

# Carboxylic Acids and Its Derivatives

## Question1

**Statement - I : Reduction of ester by DIABL-H followed by hydrolysis gives aldehyde.**

**Statement - II : Oxidation of benzyl alcohol with aqueous  $\text{KMnO}_4$  leads to the formation to Benzaldehyde.**

**Among the above statements, identify the correct statement.**

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**Options:**

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

**Answer: B**

**Solution:**

Statement I is true, and Statement II is false.

DIBAL-H (diisobutylaluminium hydride) at low temperature selectively reduces an ester to the corresponding aldehyde upon work-up.

Aqueous  $\text{KMnO}_4$  oxidizes benzyl alcohol all the way to benzoic acid, not benzaldehyde.

Answer: Option B.

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## Question2

Which of the following has most acidic Hydrogen ?

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Options:

- A. Propanoic acid
- B. Dichloroacetic acid
- C. Trichloroacetic acid
- D. Chloroacetic acid

**Answer: C**

**Solution:**

Trichloroacetic acid (Option C) is the strongest acid. Here's why:

Electron-withdrawing effect

Chlorine atoms pull electron density away from the  $-\text{COOH}$  group, stabilizing the conjugate base (the carboxylate anion).

More Cl  $\rightarrow$  greater stabilization  $\rightarrow$  stronger acid.

Comparative pKa values

Propanoic acid,  $\text{CH}_3\text{CH}_2\text{COOH}$ :  $\text{pK}_a \approx 4.87$

Chloroacetic acid,  $\text{ClCH}_2\text{COOH}$ :  $\text{pK}_a \approx 2.86$

Dichloroacetic acid,  $\text{Cl}_2\text{CHCOOH}$ :  $\text{pK}_a \approx 1.25$

Trichloroacetic acid,  $\text{CCl}_3\text{COOH}$ :  $\text{pK}_a \approx 0.66$

Since trichloroacetic acid has the lowest pKa, it donates its proton most readily and is thus the most acidic.

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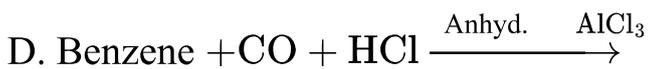
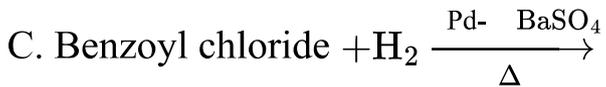
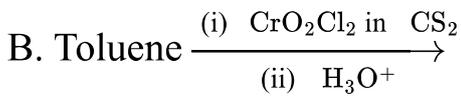
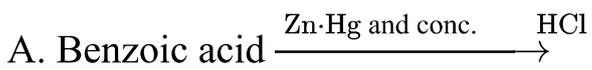
## Question3

