EXERCISE - O

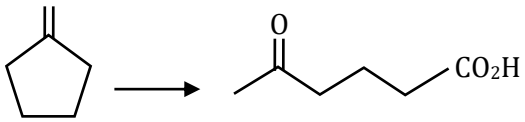
SINGLE CORRECT TYPE QUESTIONS

Classification, preparation and physical properties of carboxylic acids

1. The acid present in red ants is

(A) HCOOH (B) C_6H_5COOH (C) CH_3COOH (D) $CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-COOH$

CCD084

2. 

The above conversion can be done by which of the following process ?

(A) HBr peroxide; $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-O^-$ at high temperature, O_3/H_2O

(B) HBr; $CH_3CH_2O^-$ at high temperature, O_3/H_2O

(C) HI, CH_3O^- at high temperature, O_3/H_2O in presence of Zn

(D) HCl peroxide

CCD128

3. $CH_3-C\equiv N \xrightarrow{H_2O/H^{\oplus}} (A) + \underset{\text{Nitrogen contain compound}}{(B)}$

Compound (A) is

(A) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-H$ (B) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-OH$ (C) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-NH_2$ (D) $CH_3-CH_2-NH_2$

CCD090

4. Acetic acid forms dimer in vapour phase due to

(A) Intramolecular H–Bonding (B) Inter molecular H–bonding

(C) Orbital–overlapping (D) None of these

CCD099

5. Arrange the following carboxylic acid in to order of solubility

$\underset{(A)}{CH_3COOH}$ $\underset{(B)}{CH_3CH_2COOH}$ $\underset{(C)}{CH_3CH_2CH_2COOH}$

(A) B > C > A (B) C > B > A (C) A > C > B (D) A > B > C

CCD100

Chemical reaction of carboxylic acids

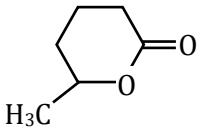
6. Which of the following acids has the smallest dissociation constant ?

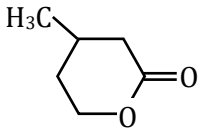
(A) $CH_3-\underset{\displaystyle NO_2}{\underset{|}{CH}}-COOH$ (B) $O_2N-CH_2-CH_2-COOH$

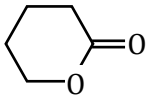
(C) $Cl-CH_2-CH_2-COOH$ (D) $NC-CH_2-CH_2-COOH$

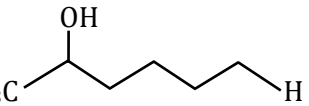
CCD129

7. End product of this conversion $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-CH_2-CO_2H \xrightarrow[2.H_2O,H^+]{1.NaBH_4}$ is

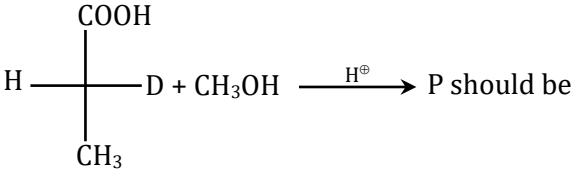
(A) 

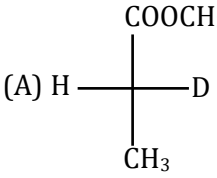
(B) 

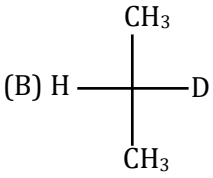
(C) 

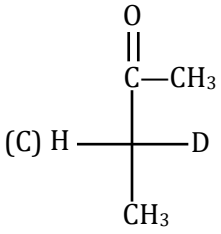
(D) 

CCD130

8.  P should be

(A) 

(B) 

(C) 

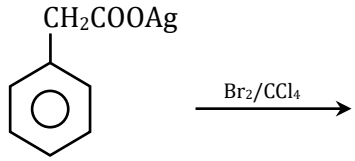
(D) None

CCD110

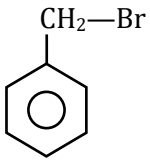
9. Which gas released at anode and cathode respectively . In kolbe's electrolysis.

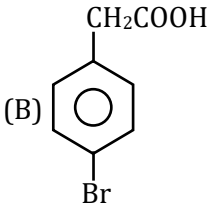
(A) CO_2, H_2O (B) CO_2, H_2 (C) H_2, CO_2 (D) CO_2, CO

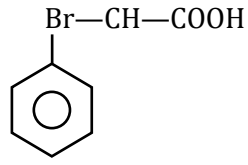
CCD115

10. 

Major product is

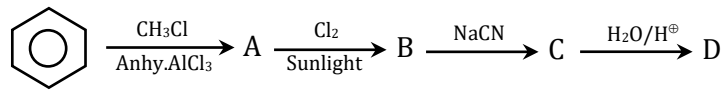
(A) 

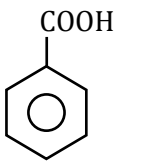
(B) 

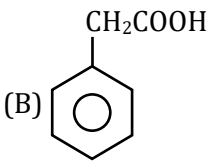
(C) 

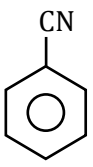
(D) None of these

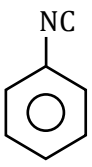
CCD118

11. 

(A) 

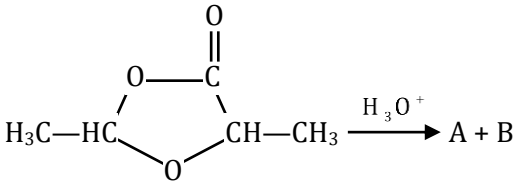
(B) 

(C) 

(D) 

CCD122

Preparation and chemical reactions of derivatives of carboxylic acids

12. 

A and B are

(A) $CHCH_2OOH$, CH_3CH_2OH

(B) $H_3C—\underset{\underset{COOH}{|}}{CH}—CH_3$, $H_3C—CH_2—OH$

(C) $H_3C—\underset{\underset{OH}{|}}{CH}—COOH$, CH_3CHO

(D) $H_2\underset{\underset{OH}{|}}{C}—CH_2—COOH$, $H_2\underset{\underset{OH}{|}}{C}—\underset{\underset{OH}{|}}{CH_2}$

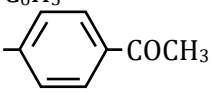
CCD131

13. An ester (X) with molecular formula $C_9H_{10}O_2$ was treated with excess of CH_3MgBr and the complex so formed, was treated with H_2SO_4 to give an alkene (Y) whose ozonolysis gave a ketone with molecular formula C_8H_8O which shows positive iodoform test. The structure of (X) is.

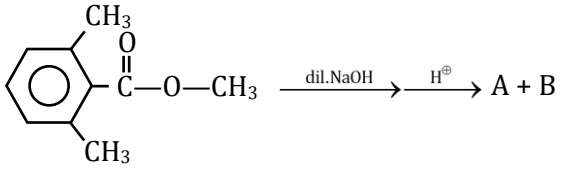
(A) $C_6H_5COOC_2H_5$

(B) $CH_5COOC_6H_5$

(C) $C_6H_5CH_2COOC_2H_5$

(D) p-H_3CO  $COCH_3$

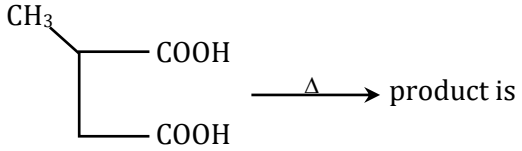
CCD132

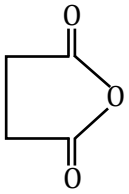
14. 

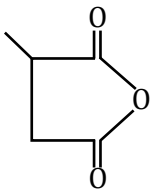
The product A and B (after distillation) can be distinguished by :

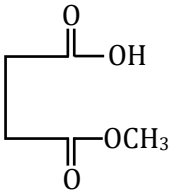
(A) Tollen's Reagent (B) 2, 4-DNP (C) $NaHCO_3$ (D) $FeCl_3$

CCD133

15. 

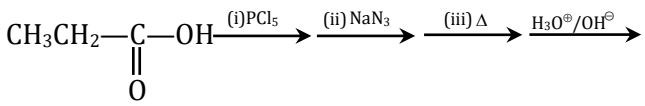
(A) 

(B) 

(C) 

(D) 

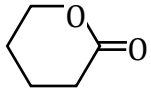
CCD114

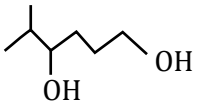
16. 

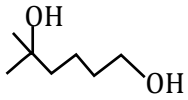
product of given sequence reaction is

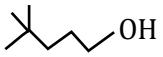
(A) $CH_3CH_2NH_2$ (B) $CH_3CH_2—OH$ (C) $CH_3—\overset{\overset{O}{\|}}{C}—H$ (D) $CH_3—\overset{\overset{O}{\|}}{C}—CH_3$

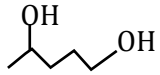
CCD121

17. When  is treated with two equivalent of methyl magnesium iodide and the product acidified the final product will be

(A) 

(B) 

(C) 

(D) 

CCD124

18. $CH_3—\underset{\underset{O}{\|}}{C}—OCH_2CH_3 + H_2O \overset{H^{\oplus}}{\rightleftharpoons} P + Q$

Product P & Q respectively are

(A) CH_3COOH, CH_3CHO

(B) CH_3COOH, CH_3CH_2OH

(C) CH_3CH_2COOH, CH_3OH

(D) $CH_3—\underset{\underset{O}{\|}}{C}—H$, $CH_3CH_2—\underset{\underset{O}{\|}}{C}—H$

CCD095

COMPREHENSION TYPE QUESTIONS

Preparation and chemical reactions of derivatives of carboxylic acids

Paragraph for Question No. 19 to 21

Amides undergo hydrolysis to yield carboxylic acid plus amine on heating in either aqueous acid or aqueous base. The conditions required for mide hydrolysis are more severe than those required for the hydrolysis of esters, anhydrides or acid chlorides, but the mechanism is similar (nucleophilic acyl substitution). Nucleophilic acyl substitution involve a tetrahedral intermediate, hence these are quite different from alkyl substitution.

