Carboxylic Acids and Its Derivatives

Question1

Which among the following is dicarboxylic acid?

MHT CET 2025 5th May Evening Shift

Options:

A.

Valeric acid

B.

Caproic acid

C.

Glutaric acid

D.

Butyric acid

Answer: C

Solution:

Name	Formula
Valeric acid	$CH_3CH_2CH_2CH_2COOH$
Caproic acid	$CH_3(CH_2)_4COOH$
Glutaric acid	$COOH(CH_2)_3COOH$
Butyric acid	$CH_3CH_2CH_2COOH$

Question2

Identify ' B ' in the following sequence of reactions.

$$\text{Acetic acid} \xrightarrow[\Delta]{\text{Thionyl chloride}} \text{A} \xrightarrow{\text{Ammonia}} \text{B}$$

MHT CET 2025 26th April Evening Shift

Options:

A.

Ethyl amine

B.

Ammonium acetate

C.

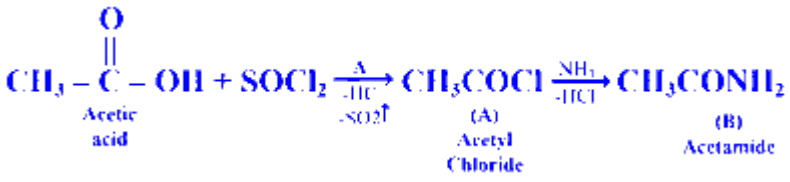
Acetyl chloride

D.

Acetamide

Answer: D

Solution:



Question3

Which among the following has highest boiling point?

MHT CET 2025 26th April Morning Shift

Options:

A. Butyric acid

B. Valeric acid

C. Acetic acid

D. Formic acid

Answer: B

Solution:

$T_b \propto$ Mw as heavier molecules show higher Vander Waal forces.

Boiling point increases as molar mass increases.

Butyric acid: $CH_3CH_2CH_2COOH$

Valeric acid: $CH_3CH_2CH_2CH_2COOH$

Acetic acid: CH_3COOH

Formic acid: HCOOH

Among the following, valeric acid has the highest boiling point.

Question4

Identify the product formed in the following reaction.

$(CH_3CO)_2O \xrightarrow{H_2O}$ **Product**

MHT CET 2025 25th April Evening Shift

Options:

A. CH_3COCH_3

B. $CH_3 - CHO$

C. $CH_3 - OH$

D. CH_3COOH

Answer: D

Solution:

Anhydrides on hydrolysis gives carboxylic acids.

$$\underset{\text{Acetic anhydride}}{(CH_3CO)_2O} \xrightarrow{H_2O} \underset{\text{Acetic acid}}{2CH_3COOH}$$

Question5

Identify the product formed in the following reaction.

$$C_6H_5 - CH_2 - CH_3 \xrightarrow[ii)\ H_3O^+]{i)\ alk.\ KMnO_4} \textbf{Product}$$

MHT CET 2025 25th April Evening Shift

Options:

A. $C_6H_5 - CH_2 - COOH$

B. $C_6H_5CH_2 - CH_2 - COOH$

C. $C_6H_5 - OH$

D. $C_6H_5 - COOH$

Answer: D

Solution:

$$\underset{\text{(Ethylbenzene)}}{C_6H_5 - CH_2 - CH_3} \xrightarrow[(ii)\ H_3O^-]{(i)\ alk.KMnO_4} \underset{\text{(Benzoic acid)}}{C_6H_5 - COOH}$$

Question6

Which among the following is NOT dicarboxylic acid?

MHT CET 2025 25th April Morning Shift

Options:

A. Malonic acid

B. Caproic acid

C. Glutaric acid

D. Succinic acid

Answer: B

Solution:

- **Malonic acid** → HOOC–CH_2–COOH → has **two –COOH groups** ✅ (dicarboxylic acid).
- **Caproic acid** → CH_3–$(CH_2)_4$–COOH → has **only one –COOH group** ❌ (monocarboxylic acid).
- **Glutaric acid** → HOOC–$(CH_2)_3$–COOH → has **two –COOH groups** ✅ (dicarboxylic acid).
- **Succinic acid** → HOOC–$(CH_2)_2$–COOH → has **two –COOH groups** ✅ (dicarboxylic acid).

✅ **Correct Answer: Option B — Caproic acid**

Question7

Identify ' A ' in the following reaction.

$\mathbf{A + \text{Acetic anhydride} \xrightarrow{H^+} \text{Aspirin} + \text{Acetic acid}}$

MHT CET 2025 23rd April Evening Shift

Options:

A. Acrylic acid

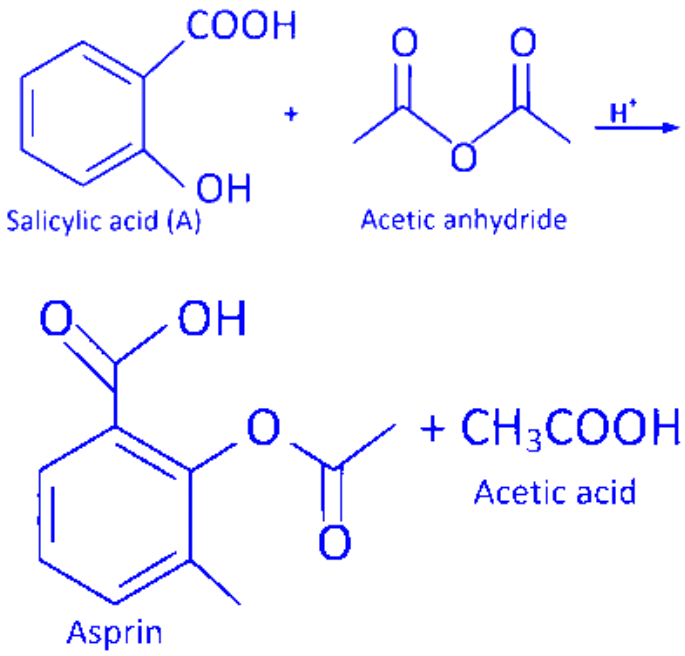
B. Oxalic acid

C. Salicylic acid

D. Phthalic acid

Answer: C

Solution:



Question8

Identify substrate ' S ' in the following reaction.

$$\mathrm{S} \xrightarrow{\text{Dimethylcadmium}} \text{Propanone} + \text{Cadmium chloride}$$

MHT CET 2025 23rd April Morning Shift

Options:

A. Ethyl chloride

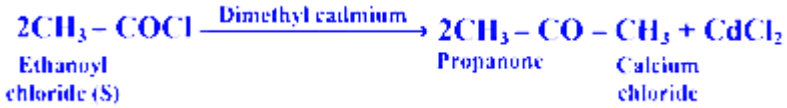
B. Ethylene dichloride

C. Ethanoyl chloride

D. Ethylidene dichloride

Answer: C

Solution:



Question9

In a reaction,

$$(CH_3)_2CHMgBr + CO_2 \xrightarrow[\text{ether}]{\text{dry}} A \xrightarrow[\text{dilHCl}]{\text{H.OH}} B.$$

Find the product ' B ' of above reaction.

MHT CET 2025 22nd April Evening Shift

Options:

A. Propanoic acid

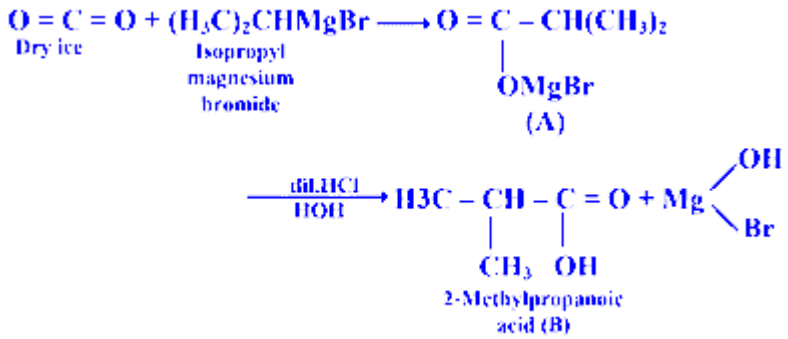
B. 2-Methyl propanoic acid

C. Butanoic acid

D. 2,2-Dimethyl ethanoic acid

Answer: B

Solution:



Question10

Identify the reagent used in the following reaction.

