z	$\text{H}_2\text{N}-\text{Z}$	Reagent name	Carbonyl derivative	Product name
-H	$\text{H}_2\text{N}-\text{H}$	Ammonia	$\text{>C=NH}$	Imine
-R		Amine $\text{RNH}_2$	$\text{>C=NR}$	Substituted imine (Schiff's base)
-OH	$\text{H}_2\text{N-OH}$	Hydroxylamine	$\text{>C=N-OH}$	Oxime
$-\text{NH}_2$		Hydrazine	$\text{>C=N-NH}_2$	Hydrazone
$-\text{HN-C}_6\text{H}_4-$		Phenylhydrazine	$\text{>C=N-NH-C}_6\text{H}_4-$	Phenylhydrazone
$-\text{HN-C}_6\text{H}_3(\text{NO}_2)_2-$		2,4-Dinitrophenyl-hydrazine <i>Braddys reagent</i>	$\text{>C=N-NH-C}_6\text{H}_3(\text{NO}_2)_2-$	2,4 Dinitrophenyl-hydrazone
$-\text{NH-C}(=\text{O})-\text{NH}_2$		Semicarbazide	$\text{>C=N-NH-C(=O)-NH}_2$	Semicarbazone

### Match the List I with List II.

List-I (Products formed)	List-II (Reaction of carbonyl compound with)
(A) Cyanohydrin	(i) NH <sub>2</sub> OH
(B) Acetal	(ii) RNH <sub>2</sub>
(C) Schiff's base	(iii) Alcohol
(D) Oxime	(iv) HCN

Choose the correct answer from the options given below:

**A**

(A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

**B**

(A)-(iii), (B)-(iv), (C)-(ii), (D)-(i)

**C**

(A)-(ii), (B)-(iii), (C)-(iv), (D)-(i)

**D**

(A)-(i), (B)-(iii), (C)-(ii), (D)-(iv)

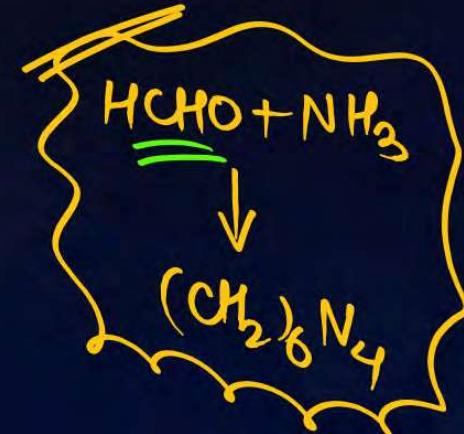
C.Q. 27

PW

**When formaldehyde is treated with ammonia, the compound formed is:**

- A** formaldehyde ammonia
- C** formalin

- B** hexamethylene tetramine
- D** methylamine



C.Q. 28



Ald | Ket

A compound does not react with 2, 4-dinitrophenyl hydrazine. Compound is:

A acetone

B acetaldehyde

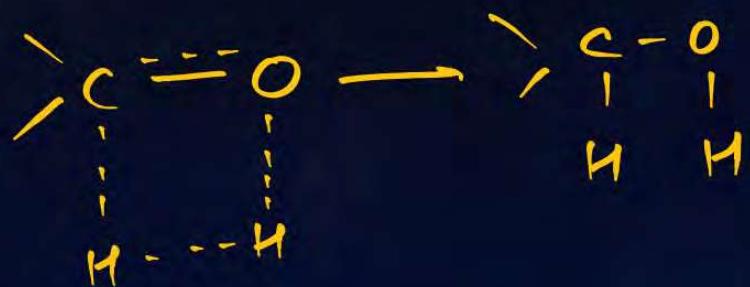
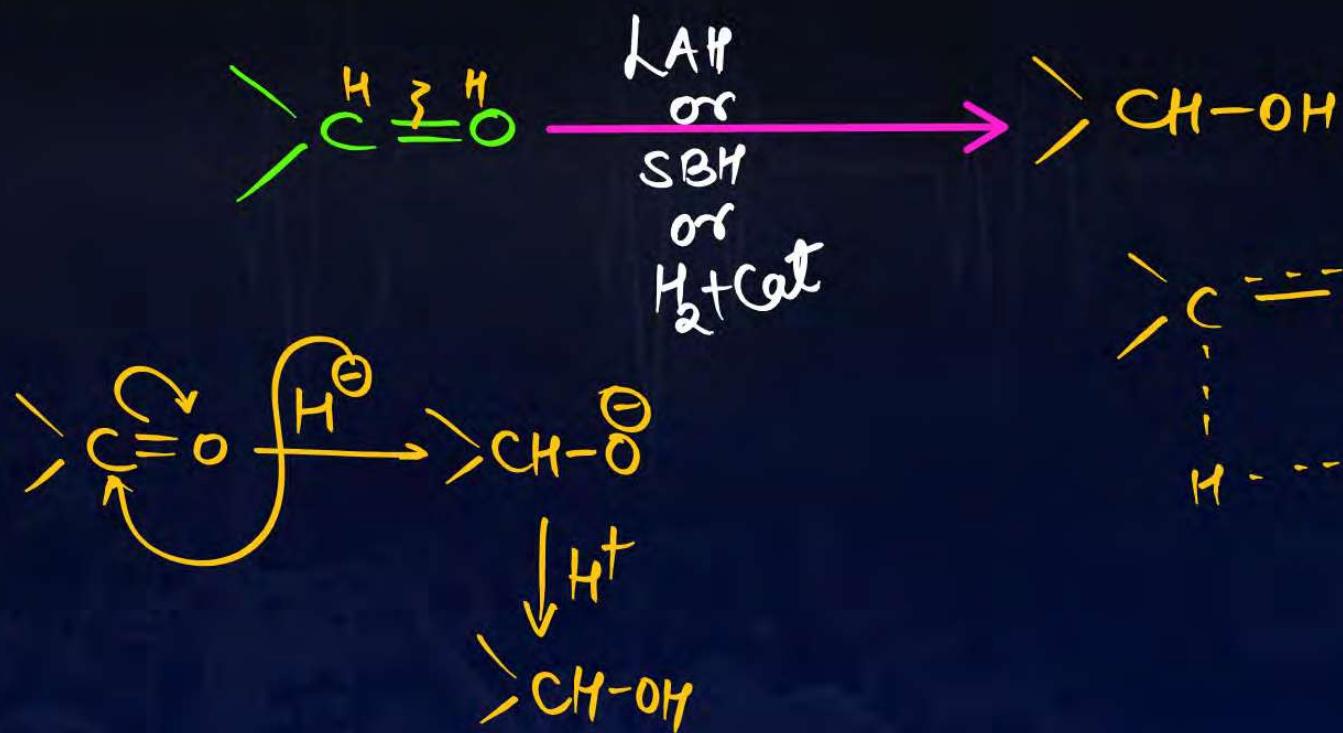
C  $\text{CH}_3\text{OH}$

D  $\text{CH}_3\text{CH}_2\text{COCH}_3$

✓

## 2. Reduction Reaction:

### A. Reduction to Alcohols:



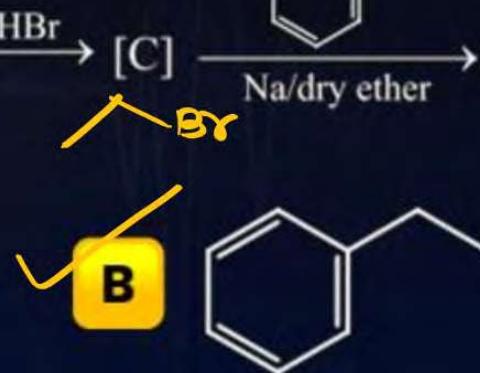
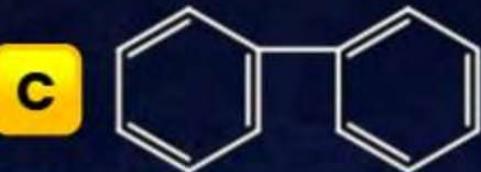
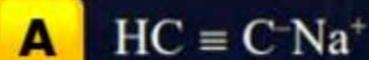
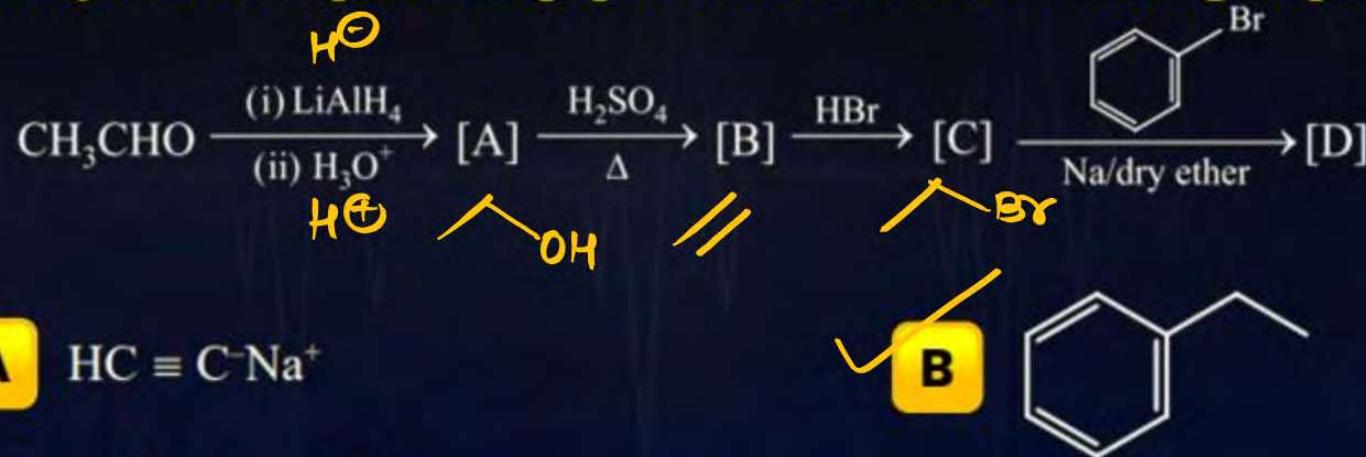
## **OP Points**

**Aldehydes and ketones are reduced to primary and secondary alcohols respectively by sodium borohydride ( $\text{NaBH}_4$ ) or lithium aluminium hydride ( $\text{LiAlH}_4$ ) as well as by catalytic hydrogenation.**

C.Q. 29 (NEET 2023)

PW

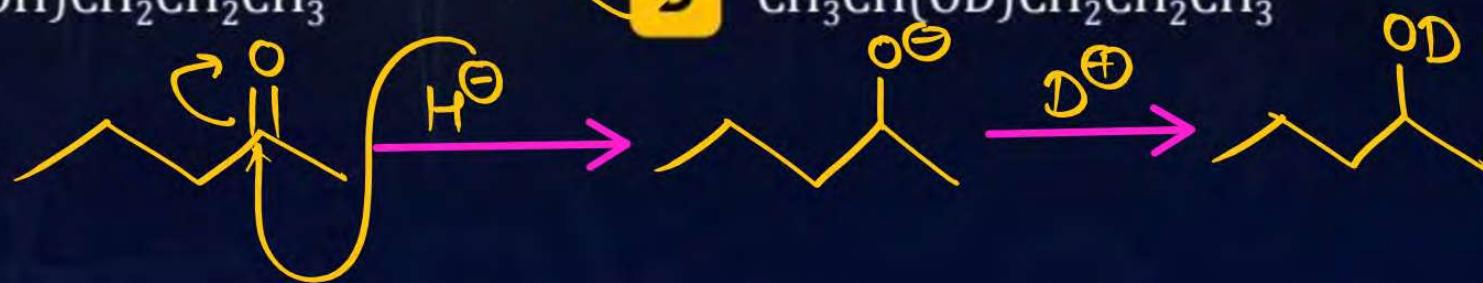
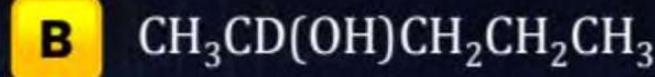
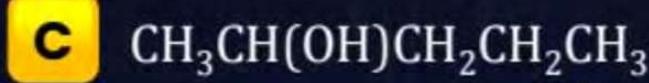
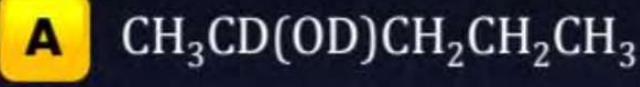
Identify the final product [D] obtained in the following sequence of reactions.

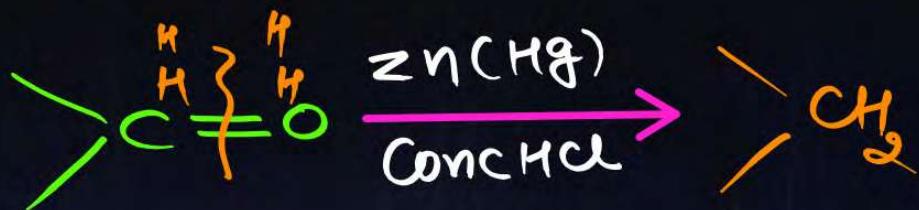


C.Q. 30

PW

If pentan-2-one is reacted with  $\text{NaBH}_4$ , followed by hydrolysis with  $\text{D}_2\text{O}$ , the product will be:



**B. Clemmensen Reduction:**

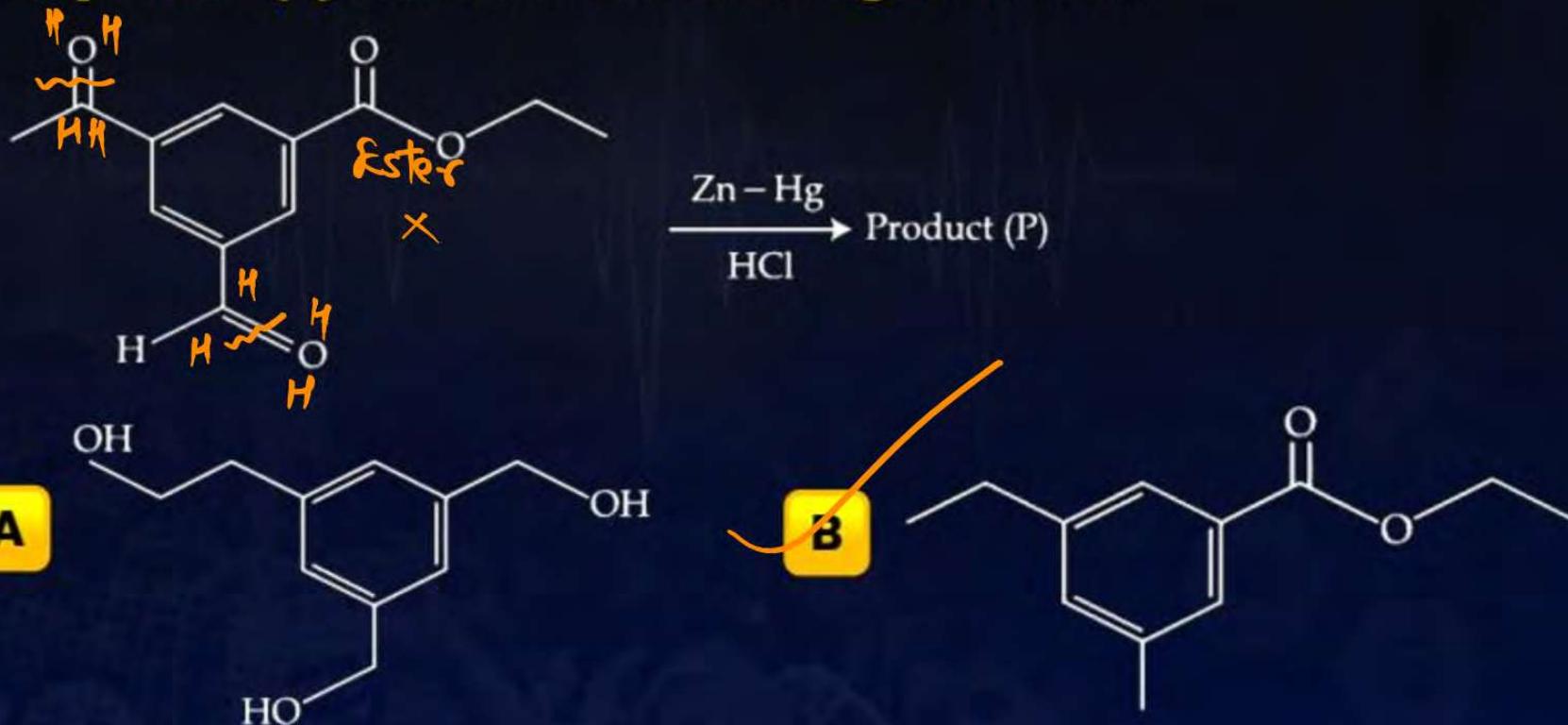
## **OP Points**

The carbonyl group of aldehydes and ketones is reduced to  $\text{CH}_2$  group on treatment with zinc amalgam and concentrated hydrochloric acid.

C.Q. 31 (JEE Mains 2025, 29 January Shift-1)

PW

The product (P) formed in the following reaction is:



PW



**Match List-I with List-II.**

	List – I (Reactions)		List – II (Reagents)
(A)	$\text{CH}_3(\text{CH}_2)_5-\overset{\substack{\text{H} \\ \text{H}}}{\underset{\text{O}}{\text{C}}}(\text{OC}_2\text{H}_5)\rightarrow\text{CH}_3(\text{CH}_2)_5\text{CHO}$ 	(I)	$\text{CH}_3\text{MgBr}, \text{H}_2\text{O}$
(B)	$\text{C}_6\text{H}_5\text{COC}_6\text{H}_5\rightarrow\text{C}_6\text{H}_5\text{CH}_2\text{C}_6\text{H}_5$	(II)	$\text{Zn}(\text{Hg})$ and conc. $\text{HCl}$
(C)	$\text{C}_6\text{H}_5\text{CHO}\rightarrow\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CH}_3$	(III)	$\text{NaBH}_4, \text{H}^+$
(D)	$\text{CH}_3\text{COCH}_2\text{COOC}_2\text{H}_5\rightarrow\text{CH}_3\overset{\text{H}}{\underset{\text{H}}{\text{C}}}(\text{OH})\text{CH}_2\text{COOC}_2\text{H}_5$ 	(IV)	DIBAL-H, $\text{H}_2\text{O}$

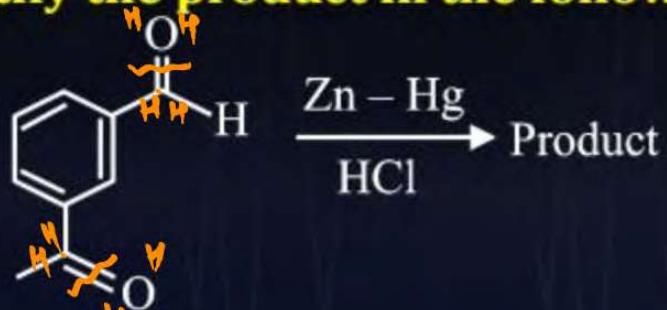
**Choose the correct answer from options given below:**

- A** A-(III), (B)-(IV), C-(I), (D)-(II)
- B** A-(IV), (B)-(II), C-(I), (D)-(III)
- C** A-(IV), (B)-(II), C-(III), (D)-(I)
- D** A-(III), (B)-(IV), C-(II), (D)-(I)

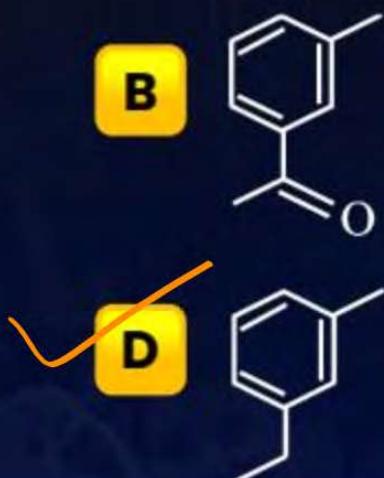
C.Q. 33 (JEE Mains 4th April 2024, Morning Shift)

PW

Identify the product in the following reaction:



- A   
B   
C   
D



C.Q. 34 (NCERT Exemplar)



Match the reactions given in Column I with the suitable reagents given in Column II.