($RCH_2Br \xrightarrow{NaCN} RCH_2CN$) which involves a pentavalent intermediate or transition state.

One of the important reaction of esters is their reaction with two equivalent of Grignard reagent to give tertiary alcohols.

19. The mechanism involved during the hydrolysis of acid derivatives is :

(A) elimination- addition

(B) addition – elimination

(C) nuleophilic addition elimination

(D) electrophilic addition elimination

CCD134

20. Which of the following constitutes the best substrate during the acidic hydrolysis of amides ?

(A) $R—\underset{\underset{O}{\|}}{C}—NH_2$

(B) $R—\underset{\underset{O}{\|}}{C}—\overset{+}{N}H_3$

(C) $R—\underset{\underset{OH^{\oplus}}{\|}}{C}—NH_2$

(D) $R—\underset{\underset{OH^{+}}{\|}}{C}—\overset{+}{N}H_3$

CCD135

21. For which functional derivative of carboxylic acids, acidic hydrolysis is the fastest ?

(A) Acid chlorides (B) Acid amides (C) Acid anhydrides (D) Esters

CCD136

MATRIX MATCH TYPE QUESTION

Classification, preparation and physical properties of carboxylic acids

22. Match the acids given in column-I with their correct IUPAC names given in

Column-I (Acids)		Column-II (IUPAC names)	
(i)	Phthalic acid	(a)	Hexane-1, 6-dioic acid
(ii)	Oxalic acid	(b)	Benzene-1, 2-dicarboxylic acid
(iii)	Succinic acid	(c)	Pentane-1, 5-dioic acid
(iv)	Adipic acid	(d)	Butane-1, 4-dioic acid
(v)	Glutaric acid	(e)	Ethan-1, 2-dioic acid

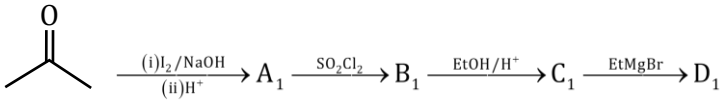
Code :-

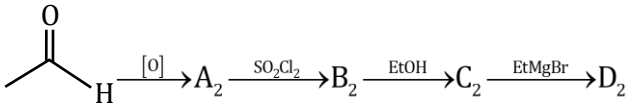
(A) i-(b) ii-(e) iii-(d) iv-(a) v-(c)
(B) i-(e) ii-(b) iii-(d) iv-(a) v-(c)
(C) i-(b) ii-(d) iii-(e) iv-(a) v-(c)
(D) i-(b) ii-(e) iii-(a) iv-(d) v-(c)

CCD086

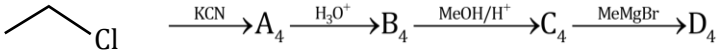
Preparation and chemical reactions of derivatives of carboxylic acids

23. Match the following

Reaction sequence I 

Reaction sequence II 

Reaction sequence III 

Reaction sequence IV 

Match the compounds give in column-I with respect to the sequences in which there are found in Column – II

Column – I		Column – II	
(a)	$CH_3—\overset{\overset{O}{\|\|}}{C}—Cl$	(p)	Sequence I
(b)	$CH_3—\overset{\overset{O}{\|\|}}{C}—Et$	(q)	Sequence II
(c)	$Et—\overset{\overset{O}{\|\|}}{C}—OH$	(r)	Sequence III
(d)	$Et—\overset{\overset{O}{\|\|}}{C}—O—Me$	(s)	Sequence IV

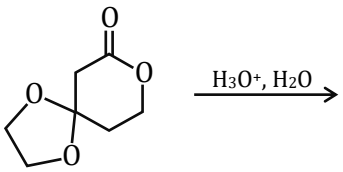
(A) (p) → (a), (b); (q) → (a),(b); (r) → (b),(c),(d); (s) → (b),(c),(d)
(B) (p) → (a), (c); (q) → (a),(b); (r) → (b),(c),(d); (s) → (b),(c),(d)
(C) (p) → (a), (b); (q) → (a),(d); (r) → (b),(c),(d); (s) → (b),(c),(d)
(D) (p) → (a), (b); (q) → (a),(b); (r) → (a),(c),(d); (s) → (b),(c),(d)

CCD137

EXERCISE - S

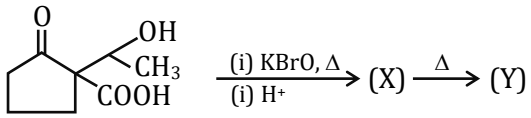
Classification, preparation and physical properties of carboxylic acids

1. Total number of oxygen atom in the final product ?



CCD138

Chemical reaction of carboxylic acids

2. 

Hence the product (Y) in the above sequence of reaction, is :

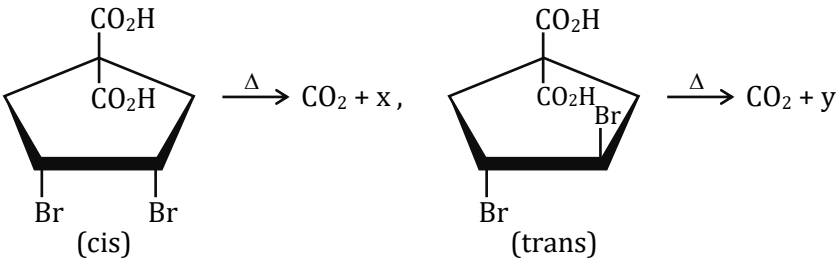
CCD139

3. Identify the compound C in the following sequence :

$(CH_3)_2CHCH_2C{\equiv}N \xrightarrow{HCl,H_2O}$ compound A $\xrightarrow[2.\ H_2O]{1.\ LiAlH_4}$ compound B $\xrightarrow[CH_2Cl_2]{PCC}$ Compound C

CCD140

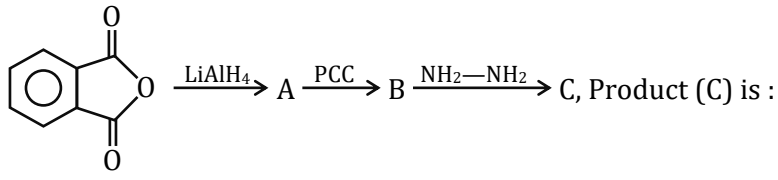
4. Products obtained in the given reactions are shown below.



Total number of possible products for above reactions excluding CO_2.

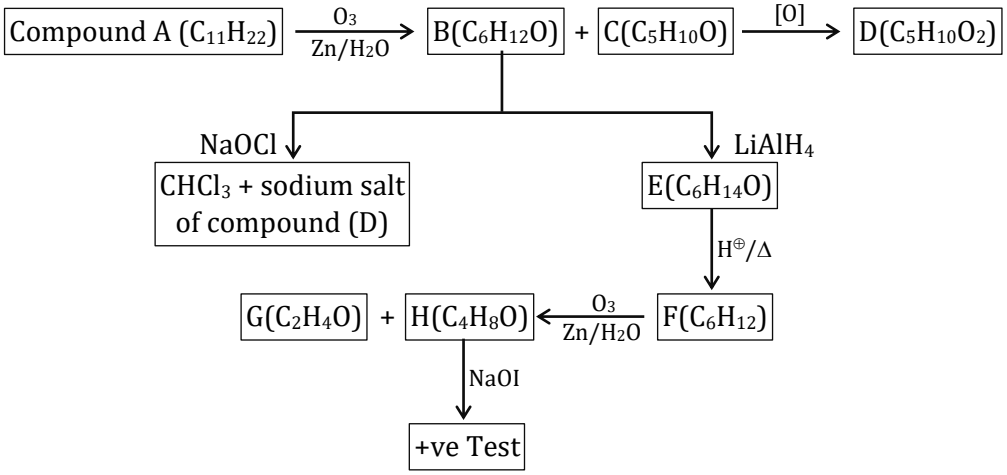
CCD141

Preparation and chemical reactions of derivatives of carboxylic acids

5. 

CCD142

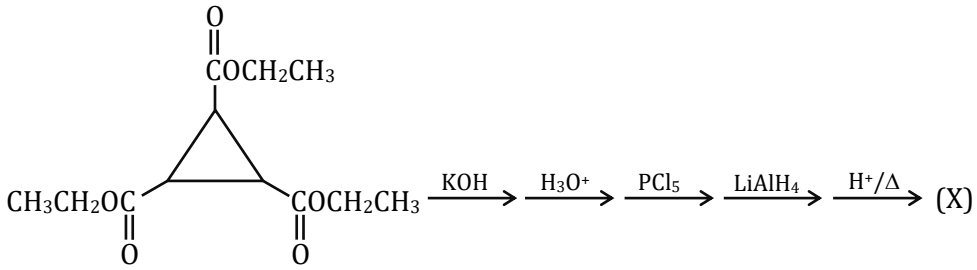
Passage for Question No. 6



6. $D(C_5H_{12}O_2) \xrightarrow{SOCl_2} X \xrightarrow[H_2O/Ag_2O]{CH_2=\overset{\oplus}{N}=\overset{\ominus}{N}} Y$; Number of carbon atoms in the product Y is

CCD143

7.