Benzoic acid $\xrightarrow{\text{Reagent}}$ Benzoyl chloride + Phosphorus oxychloride + Hydrogen chloride

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Options:

A. PCl_3

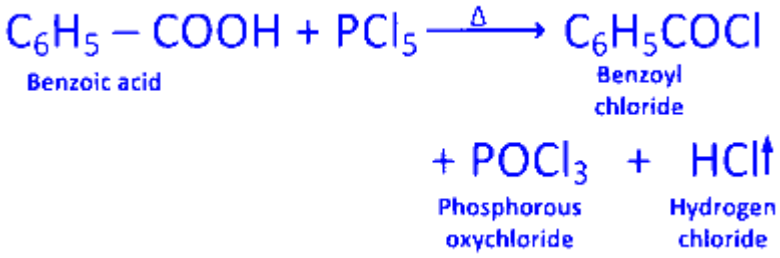
B. HCl

C. PCl_5

D. $SOCl_2$

Answer: C

Solution:



Question11

Identify the product ' B ' in following reaction.

Dry ice $\xrightarrow[\text{dry ether}]{CH_3MgBr}$ A $\xrightarrow{H_3O^+}$ B

MHT CET 2025 22nd April Morning Shift

Options:

A. Methanoic acid

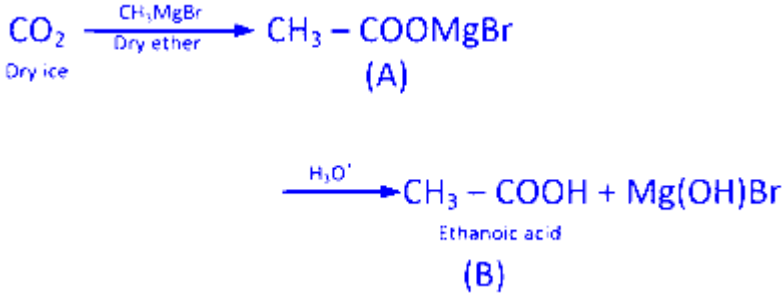
B. Ethanoic acid

C. Methanol

D. Ethanol

Answer: B

Solution:



Question12

Which from following compounds is obtained when acetamide is warmed with bromine and excess conc. $KOH_{(aq)}$ solution?

MHT CET 2025 21st April Evening Shift

Options:

A. CH_4

B. $CH_3CH_2NH_2$

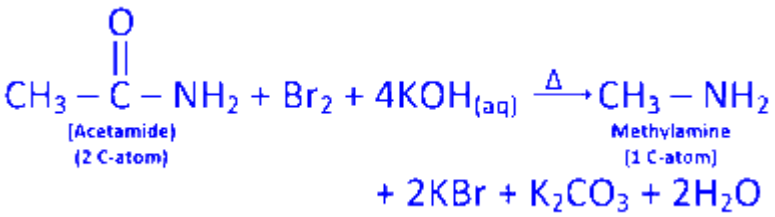
C. CH_3COOH

D. CH_3NH_2

Answer: D

Solution:

Hoffmann bromaamide reaction can be given as follows:



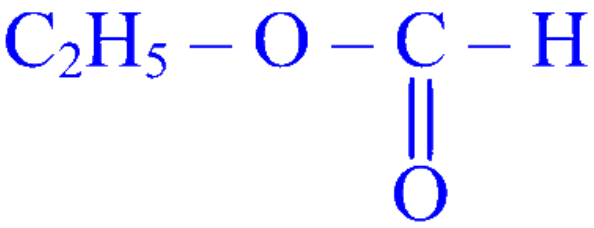
Question13

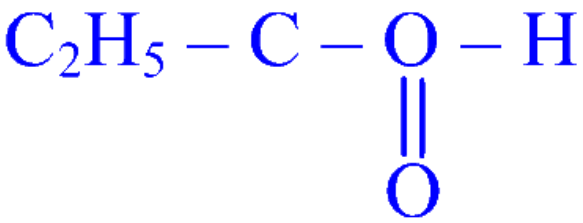
Methyl propanoate on hydrolysis with dil NaOH forms a salt that on further acidification with conc. HCl forms

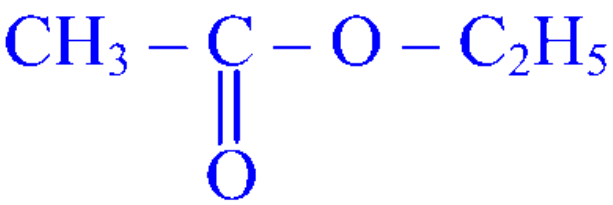
MHT CET 2025 21st April Evening Shift

Options:

A. $CH_3 - COOH$

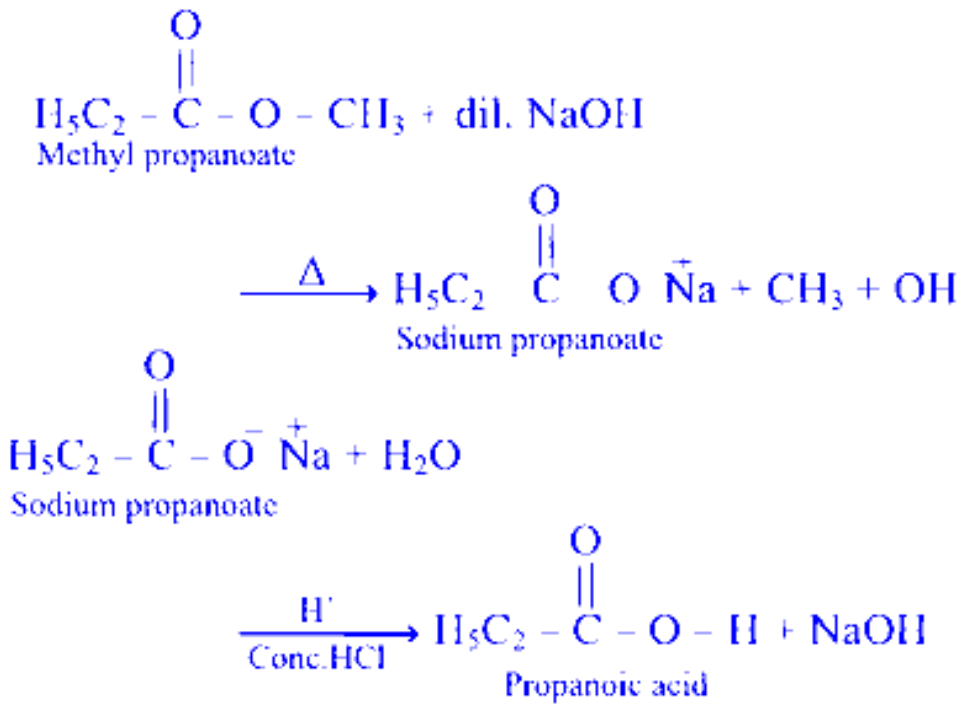
B. 

C. 

D. 

Answer: C

Solution:



Question14

Identify the correct decreasing order of boiling points for different organic compounds from following.

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Options:

A. Carboxylic acids > Amines > Alcohols

B. Carboxylic acids > Alcohols > Amines

C. Amines > Alcohols > Carboxylic acids

D. Alcohols > Amines > Carboxylic acids

Answer: B

Solution:

Carboxylic acids, alcohols, and amines all have intermolecular hydrogen bonding, but their boiling points differ due to the strength of hydrogen bonding and molecular interactions.

Carboxylic acids form very strong hydrogen bonds (even dimerize), so they have the highest boiling points among the three.

Alcohols form moderate hydrogen bonds.

Amines form the weakest hydrogen bonds (compared to the above two).

Correct decreasing order:

Carboxylic acids > Alcohols > Amines

So, the correct answer is:

Option B

Carboxylic acids > Alcohols > Amines

Question15

Which among the following functional groups is reduced by diborane?

MHT CET 2025 20th April Evening Shift

Options:

A. -COOR

B. -COOH

C. $-NO_2$

D. -X

Answer: B

Solution:

Diborane (B_2H_6) is a reducing agent that specifically reduces carboxylic acids ($-COOH$) to primary alcohols. It does **not** usually reduce esters ($-COOR$), nitro groups ($-NO_2$), or halides ($-X$).

Correct option:

Option B: $-COOH$

Question16

Which among the following is NOT dicarboxylic acid?