**Column I**

(Reactions)

- (i) Benzophenone  $\rightarrow$  Diphenylmethane C
- (ii) Benzaldehyde  $\rightarrow$  1-Phenylethanol D
- (iii) Cyclohexanone  $\rightarrow$  Cyclohexanol A
- (iv) Phenyl benzoate  $\rightarrow$  Benzaldehyde B

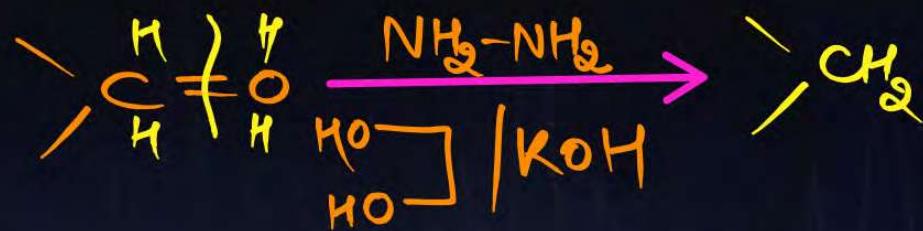
**Column II**

(Reagents)

- (A)  $\text{LiAlH}_4$
- (B) DIBAL-H
- (C)  $\text{Zn}(\text{Hg})/\text{Conc. HCl}$
- (D)  $\text{CH}_3\text{MgBr}$

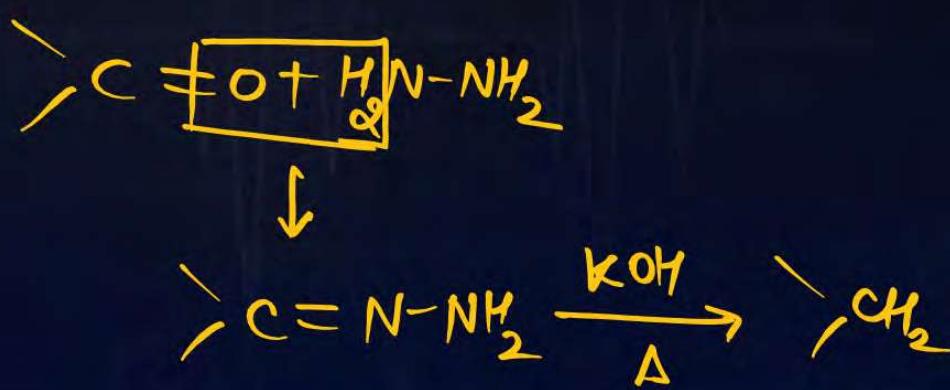


### C. Wolff-Kishner Reduction:



**OP Points**

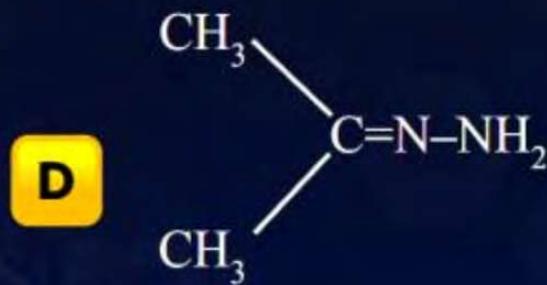
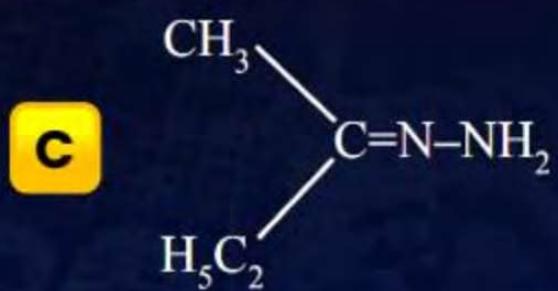
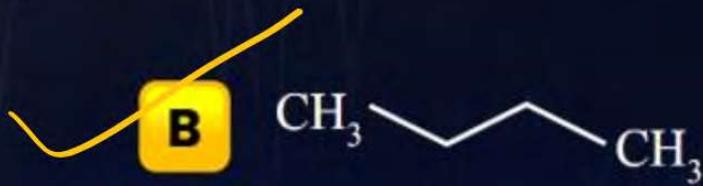
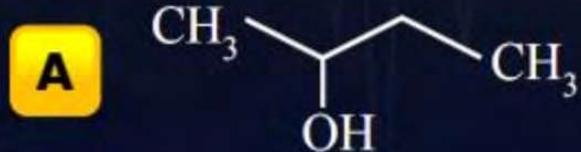
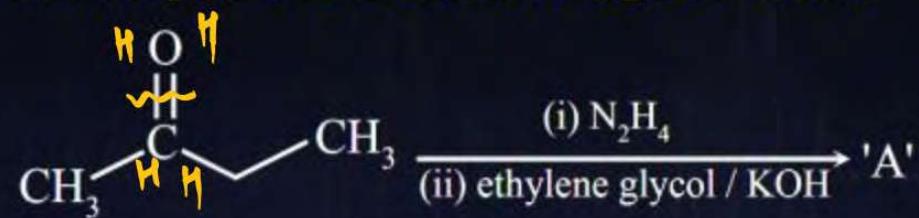
The carbonyl group of aldehydes and ketones is reduced to  $\text{CH}_2$  group on treatment with hydrazine followed by heating with sodium or potassium hydroxide in high boiling solvent such as ethylene glycol.



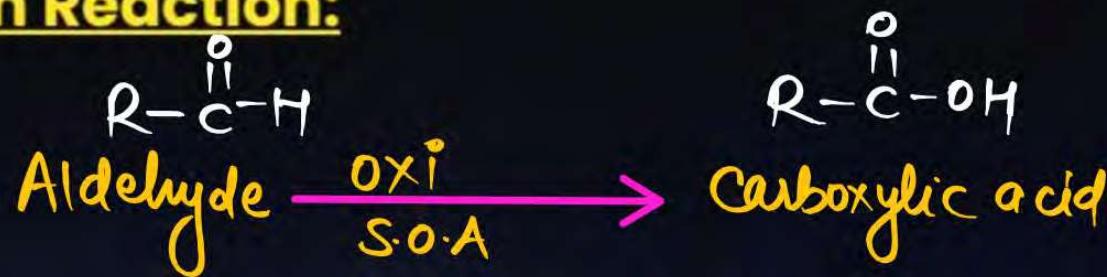
C.Q. 35 (JEE Mains 5th April 2024, Morning Shift)

PW

Identify 'A' in the following reaction:



### 3. Oxidation Reaction:



- 1)  $\text{CrO}_3 + \text{H}_2\text{O}$   
or  
 $\text{H}_2\text{CrO}_4$
- 2)  $\text{CrO}_3 + \text{H}_2\text{S}\text{O}_4$   
Jones's reagent
- 3)  $\text{KMnO}_4$  Hot  
or  
 $\text{KMnO}_4/\text{H}^+$   
or  
 $\text{Alk KMnO}_4/\Delta$   
 $\text{H}^+$

## A. Tollen's Test:

Tollen's Reagent

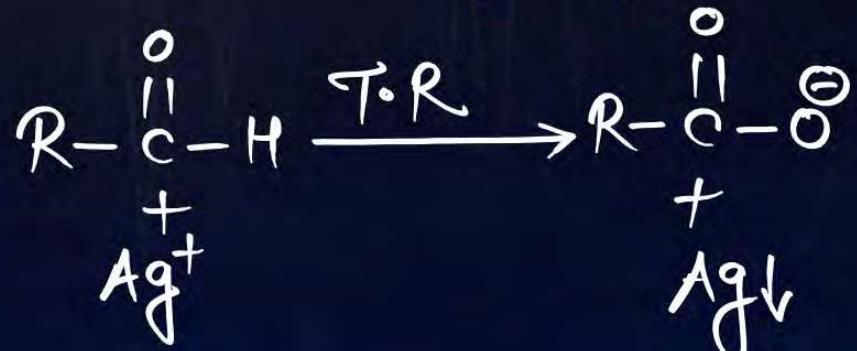
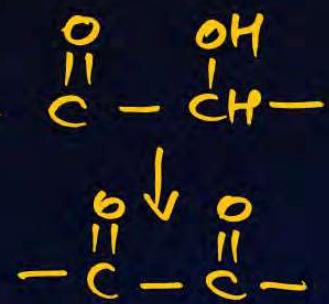
Ammoniacal silver nitrate  
 $(AgNO_3 + NH_4OH)$

Silver Mirror  
 Test

All Ald ✓      Ket X  
 (Ali & Kro)

HCOOH ✓

$\alpha$ -hydroxy Ketone ✓



Silver mirror

**OP Points**

1. 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.

2. The aldehydes are oxidized to corresponding carboxylate anion.

3. The reaction occurs in alkaline medium. ✓

Which of the following compounds will give silver mirror with ammoniacal silver nitrate?

- (A) Formic acid  $\text{HCOOH}$
- (B) Formaldehyde  $\text{HCHO}$
- (C) Benzaldehyde  $\text{PhCHO}$
- (D) Acetone

Choose the correct answer from the options given below:

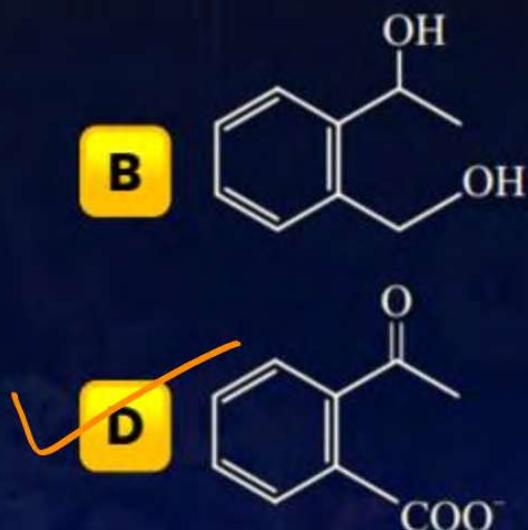
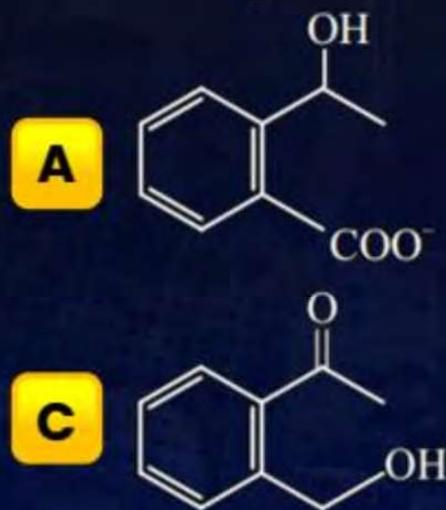
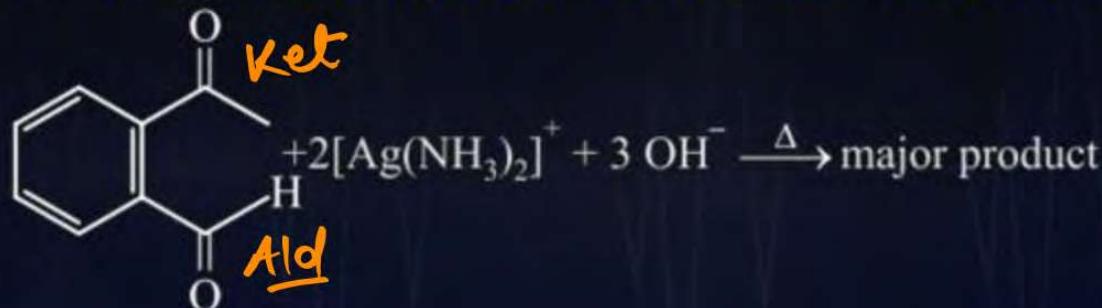
- A C and D only
- C A only

- B A, B and C only
- D B and C only

C.Q. 37 (NEET 2023)

PW

Identify the major product obtained in the following reaction:



## B. Fehling's Test:

Fehling A aq  $\text{CuSO}_4$

+

Fehling B

$\text{NaOAc}$

$\begin{array}{c} | \\ \text{CHOH} \end{array}$

$\begin{array}{c} | \\ \text{CHOH} \end{array}$

$\text{C}_6\text{H}_5\text{COOK}$

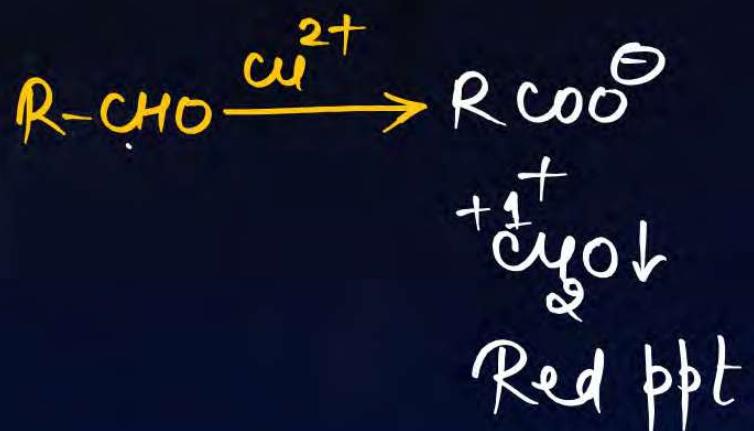
$\text{NaKT}$

Sodium potassium

tartarate

Rochelle's salt

Ali Ald ✓       $\text{HCOOH}$  ✓  
Aro Ald X       $\alpha$ -hydroxy car ✓  
Ket X

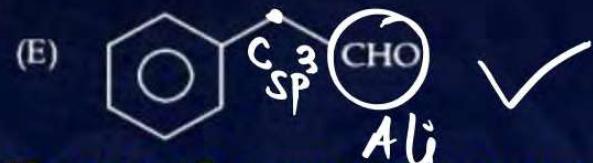
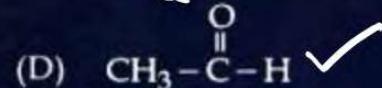
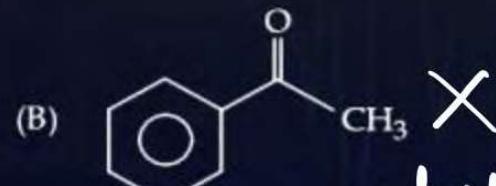
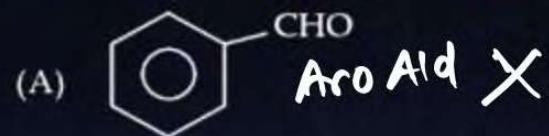


## OP Points

1. Fehling reagent comprises of two solutions, Fehling solution A and Fehling solution B.
2. Fehling solution A is aqueous copper sulphate and Fehling solution B is alkaline sodium potassium tartarate (Rochelle salt).
3. These two solutions are mixed in equal amounts before test.
4. On heating an aldehyde with Fehling's reagent, a reddish brown precipitate is obtained.
5. Aldehydes are oxidised to corresponding carboxylate anion.
6. Aromatic aldehydes do not respond to this test.

C.Q. 38 (JEE Mains 2025, 22 January Shift-1)

The compounds which give positive Fehling's test are:



Choose the correct answer from the options given below:

- A** (A), (D) and (E) Only
- B** (C), (D) and (E) Only
- C** (A), (B) and (C) Only
- D** (A), (C) and (D) Only

C.Q. 39 (NEET 2024)



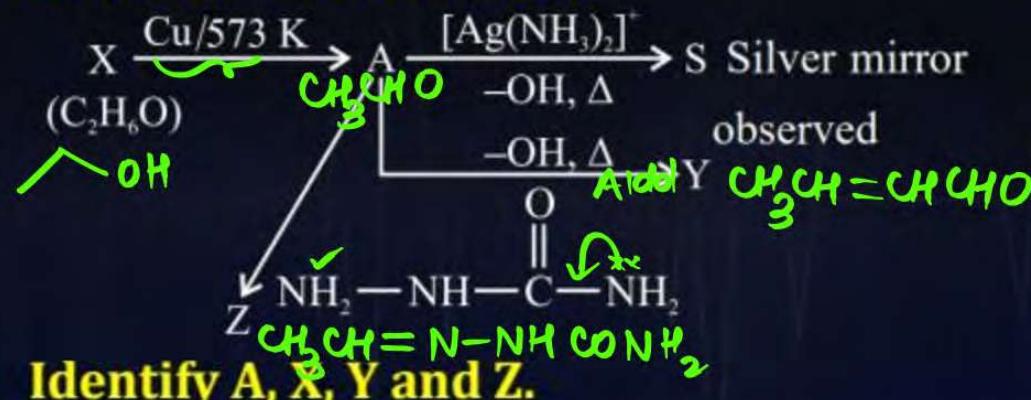
**Fehling's solution 'A' is:**

- A** Alkaline solution of sodium potassium tartrate (Rochelle's salt)
- B** Aqueous sodium citrate
- C** Aqueous copper sulphate
- D** Alkaline copper sulphate

C.Q. 40 (NEET 2017)

PW

Consider the reactions:



- A A-Ethanol, X-Acetaldehyde, Y-Butanone, Z-Hydrazone
- B A-Methoxymethane, X-Ethanoic acid, Y-Acetate ion, Z-hydrazine
- C A-Methoxymethane, X-Ethanol, Y-Ethanoic acid, Z-Semicarbazide
- D A-Ethanal, X-Ethanol, Y-But-2-enal, Z-Semicarbazone