Product (X) is :

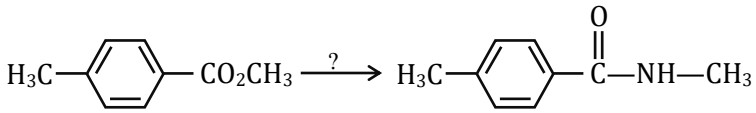
CCD144

8. Identify the final product from the given sequence of reaction.

Acetoacetic ester $\xrightarrow{NaOEt}$ $\xrightarrow{CH_3I}$ $\xrightarrow{NaOEt}$ $\xrightarrow{CH_3CH_2CH_2Br}$

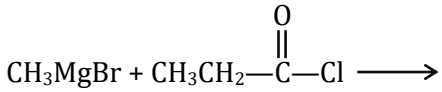
CCD145

9. Choose the best sequence of reactions for transformation given.



CCD146

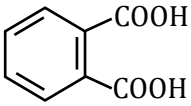
10. Total number of enol possible for the compound formed during given reaction will be (Including stereoisomer):

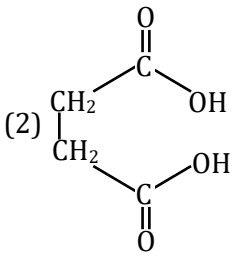


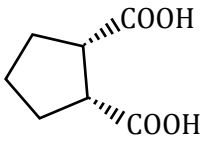
CCD147

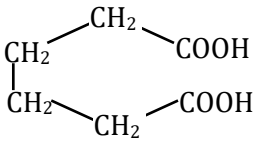
EXERCISE - JEE (Main) PYQ

1. Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride : **[JEE (Main) 2019]**

(1) 

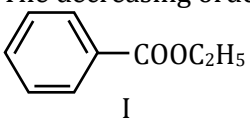
(2) 

(3) 

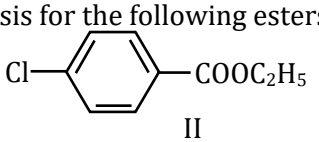
(4) 

CCD032

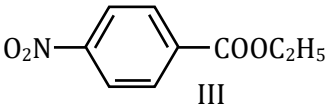
2. The decreasing order of ease of alkaline hydrolysis for the following esters is : **[JEE (Main) 2019]**



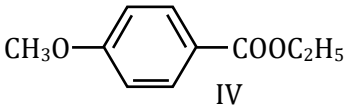
I



II



III

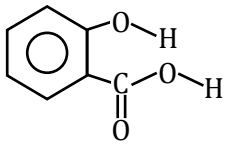


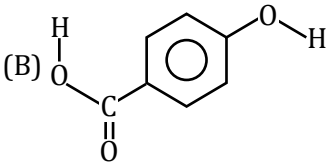
IV

(1) IV > II > III > I (2) III > II > I > IV (3) III > II > IV > I (4) II > III > I > IV

CCD033

3. Consider the following molecules and statements related to them : **[JEE (Main) 2020]**

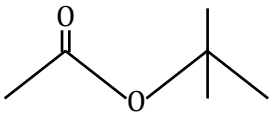
(A) 

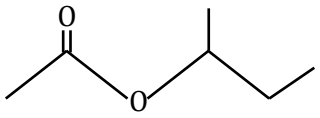
(B) 

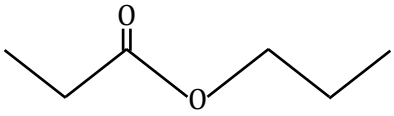
(a) (B) is more likely to be crystalline than (A)
(b) (B) has higher boiling point than (A)
(c) (B) dissolves more readily than (A) in water
Identify the correct option from below :
(1) only (a) is true (2) (a) and (c) are true (3) (b) and (c) are true (4) (a) and (b) are true

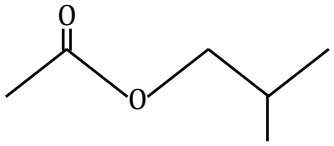
CCD034

4. An organic compound (A) (molecular formula $C_6H_{12}O_2$) was hydrolysed with dil. H_2SO_4 to give a carboxylic acid (B) and an alcohol (C). 'C' give white turbidity immediately when treated with anhydrous $ZnCl_2$ and conc. HCl. The organic compound (A) is : **[JEE (Main) 2020]**

(1) 

(2) 

(3) 

(4) 

CCD035

5. The major product of the following chemical reaction is : **[JEE (Main) 2021]**

$$CH_3CH_2CN \xrightarrow[(3)\ Pd/BaSO_4,H_2]{\substack{(1)\ H_3O^{\oplus},\ \Delta \\ (2)\ SOCl_2}} ?$$

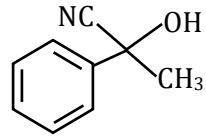
(1) $CH_3CH_2CH_3$ (2) $CH_3CH_2CH_2OH$ (3) $(CH_3CH_2CO)_2O$ (4) CH_3CH_2CHO

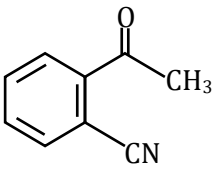
CCD036

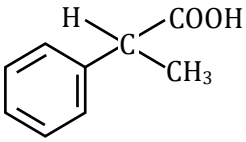
6. The structure of product C, formed by the following sequence of reactions is :

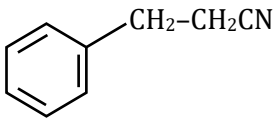
$CH_3COOH + SOCl_2 \longrightarrow A \xrightarrow[AlCl_3]{\text{Benzene}} B \xrightarrow[-OH]{KCN} C$

[JEE (Main) 2021]

(1) 

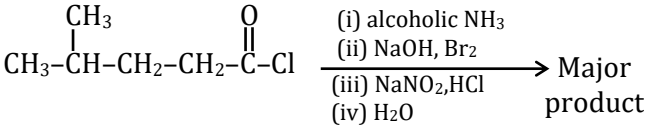
(2) 

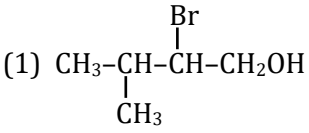
(3) 

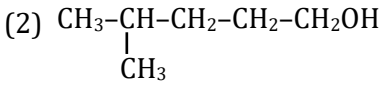
(4) 

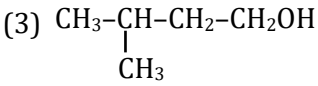
CCD037

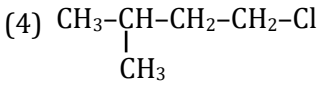
7. The major product of the following reaction is : **[JEE (Main) 2021]**



(1) 

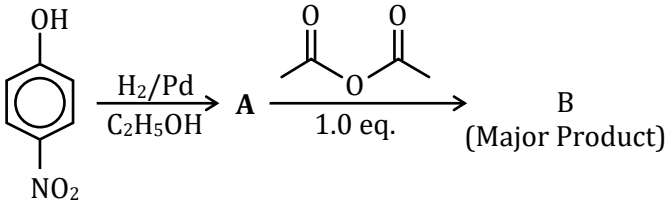
(2) 

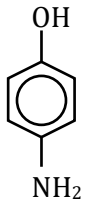
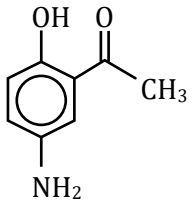
(3) 

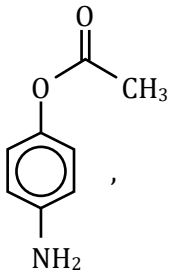
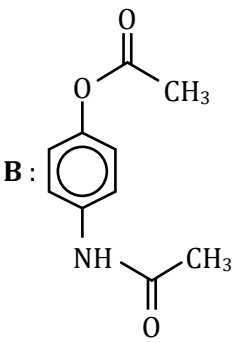
(4) 

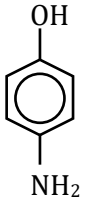
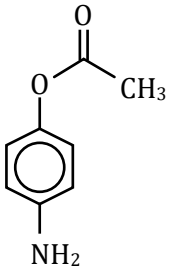
CCD039

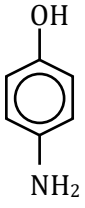
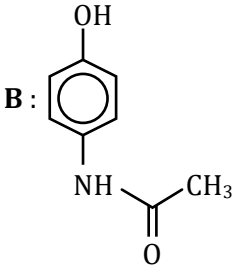
8. The correct structures of A and B formed in the following reactions are : **[JEE (Main) 2021]**



(1) **A** :  , **B** : 

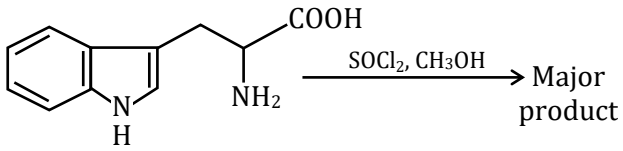
(2) **A** :  , **B** : 

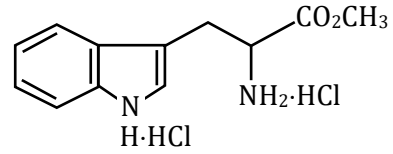
(3) **A** :  , **B** : 

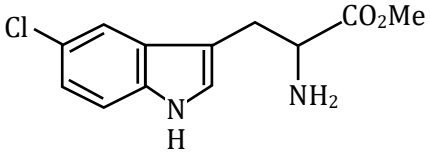
(4) **A** :  , **B** : 

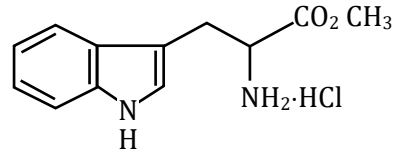
CCD040

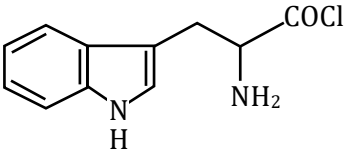
9. The major product formed in the following reaction is : **[JEE (Main) 2021]**



(1) 

(2) 

(3) 

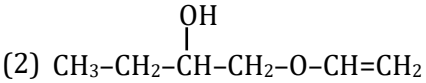
(4) 

CCD041

10. In the following sequence of reactions a compound A, (molecular formula $C_6H_{12}O_2$) with a straight chain structure gives a C_4 carboxylic acid. A is : **[JEE (Main) 2021]**

$$\mathbf{A} \xrightarrow[H_3O^{\oplus}]{LiAlH_4} \mathbf{B} \xrightarrow{\text{Oxidation}} C_4 \text{ - carboxylic acid}$$

(1) $CH_3 - CH_2 - COO - CH_2 - CH_2 - CH_3$

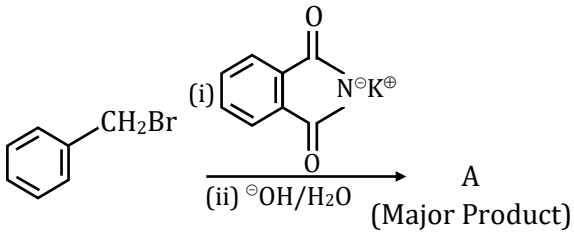
(2) 

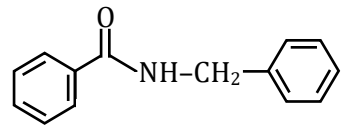
(3) $CH_3 - CH_2 - CH_2 - COO - CH_2 - CH_3$

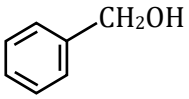
(4) $CH_3 - CH_2 - CH_2 - O - CH = CH - CH_2 - OH$

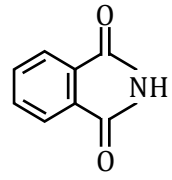
CCD042

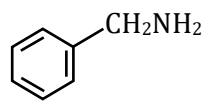
11. What is A in the following reaction ? **[JEE (Main) 2021]**



(1) 

(2) 

(3) 

(4) 

CCD043

12. Two statements are given below :

Statement I: The melting point of monocarboxylic acid with even number of carbon atoms is higher than that of with odd number of carbon atoms immediately below and above it in the series.