MHT CET 2025 20th April Morning Shift

Options:

A. Adipic acid

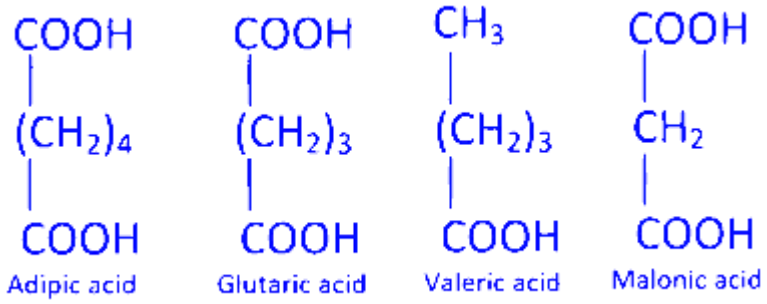
B. Glutaric acid

C. Valeric acid

D. Malonic acid

Answer: C

Solution:



Question17

Identify the product ' B ' in the following sequence of reactions.

$$\text{Methylpropanoate} \xrightarrow[\text{dil. NaOH}]{\Delta} A \xrightarrow[\text{Conc. HCl}]{H^+} B$$

MHT CET 2025 20th April Morning Shift

Options:

A. sodium propanoate

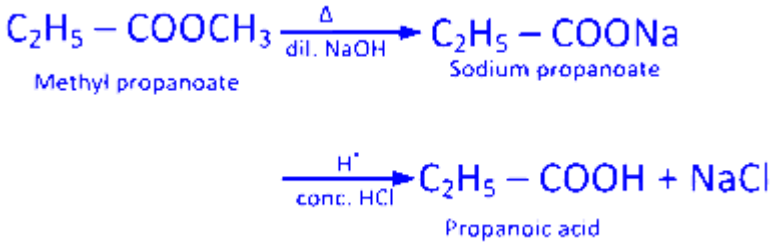
B. propanone

C. propanal

D. propanoic acid

Answer: D

Solution:



Question18

Cyclohexene on oxidation with $KMnO_4$ in dil. H_2SO_4 forms

MHT CET 2025 19th April Evening Shift

Options:

A. Cyclohexanol

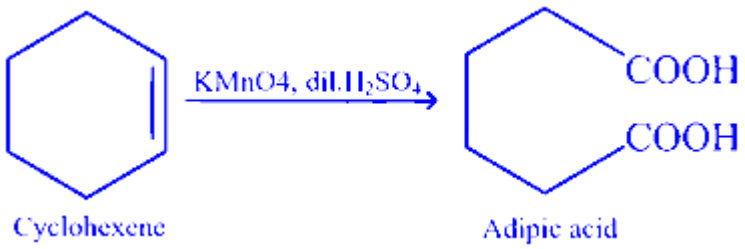
B. Cyclohexanone

C. Hexanoic acid

D. Adipic acid

Answer: D

Solution:



Question19

Identify the product formed in the following reaction.

$$C_6H_5 - CH_2 - CH_3 \xrightarrow[(ii)\ H_3O^+]{(i)\ alk.KMnO_4} \text{product}$$

MHT CET 2024 16th May Evening Shift

Options:

A. $C_6H_5 - CH_2COOH$

B. $C_6H_5 - CH_2 - CH_2 - CH_2 - COOH$

C. $C_6H_5 - OH$

D. $C_6H_5 - COOH$

Answer: D

Solution:

$$C_6H_5 - CH_2 - CH_3 \xrightarrow[(ii)\ H_3O^+]{(i)\ alk.KMnO_4} C_6H_5 - COOH$$
(Benzoic acid)

Question20

Identify the product X in the following reaction.

Ethanoyl chloride $\xrightarrow{H_2O}$ X

MHT CET 2024 16th May Evening Shift

Options:

A. Ethanol

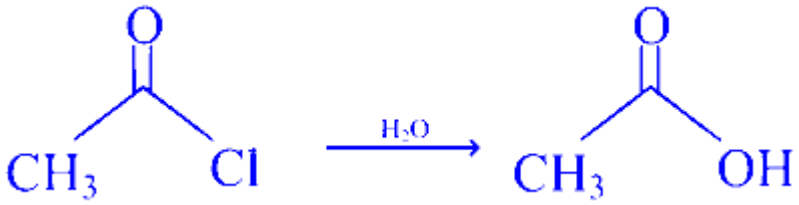
B. Ethanoic acid

C. Ethanal

D. Ethylethanoate

Answer: B

Solution:



Question21

Which among the following is NOT dicarboxylic acid?

MHT CET 2024 16th May Morning Shift

Options:

A. Adipic acid

B. Valeric acid

C. Glutaric acid

D. Malonic acid

Answer: B

Solution:

Valeric acid is not a dicarboxylic acid.

Explanation:

Adipic acid has the chemical formula HOOC-$(CH_2)_4$-COOH, indicating it has two carboxylic acid groups.

Valeric acid is a monocarboxylic acid with the chemical formula $CH_3(CH_2)_3COOH$, containing only one carboxylic acid group.

Glutaric acid contains two carboxylic acid groups and has the formula HOOC-$(CH_2)_3$-COOH.

Malonic acid has the formula HOOC-CH_2-COOH and also contains two carboxylic acid groups.

Therefore, valeric acid (Option B) is the only compound in the list that does not have two carboxylic acid groups.

Question22

Identify the product formed in the following reaction.

$$CH_3CH_2MgBr \xrightarrow[\text{ii) dil. HCl}]{\text{i) dry ice/dry ether}} \text{product}$$

MHT CET 2024 15th May Morning Shift

Options:

A. Ethanoic acid

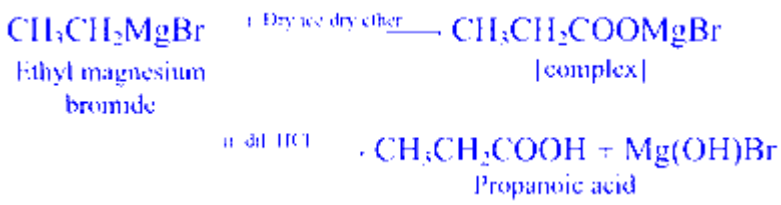
B. Propanoic acid

C. 2-Methylpropanoic acid

D. Butanoic acid

Answer: B

Solution:



Question23

Identify product 'B' in the following reaction.

$$\textbf{Sodium phenoxide} \xrightarrow[6\ \text{atm}]{CO_2, 398\ K} A \xrightarrow{H_3O^+} B$$

MHT CET 2024 11th May Evening Shift

Options:

A. Picric acid

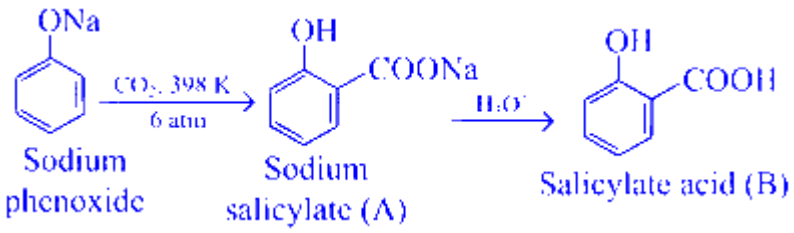
B. Sulphonic acid

C. Salicylic acid

D. Salicylaldehyde

Answer: C

Solution:



Question24

Select the correct increasing order of boiling points of alcohols, amines and carboxylic acids of comparable molar mass from the following.

MHT CET 2024 10th May Evening Shift

Options:

A. Alcohols < Amines < Carboxylic acids

B. Amines < Carboxylic acids < Alcohols

C. Amines < Alcohols < Carboxylic acid

D. Carboxylic acids < Alcohols < Amines

Answer: C

Solution:

Explanation of Boiling Points

The boiling points of organic compounds are determined by intermolecular forces. The types of intermolecular forces present in alcohols, amines, and carboxylic acids are:

Alcohols: Primarily hydrogen bonding due to the presence of a hydroxyl group ($-OH$).

Amines: Hydrogen bonding, but generally weaker than that in alcohols because of the nitrogen atom who is less electronegative compared to oxygen.

Carboxylic Acids: Strong hydrogen bonding as well as dimer formation in the liquid phase, which significantly increases the intermolecular forces.