Reaction by which benzaldehyde cannot be prepared is



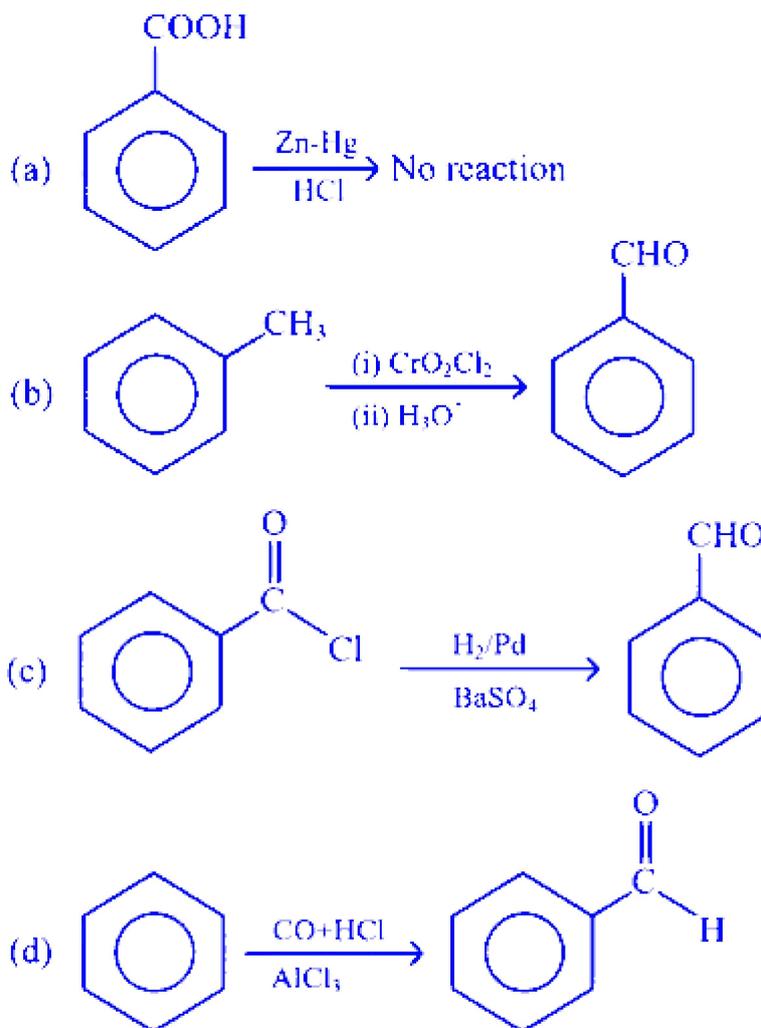
# KCET 2022

## Options:



**Answer: A**

## Solution:



## Question4

Ethanoic acid undergoes Hell-Volhard Zelinsky reaction but methanoic acid does not, because of

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Options:

- A. presence of  $\alpha$ -H atom in ethanoic acid
- B. absence of  $\alpha$ -H atom in ethanoic acid
- C. higher acidic strength of ethanoic acid than methanoic acid
- D. presence of  $\alpha$ -H atom in methanoic acid

Answer: A

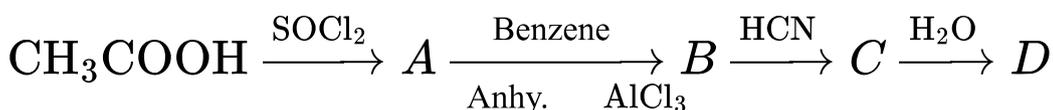
Solution:

Ethanoic acid has  $\alpha$ -H atom, thus it undergoes Hell-Volhard Zelinsky reaction. Whereas methanoic acid does not has  $\alpha$ -H atom, thus it does not give this test.

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## Question5

In set of reactions, identify *D*

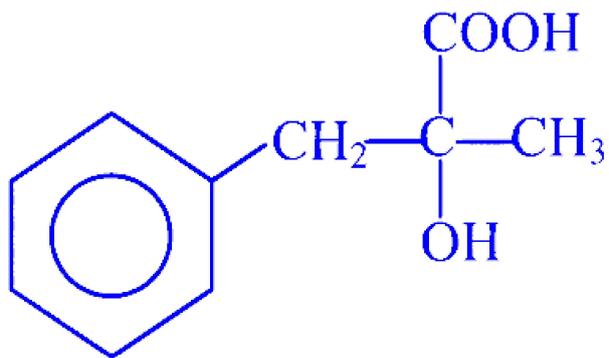


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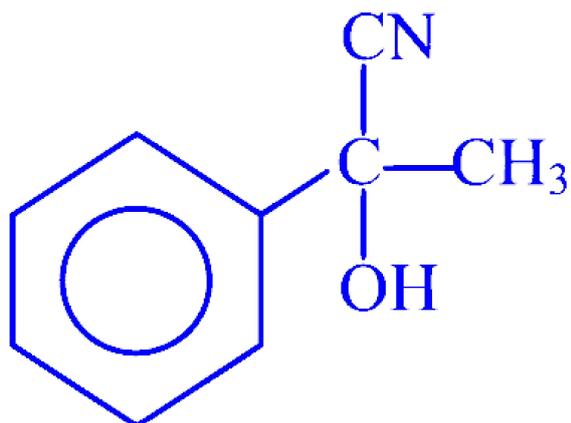
Options:



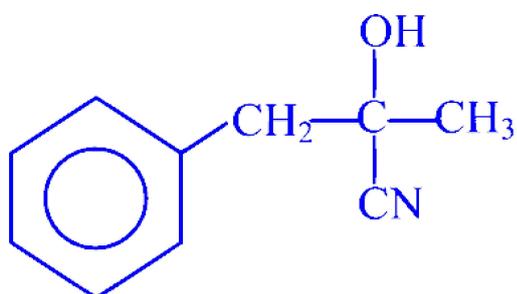
A.