Statement II : The solubility of monocarboxylic acids in water decreases with increase in molar mass.

Choose the most appropriate option: **[JEE (Main) 2022]**

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

CCD044

13. Decarboxylation of all six possible forms of diaminobenzoic acids $C_6H_3(NH_2)_2COOH$ yields three products A, B and C. Three acids give a product 'A', two acids gives a product 'B' and one acid give a product 'C'. The melting point of product 'C' is

[JEE (Main) 2022]

(1) 63°C (2) 90°C (3) 104°C (4) 142°C

CCD045

14. Given below are two statements :

Statement I : The esterification of carboxylic acid with an alcohol is a nucleophilic acyl substitution.

Statement II : Electron withdrawing groups in the carboxylic acid will increase the rate of esterification reaction.

Choose the **most appropriate** option : **[JEE (Main) 2022]**

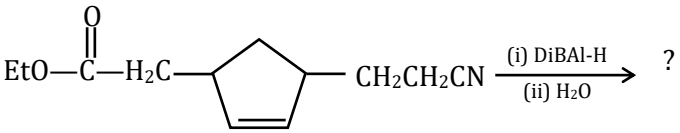
(1) Both **Statement I** and **Statement II** are correct.

(2) Both **Statement I** and **Statement II** are incorrect.

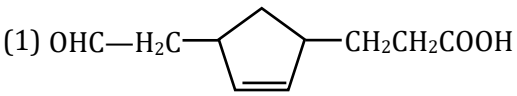
(3) **Statement I** is correct but **Statement II** is incorrect.

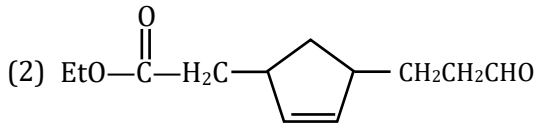
(4) **Statement I** is incorrect but **Statement II** is correct.

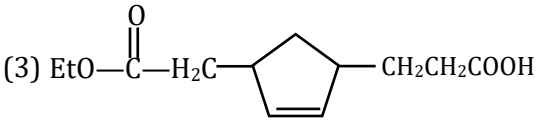
CCD046

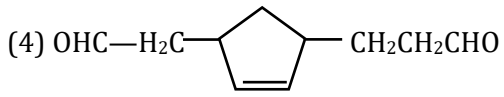
15. 

Consider the above reaction and predict the major product. **[JEE (Main) 2022]**

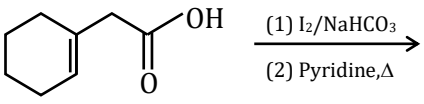
(1) 

(2) 

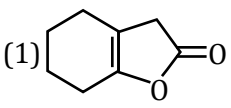
(3) 

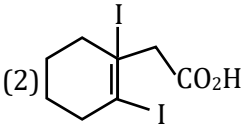
(4) 

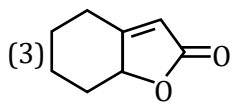
CCD047

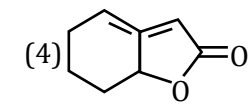
16. 

Find out the major product for the above reaction. **[JEE (Main) 2022]**

(1) 

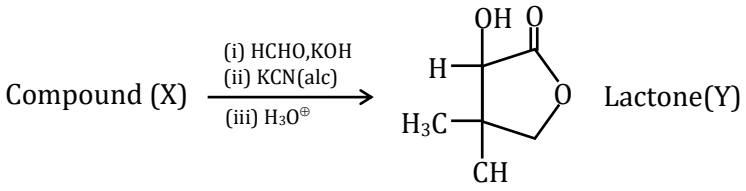
(2) 

(3) 

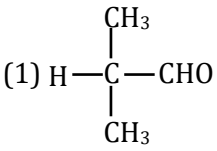
(4) 

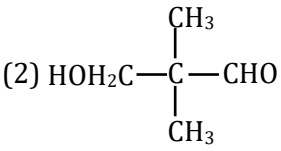
CCD048

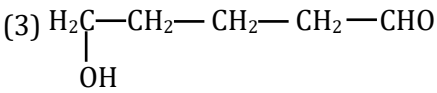
17. Compound (X) undergoes following sequence of reactions to give the Lactone (Y).

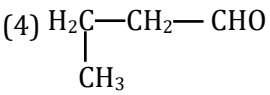


[JEE (Main) 2023]

(1) 

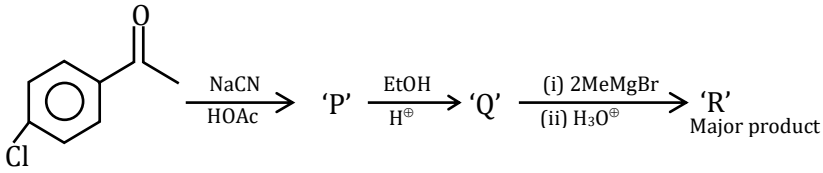
(2) 

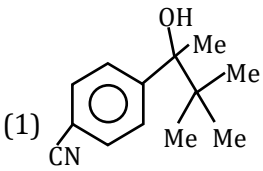
(3) 

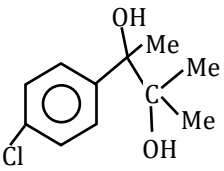
(4) 

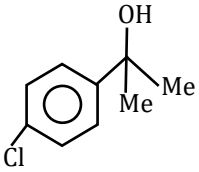
CCD049

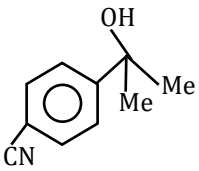
18. 'R' formed in the following sequence of reaction is: **[JEE (Main) 2023]**



(1) 

(2) 

(3) 

(4) 

CCD050

19. **Match List I with List II** **[JEE (Main) 2023]**

	List I Name of reaction		**List II Reagent used**
A	Hell-Volhard-Zelinsky reaction	I.	$NaOH + I_2$
B	Iodoform reaction	II.	(i) CrO_2Cl_2, CS_2; (ii) H_2O
C	Etard reaction	III.	(i) Br_2/red phosphorus; (ii) H_2O
D	Gatterman-Koch reaction	IV.	CO, HCl, anhyd. $AlCl_3$

Choose the correct answer from the options given below:

(1) A-III, B-II, C-I, D-IV (2) A-III, B-I, C-IV, D-II (3) A-I, B-II, C-III, D-IV (4) A-III, B-I, C-II, D-IV

CCD148

20. Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A : A solution of the product obtained by heating a mole of glycine with a mole of chlorine in presence of red phosphorous generates chiral carbon atom.

Reason R : A molecule with 2 chiral carbons is always optically active.

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

[JEE (Main) 2023]

(1) A is false but R is true.

(2) A is true but R is false.

(3) Both A and R are true and R is the correct explanation of A.

(4) Both A and R are true and R is NOT the correct explanation of A.

CCD149

EXERCISE - JEE (Advanced) PYQ

1. Benzoyl chloride is prepared from benzoic acid by: **[IIT - 2000]**

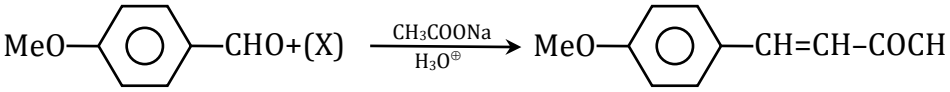
(A) Cl_2, hv (B) SO_2Cl_2 (C) $SOCl_2$ (D) Cl_2, H_2O

CCD071

2. Which of the following acids has the smallest dissociation constant? **[IIT - 2002]**

(A) $CH_3CHFCOOH$ (B) FCH_2CH_2COOH (C) $BrCH_2CH_2COOH$ (D) $CH_3CHBrCOOH$

CCD072

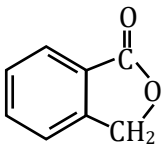
3. 

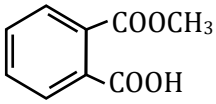
The compound (X) is **[IIT - 2005]**

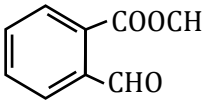
(A) $(CH_3CO)_2O$ (B) Br CH_2–COOH (C) CH_3COOH (D) CHO–COOH

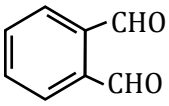
CCD073

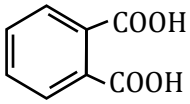
4. Which of the following reactants on reaction with conc. NaOH followed by acidification gives the following lactone as the only product? **[IIT - 2006]**



(A) 

(B) 

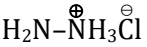
(C) 

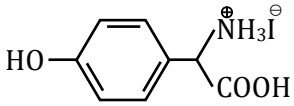
(D) 

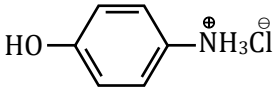
CCD074

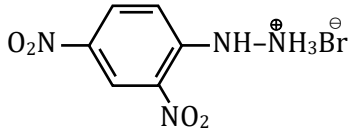
5. Match the compounds in **Column I** with their characteristic test(s)/reaction(s) given in **Column II**. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS. **[IIT - 2008]**

Column-I,

(A) 

(B) 

(C) 

(D) 

Column-II.