Increasing Order of Boiling Points

Given the described intermolecular forces, the boiling points of the compounds in increasing order are:

Amines $<$ Alcohols $<$ Carboxylic acids

This ordering is due to the fact that:

Amines have weaker hydrogen bonding compared to alcohols.

Alcohols possess stronger hydrogen bonding than amines but weaker than carboxylic acids.

Carboxylic Acids exhibit the strongest intermolecular forces due to their ability to form dimers.

Correct Option

Option C: Amines $<$ Alcohols $<$ Carboxylic acid

Question25

Which compound from following has highest boiling point?

MHT CET 2024 10th May Morning Shift

Options:

A. $\mathrm{n-C_4H_9OH}$

B. $\mathrm{(CH_3)_3C-NH_2}$

C. $C_2H_5\ N(CH_3)_2$

D. C_2H_5COOH

Answer: D

Solution:

Intermolecular hydrogen bonding is maximum in carboxylic acids. Hence, among the given compounds, C_2H_5COOH has the highest boiling point.

Question26

What is the product obtained when phenylethene is treated with $KMnO_4$ in dilute H_2SO_4 ?

MHT CET 2024 10th May Morning Shift

Options:

A. $C_6H_5CH_2CHO$

B. $C_6H_5CH_2COOH$

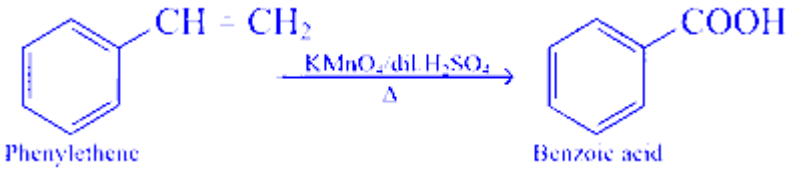
C. C_6H_5COOH

D. $C_6H_5COCH_3$

Answer: C

Solution:

Acidic potassium permanganate oxidizes phenylethene to benzoic acid. This is called oxidative cleavage of alkenes.



Question27

Which among the following is a pair of monocarboxylic acids?

MHT CET 2024 4th May Evening Shift

Options:

A. Malonic acid and propionic acid

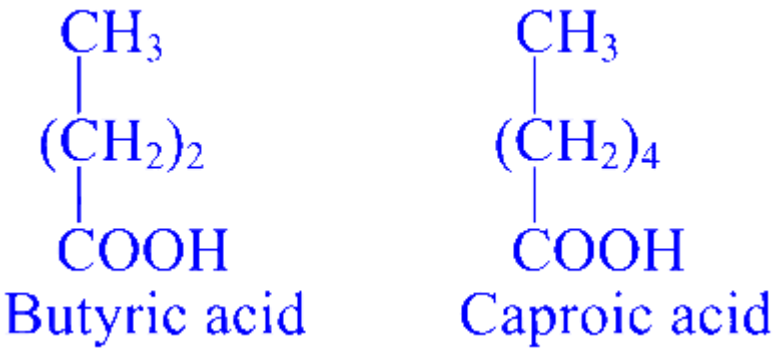
B. Valeric acid and succinic acid

C. Acetic acid and adipic acid

D. Butyric acid and caproic acid

Answer: D

Solution:



Propionic acid, valeric acid and acetic acid are monocarboxylic acids. Malonic acid, succinic acid and adipic acid are dicarboxylic acids.

Question28

Which from following compounds is NOT a mono carboxylic acid?

MHT CET 2024 3rd May Evening Shift

Options:

A. Phthalic acid

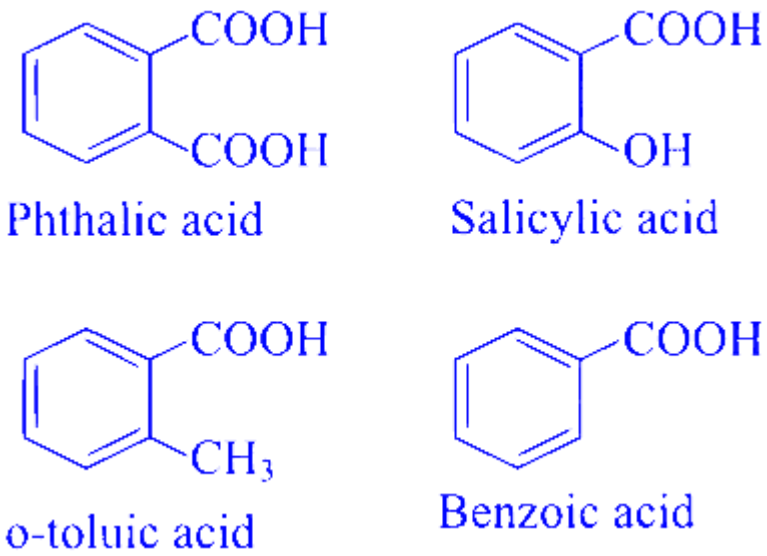
B. Salicylic acid

C. o-toluic acid

D. Benzoic acid

Answer: A

Solution:



Question29

Which from following is NOT a dicarboxylic acid?

MHT CET 2024 3rd May Evening Shift

Options:

A. Citric acid

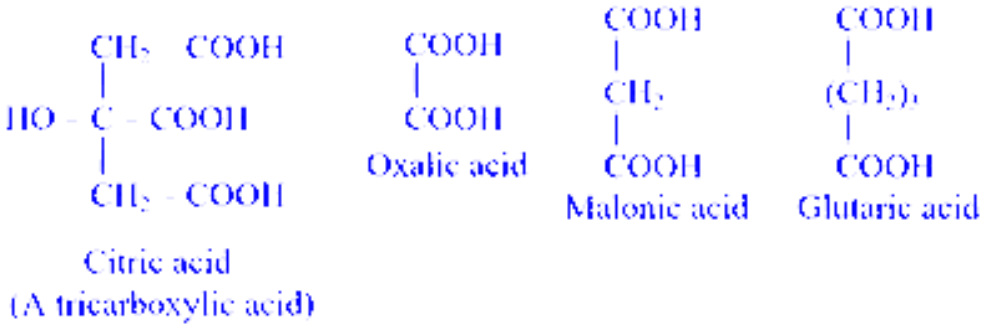
B. Oxalic acid

C. Malonic acid

D. Glutaric acid

Answer: A

Solution:



Question30

Which of the following is a tricarboxylic acid?

MHT CET 2024 2nd May Evening Shift

Options:

A. Propionic acid

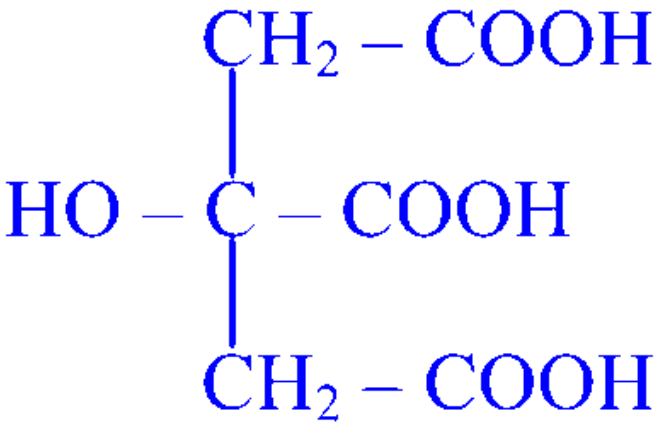
B. Oxalic acid

C. Malonic acid

D. Citric acid

Answer: D

Solution:



Citric acid
(Tricarboxylic acid)

Question31

Which of the following compounds is obtained when cyclohexene is oxidized using $KMnO_4$ in dilute H_2SO_4 ?

MHT CET 2024 2nd May Morning Shift

Options:

A. Cyclohexanol

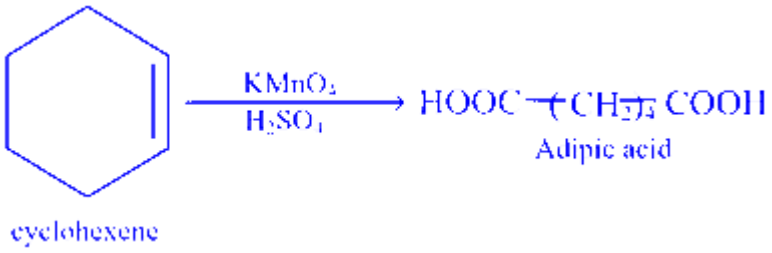
B. Cyclohexanone

C. Benzoic acid

D. Adipic acid

Answer: D

Solution:



Question32

Which from following compounds is obtained when acyl chloride is hydrolysed with water?