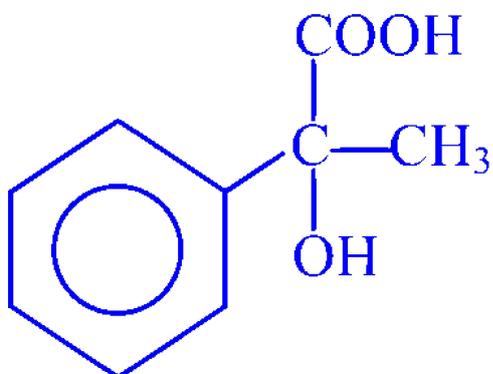
B.



C.



D.





## Question6

The reagent which can do the conversion  $\text{CH}_3\text{COOH} \longrightarrow \text{CH}_3 - \text{CH}_2 - \text{OH}$  is

### KCET 2021

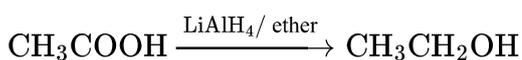
Options:

- A.  $\text{LiAlH}_4$ / ether
- B.  $\text{H}_2$ , Pt
- C.  $\text{NaBH}_4$
- D. Na and  $\text{C}_2\text{H}_5\text{OH}$

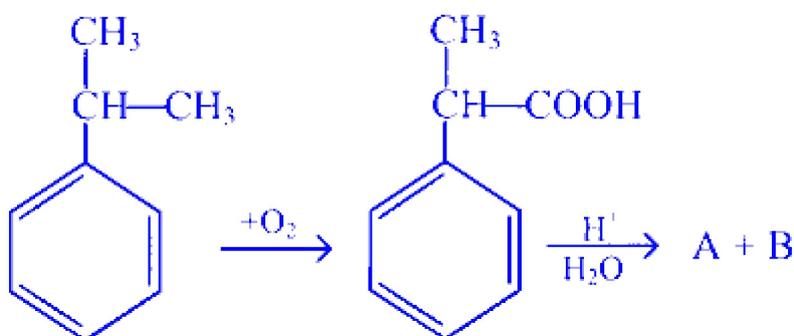
**Answer: A**

### Solution:

$\text{LiAlH}_4$ /ether is a reducing agent, thus it can reduce carboxylic acid (in this case is acetic acid) to alcohols (in this case is ethanol). The overall reaction is as follows



## Question7



The product 'A' gives white precipitate when treated with bromine water. The product 'B' is treated with barium hydroxide to give the

product *C*. The compound *C* is heated strongly to form product *D*.  
The product *D* is

## KCET 2021

Options:

A. 4-methylpent-3-en-2-one

B. but-2 enal

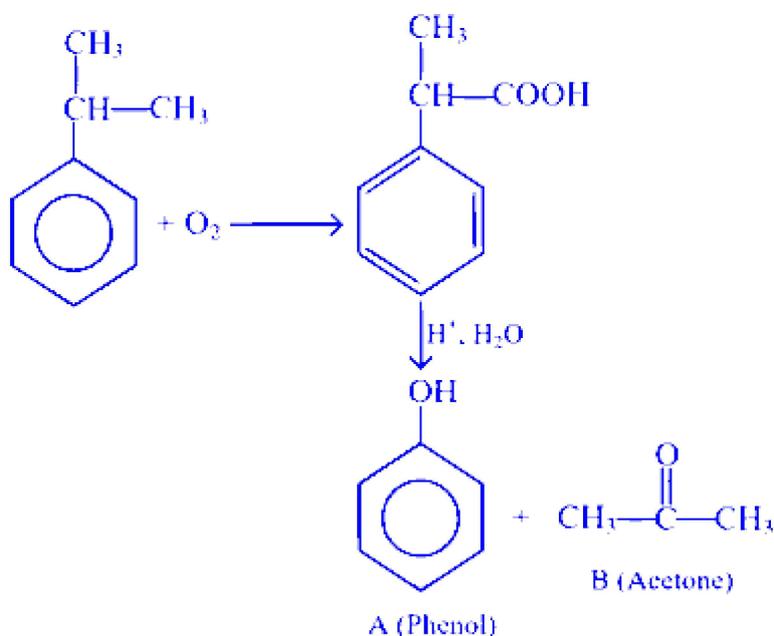
C. 3-methylpent-3-en-2-one

D. 2-methylbut-2-enal

**Answer: A**

## Solution:

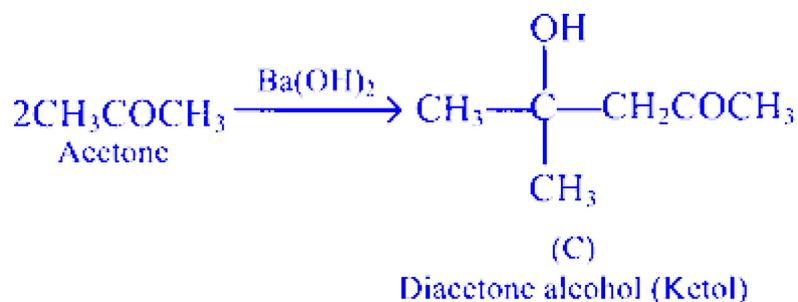
The given reaction take place in following way



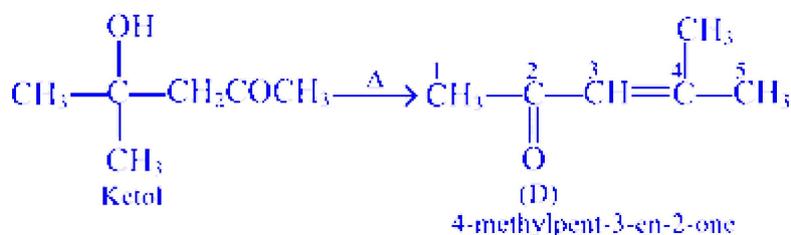
Phenol gives white ppt. with bromine water.

Acetone when treated with  $Ba(OH)_2$  undergoes aldol condensation as follows





On heating further, ketol gives 4-methylpent-3-en-2-one



∴ The product D is 4-methylpent-3-en-2-one.

## Question8

**Propanoic acid undergoes HVZ reaction to give chloropropanoic acid. The product obtained is**

### KCET 2019

**Options:**

- A. stronger acid than propanoic acid
- B. as stronger as propanoic acid
- C. weaker acid than propanoic acid
- D. stronger than dichloropropanoic acid

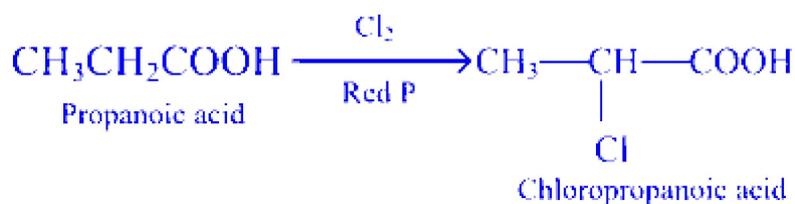
**Answer: A**

**Solution:**

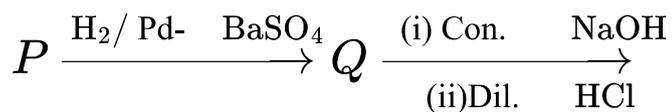
Propanoic acid undergoes HVZ reaction to give chloropropanoic acid. The product obtained is stronger acid than propanoic acid because chloropropanoic acid contain EWG. (Cl-group) that increases the stability of the carboxylate ion by dispersing the negative charge.