(P) Sodium fusion extract of the compound gives Prussian blue colour with $FeSO_4$

(Q) Gives positive $FeCl_3$ test

(R) Gives white precipitate with $AgNO_3$

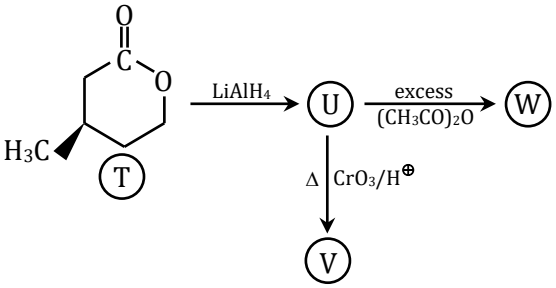
(S) Reacts with aldehydes to form the corresponding hydrazone derivative

(A) (A) → R,S; (B) → P, Q; (C) → P,Q,R ; (D) → P,S
(B) (A) → R; (B) → P,S; (C) → P,Q,R ; (D) → P,S
(C) (A) → S; (B) → P, Q; (C) → Q,R,S ; (D) → P,S
(D) (A) → p,q; (B) → P, R; (C) → P,Q,R ; (D) → P,S

CCD075

6. With reference the scheme given, which of the given statement(s) about T, U, V & W is/are correct :–

[IIT - 2012]

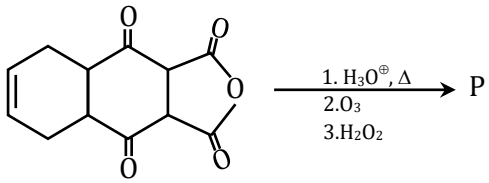


(A) 'T' is soluble in hot aq NaOH
(B) 'U' is optically active
(C) mol formula of W is $C_{10}H_{18}O_4$
(D) V gives effervescence with aq $NaHCO_3$

CCD076

7. The total number of carboxylic acid groups in the product P is :–

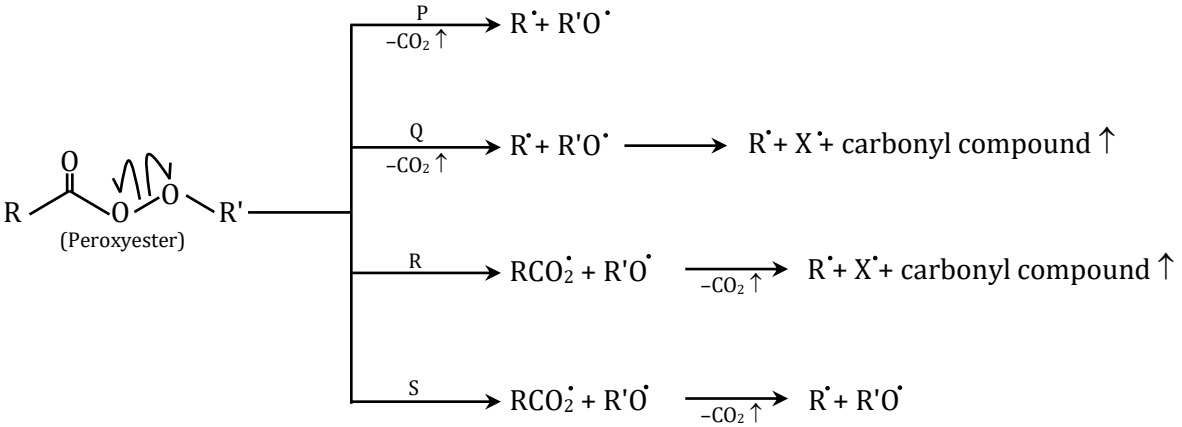
[IIT - 2013]



CCD077

8. Different possible **<u>thermal</u>** decomposition pathways for peroxyesters are shown below. Match each pathway from List-I with an appropriate structure from List-II and select the correct answer using the code given below the lists.

[IIT - 2014]

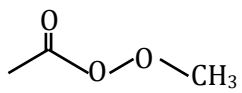


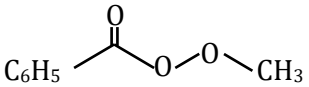
List-I

(P) Pathway **P**

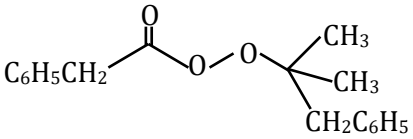
(Q) Pathway **Q**

List-II

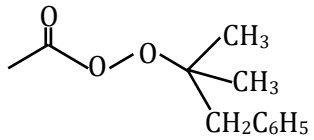
(1) 

(2) 

(R) Pathway **R**

(3) 

(S) Pathway **S**

(4) 

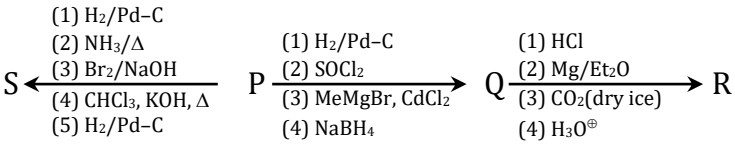
Code :

	P	Q	R	S
(A)	1	3	4	2
(B)	2	4	3	1
(C)	4	1	2	3
(D)	3	2	1	4

CCD078

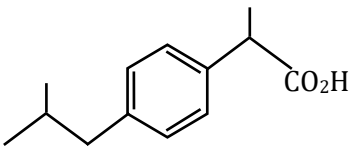
PARAGRAPH FOR NO. 9 & 10

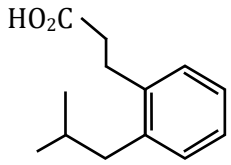
An organic acid P ($C_{11}H_{12}O_2$) can easily be oxidized to a dibasic acid which reacts with ethyleneglycol to produce a polymer dacron. Upon ozonolysis, **P** gives an aliphatic ketone as one of the products. **P** undergoes the following reaction sequences to furnish **R** via The compound **P** also undergoes another set of reactions to produce **S.**

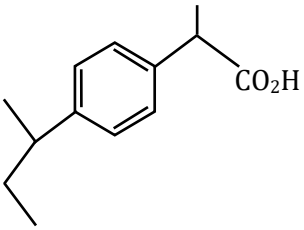


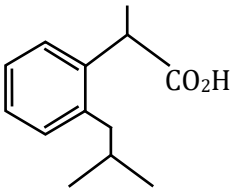
(There are two questions based on PARAGRAPH "A", the question given below is one of them)

9. The compound **R** is **[JEE (Advanced) 2018]**

(A) 

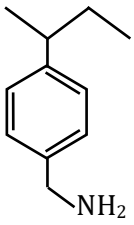
(B) 

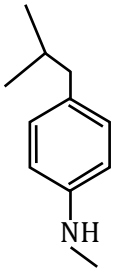
(C) 

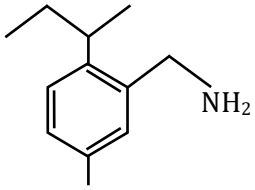
(D) 

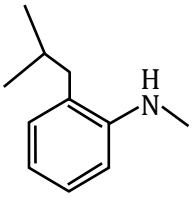
CCD079

10. The compound **S** is **[JEE (Advanced) 2018]**

(A) 

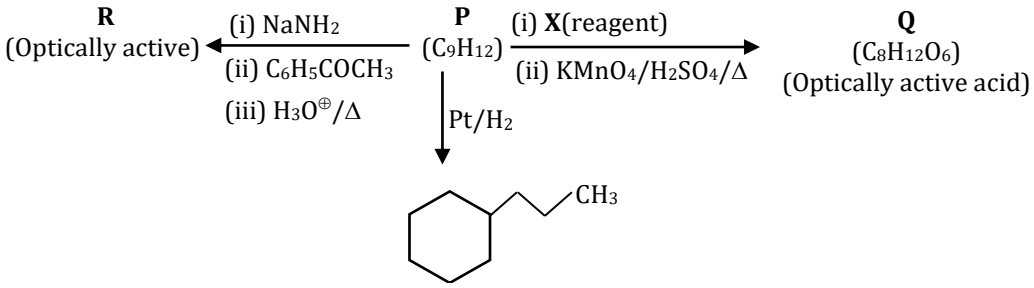
(B) 

(C) 

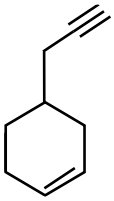
(D) 

CCD080

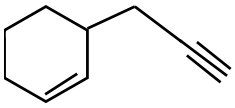
11. Consider the following transformations of a compound **P**.

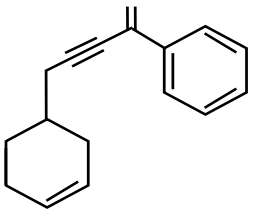


Choose the correct option(s). **[JEE (Advanced) 2020]**

(A) **P** is 

(B) **X** is Pd-C/quinoline/H_2

(C) **P** is 

(D) **R** is 

CCD081

12. Match the compounds in LIST-I with the observation in LIST-II and choose the correct option.

[JEE (Advanced) 2022]

LIST-I	**LIST-II**
(I) Aniline	(P) Sodium fusion extract of the compound on boiling with $FeSO_4$, followed by acidification with conc. H_2SO_4, gives Prussian blue color.
(II) o-Cresol	(Q) Sodium fusion extract of the compound on treatment with sodium nitroprusside gives blood red color.
(III) Cysteine	(R) Addition of the compound to a saturated solution of $NaHCO_3$ results in effervescence.
(IV) Caprolactam	(S) The compound reacts with bromine water to give a white precipitate.
	(T) Treating the compound with neutral $FeCl_3$solution produces violet color.