MHT CET 2024 2nd May Morning Shift

Options:

A. Alcohols

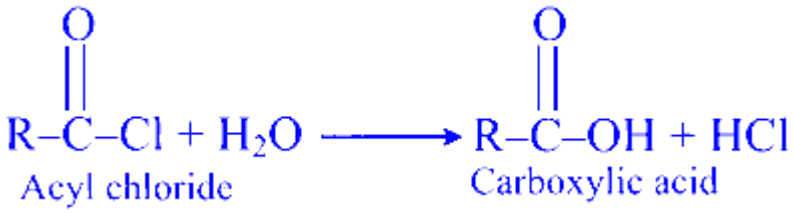
B. Carboxylic acids

C. Aldehydes

D. Esters

Answer: B

Solution:



Question33

Which among the following is NOT dicarboxylic acid?

MHT CET 2023 14th May Evening Shift

Options:

A. Malonic acid

B. Caproic acid

C. Glutaric acid

D. Succinic acid

Answer: B

Solution:

Caproic acid: $CH_3(CH_2)_4COOH$

Question34

Identify 'A' in the following reaction.

A+ Acetic anhydride $\xrightarrow{H^+}$ Aspirin + Acetic acid

MHT CET 2023 14th May Morning Shift

Options:

A. Acrylic acid

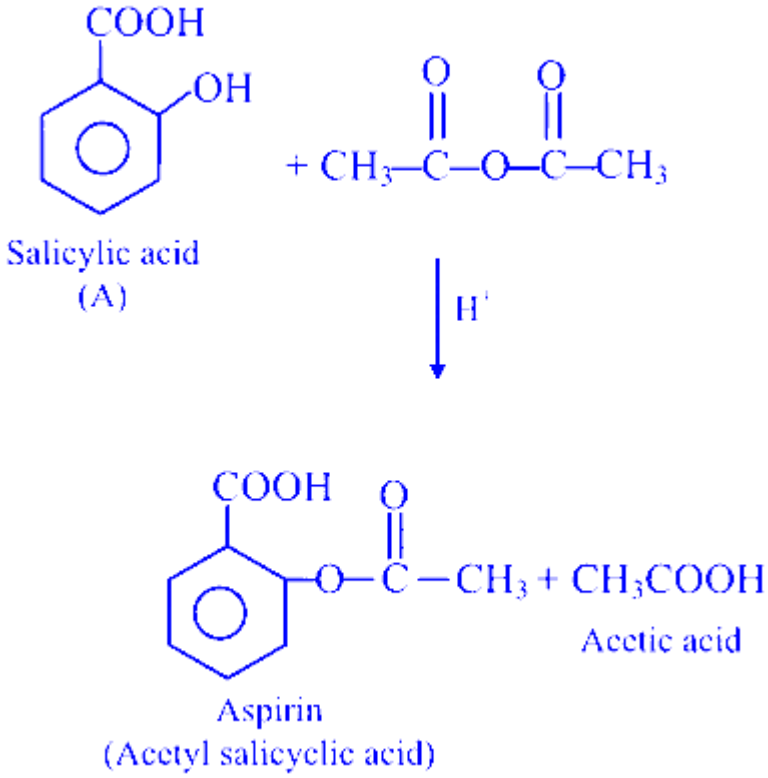
B. Oxalic acid

C. Salicylic acid

D. Phthalic acid

Answer: C

Solution:



Question35

Identify the reagent used in the following reaction.

Benzoic acid $\xrightarrow[\Delta]{\text{Reagent}}$ Benzoyl chloride +Phosphorous oxychloride + Hydrogen chloride

MHT CET 2023 14th May Morning Shift

Options:

A. PCl_3

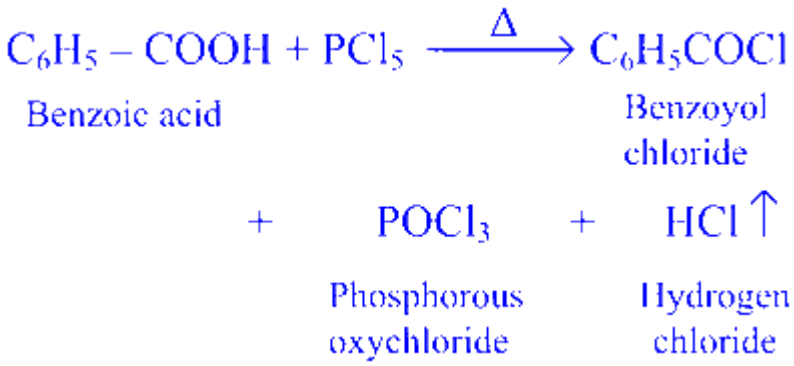
B. HCl

C. PCl_5

D. $SOCl_2$

Answer: C

Solution:



Question36

Which among the following is a pair of monocarboxylic acids?

MHT CET 2023 13th May Morning Shift

Options:

A. Malonic acid and propionic acid

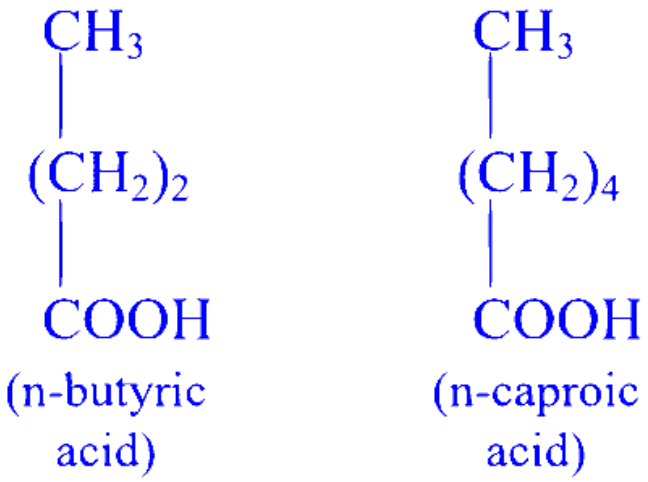
B. Valeric acid and succinic acid

C. Acetic acid and adipic acid

D. Butyric acid and caproic acid

Answer: D

Solution:



Propionic acid, valeric acid and acetic acid are monocarboxylic acids.

Malonic acid, succinic acid and adipic acid are dicarboxylic acids.

Question37

Which among the following compounds has highest boiling point?

MHT CET 2023 13th May Morning Shift

Options:

A. Propanone

B. Ethanoic acid

C. Propan-1-ol

D. Propanal

Answer: B

Solution:

Carboxylic acids have higher boiling points than those of alkanes, ethers, alcohols aldehydes and ketones of comparable mass.

Question38

Which among the following is dicarboxylic acid?

MHT CET 2023 12th May Evening Shift

Options:

A. Valeric acid

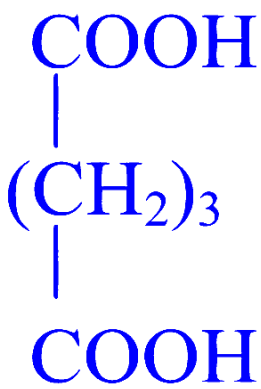
B. Caproic acid

C. Glutaric acid

D. Butyric acid

Answer: C

Solution:



Glutaric acid

Question39

Select the CORRECT increasing order of boiling points of alcohols, amines and carboxylic acids of comparable molar mass from the following.

MHT CET 2023 12th May Evening Shift

Options:

A. Alcohols < Amines < Carboxylic acids

B. Amines < Carboxylic acids < Alcohols

C. Amines < Alcohols < Carboxylic acids

D. Carboxylic acids < Alcohols < Amines

Answer: C

Solution:

N – H bonds in amines are less polar than O – H bond in alcohols. Carboxyl group (–COOH) of carboxylic acid contains O – H bond which is responsible for formation of hydrogen bonding. Strength of hydrogen bonding in carboxylic acid is greater than that of alcohols.

The O – H bond in carboxylic acid is polarized to a great extent as compared to alcohol. Hence, they have higher boiling points than corresponding alcohols.