C. Benedict's Test: (Same as Fehling)

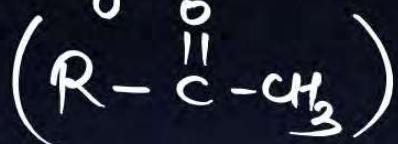
Benedict A aq cusa,  
+

Benedict B sodium  
citrate

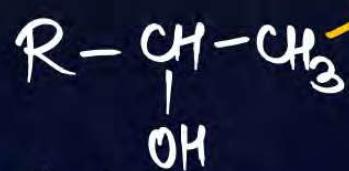
## D. Haloform Test: Reagent :-

- 1)  $X_2 + NaOH \text{ or } KOH$
- 2)  $NaOx \text{ or } Kox$
- 3)  $CaOCl_2$

1) Methyl Ketone ✓

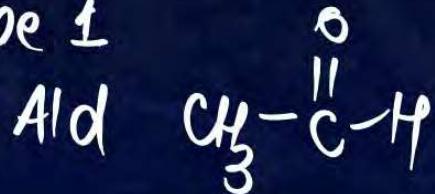


2) 2° Alcohol

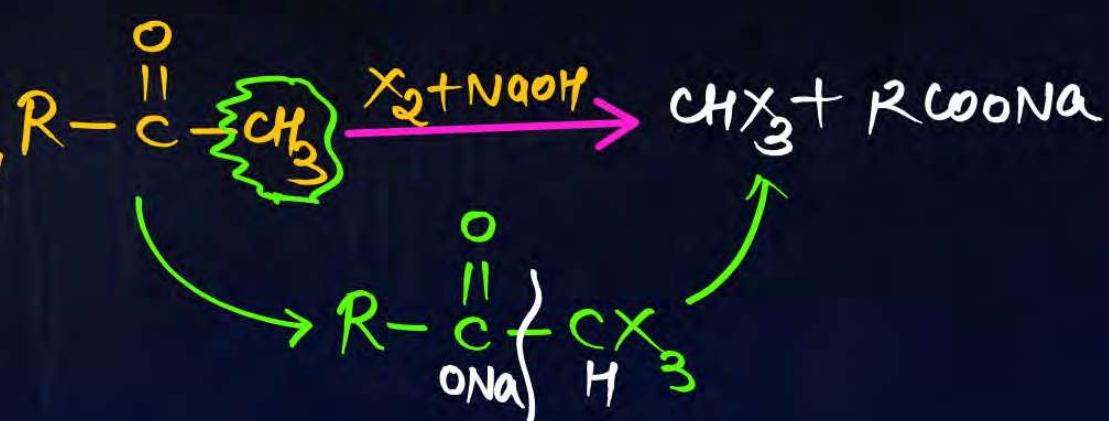


3) Only 1° Alco

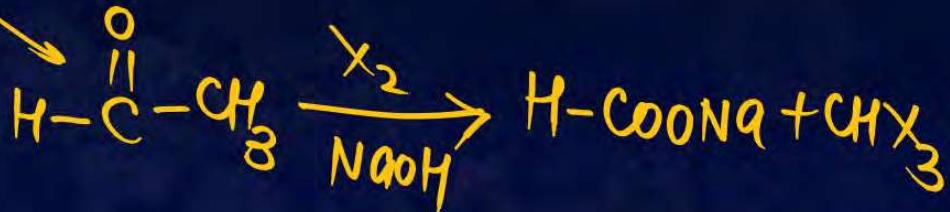
4) one 1° Ald

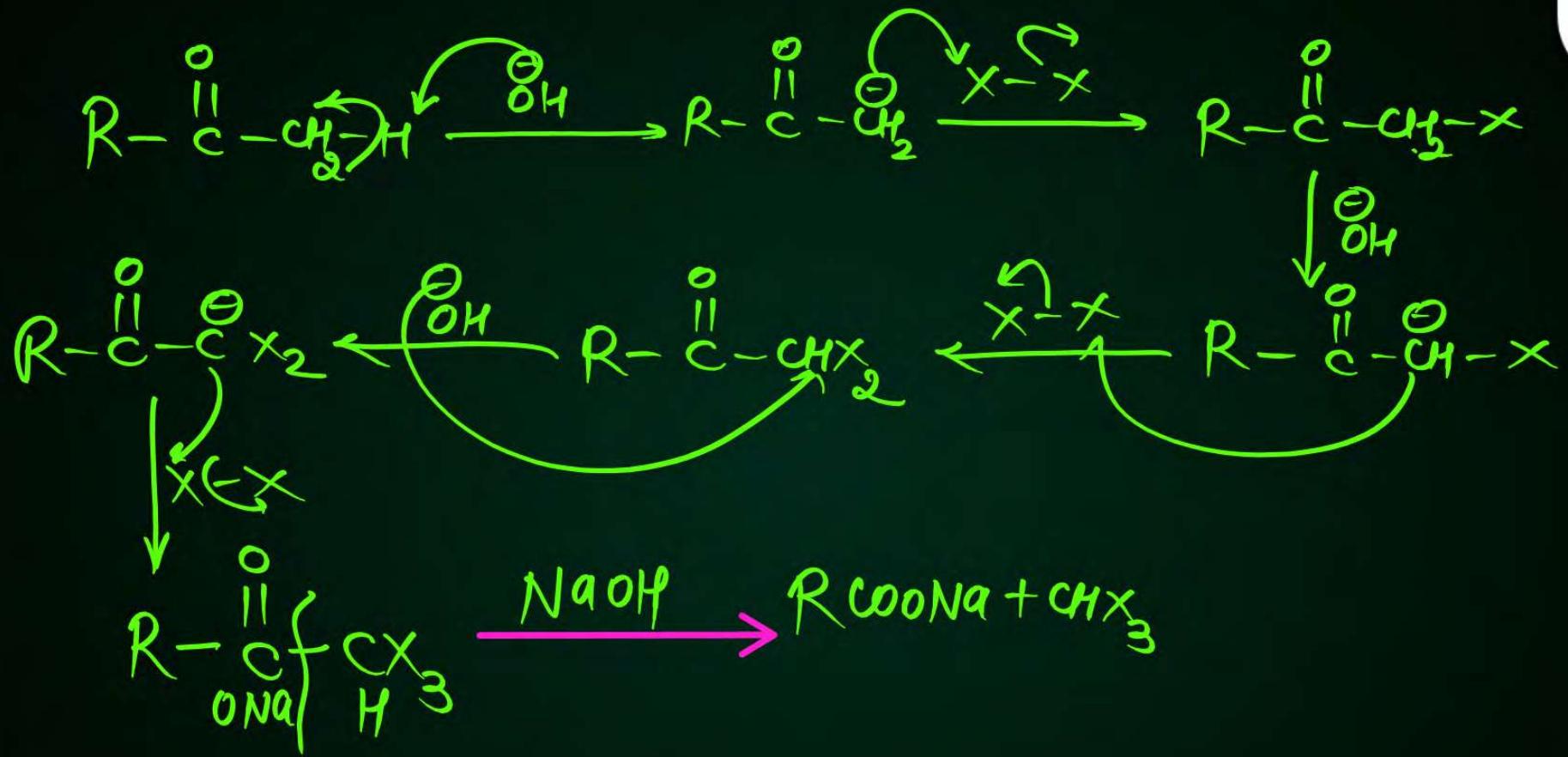


oxi



oxi





## OP Points

1. Aldehydes and ketones having at least one methyl group linked to the carbonyl carbon atom (methyl ketones) are oxidized by sodium hypohalite to sodium salts of corresponding carboxylic acids having one carbon atom less than that of carbonyl compound.
2. The methyl group is converted to haloform. ✓
3. This oxidation does not affect a carbon-carbon double bond, if present in the molecule.
4. Iodoform reaction with sodium hypoiodite is also used for detection of  $\text{CH}_3\text{CO}$  group or  $\text{CH}_3\text{CH}(\text{OH})$  group which produces  $\text{CH}_3\text{CO}$  group on oxidation.  
 $\text{NaOI} (\text{I}_2 + \text{NaOH})$

**C.Q. 41 (AIPMT 2012)**

$\text{CH}_3\text{CHO}$  and  $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$  can be distinguished chemically by:

**A** Benedict test

**C** Tollen's reagent test

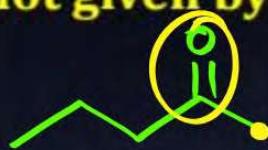
**B** Iodoform test

**D** Fehling solution test

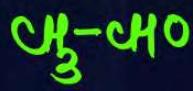
C.Q. 42 (AIPMT 1999)

Iodoform test is not given by

A 2-Pentanone



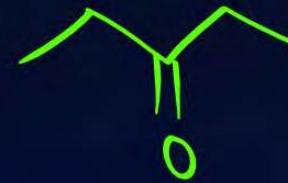
C Ethanal



B Ethanol

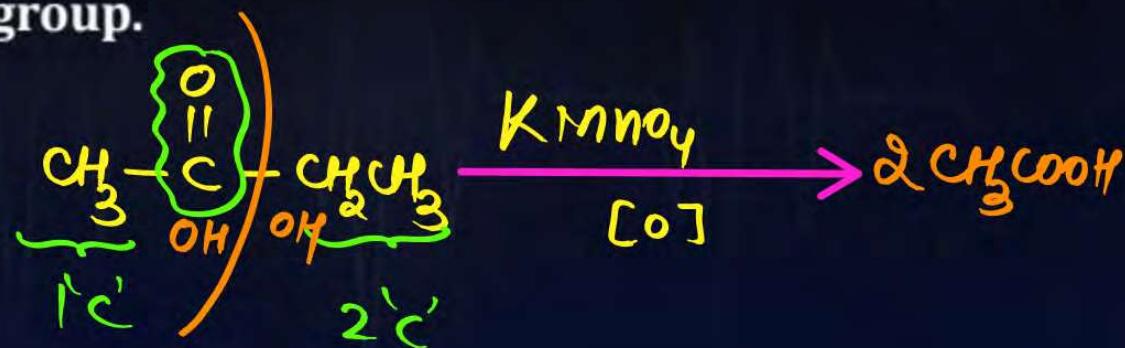


D 3-Pentanone



### E. Popoff's Rule:

Popoff's rule states that during the oxidation of unsymmetrical ketone, the cleavage of the C-CO bond is such that the keto group always stays with smaller alkyl group.



## OP Points

1. Ketones are generally oxidised under vigorous conditions, i.e., strong oxidising agents and at elevated temperatures.
2. Their oxidation involves carbon-carbon bond cleavage to afford a mixture of carboxylic acids having lesser number of carbon atoms than the parent ketone.

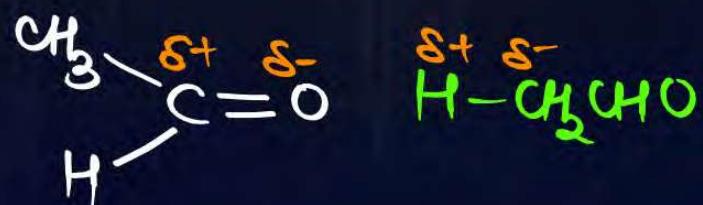


[Maha imp]

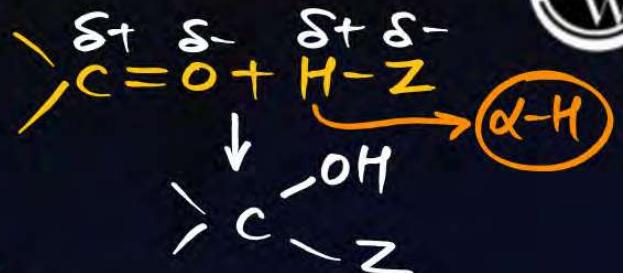
## Aldol Condensation

## Carbonyl comp having $\alpha$ -H

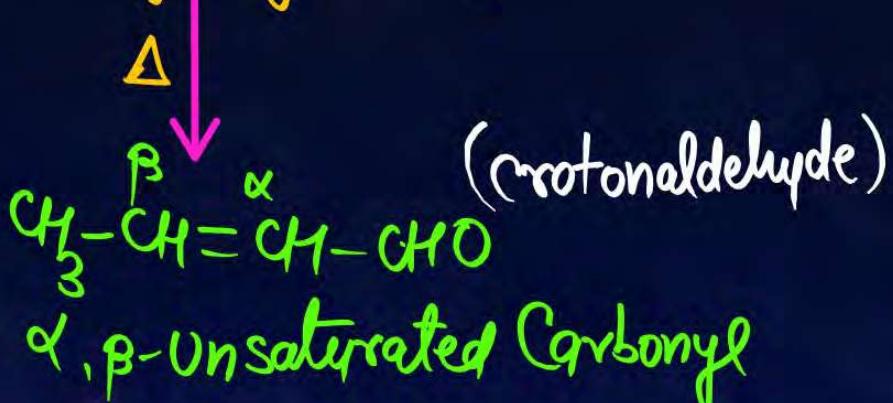
self  
Aldol



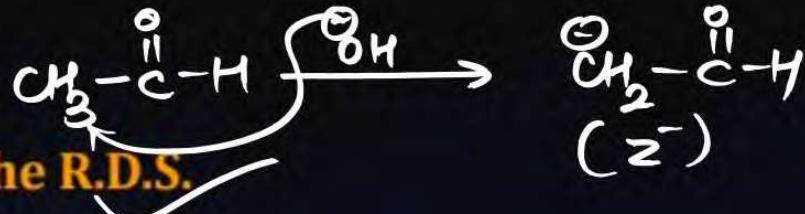
Reagent : dil. Base  
      *e.g.*



## $\beta$ -hydroxy Carbonyl

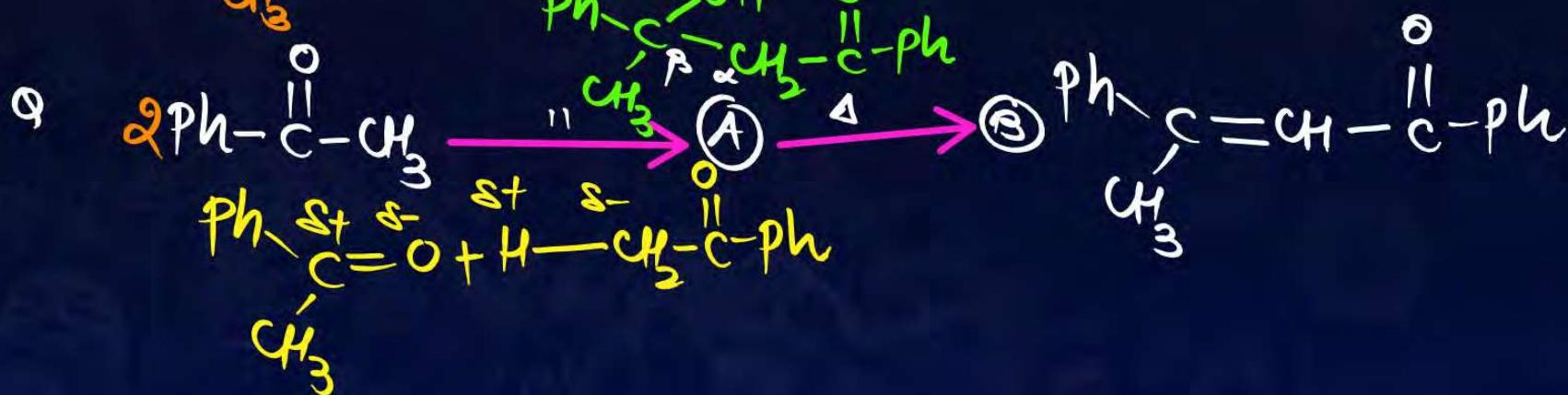
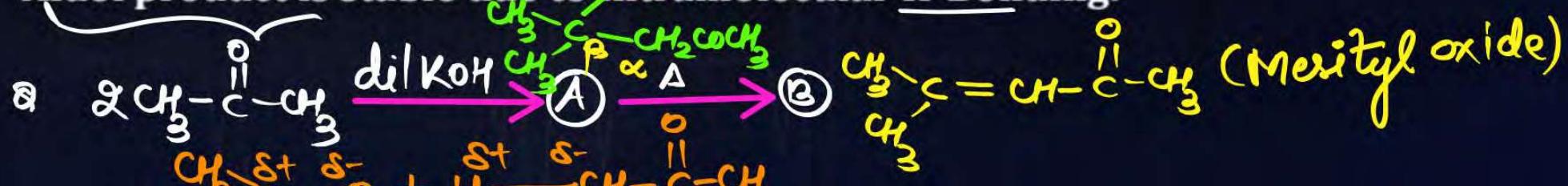


## OP Points

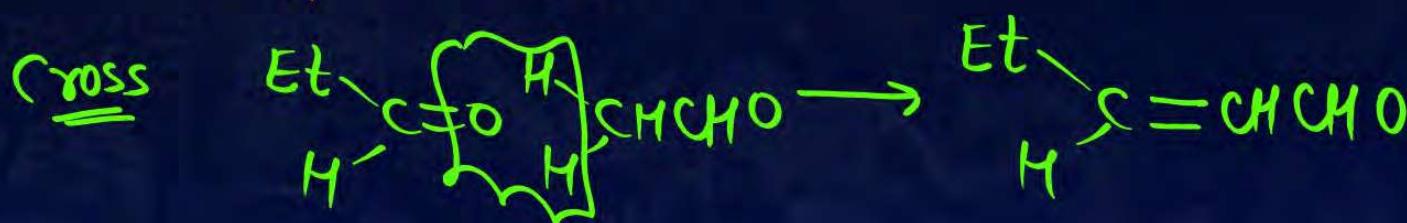
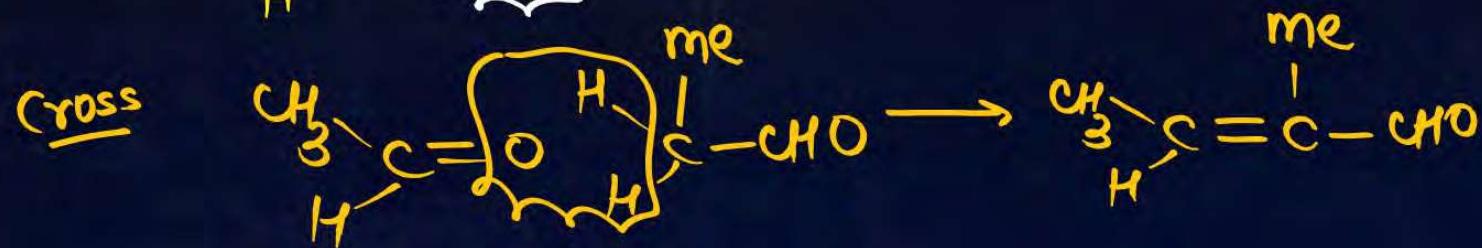
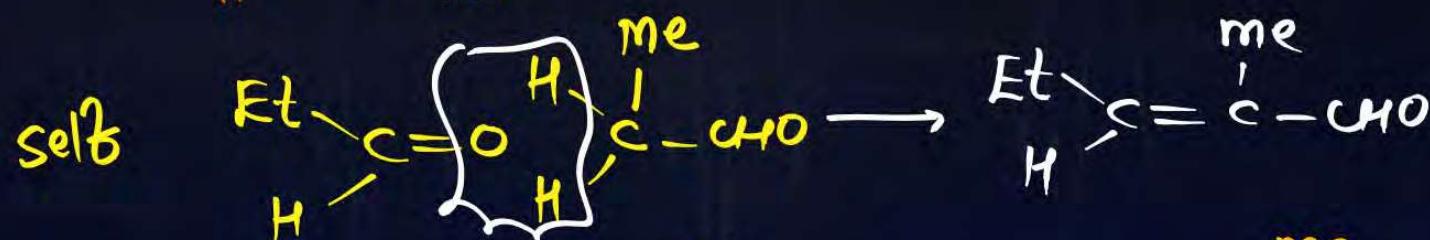
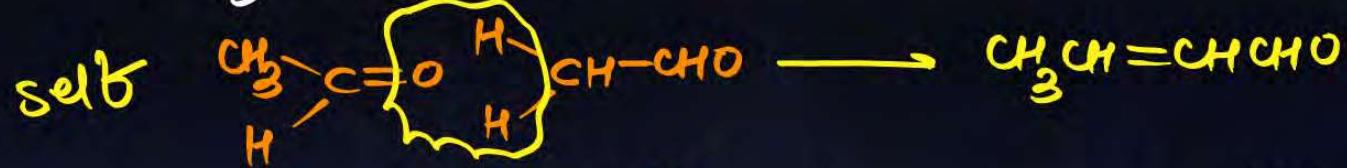
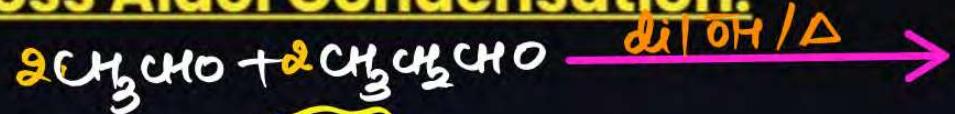