(A) I → P, Q; II → S; III → Q, R; IV → P

(B) I → P ; II → R, S; III → R; IV → Q, S

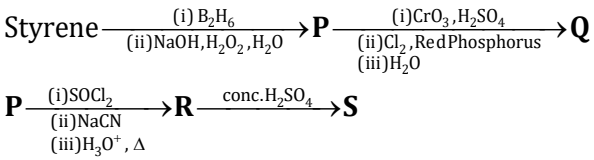
(C) I → Q, S; II → P, T; III → P; IV → S

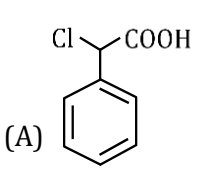
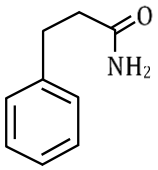
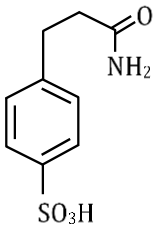
(D) I → P, S; II → T; III → Q, R; IV → P

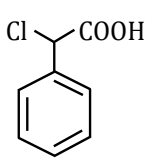
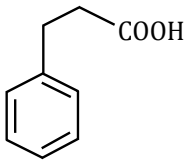
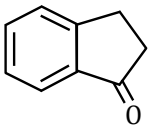
CCD082

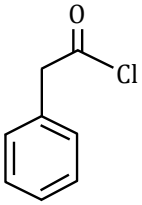
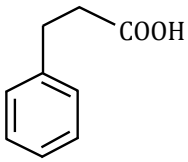
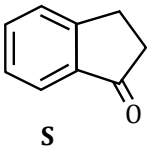
13. Consider the following reaction scheme and choose the correct option(s) for the major products **Q**, **R** and **S**.

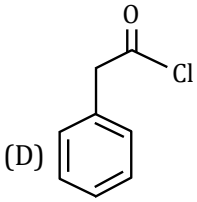
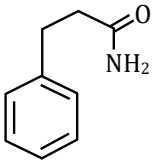
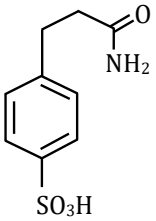
[JEE (Advanced) 2023]



(A)  **Q**
 **R**
 **S**

(B)  **Q**
 **R**
 **S**

(C)  **Q**
 **R**
 **S**

(D)  **Q**
 **R**
 **S**

CCD150

14. In the following reactions, **P, Q, R,** and **S** are the major products.

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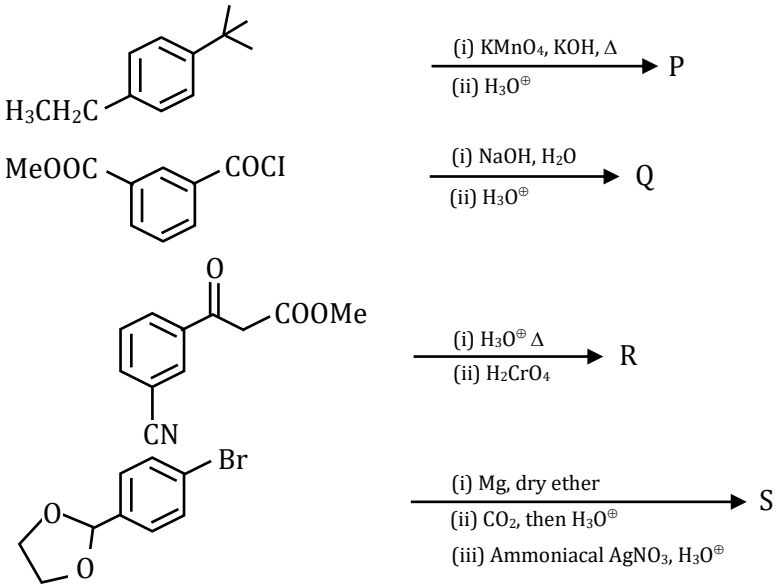


The correct statement (s) about **P, Q, R,** and **S** is (are)

(A) **P** and **Q** are monomers of polymers dacron and glyptal, respectively.

(B) **P, Q,** and **R** are dicarboxylic acids.

(C) Compounds **Q** and **R** are the same.

(D) **R** does **not** undergo aldol condensation and **S** does **not** undergo Cannizzaro reaction.

CCD151

JEE (Main) Practice Paper

This paper is for yourself practice and assessment the discussion of this paper is optional though you can see PDF solutions or video solutions or solutions in hardcopy whichever is provided.

SECTION–A

- This section contains **TWENTY** questions.
- Each question has **FOUR** options (1), (2), (3) and (4). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +4, if only the bubble corresponding to the correct option is darkened.
Zero Marks : 0, if none of the bubbles is darkened.
Negative Marks : –1 in all other cases

1. In which reaction product is hydrocarbon?

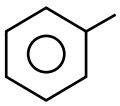
(1) $RCOOK \xrightarrow{\text{Electrolysis}}$ (2) $RCOOAg \xrightarrow{I_2/\Delta}$

(3) $CH_3—CH_3 \xrightarrow{Cl_2/h\nu}$ (4) $CH_3—\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}—Cl \xrightarrow{C_2H_5OH}$

CCD001

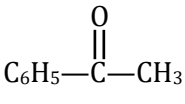
2. Which of the following set of reaction can not prepare carboxylic acid as the final product ?

(1) $R–MgX + O=C=O \xrightarrow{\text{Dry ether}} A \xrightarrow{H_3O^{\oplus}}$ (2) $R—CN \xrightarrow[(ii)\ H_2O/H^{\oplus}]{(i)\ SnCl_2 + HCl}$

(3)  $\xrightarrow[\Delta]{KMnO_4, \overset{\ominus}{O}H} A \xrightarrow{H_3O^{\oplus}}$ (4) None of these

CCD002

3. In the given reaction,

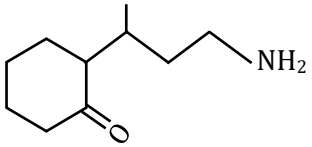
 $\xrightarrow[(ii)\ H^{\oplus}]{(i)\ Br_2/KOH} CHBr_3 + [X]$

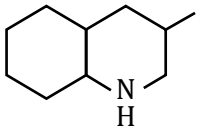
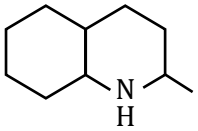
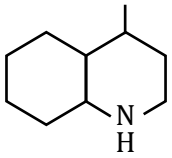
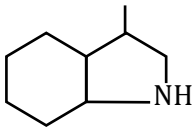
[X] will be :

(1) $C_6H_5–CHO$ (2) C_6H_5COOH (3) $C_6H_5–CH_2OH$ (4) CH_3COOH

CCD003

4. Reductive amination of A forms:

A : 

(1)  (2)  (3)  (4) 

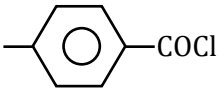
CCD004

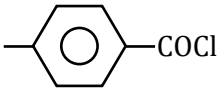
5. In the given reaction :
[X] + Acetic anhydride → Aspirin
[X] will be :
(1) Benzoic acid
(2) *o*-methoxybenzoic acid
(3) *o*-Hydroxybenzoic acid
(4) *p*-Hydroxybenzoic acid

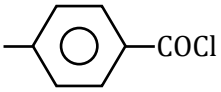
CCD005

6. Arrange following compounds in decreasing order of reactivity for hydrolysis reaction :

(I) C_6H_5COCl

(II) 

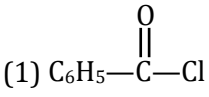
(III) 

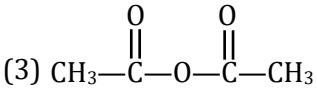
(IV) 

(1) II > IV > I > III
(2) II > IV > III > I
(3) I > II > III > IV
(4) IV > III > II > I

CCD006

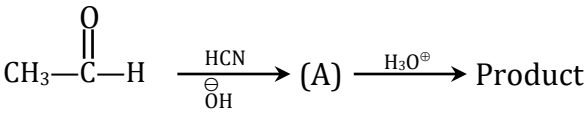
7. Which one of the following compounds gives carboxylic acid with HNO_2?

(1) 
(2) $C_6H_5CONH_2$

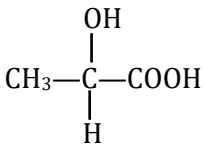
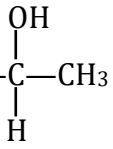
(3) 
(4) $CH_3COOC_2H_5$

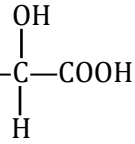
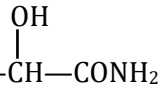
CCD007

8. In the reaction sequence,



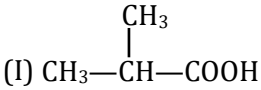
Product will be :

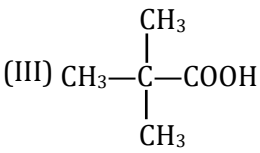
(1) 
(2) 

(3) Mixture of and 
(4) 

CCD008

9. Arrange these esters in decreasing order of ease of esterification with $CH_3OH/H^{\oplus}$:

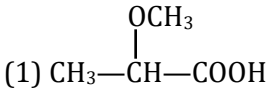
(I) 
(II) $H_3C—CH_2—COOH$

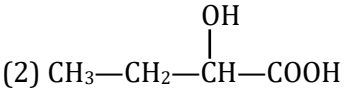
(III) 
(IV) $(CH_3—CH_2)_3C–COOH$

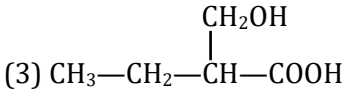
(1) II > I > III > IV
(2) I > II > III > IV
(3) III >IV > II > I
(4) IV > III > II > I

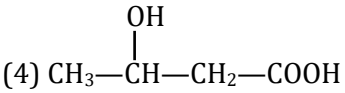
CCD009

10. Which optically active compound on reduction with $LiAlH_4$ will give optically inactive compound?

(1) 

(2) 

(3) 

(4) 

CCD010

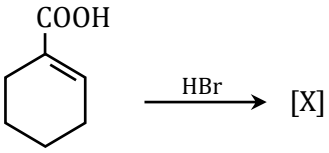
11. Which will form lactone on treatment with NaOH ?