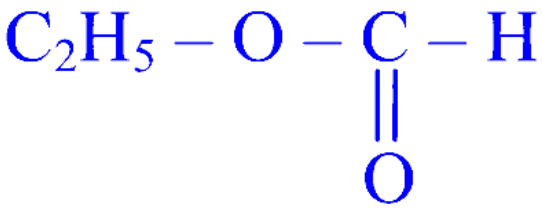
Question40

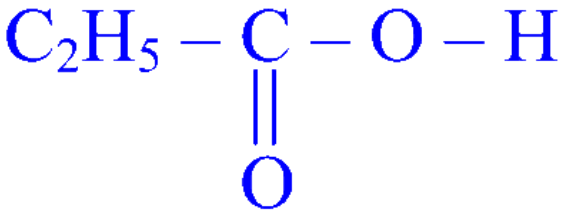
Methyl propanoate on hydrolysis with dil NaOH forms a salt which on further acidification with conc. HCl forms _____.

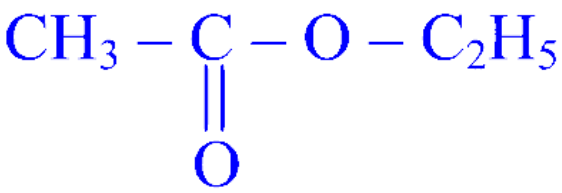
MHT CET 2023 11th May Evening Shift

Options:

A. $CH_3 - COOH$

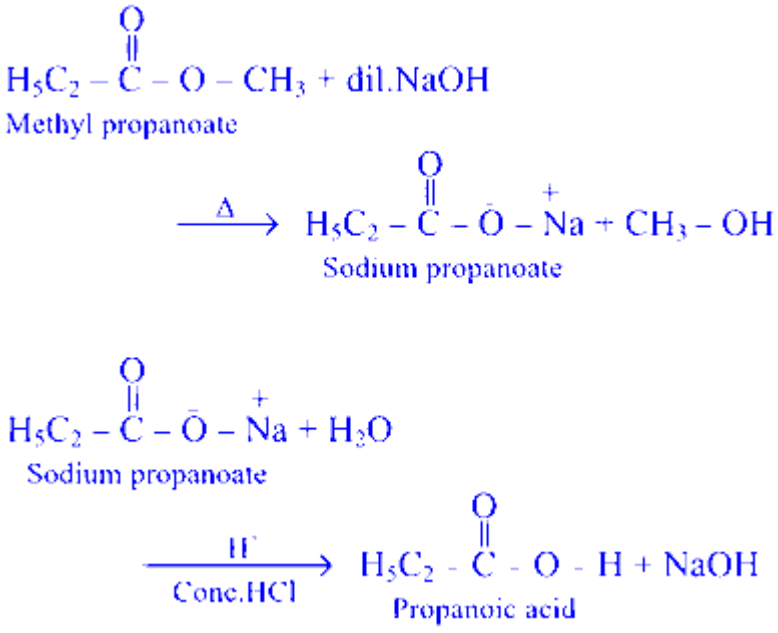
B. 

C. 

D. 

Answer: C

Solution:



Question41

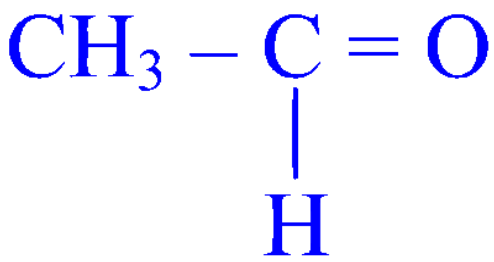
Identify the product obtained in the following reaction.

$(CH_3CO)_2O \xrightarrow{H_2O}$ Product

MHT CET 2023 11th May Evening Shift

Options:

A. CH_3COCH_3

B. 

C. $CH_3 - OH$

D. CH_3COOH

Answer: D

Solution:

Anhydrides on hydrolysis with water give carboxylic acids.

$(CH_3CO)_2O \xrightarrow{H_2O} 2CH_3COOH$

Question42

Identify the product of following reaction.

Benzoyl chloride $\xrightarrow{H_2O}$ product

MHT CET 2023 11th May Morning Shift

Options:

A. Benzyl alcohol

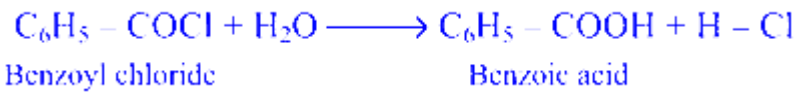
B. Benzaldehyde

C. Benzoic acid

D. Benzophenone

Answer: C

Solution:



Question43

Which of the following is tricarboxylic acid?

MHT CET 2023 10th May Evening Shift

Options:

A. Propionic acid

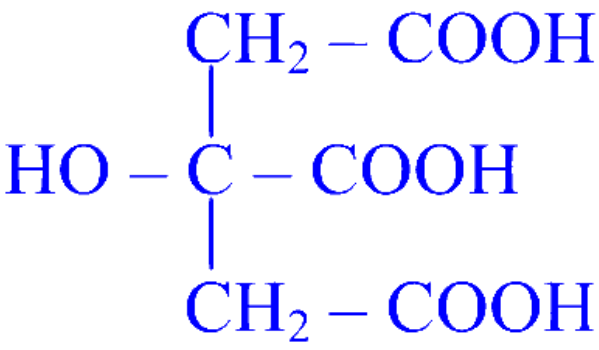
B. Oxalic acid

C. Malonia acid

D. Citric acid

Answer: D

Solution:



Citric acid
(Tricarboxylic acid)

Question44

Which from following statements is TRUE about $CH_3CH(NH_2)CH_2COOH$ molecule?

MHT CET 2023 10th May Evening Shift

Options:

A. It is an example of amino acids.

B. Its IUPAC name is 3-carboxy-2-amine.

C. The amino group is located at $C-2$.

D. $-NH_2$ group is considered as principal functional group for IUPAC naming.

Answer: A

Solution:

The given molecule is not an amino acid. Its IUPAC name is 3-aminobutanoic acid. The amino substituent is located at C-3 on four carbon chain. $-COOH$ group is considered as principal functional group for IUPAC naming. Hence, statements (A), (B), (C) and (D) are incorrect about the given molecule.

Question45

Identify the product 'B' in the following reaction.

Cumene $\xrightarrow[\Delta]{KMnO_4\ .\ KOH}$ **A** $\xrightarrow{H_3O^+}$ **B**

MHT CET 2023 9th May Evening Shift

Options:

A. Phenol

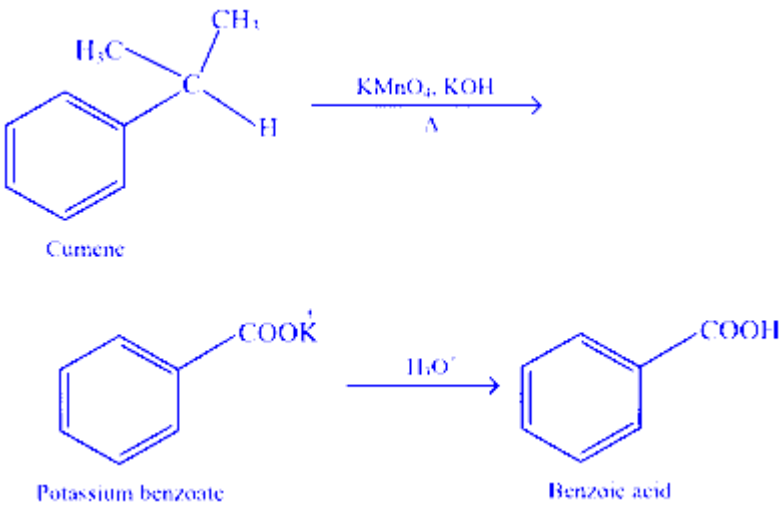
B. Potassium benzoate

C. Benzoic acid

D. Aniline

Answer: C

Solution:



Note: The entire alkyl chain on ring, regardless of its length, is oxidized to a carboxyl group.

Question46

Identify the reagent 'A' used in the following conversion.