1. Carbanion formation is the R.D.S.

2. Aldol product is stable due to Intramolecular H-Bonding.



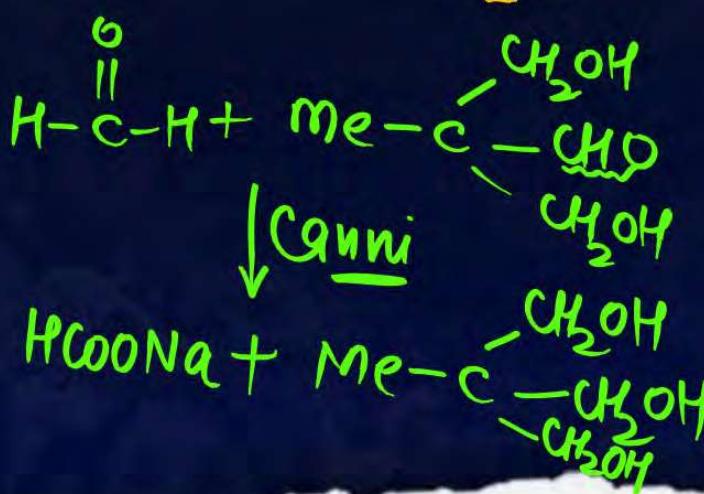
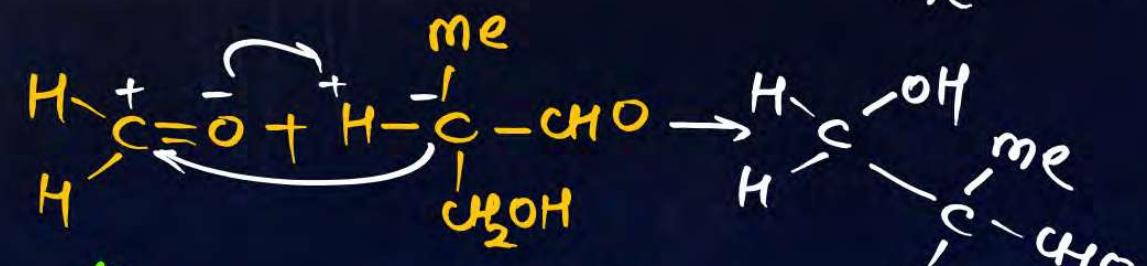
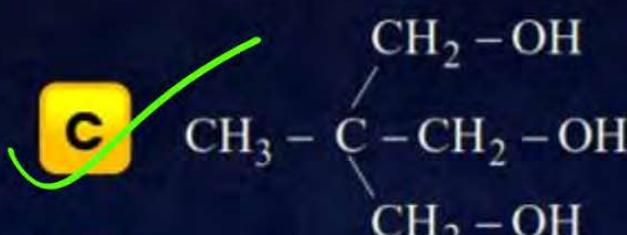
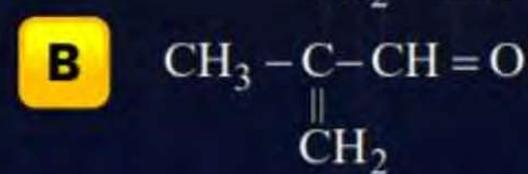
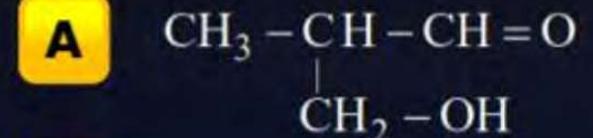
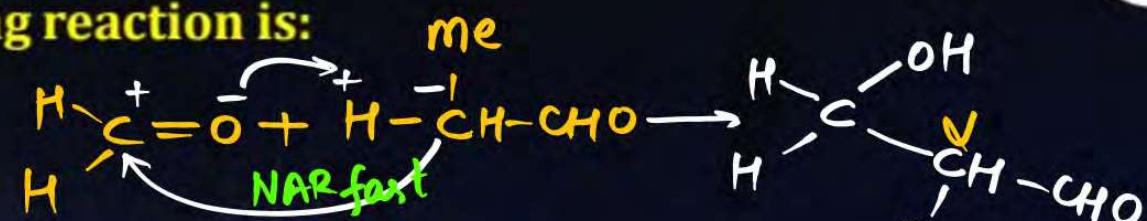
## Cross Aldol Condensation:



C.Q. 43 (JEE Mains 2025, 23 January Shift-1)

PW

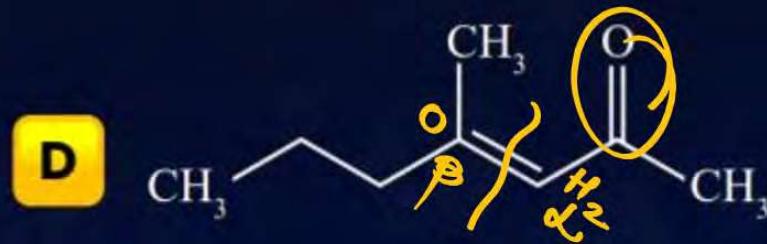
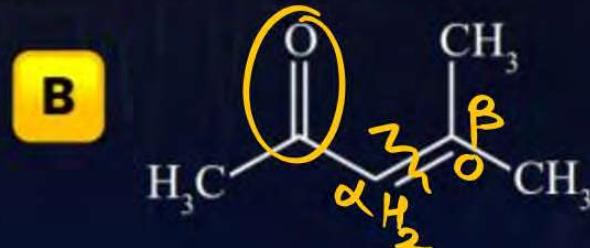
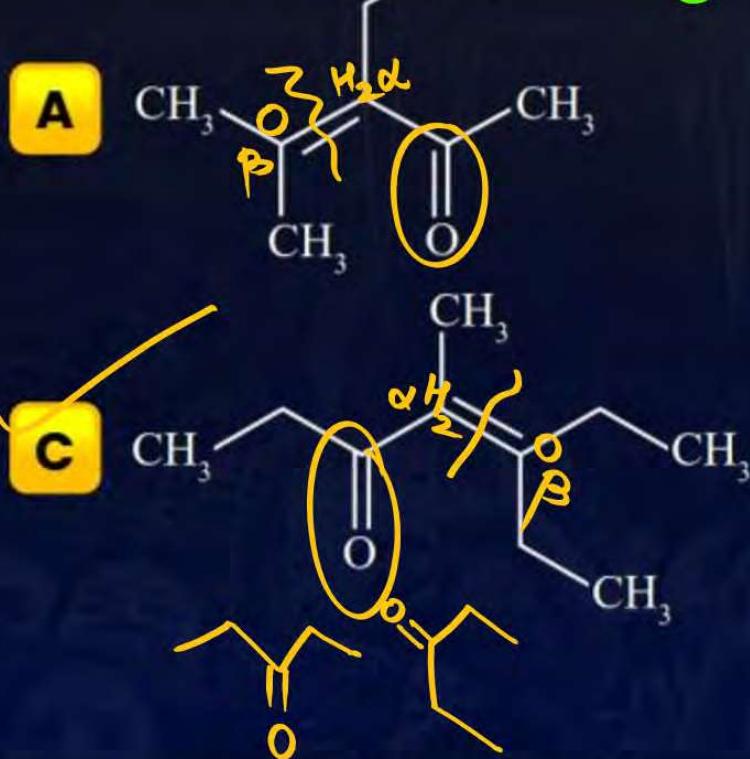
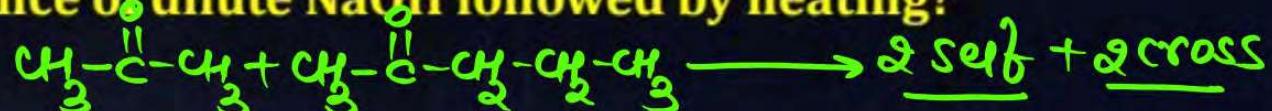
The major product of the following reaction is:



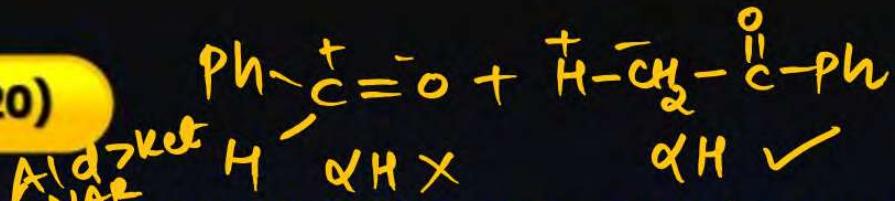
C.Q. 44 (NEET 2022)

PW

Which one of the following is not formed when acetone reacts with 2-pentanone in the presence of dilute NaOH followed by heating?



C.Q. 45 (NEET 2020)



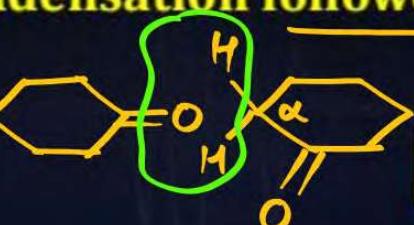
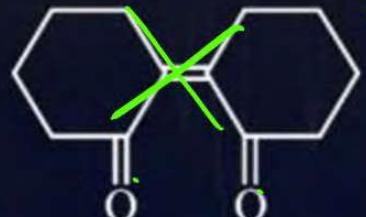
Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as:

- A Cannizzaro's reaction
- B Cross Cannizzaro's reaction
- C Cross Aldol condensation
- D Aldol condensation

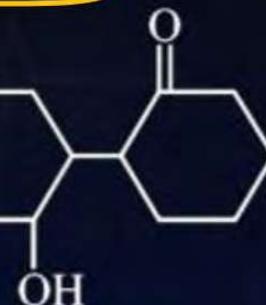
C.Q. 46 (NEET 2017)

Which of the following product is formed when cyclohexanone undergoes aldol condensation followed by heating?

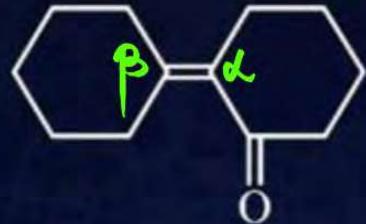
A



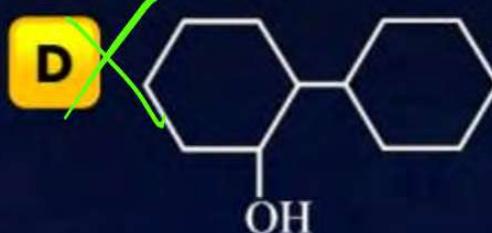
B



C



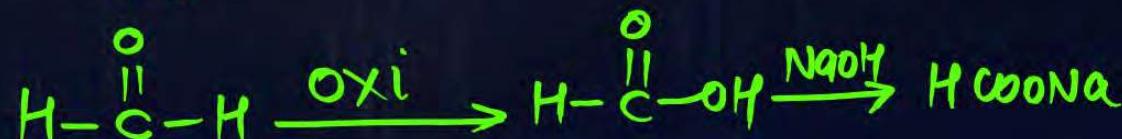
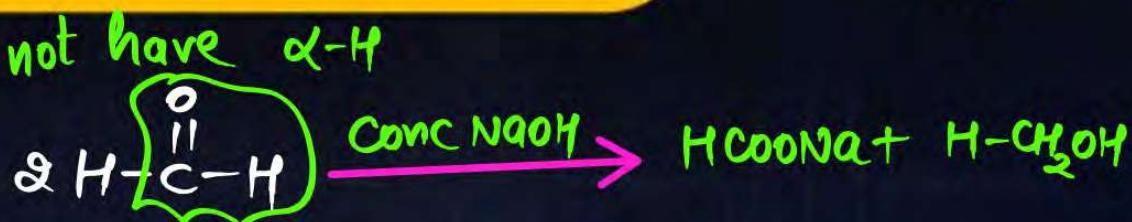
D





## Cannizzaro Reaction

Ald do not have  $\alpha$ -H  
self

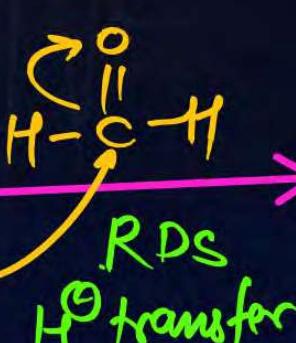
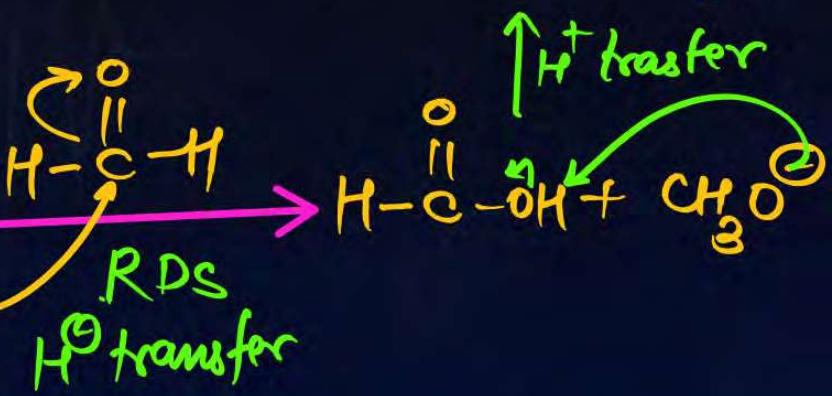
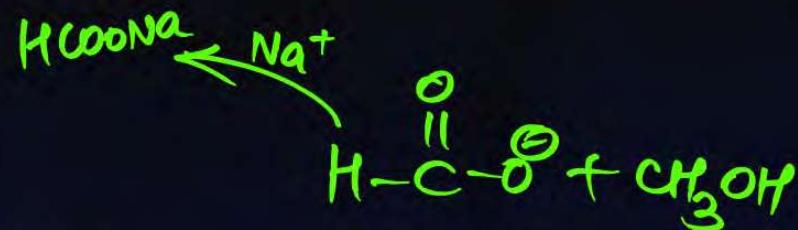
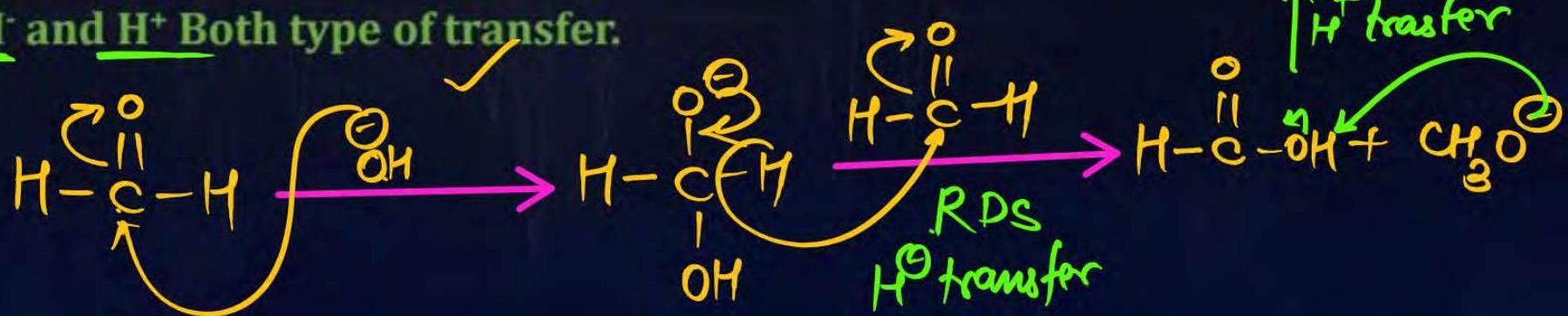


Reagent conc<sup>n</sup> NaOH / KOH  
or gphCHO  $\xrightarrow{\text{Conc KOH}}$   
PhCOOK  
+  
PhCOONa



**OP Points**

1. H⁻ transfer is the R.D.S.
2. Disproportionation reaction.
3. H⁻ and H⁺ Both type of transfer.

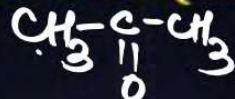


## Cross Cannizzaro Reaction:

[NAR fast wala oxi]



Both acetaldehyde and acetone (individually) undergo which of the following reactions?



- A. Iodoform Reaction ✓
- B. Cannizzaro Reaction ✗
- C. Aldol Condensation ✓
- D. Tollen's Test ✗
- E. Clemmensen Reduction ✓

Choose the *correct* answer from the options given below:

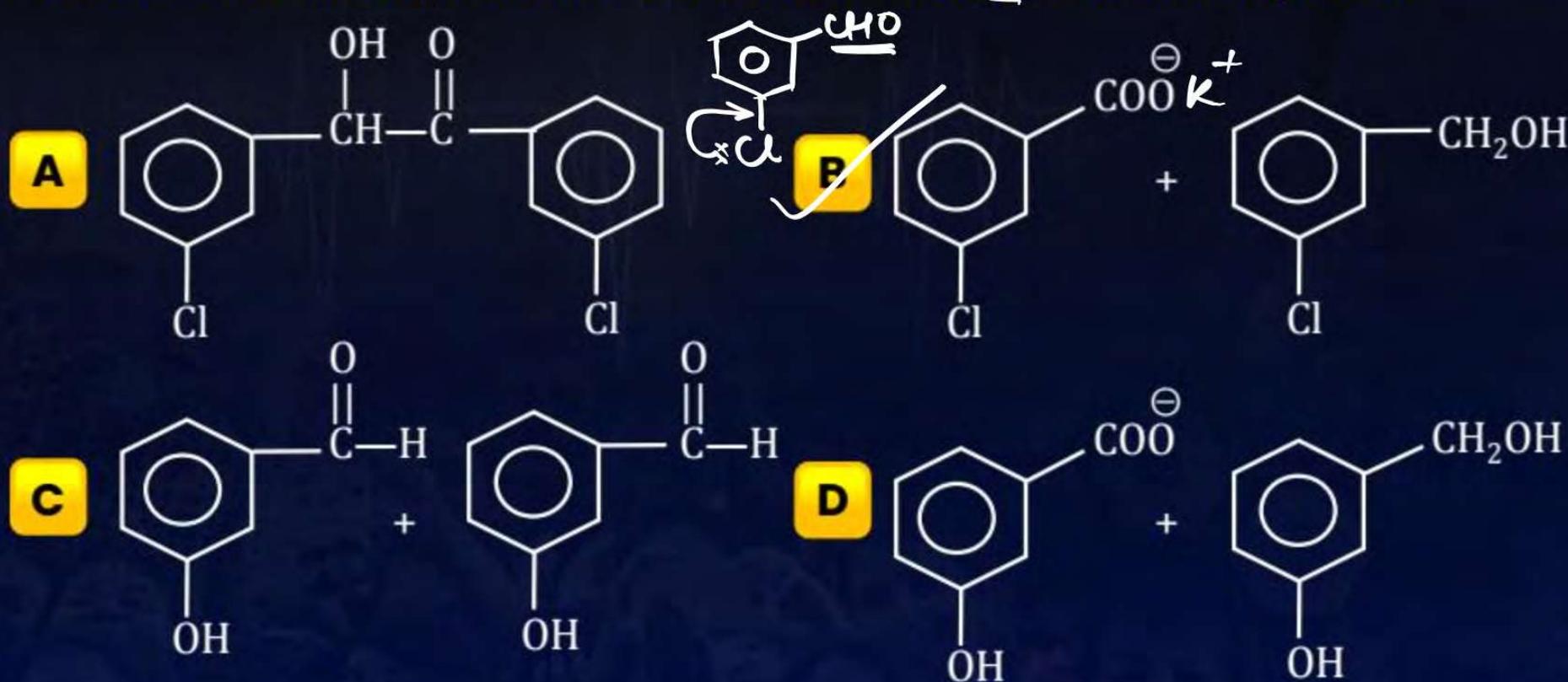
- A** B, C and D Only
- B** C and E Only
- C** A, B and D Only
- D** A, C and E Only



C.Q. 48 (JEE Mains 30th January 2024, Evening Shift)



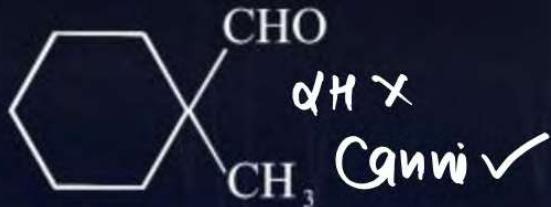
m-chlorobenzaldehyde on treatment with 50% KOH solution yields



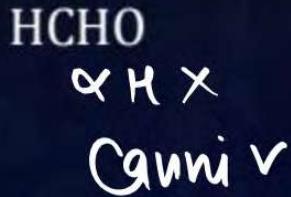
C.Q. 49 (NCERT Exemplar)

Cannizaro's reaction is not given by \_\_\_\_\_.