(1) α-Bromo acid (2) β-Bromo acid

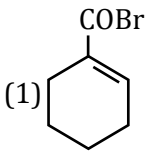
(3) β-Hydroxy acid (4) δ-Bromo acid

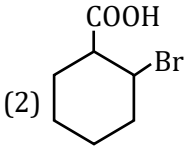
CCD011

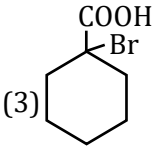
12. In the given reaction:

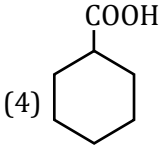


[X] will be :

(1) 

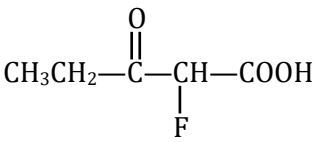
(2) 

(3) 

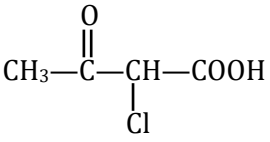
(4) 

CCD012

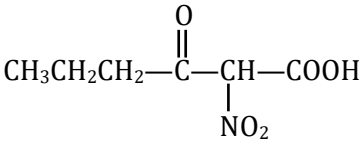
13. Correct order of decarboxylation



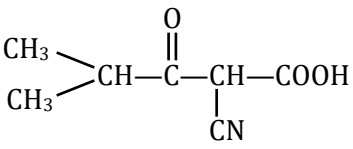
(a)



(b)



(c)



(d)

(1) a > b > c > d (2) c > d > b > a (3) c > d > a > b (4) d > c > a > b

CCD013

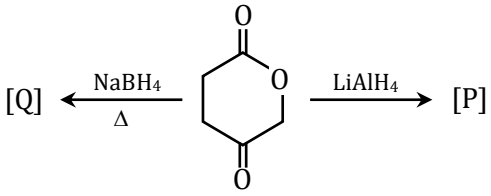
14. N-Ethyl pthalimide on hydrolysis gives:

(1) Methyl alcohol (2) Ethyl amine

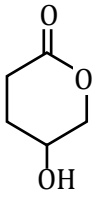
(3) Dimethyl amine (4) Diethyl amine

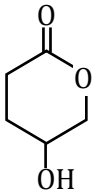
CCD014

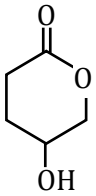
15. In the given reaction:



[P] and [Q] respectively be :

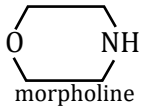
(1) $CH_2OH—CH_2—CH_2—\underset{\underset{OH}{|}}{CH}—CH_2OH$ and 

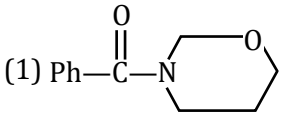
(2)  and $CH_2OH—CH_2—CH_2—\underset{\underset{OH}{|}}{CH}—CH_2OH$

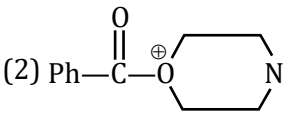
(3) Both are 

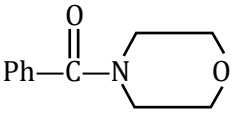
(4) Both are $CH_2OH—CH_2—CH_2—\underset{\underset{OH}{|}}{CH}—CH_2OH$

CCD015

16. $Ph—\overset{\overset{O}{||}}{C}—Cl$ +  → A 'A' is Major

(1) 

(2) 

(3) 

(4) $Ph—\overset{\overset{O}{||}}{C}—NH_2$

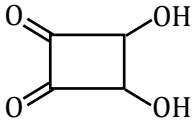
CCD016

17. $CH_3NH_2 \xrightarrow{(CH_2)_2O}$ (A)

(1) 'A' is more basic than CH_3NH_2
(2) 'A' is less basic than CH_3NH_2
(3) 'A' is Ter-amine
(4) None

CCD017

18. Which of the following can released CO_2 with $NaHCO_3$.



(i)

$CH_2(COOH)_2$

(ii)

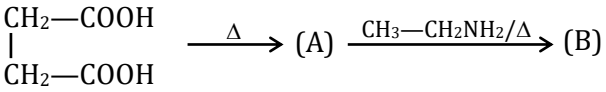
$CH_3—\overset{\overset{O}{||}}{C}—COOH$

(iii)

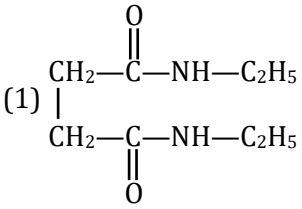
(1) (i), (ii) & (iii)
(2) (i) & (ii)
(3) (ii) & (iii)
(4) (i) & (ii)

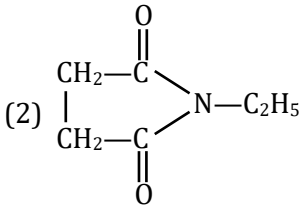
CCD018

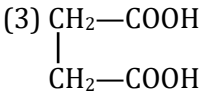
19. In the given reaction sequence:

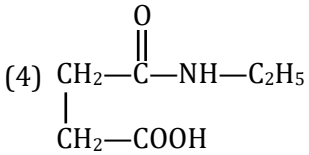


(B) will be:

(1) 

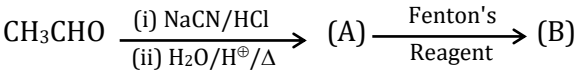
(2) 

(3) 

(4) 

CCD019

20. In the given reaction :



(B) will be :

(1) Acetic acid (2) Oxalic acid (3) Pyruvic acid (4) Citric acid

CCD020

SECTION-B

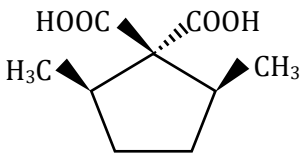
- This section will have **TEN questions**. Candidate can choose to attempt any 5 questions out of these 10 questions. In case if candidate attempts more than 5 questions, first 5 attempted questions will be considered for marking.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value (Answer should be rounded off to the nearest integer).
- Answer to each question will be evaluated according to the following marking scheme:

  Full Marks : +4, if only correct answer is given.
  Zero Marks : 0, if no answer is given.
  Negative Marks :-1 for incorrect answer

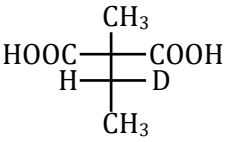
---

1. Number of compound which on electrolysis does not give hydrocarbon :
C_6H_5COONa, $HCOONa$, $Me_3C—COONa$, $NaOOC—CH=CH—COONa$

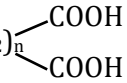
CCD021

2. Find the total number of products obtained when  Undergoes decarboxylation [neglect the CO_2]

CCD022

3. Find the total number of different products obtained when  is heated strongly.

CCD023

4. Dicarboxylic acid $(CH_2)_n$  on heating undergo cyclisation giving cyclic anhydride. For this reaction, what should be the minimum values of n?

CCD024

5. How many different isomers (including stereoisomers) of cyclohexane dicarboxylic acid on heating with P_2O_5 gives cyclic anhydride?

CCD025

6. Total number of compounds which are soluble in hot a NaOH are :
(i) Salicyclic acid (ii) Aspirine (iii) Carbolic acid (iv) Acetic acid
(v) Succinic anhydride (vi) Cyclohexanone (vii) Benzene sulphonamide (viii) Cyclohexene

CCD026

7. Number of the following statements which are correct ?
(i) Formic acid is stronger acid than acetic acid
(ii) o-bromobenzoic acid is weaker than o-chlorbenzoic acid
(iii) Acetaldehyde does not respond to silver mirror test
(iv) benzaldehyde does not reduce fehling's solution

CCD027

8. Number of the following reaction that can be used to prepare benzoic acid?
(i) Reaction of ethene with HCl
(ii) Hydrolysis of benzotrichloride with aqueous Ca $(OH)_2$
(iii) Hydrolysis of benzonitrile
(iv) Oxidation of isopropyl benzene with alkaline $KMnO_4$

CCD028

9. Number of the following reagents that cannot be used to distinguish between phenol and benzoic acid ?
(i) Molisch reagent (ii) Neutral $FeCl_3$ (iii) Aqueous NaOH (iv) Tollen's reagent

CCD029

10. $\underset{(A)}{PhCOOH} \xrightarrow[(ii)\ \Delta]{(i)\ N_3H,\ H^{\oplus}} (B) \xrightarrow{H_2O/OH^{\ominus}} (C)$

Number of the following statements is/are correct about the reaction ?
(i) The compounds (B) and (C) respectively are Ph–N=C=O and $PhNH_2$.
(ii) The compounds (B) and (C) respectively are $Ph\overset{\oplus}{N} \equiv \overset{\ominus}{C}$ and PhNHMe.
(iii) The reaction is known as Curtius rearrangement reaction.
(iv) The reaction is known as Schmidt reaction.

CCD030

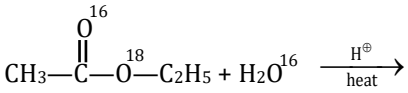
JEE (Advanced) Practice Paper

This paper is for yourself practice and assessment the discussion of this paper is optional though you can see PDF solutions or video solutions or solutions in hardcopy whichever is provided.