Ethyl bromide $\xrightarrow{A}$ Ethylpropanoate

MHT CET 2023 9th May Evening Shift

Options:

A. Sodium propoxide

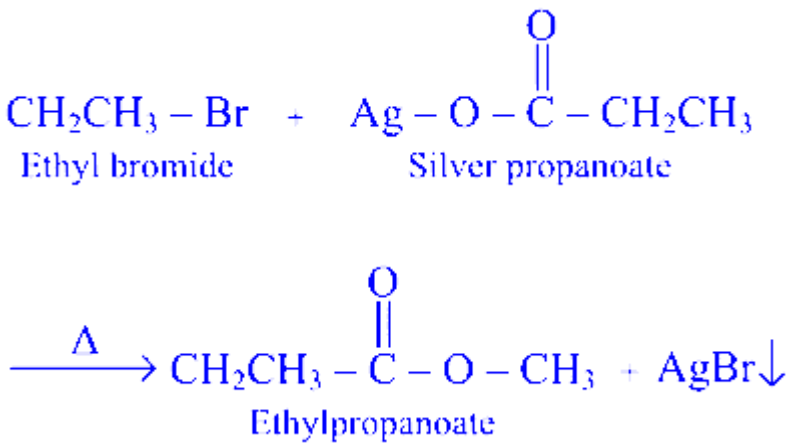
B. Ethoxy propane

C. Silver propanoate

D. Silver ethanoate

Answer: C

Solution:



Question47

Which among the following has the lowest boiling point?

MHT CET 2023 9th May Evening Shift

Options:

A. Butyric acid

B. Valeric acid

C. Acetic acid

D. Formic acid

Answer: D

Solution:

Boiling point increases as the molar mass increases. Formic has the lowest molar mass among given and hence, it has the lowest boiling point.

Question48

Identify the product 'B' in the following reaction.

$$\text{Dry ice} \xrightarrow[\text{Dry ether}]{CH_3MgBr} \mathbf{A} \xrightarrow[\text{dil. HCl}]{H_2O} \mathbf{B}$$

MHT CET 2023 9th May Morning Shift

Options:

A. Methanoic acid

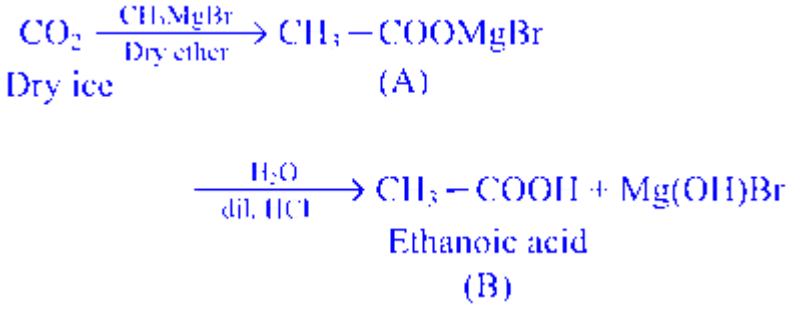
B. Ethanoic acid

C. Methanol

D. Ethanol

Answer: B

Solution:



Question49

Identify the product 'B' in the following series of reactions.

$$CH_3COOH + CH_3CH_2OH \overset{H^+}{\rightleftharpoons} A \xrightarrow[Ni/Pd,\Delta]{H_2} \mathbf{B}$$

MHT CET 2021 24th September Evening Shift

Options:

A. CH_3OH

B. C_2H_5OH

C. $CH_3CH_2 - O - CH_3$

D. $CH_3CH_2 - O - CH_2CH_3$

Answer: B

Solution:

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{CH_3CH_2OH} \overset{H^+}{\rightleftharpoons} \underset{\text{Ethyl ethanoate}}{CH_3COOH_2CH_3} + H_2O \xrightarrow[Ni/Pd,\ \Delta]{H_2} 2\underset{\text{Ethanol}}{CH_3 - CH_2 - OH}$$

Question50

Which of the following carboxylic acids has lowest boiling point?

MHT CET 2021 24th September Evening Shift

Options:

A. Butyric acid

B. Propionic acid

C. Acetic acid

D. Valeric acid

Answer: C

Solution:

To determine which carboxylic acid has the lowest boiling point, we need to understand how the molecular structure and intermolecular forces of each compound affect its boiling point. Carboxylic acids exhibit strong intermolecular hydrogen bonding, which generally leads to higher boiling points. However, the boiling point also depends on the molecular weight and carbon chain length of the acid. As the carbon chain length increases, the molecular weight increases, and thus the boiling point also increases due to the greater van der Waals forces (dispersion forces) between the molecules.

Let's consider the carboxylic acids given in the options:

Option A: Butyric acid

Butyric acid has the chemical formula $C_4H_8O_2$. It has 4 carbon atoms.

Option B: Propionic acid

Propionic acid has the chemical formula $C_3H_6O_2$. It has 3 carbon atoms.

Option C: Acetic acid

Acetic acid has the chemical formula $C_2H_4O_2$. It has 2 carbon atoms.

Option D: Valeric acid

Valeric acid has the chemical formula $C_5H_{10}O_2$. It has 5 carbon atoms.

From the molecular structures, we can see that acetic acid (Option C) has the shortest carbon chain length, meaning it has the lowest molecular weight and the weakest van der Waals forces among the options. Therefore, acetic acid will have the lowest boiling point.

Correct answer: Option C

Question51

Identify the products of following reaction :

$$C_6H_5COOC_2H_5 \xrightarrow[\text{dil.} \quad H_2SO_4]{\Delta}$$

MHT CET 2021 23rd September Evening Shift

Options:

A. $C_6H_5OH + C_2H_5OH$

B. $C_6H_5COOH + C_2H_5COOH$

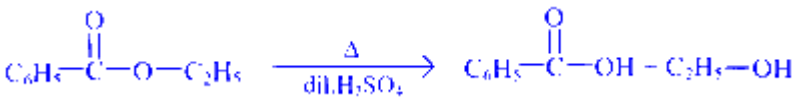
C. $C_6H_5COOH + C_2H_5OH$

D. $C_6H_5OH + C_2H_5COOH$

Answer: C

Solution:

Acid hydrolysis of ester



Question52

Identify product 'B' in following reaction.

$$\text{Cumene} \xrightarrow[\Delta]{KMnO_4, KOH} A \xrightarrow{H_3O+} B$$

MHT CET 2021 22th September Evening Shift

Options:

A. Benzoic acid

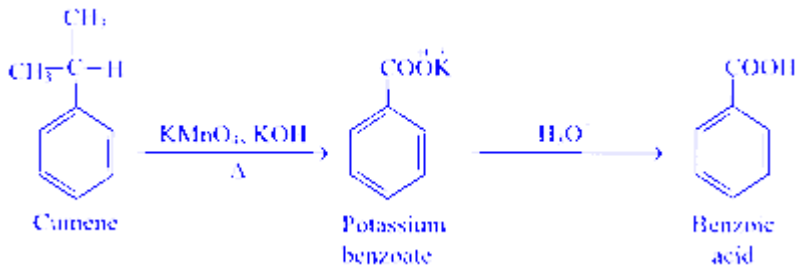
B. Benzophenone

C. Phenol

D. Benzaldehyde

Answer: A

Solution:



Question53

Which of the following alkenes on oxidation by $KMnO_4$ in dil. H_2SO_4 forms adipic acid?

MHT CET 2021 22th September Evening Shift

Options:

A. Hex-3-ene

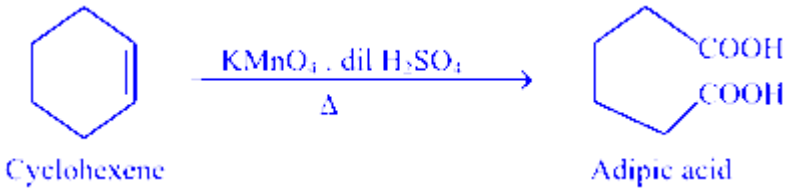
B. Hex-1-ene

C. Hex-2-ene

D. Cyclohexene

Answer: D

Solution:



Question54

Which among the following is a pair of dicarboxylic acids?