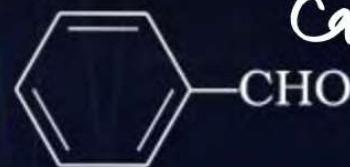
A



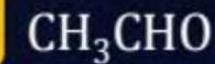
C



B



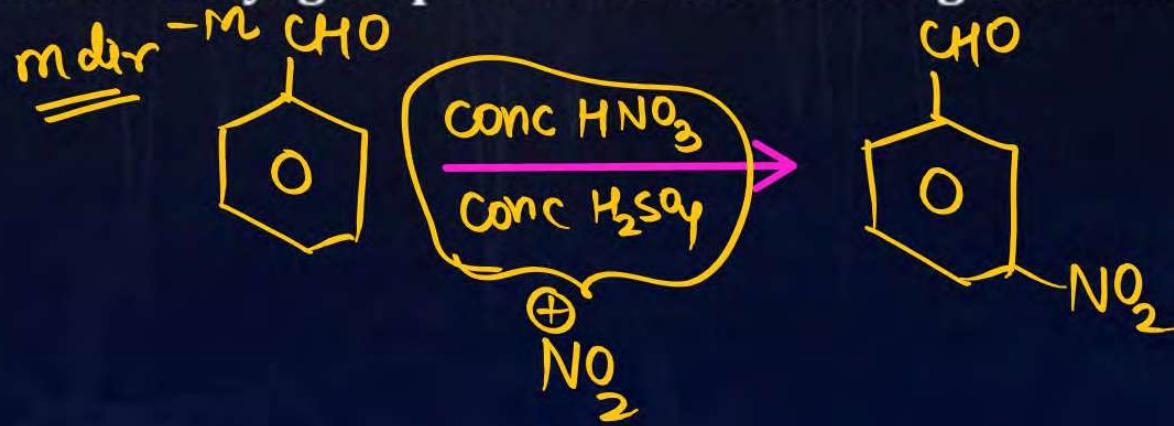
D





## Electrophilic Substitution Reaction

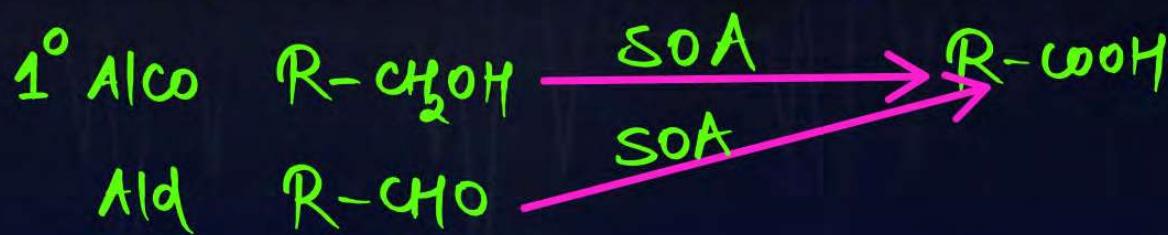
Aromatic aldehydes and ketones undergo electrophilic substitution at the ring in which the carbonyl group acts as a deactivating and meta-directing group.





## Method of Preparation of Carboxylic Acids

### 1. From primary alcohols and aldehydes:



C.Q. 50



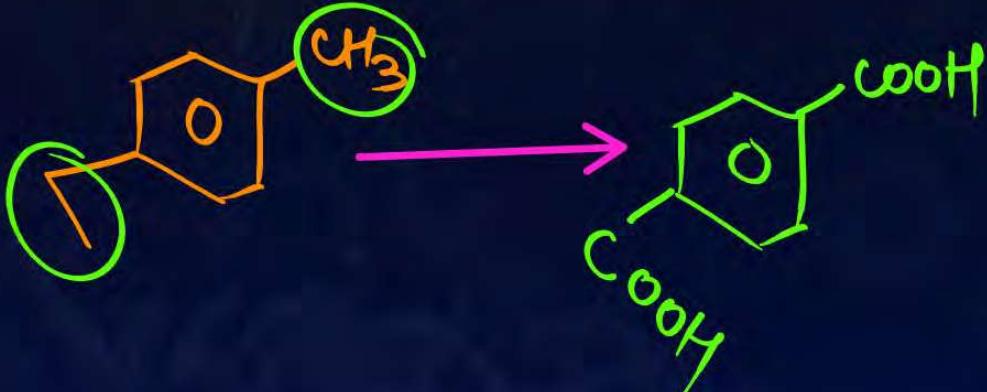
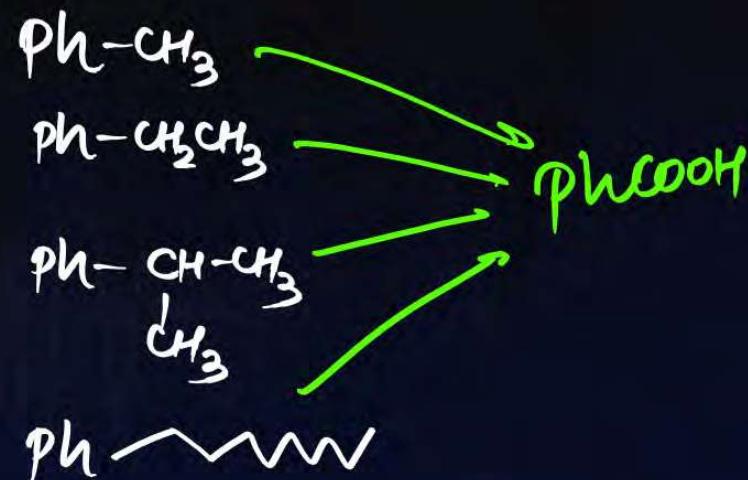
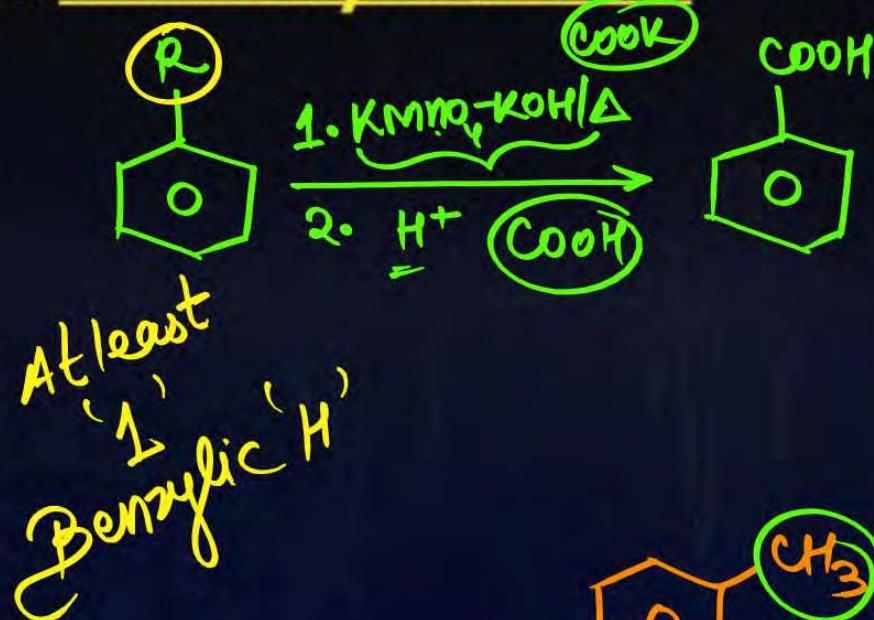
Which of the following cannot form  $\text{CH}_3\text{COOH}$  from  $\text{C}_2\text{H}_5\text{OH}$ ?

- I. PCC;    II. PDC;    III. Alk.  $\text{KMnO}_4/\text{H}^+$ ;    IV.  $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$ ;    V.  $\text{CrO}_3 \cdot \text{H}_2\text{SO}_4$

SoA

- A I, II & III
- B I & II
- C I, II & V
- D Only I

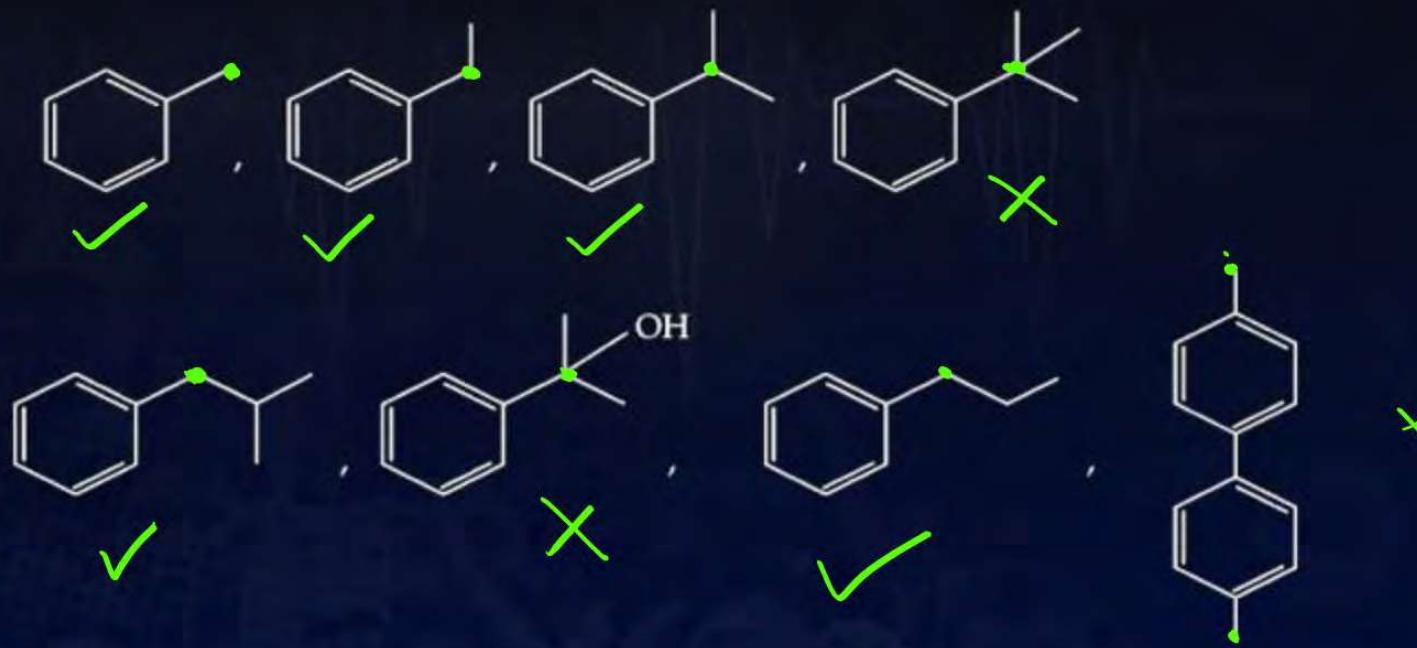
## 2. From alkyl benzene:



C.Q. 51 (JEE Mains 2025, 28 January Shift-2)



The total number of compounds from below when treated with hot KMnO<sub>4</sub> giving benzoic acid is:



**C.Q. 52 (NEET 2024)**



**Match List I with List II.**

	List-I (Reaction)		List-II (Reagents/Condition)
A.		I.	
B.		II.	$\text{CrO}_3$
C.		III.	$\text{KMnO}_4 / \text{KOH}, \Delta$
D.		IV.	(i) $\text{O}_3$ (ii) $\text{Zn-H}_2\text{O}$

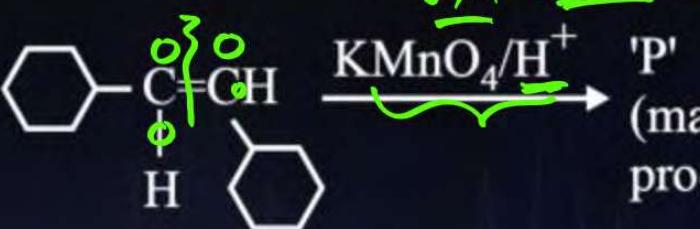
Choose the correct answer from the option given below:

- A A-IV, B-I, C-II, D-III 
- B A-I, B-IV, C-II, D-III
- C A-IV, B-I, C-III, D-II
- D A-III, B-I, C-II, D-IV

C.Q. 53 (NEET 2024)

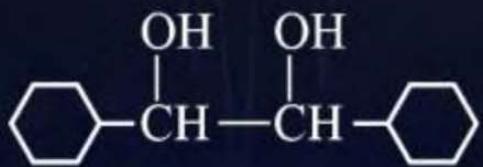
PW

For the given reaction:

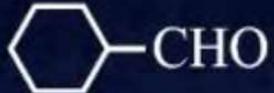


'P' (major product)

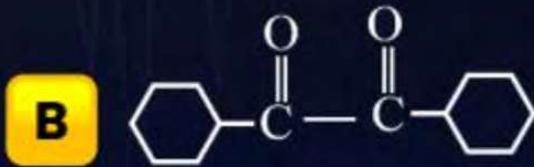
A



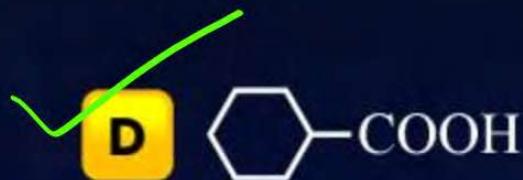
C



B

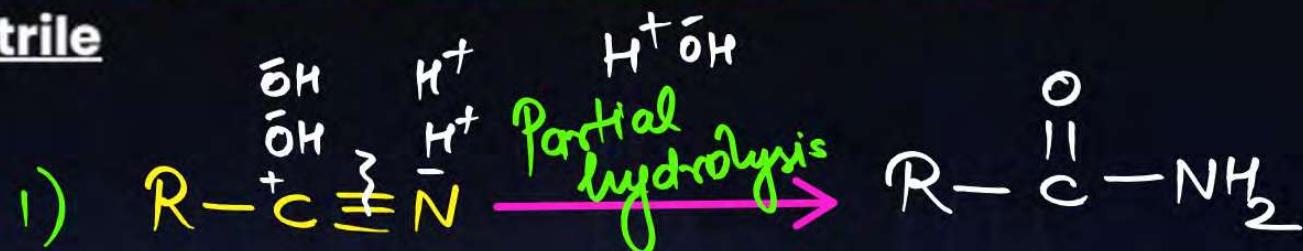


D

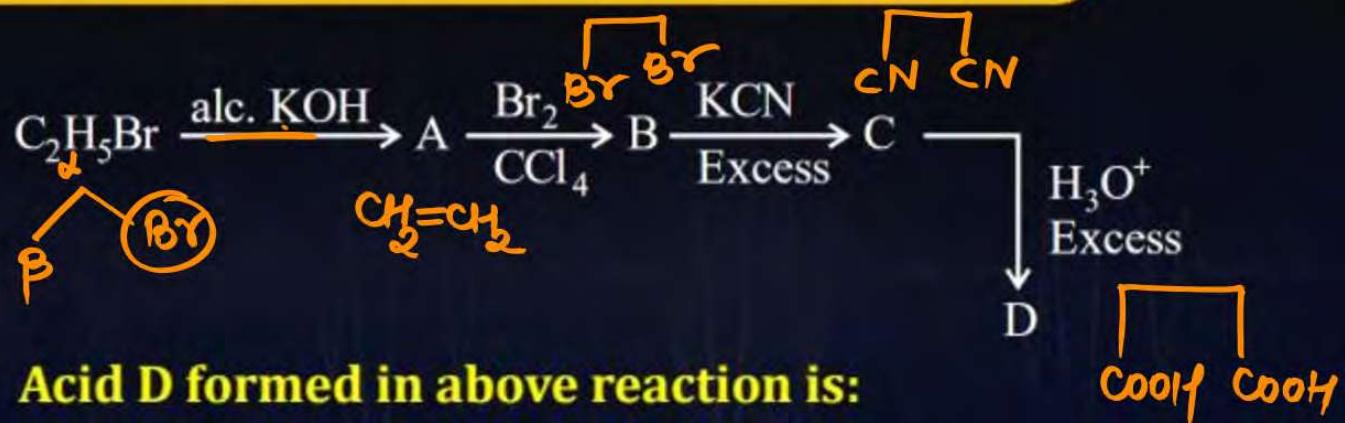


### 3. From hydrolysis of acid derivatives:

#### A. Nitrile



C.Q. 54 (JEE Mains 1st Feb 2024, Evening Shift)

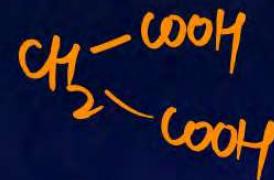


**Acid D formed in above reaction is:**

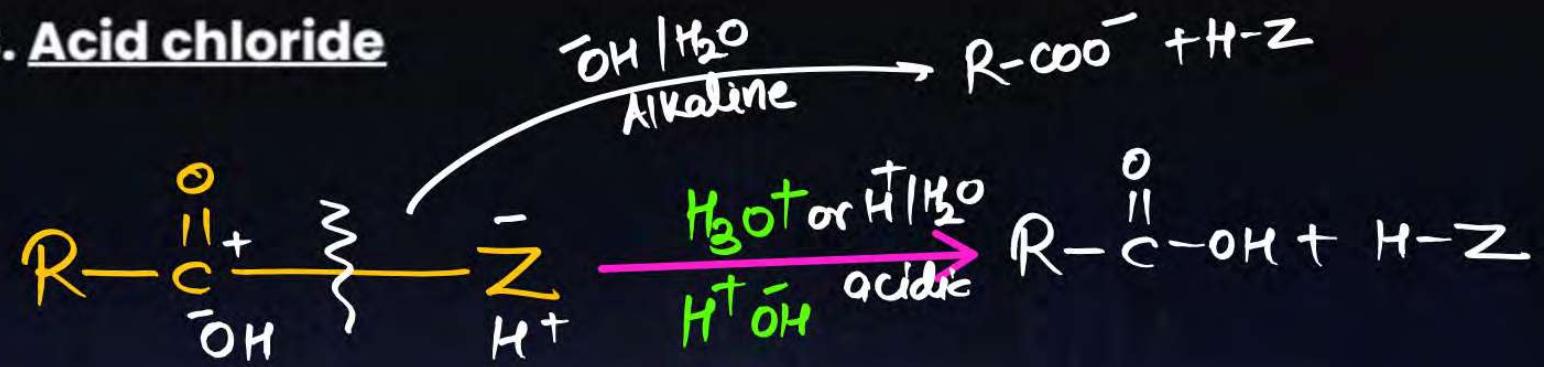
- A** Gluconic acid
  - C** Oxalic acid



- B Succinic acid
  - D Malonic acid



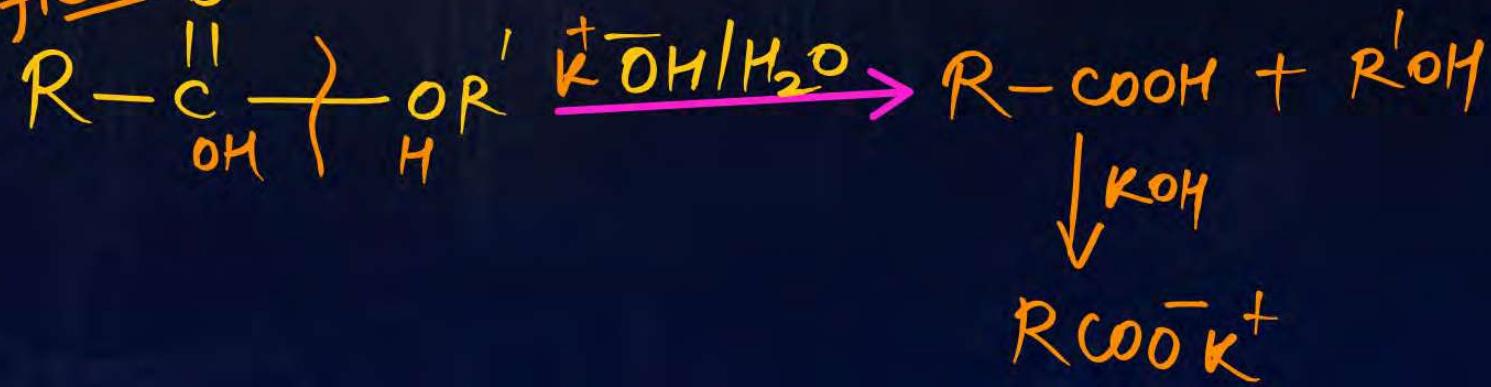
### **B. Acid chloride**



**C. Anhydride**

**D. Ester**

Saponification



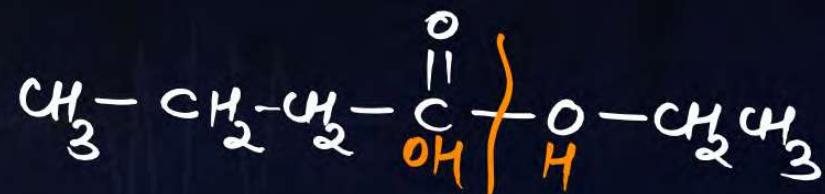
C.Q. 55

Acidic hydrolysis



The final product(s) of basic hydrolysis followed by acidification of ethyl butanoate is:

- A Only ethanoic acid
- B Only butanoic acid
- C Ethanoic acid & butanoic acid
- D Butanoic acid & ethanol



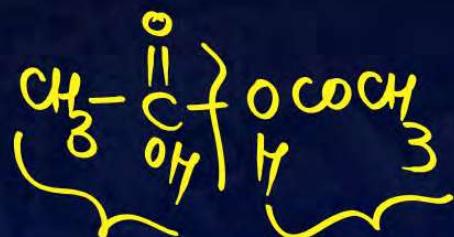
E. Amides

C.Q. 56 (AIIMS 2008)

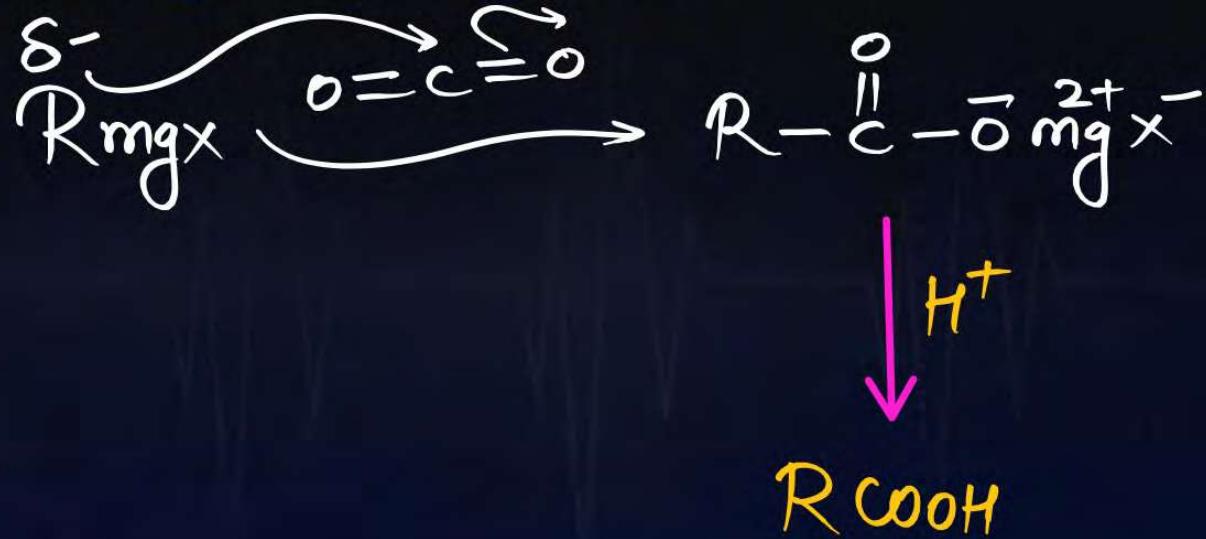


Acid hydrolysis of which of the following compounds yields two different organic compounds:

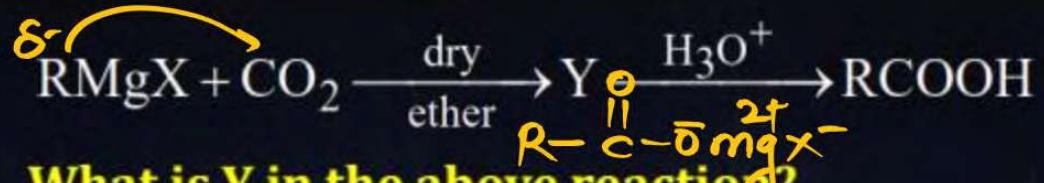
- A  $\text{CH}_3\text{COOH}$
- B  $\text{CH}_3\text{CONH}_2$
- C  $\text{CH}_3\text{COOC}_2\text{H}_5$
- D  $(\text{CH}_3\text{CO})_2\text{O}$



#### 4. From Grignard reagents:



## C.Q. 57 (NEET 2022)



What is Y in the above reaction?

A ~~(RCOO)<sub>2</sub>Mg~~

B ~~RCOO<sup>-</sup>Mg<sup>+</sup>X~~

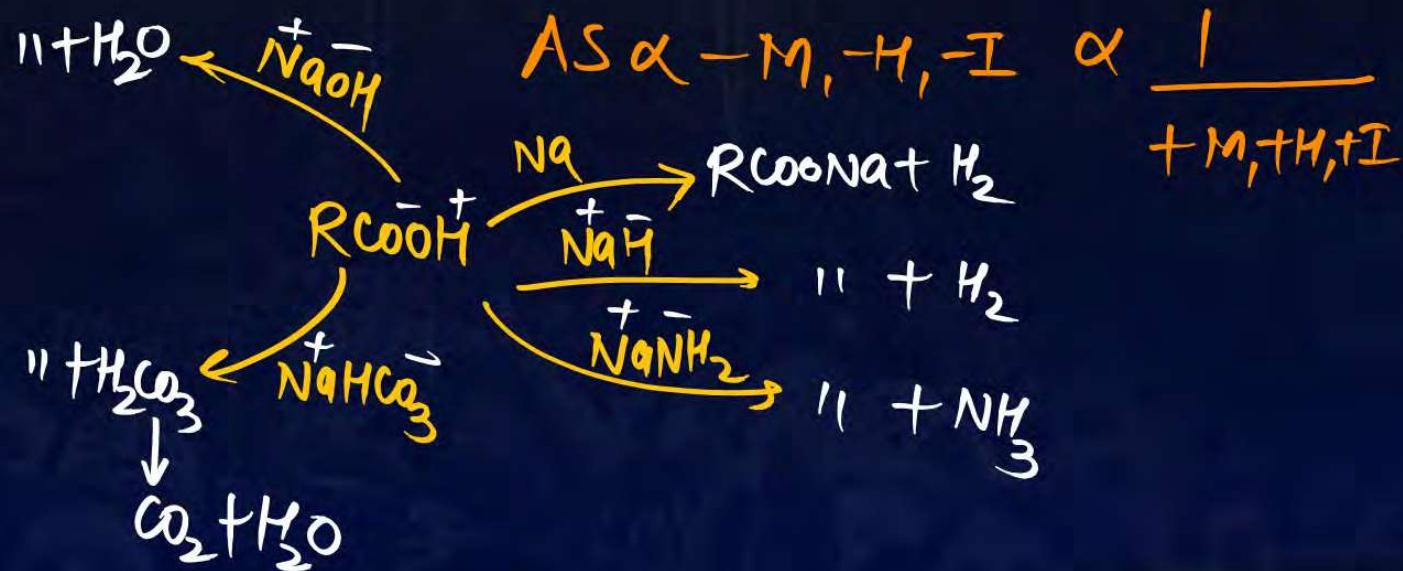
C ~~R<sub>3</sub>CO<sup>-</sup>Mg<sup>+</sup>X~~

D ~~RCOO<sup>-</sup>X<sup>+</sup>~~



## Chemical Properties of Carboxylic Acids

### 1. Acidic Strength:



C.Q. 58 (JEE Mains 2025, 24 January Shift-1)



X g of benzoic acid on reaction with aq.  $\text{NaHCO}_3$  released  $\text{CO}_2$  that occupied 11.2 L volume at STP.

X is ~~61 gms~~ g.



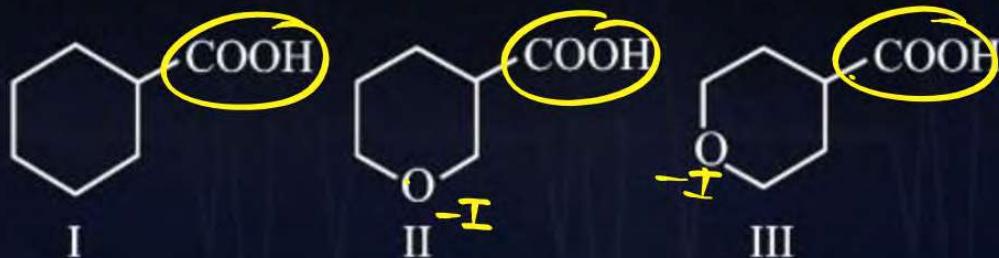
$\left(\frac{1}{2} \text{ mol}\right)$

$$\omega_{\text{PhCOOH}} = \frac{1}{2} \times 122$$

$$= 61$$

11.2 L  
STP  
 $\left(\frac{1}{2} \text{ mol}\right)$

The correct order of strengths of the carboxylic Acids is:



$\text{II} > \text{III} > \text{I}$

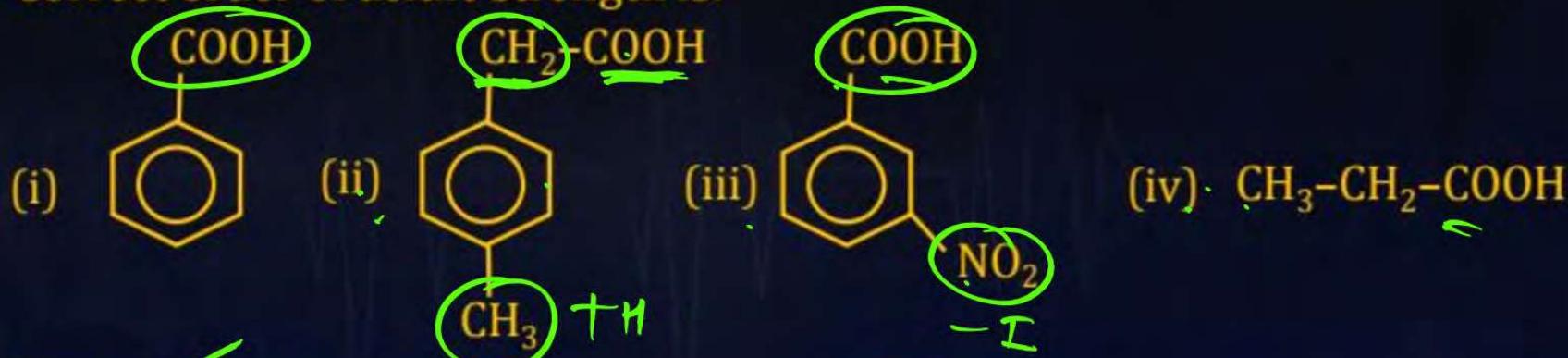
- A III > II > I
- C I > II > III

- B II > I > III
- D II > III > I

C.Q. 60 (AIIMS 2018)

PW

Correct order of acidic strength is:

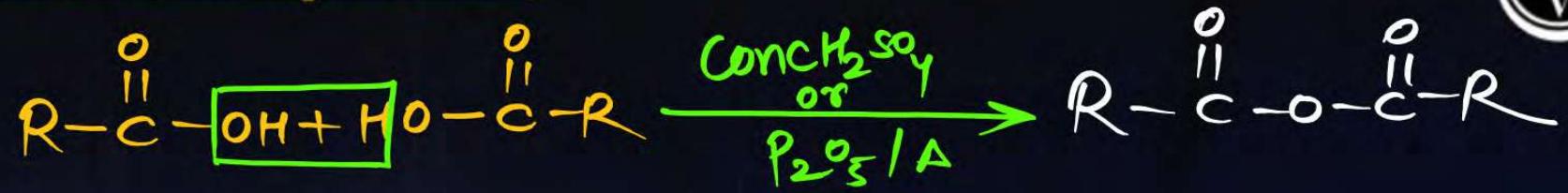


iii > i > ii > iv

- A iii > i > ii > iv  
C iv > i > ii > iii

- B i > iii > ii > iv  
D iii > iv > i > ii

## 2. Formation of anhydrides:



C.Q. 61



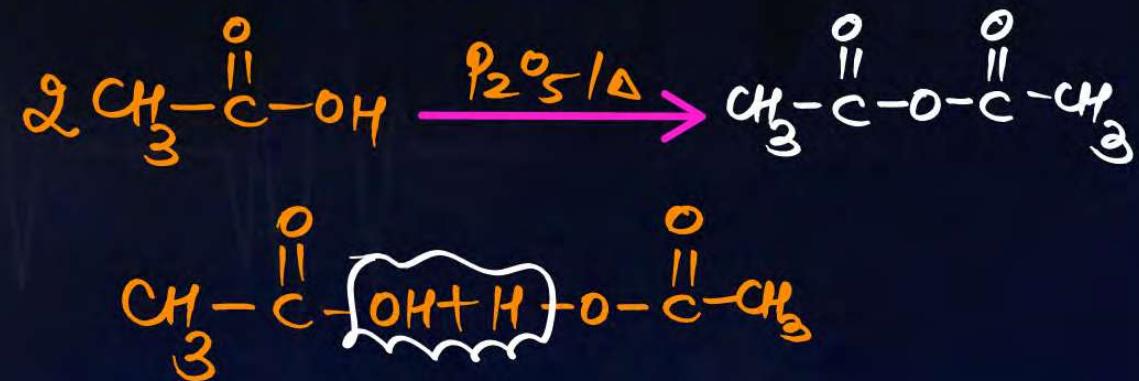
What product is formed when acetic acid heated with  $P_2O_5$ ?

A Acetyl chloride

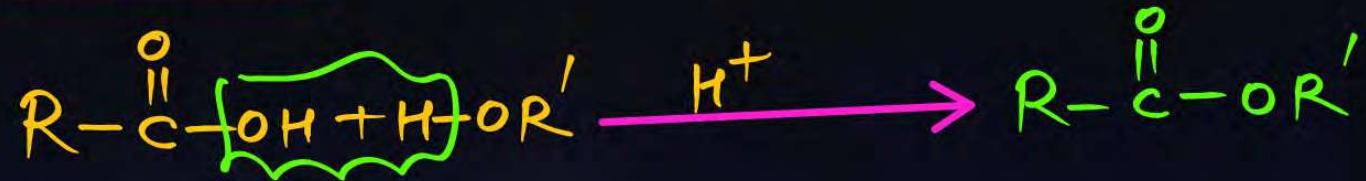
B Acetic anhydride

C Ethanoic anhydride

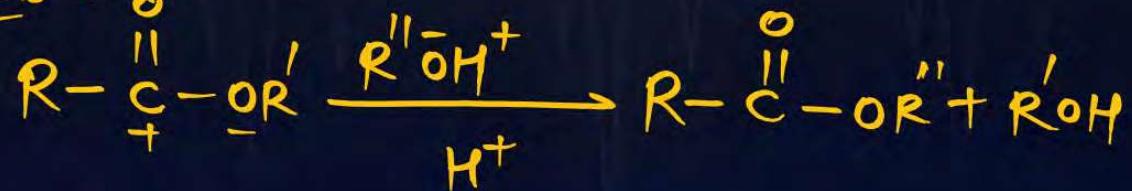
D Both (B) & (C)



### 3. Esterification:

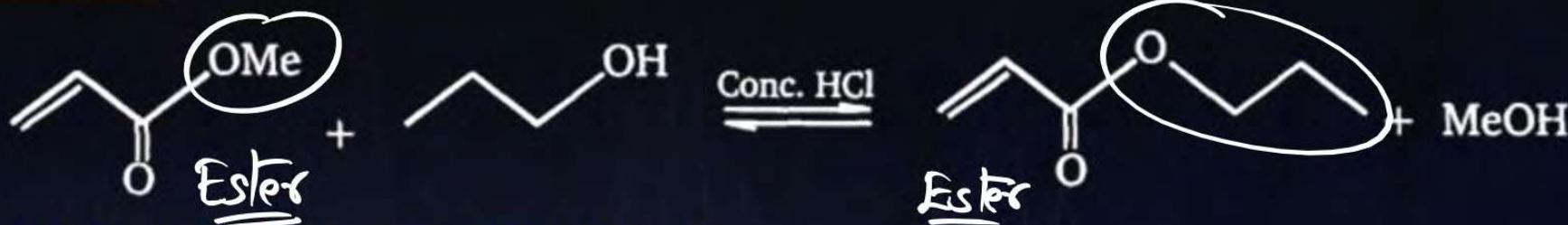


Trans-Esteri



C.Q. 62

PW



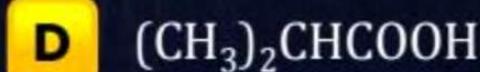
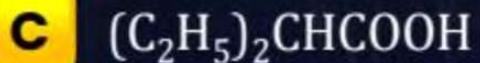
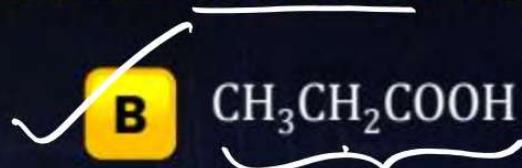
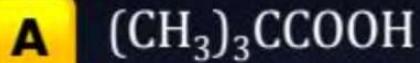
Above reaction is an example of:

- A** Esterification
- B** Saponification
- C** Hydrolysis
- D** Trans Esterification

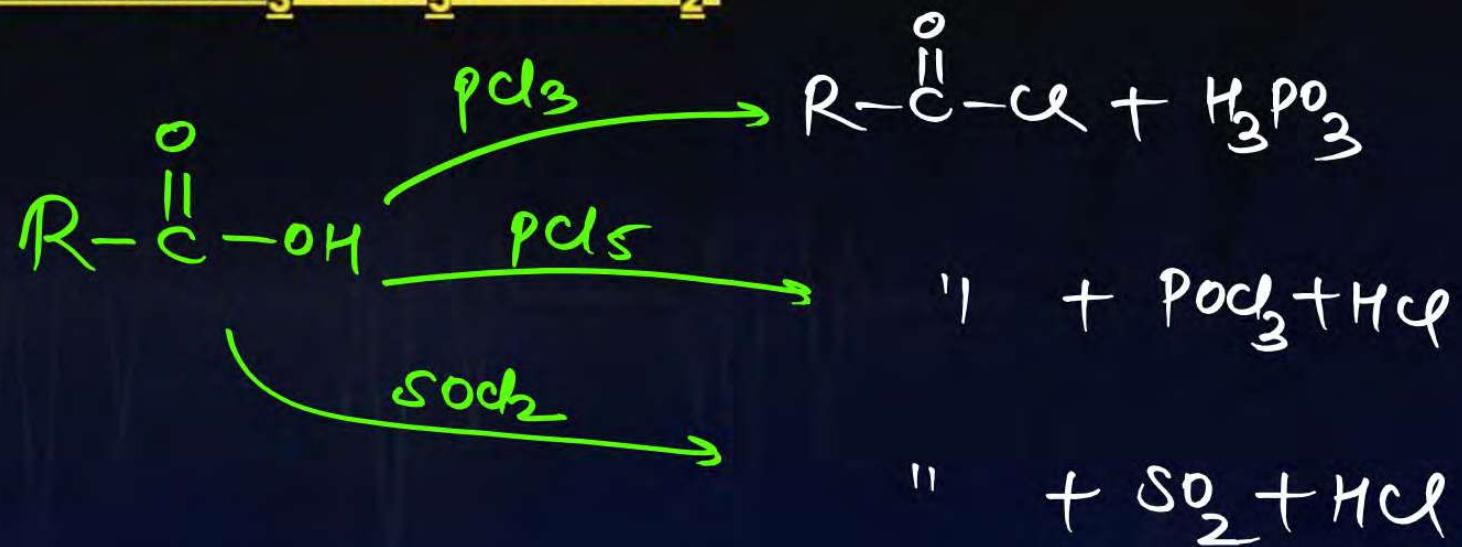
C.Q. 63



Which of the following carboxylic acids is most reactive towards esterifications?