Reaction involved is as follows



## Question9



*R* and *S* form benzyl benzoate when treated with each other. Hence *P* is

### KCET 2019

Options:

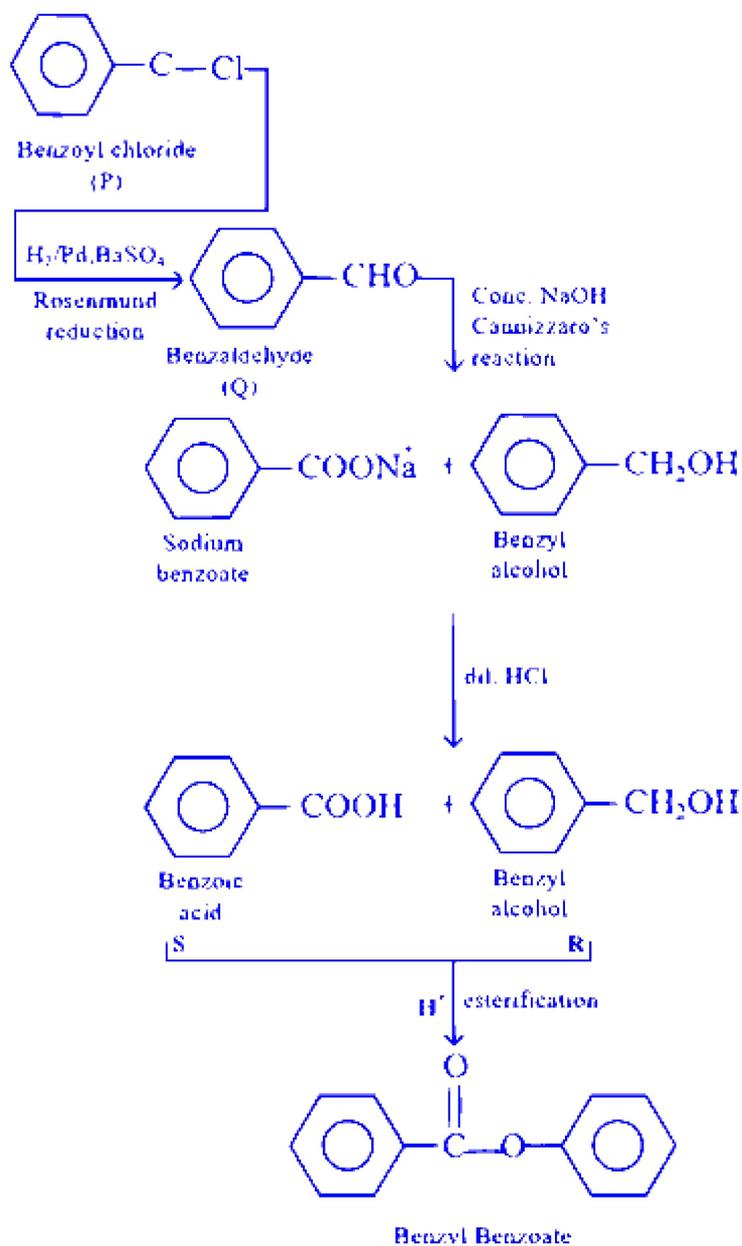
- A.  $\text{C}_6\text{H}_5\text{CHO}$
- B.  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
- C.  $\text{C}_6\text{H}_5\text{COCl}$
- D.  $\text{C}_6\text{H}_5\text{COOH}$

**Answer: C**

**Solution:**

In the given reaction, *P* is benzoyl chloride, *Q* is benzaldehyde, *R* is benzylalcohol and *S* is benzoic acid.





## Question10

Lower members of aliphatic carboxylic acid are soluble in water. This is due to

KCET 2017

Options:

- A. formation of hydrogen bonds with water
- B. due to London forces
- C. water is non electrolyte

D. van der-Waal's interaction with water molecules

**Answer: A**

### **Solution:**

The lower members of the aliphatic carboxylic acid family, specifically those with carbon chains up to C<sub>4</sub>, are highly soluble in water. This high solubility is primarily attributed to the formation of hydrogen bonds between the carboxyl group (COOH) of the acid and water molecules.

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