MHT CET 2021 22th September Morning Shift

Options:

A. Glutaric acid and Malonic acid

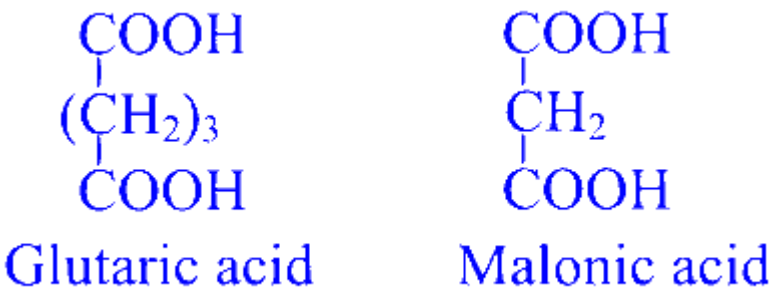
B. Succinic acid and Valeric acid

C. Oxalic acid and Caproic acid

D. Propionic acid and Adipic acid

Answer: A

Solution:



Question55

Identify the product 'P' of following reaction.

Ethanoyl chloride $\xrightarrow{H_2O}$ P

MHT CET 2021 21th September Morning Shift

Options:

A. Ethyl ethanoate

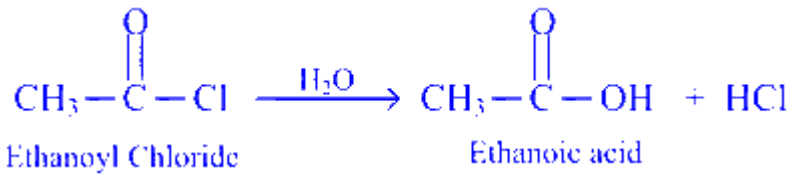
B. Ethanoic acid

C. Ethanol

D. Ethanal

Answer: B

Solution:



Question56

Identify compound A used in following reaction.

Benzoic acid $\xrightarrow[\Delta]{A}$ Benzoyl chloride + Phosphorous oxychloride + Hydrogen chloride

MHT CET 2021 20th September Evening Shift

Options:

A. $SOCl_2$

B. PCl_3

C. HCl

D. PCl_5

Answer: D

Solution:

$$\underset{\text{Benzoic acid}}{C_6H_5-COOH}+PCl_5 \xrightarrow{\Delta} \underset{\text{Benzoyl Chloride}}{C_6H_5COCl}+POCl_3+HCl$$

Question57

Which among the following is strongest acid?

MHT CET 2021 20th September Evening Shift

Options:

A. Chloroacetic acid

B. Fluoroacetic acid

C. Bromoacetic acid

D. Iodoacetic acid

Answer: B

Solution:

$F-CH_2-COOH > Cl-CH_2-COOH > Br-CH_2-COOH > I-CH_2-COOH$

Higher the electronegativity of halogen, greater is the stabilization of the conjugate base, stronger is the acid.

Question58

Which among the following compounds has highest boiling point?

MHT CET 2020 16th October Morning Shift

Options:

A. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

B. $CH_3 - CH_2 - CH_2 - CHO$

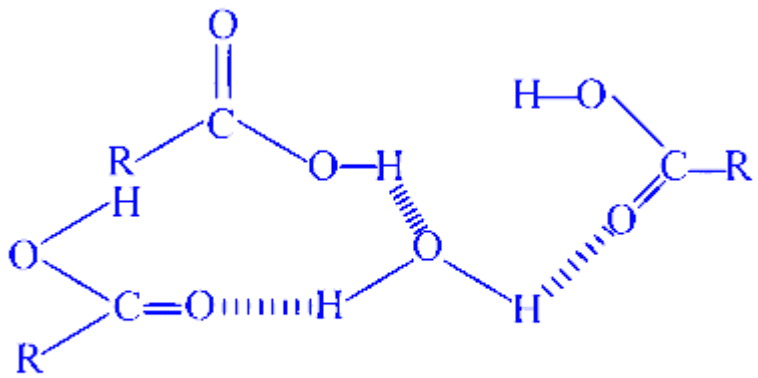
C. $CH_3 - CH_2 - COOH$

D. $CH_3 - CH_2 - COCH_3$

Answer: C

Solution:

$CH_3 - CH_2 - COOH$ compound has highest boiling point because carboxylic acids are higher boiling liquids than aldehydes. Ketones and even alcohols of comparable molecular masses. This is due to more extensive association of carboxylic acid molecules through intermolecular hydrogen bonding. The hydrogen bonds are not broken completely even in the vapour phase. In fact, most carboxylic acid exist as dimer in the vapour phase or in the aprotic solvents.



Hydrogen bonding of RCOOH with H_2O

Question59

The number of pi-bonds present in benzoic acid molecule are

MHT CET 2019 3rd May Morning Shift

Options:

A. 5

B. 4

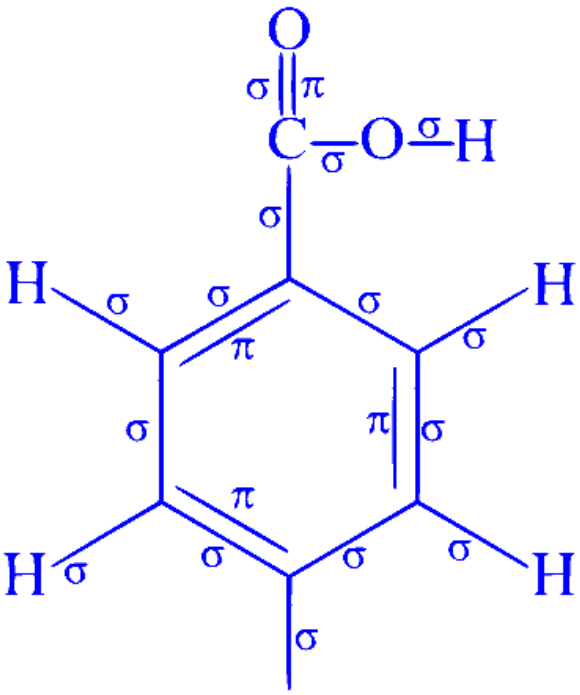
C. 3

D. 6

Answer: B

Solution:

The number of pi-bonds present in benzoic acid molecule are 4 (four). Structure of benzoic acid is as follows:



4π–bond, 15σ-bond

Question60

Soaps are the sodium or potassium salts of higher fatty acids, containing number of carbon atoms more than,

MHT CET 2019 3rd May Morning Shift

Options:

A. 10

B. 6

C. 8

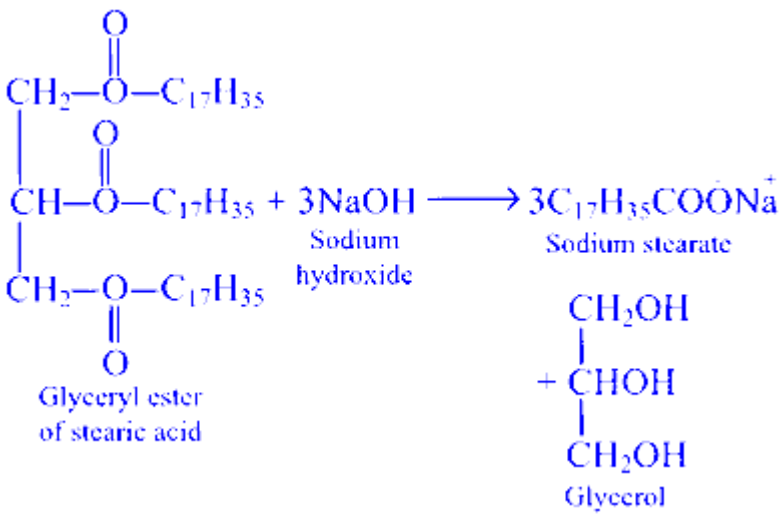
D. 12

Answer: D

Solution:

Soaps are the sodium or potassium salts of higher fatty acids, containing number of carbon atoms more than 12, e.g. stearic, oleic and palmitic acids. These are prepared by heating fat with aqueous sodium hydroxide solution. This reaction is known as saponification.

e.g.



Question61

Which among the following compounds is obtained when ethane nitrile is acid hydrolysed?

MHT CET 2019 2nd May Evening Shift

Options:

A. Formic acid

B. Formamide

C. Acetamide

D. Acetic acid

Answer: D

Solution:

Acetic acid is obtained when ethanenitrile is acid hydrolysed. The equation for the reaction can be written as:

$$\underset{\text{Ethane nitrile}}{CH_3CN} + 2H_2O \xrightarrow{H^+} \underset{\text{Acetic acid}}{CH_3COOH} + NH_4Cl$$