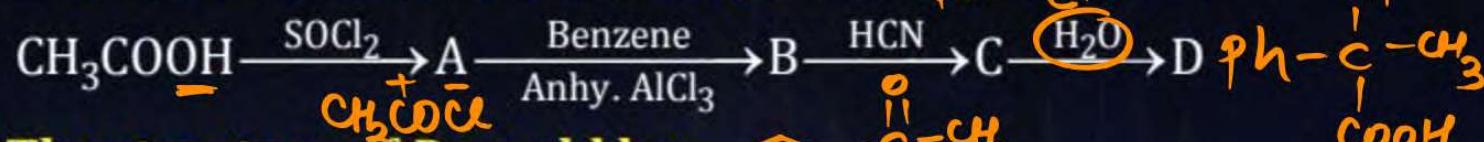


#### 4. Reaction with $\text{PCl}_3$ , $\text{PCl}_5$ & $\text{SOCl}_2$ :

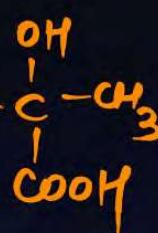


C.Q. 64 (AIPMT 2005)

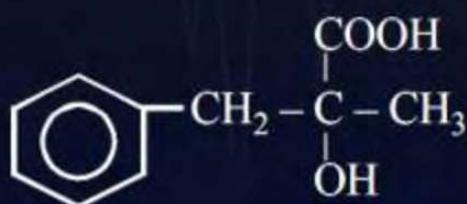
In a set of reaction acetic acid yielded a product D.



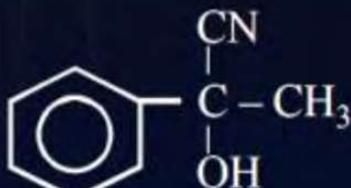
The structure of D would be:



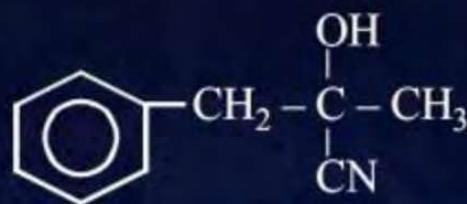
A



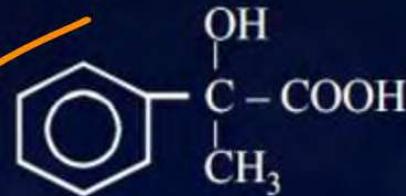
B



C



D



C.Q. 65 (AIPMT 2004)

The -OH group of an alcohol or the -COOH group of a carboxylic acid can be replaced by -Cl using

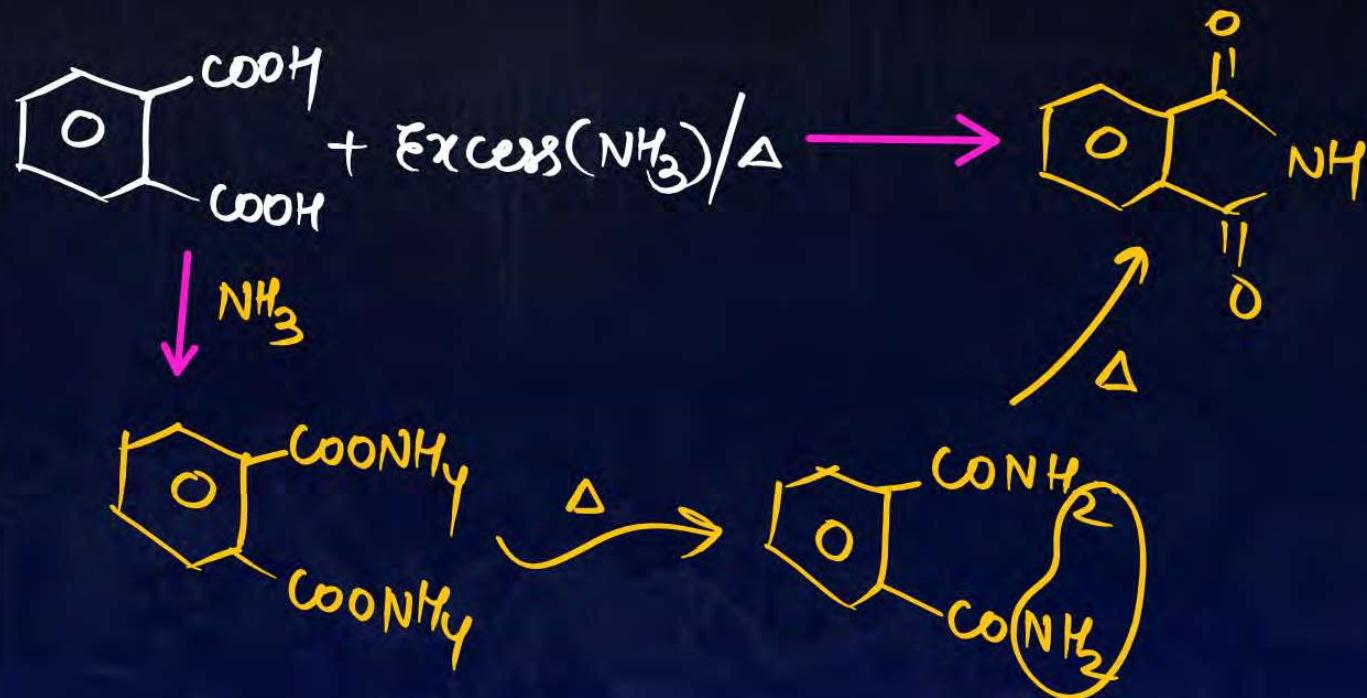
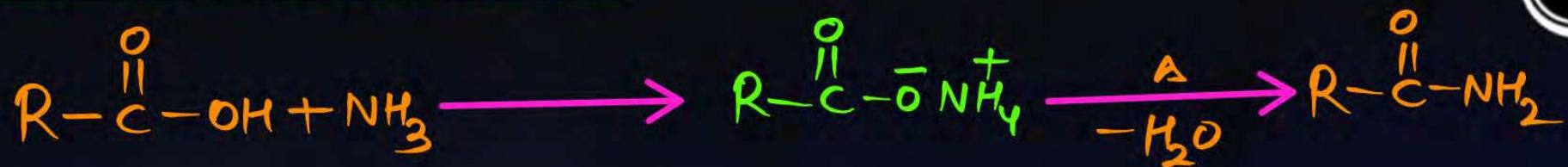
- A Phosphorus pentachloride  
 $\text{PCl}_5$

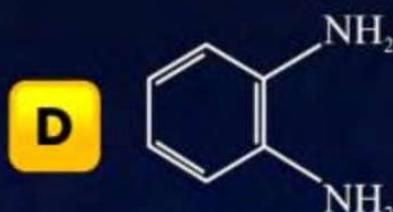
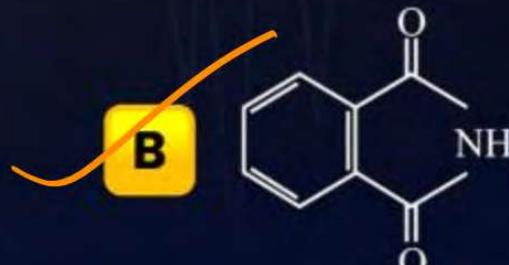
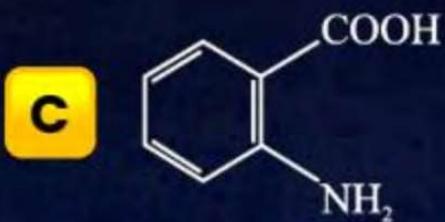
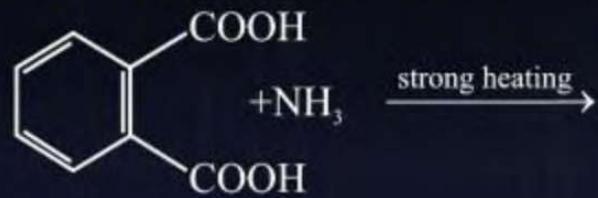
- C Chlorine  
 $\text{Cl}_2 \times$

- B Hypochlorous acid  
 $\text{HOCl} \times$

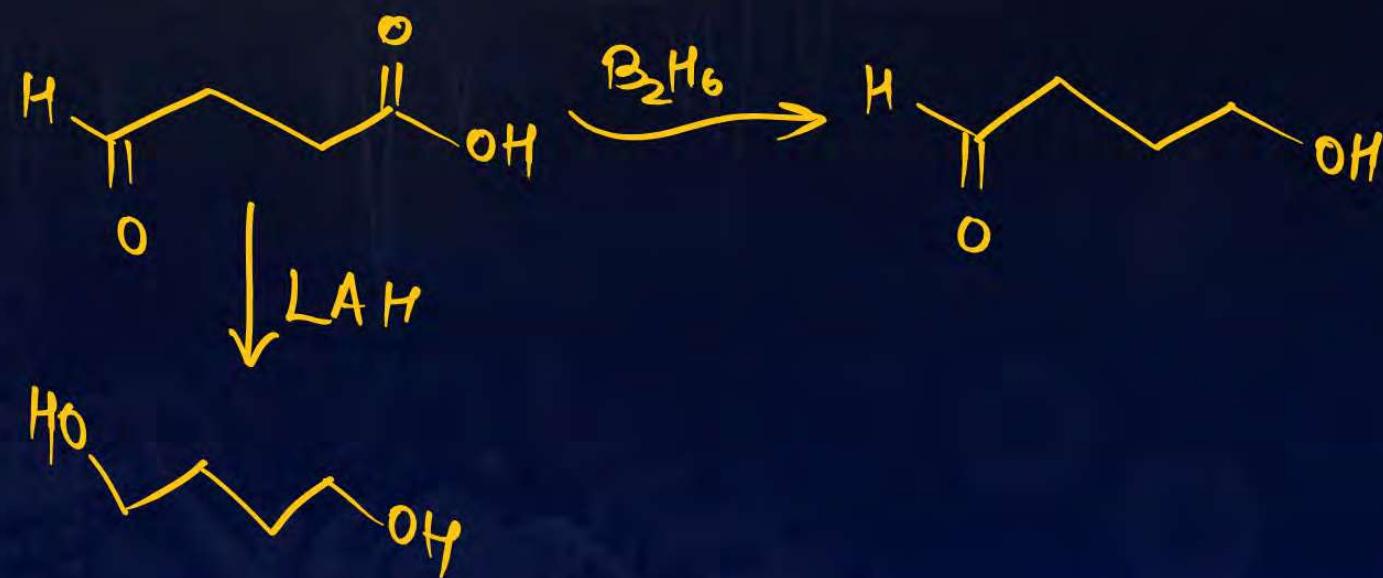
- D Hydrochloric acid  
 $\text{HCl} \times$

## 5. Reaction with ammonia:



**C.Q. 66 (NEET 2019)****The major product of the following reaction is:**

## **6. Reduction:**



C.Q. 67



Which of the following reduces carboxylic acid directly to primary alcohols?

- A  $\text{LiAlH}_4$  ✓

- B  $\text{Na} + \text{C}_2\text{H}_5\text{OH}$  ✗

- C  $\text{NaBH}_4$  ✗

- D  $\text{H}_2$  ✗

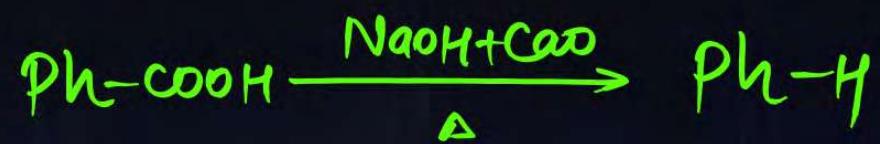
C.Q. 68

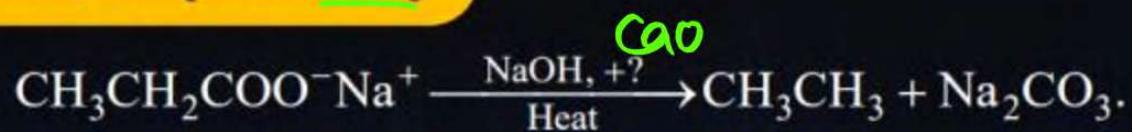


In the above reaction, D and E are respectively:

- A  $\text{CH}_3\text{CHO}$  and  $\text{CHO-CHO}$
- B  $\text{CH}_3\text{COOH}$  and  $\text{CHO-CHO}$
- C  $\text{CH}_3\text{CHO}$  and  $\text{CH}_3\text{-CH}_2\text{OH}$
- D none of these

## 7. Decarboxylation:



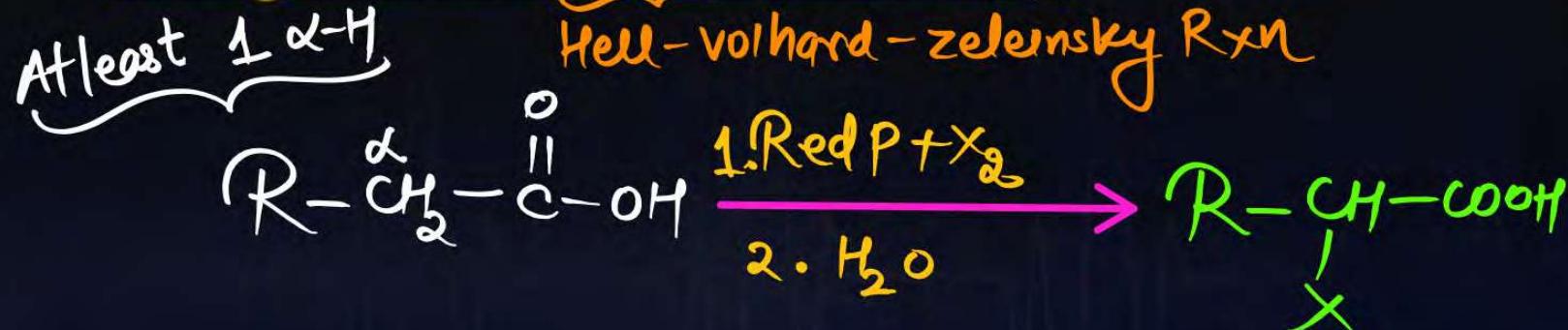
**C.Q. 69 (NEET 2021)****Consider the above reaction and identify the missing reagent/chemical.**

- A** Red Phosphorus
- B** CaO ✓
- C** DIBAL-H
- D** B<sub>2</sub>H<sub>6</sub>

## 8. Kolbe's Electrolysis:

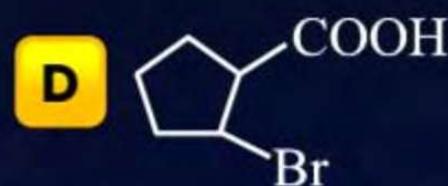
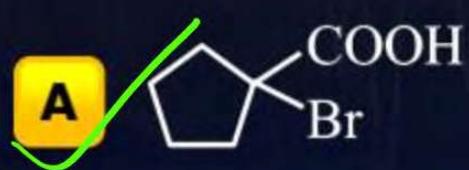
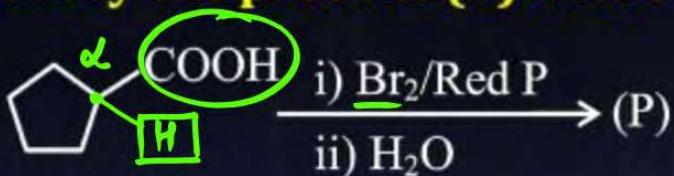


## 9. Halogenation (H.V.Z. Reaction):



C.Q. 70 (JEE Mains 8th April 2024, Morning Shift)

Identify the product (P) in the following reaction:



**Match List-I with List-II.**

	<b>List - I</b> <b>Name of reaction</b>		<b>List - II</b> <b>Reagent used</b>
(A)	Hell-Volhard Zelinsky reaction <span style="color: green; font-size: 2em;">III</span>	(I)	NaOH + I <sub>2</sub>
(B)	Iodoform reaction <span style="color: green; font-size: 2em;">I</span>	(II)	(i) CrO <sub>2</sub> Cl <sub>2</sub> , CS <sub>2</sub> (ii) H <sub>2</sub> O
(C)	Etard reaction <span style="color: green; font-size: 2em;">II</span>	(III)	(i) Br <sub>2</sub> /red phosphorus (ii) H <sub>2</sub> O
(D)	Gatterman-Koch reaction <span style="color: green; font-size: 2em;">IV</span>	(IV)	CO, HCl, anhyd. AlCl <sub>3</sub>

**Choose the correct answer from the option given below:**

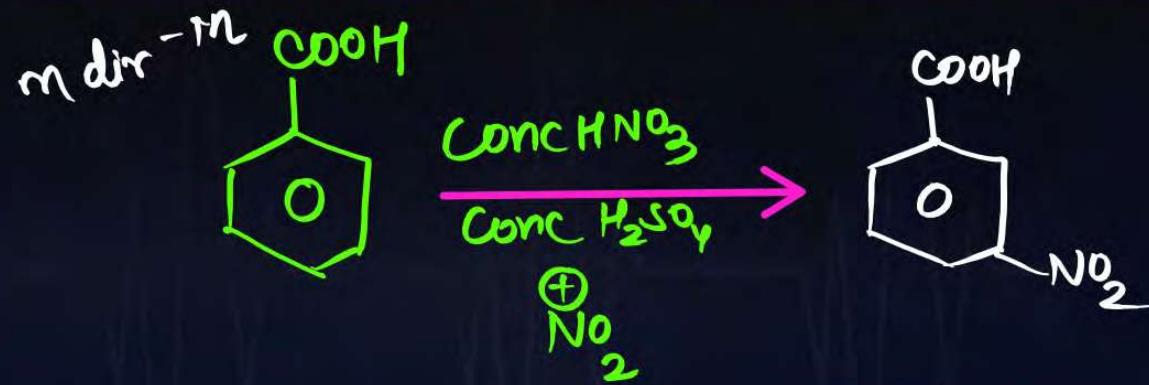
**A** (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

**B** (A)-(III), (B)-(I),(C)-(IV),(D)-(II)

**C** (A)-(I), (B)-(II),(C)-(III),(D)-(IV)

**D** (A)-(III), (B)-(I),(C)-(II),(D)-(IV)

## 10. Electrophilic Aromatic Substitution Reaction:



C.Q. 72 (AIIMS 2009)



**Assertion:** Nitration of benzoic acid gives *m*-nitrobenzoic acid.

**Reason:** Carboxyl group increases the electron-density at *meta*-position.

- A** If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.
- B** If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
- C** If Assertion is correct but Reason is incorrect.
- D** If both the Assertion and Reason are incorrect.

## Physical Properties of Aldehydes, Ketones & Carboxylic Acids:

### 1. Boiling Point

[B.P  $\propto$  MW]

$$\propto \frac{1}{\text{Branch}}$$

Carboxylic acid  $>$  AlCO  $>$  Alk | Ket  $>$  Hydrocarbon  
H-Bond  $>$  H-Bond  $\underset{\text{DM}}{\text{Alk}}$

### 2. Melting Point

[C.L.E  $\propto$  M.P]

### 3. Solubility

No. of C  $\uparrow$  Solubility  $\downarrow$

C.Q. 73 [NEET 2022]



Given below are two statements:

**Statements-I:** The boiling points of aldehydes and ketones are higher than hydrocarbons of comparable molecular mass because of weak molecular association in aldehydes and ketones due to dipole - dipole interactions.

**Statements-II:** The boiling points of aldehydes and ketones are lower than the alcohols of similar molecular mass due to the absence of H-bonding.

In the light of the above statements, choose the most appropriate answer from the options given below.

- A Statements I is incorrect but Statements II is correct.
- B Both Statements I and Statement II are correct.
- C Both Statements I and Statements II are incorrect.
- D Statements I is correct but Statements II is incorrect.

C.Q. 74 [NEET 2018]

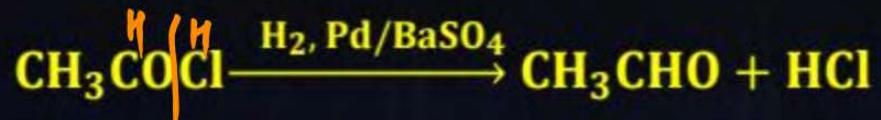


**Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their:**

- A Formation of intramolecular H-bonding. ~~X~~
- B Formation of carboxylate ion.
- C Formation of intermolecular H-bonding. ~~~~~
- D More extensive association of carboxylic acid via van der Waals force of attraction.



# Practice Problems

**QUESTION-1**

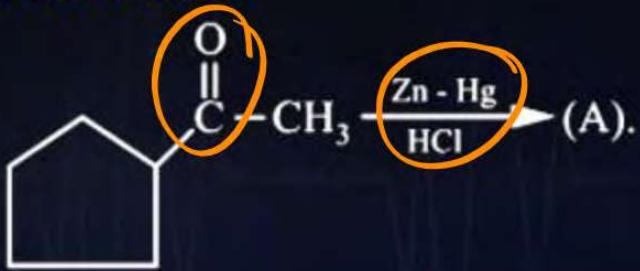
The above reaction is called;

- A** Reimer-Tiemann reaction
- B** Cannizzaro reaction
- C** Rosenmund reaction
- D** Aldol condensation reaction

## QUESTION-2



Identify (A) in reaction given below



A



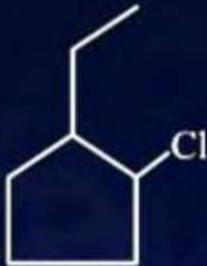
B



C



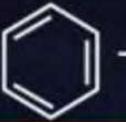
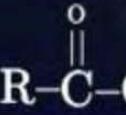
D



### QUESTION-3



**Match List-I with List-II.**

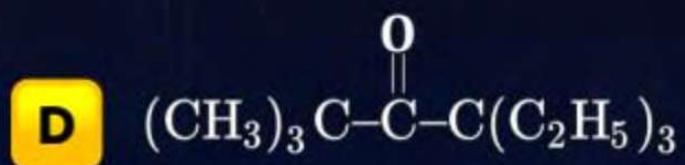
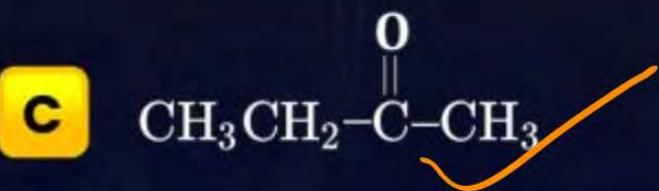
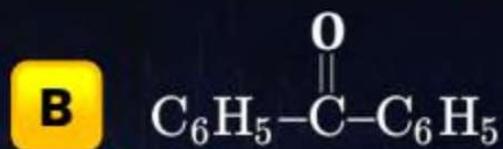
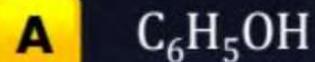
List I		List II	
A.	 $\xrightarrow[\text{Anhyd. AlCl}_3/\text{CuCl}]{\text{CO}, \text{HCl}}$ 	I.	Hell-Volhard-Zelinsky reaction
B.	 + $\underline{\text{NaOX}} \rightarrow$ 	II.	Gattermann-Koch reaction
C.	$\text{R}-\text{CH}_2-\text{OH} + \text{R}'\text{ COOH}$ $\xrightarrow{\text{Conc. H}_2\text{SO}_4}$ 	III.	Haloform reaction
D.	$\text{R}-\text{CH}_2\text{COOH} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) X}_2/\text{Red P}}$ 	IV.	Esterification

**Choose the correct answer from the options given below.**

- A** A-III, B-II, C-I, D-IV
- B** A-I, B-IV, C-III, D-II
- C** A-II, B-III, C-IV, D-I
- D** A-IV, B-I, C-II, D-III

**QUESTION-4**

Which of the following gives aldol condensation reaction?



## QUESTION-5



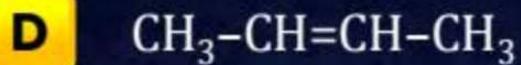
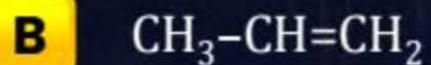
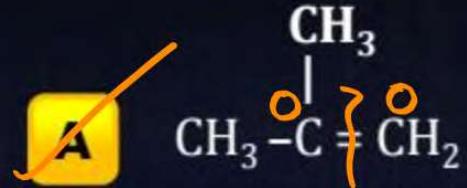
The oxidation of toluene to benzaldehyde by chromyl chloride ( $\text{CrO}_2\text{Cl}_2$ ) is called:

- A Etard reaction
- B Reimer- Tiemann reaction
- C Wurtz reaction
- D Cannizzaro's reaction

## QUESTION-6



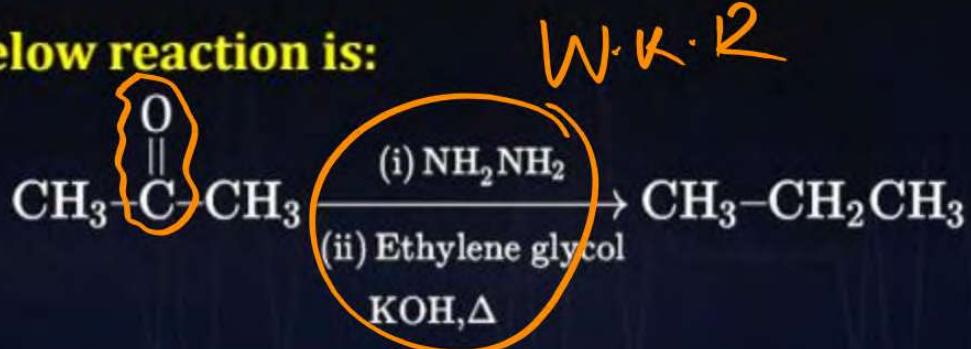
An alkene X on reductive ozonolysis gives acetone and HCHO. Alkene X is:



## QUESTION-7



The below reaction is:



- A** Clemmensen's reduction
- B** Wolff Kishner's reduction
- C** Stephen's reduction
- D** Tollen's reduction

**QUESTION-8**

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R)

~~Assertion (A): Aldehydes are less reactive towards nucleophilic addition reactions compared to ketones.~~

~~Reason (R): The presence of a hydrogen atom attached directly to the carbonyl carbon in aldehydes facilitates easier attack by nucleophiles compared to sterically hindered carbonyl carbon of ketones.~~

In the light of the above statements, choose the correct answer from the options given below:

- A A is false but R is true.
- B A is true but R is false.
- C Both A and R are true and R is the correct explanation of A.
- D Both A and R are true but R is NOT the correct explanation of A.

## QUESTION-9



The semicarbazone is formed when an aldehyde/ketone reacts with:



## QUESTION-10



When acetaldehyde is heated with Fehling's solution it gives a precipitate of;

- A Cu
- B CuO
- C Cu<sub>2</sub>O
- D CuCO<sub>3</sub>



## QUESTION-11

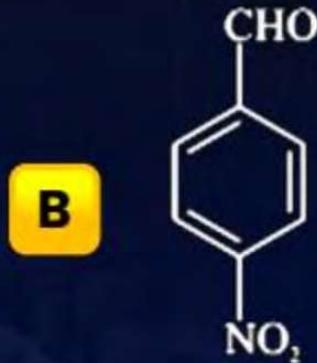
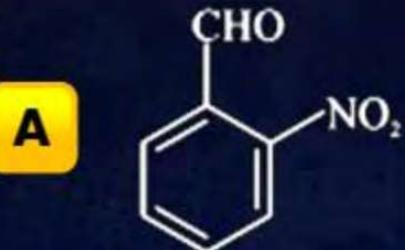
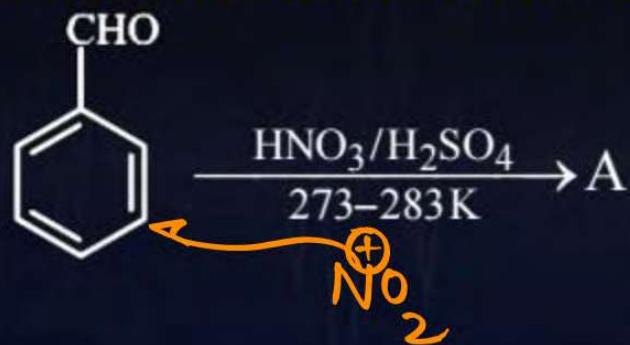


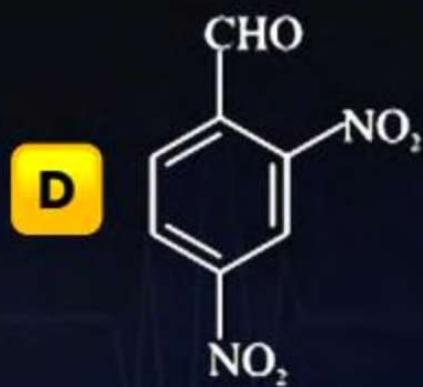
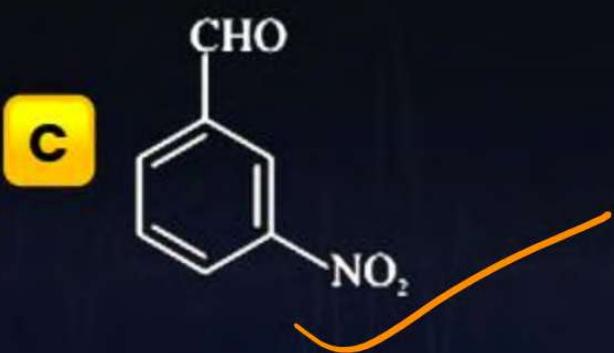
The product formed in Aldol reaction is:

- A a beta-hydroxy aldehyde or a beta-hydroxy ketone
- B an alpha-hydroxy aldehyde or ketone
- C an alpha, beta unsaturated ester
- D a beta-hydroxy acid

**QUESTION-12**

In the reaction, the product 'A' is:



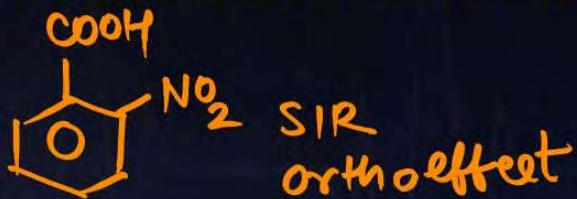


### QUESTION-13



Which of the following has the maximum acidic strength?

- A o-nitrobenzoic acid
- B m-nitrobenzoic acid
- C p-methoxybenzoic acid
- D p-nitrophenol



**QUESTION-14**

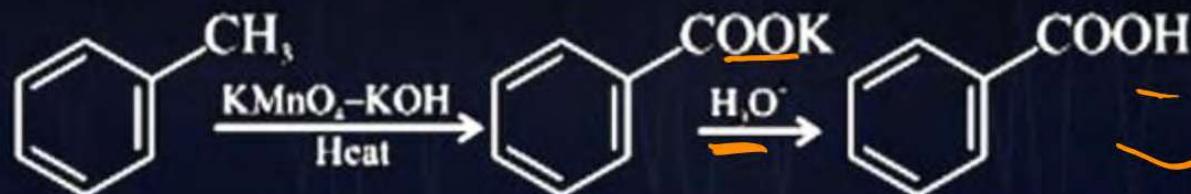
An organic compound of formula, C<sub>3</sub>H<sub>6</sub>O forms phenyl hydrazone, but gives negative Tollen's test. The compound is:



**QUESTION-15**

Given below are two statements:

Statement I: Benzoic acid can be prepared by:

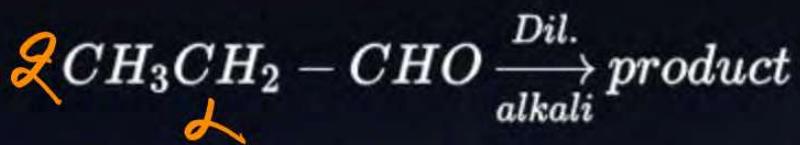


Statement II:  $\text{CF}_3\text{COOH}$  is a weaker acid than  $\text{CH}_3\text{COOH}$ .

In the light of the above statements, choose the correct answer from the options given below

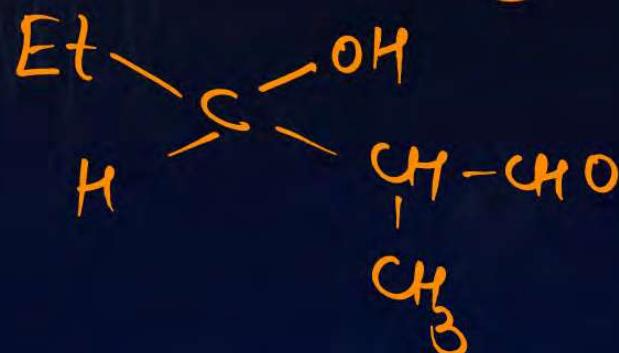
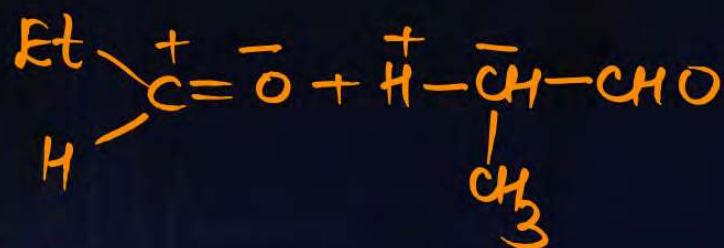
- A** Statement I is correct but Statement II is incorrect. 
- B** Statement I is incorrect but Statement II is correct.
- C** Both Statement I and Statement II are correct.
- D** Both Statement I and Statement II are incorrect.

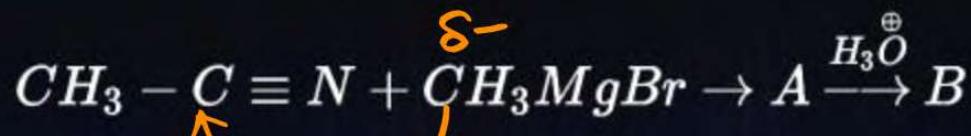
**QUESTION-16**



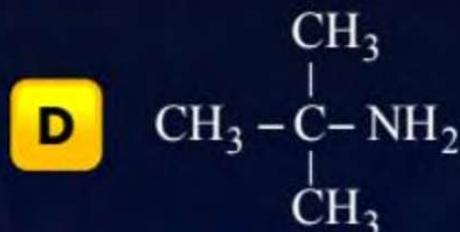
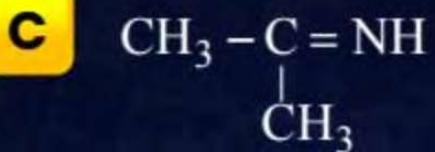
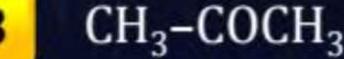
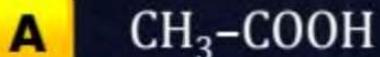
The product in the above reaction is:

- A  $\text{CH}_3\text{CH}_2\text{COOH}$
- B  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- C  $\text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{CHO}$
- D  $\checkmark \text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \underset{\text{CH}_3}{\text{CH}} - \text{CHO}$



**QUESTION-17**

The final product 'B' in the above reaction is:



## QUESTION-18



Iodoform test is not given by;

A

Pentan-2-one



B

Butan-2-one



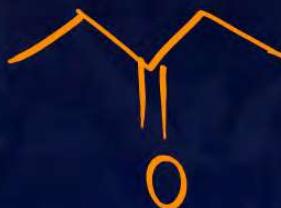
C

Propanone



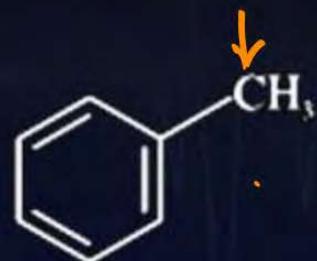
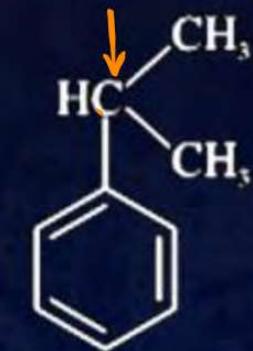
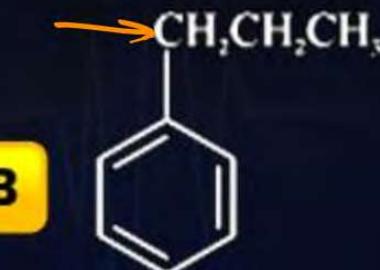
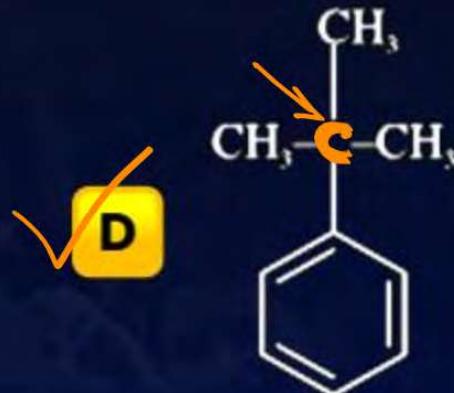
D

Pentan-3-one



**QUESTION-19**

Which of the following cannot be oxidized to give carboxylic acid?

**A****C****B****D**

## QUESTION-20



Given below are two statements:

~~Statement I: LiAlH<sub>4</sub> converts ketones into secondary alcohols.~~

~~Statement II: Propanal and propone cannot be distinguished by iodoform test.~~



In the light of the above statements, choose the correct answer from the options given below:

A Statement I is incorrect, but Statement II is correct.

B Statement I is correct, but Statement II is incorrect.

C Both Statement I and Statement II are correct.

D Both Statement I and Statement II are incorrect.

**FREE**



# प्रेरणा NEET

**PYQ TEST SERIES 2025**

**ENGLISH & HINDI**



**8 ONLINE TESTS**

In PW APP & WEB



**ALL INDIA RANK**

In case of live attempt



**DETAILED REPORT**

Subject, Chapter & Topic Level Report



**EXPERT ANALYSIS**

Paper discussion by PW faculties



**JUMBLED PYQs**

Mimicking the Actual NEET Exam



**TARGETED REVISION**

Best for NEET 2025 preparation