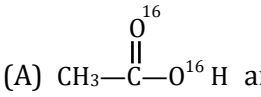
SECTION–I

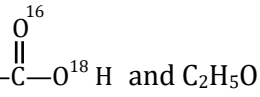
- This section contains **EIGHTH** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories:

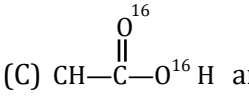
Full Marks : +3 If only the bubble corresponding to the correct option is darkened.
Zero Marks : 0 If none of the bubbles is darkened.
Negative Marks : –1 In all other cases

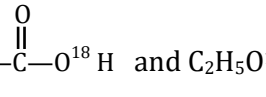
1. Consider the following reaction 

The products formed in the reaction are -

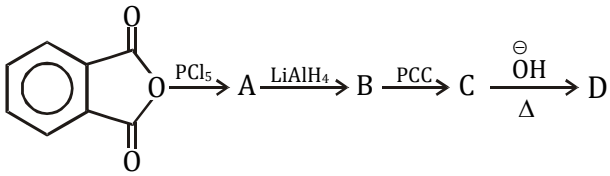
(A)  and $C_2H_5O^{18}H$

(B)  and $C_2H_5O^{16}H$

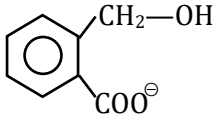
(C)  and $C_2H_5O^{16}H$

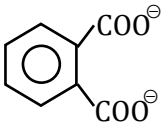
(D)  and $C_2H_5O^{18}H$

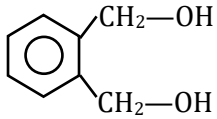
CCD051

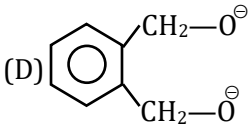
2. 

Compound D is :-

(A) 

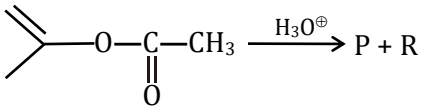
(B) 

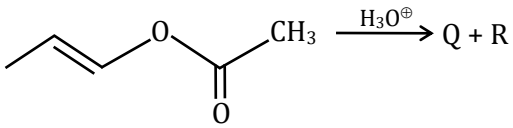
(C) 

(D) 

CCD052

3. P & Q can be distinguished by :

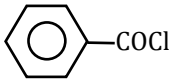


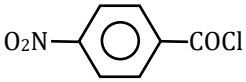


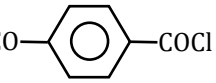
(A) $NaHSO_3$ (B) $NaHCO_3$ (C) $[Ag(NH_3)_2]^{\oplus}$ (D) Br_2/CCl_4

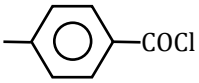
CCD053

4. Consider the following compounds :-

(A) 

(B) 

(C) 

(D) 

The correct reactivity order towards hydrolysis.

(A) (i) > (ii) > (iii) > (iv) (B) (iv) > (ii) > (i) > (iii)

(C) (ii) > (i) > (iv) > (iii) (D) (ii) > (iv) > (iii) > (i)

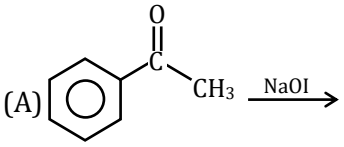
CCD054

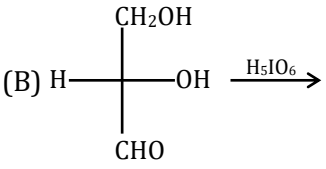
5. Acetic anhydride and ammonia gives the product:

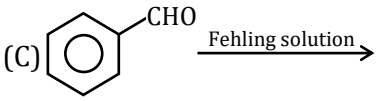
(A) CH_3CONH_2 (B) $CH_3CONHCH_3$ (C) CH_3CN (D) CH_3COONH_4

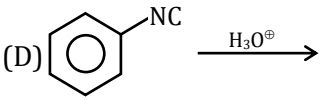
CCD055

6. Reactions in which one of the product is not carboxylic acid/salt :

(A) 

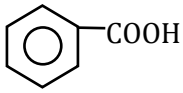
(B) 

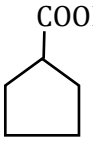
(C) 

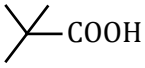
(D) 

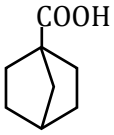
CCD056

7. Which one of the following compounds will give HVZ reaction?

(A) 

(B) 

(C) 

(D) 

CCD057

8. $RCH_2CONH_2 + NaOBr \longrightarrow ?$

Rate of reaction will be faster if 'R' is

(A)– CH_3 (B)–C_2H_5 (C) –NO_2 (D) –CN

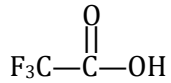
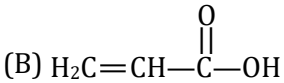
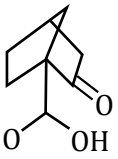
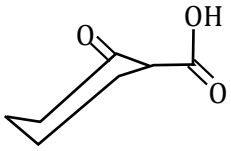
CCD058

SECTION-II

- This section contains **TWO** questions.
- Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct option(s).
- For each question, choose the correct option(s) to answer the question.
- Answer to each question will be evaluated according to the following marking scheme:

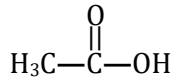
Full Marks	: +4, if only (all) the correct option(s) is (are) chosen.
Partial Marks	: +3, if all the four options are correct but ONLY three options are chosen.
Partial Marks	: +2, if three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	: +1, if two or more options are correct but ONLY one option is chosen and it is a correct option.s
Zero Marks	: 0, if none of the options is chosen (i.e. the question is unanswered).
Negative Marks	: –2, in all other cases.

9. Which of the following carboxylic acids do not undergo decarboxylation simply on heating ?

(A)  (B)  (C)  (D) 

CCD059

10. Among the following, which statement is not correct ?

(A)  will not respond to haloform test

(B) Schiff's regent and Schiff's base are different compounds

(C) Fehling's solution is a good reagent to detect aromatic aldehydes

(D) Both aldehyde and ketone can react with 2,4-dinitrophenylhydrazine reagent

CCD060

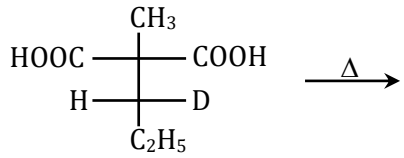
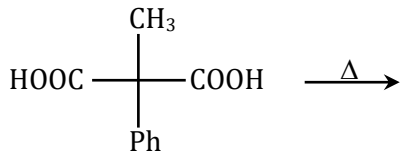
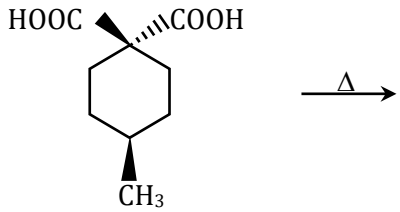
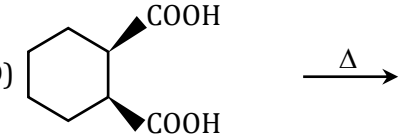
SECTION–III

- This section contains **TWO** questions.
- **Each question has matching lists.** The codes for the lists have choices (A), (B), (C) and (D) out of which ONLY ONE is correct.
- For each question, marks will be awarded in one of the following categories :

Full Marks	: +3, if only the bubble corresponding to the correct option is darkened.
Zero Marks	: 0, if none of the bubbles is darkened.
Negative Marks	: –1, in all other cases.

Matching Type Questions

11. Match the following question :

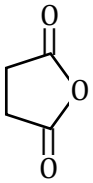
Column - I (Reaction)	**Column-II (Products)**
(A) 	(P) Diastereomers
(B) 	(Q) Racemic mixture
(C) 	(R) Meso compound
(D) 	(S) CO_2 gas will evolve
	(T) No reaction

(A) (A) → P,S (B) → Q,S (C) → P,S (D) → R
(B) (A) → S (B) → Q (C) → P (D) → R
(C) (A) → P,S (B) → R,P (C) → S (D) → R
(D) (A) → S,P (B) → S (C) → P,S (D) → R

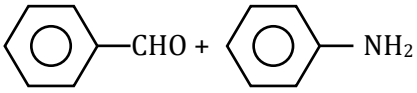
CCD061

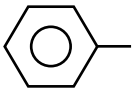
12. Match the following question :

Column I (Reactions)

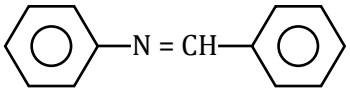
(A) CH_3NH_2 + 

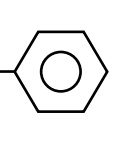
(B) $(CH_3)_2NH + C_6H_5COCl$

(C) 

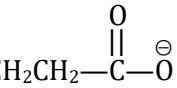
(D) CH_3NH_2 + 

Column II (Products)

(P) 

(Q) 

(R) 

(S) 

(T) No reaction

(A) (A) → (S) (B) → (R) (C) → (P) (D) → (Q)
(B) (B) → (P) (B) → (Q) (C) → (S) (D) → (T)
(C) (C) → (Q) (B) → (P) (C) → (P) (D) → (R)
(D) (D) → (R) (B) → (R) (C) → (R) (D) → (P)

CCD062

SECTION–IV

- This section contains **TWO** paragraphs.
- Based on each paragraph, there are **TWO** questions.
- Each question has **FOUR** options (A), (B), (C) and (D) **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

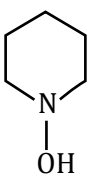
  Full Marks : +3, If only the bubble corresponding to the correct answer is darkened.

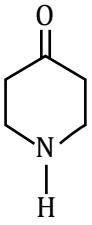
  Zero Marks : 0, In all other cases.

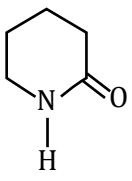
Paragraphs for Questions 13 and 14

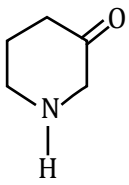
An organic lactam (A) on acid hydrolysis produces an amino acid (B) which on treatment with HNO_2 gave compound (C). compound (C), when heated with conc. H_3PO_4 gives lactone (D). the compound (A) can be synthesised from cyclopentanone with hydroxylamine followed by the treatment with conc. H_2SO_4.

13. The compound (A) is

(A) 

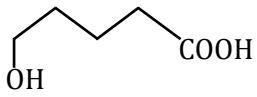
(B) 

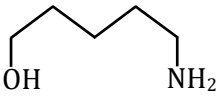
(C) 

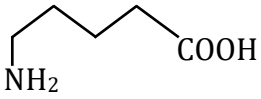
(D) 

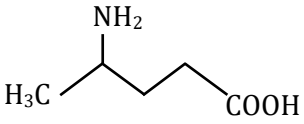
CCD063

14. The compound (B) in this reaction is

(A) 

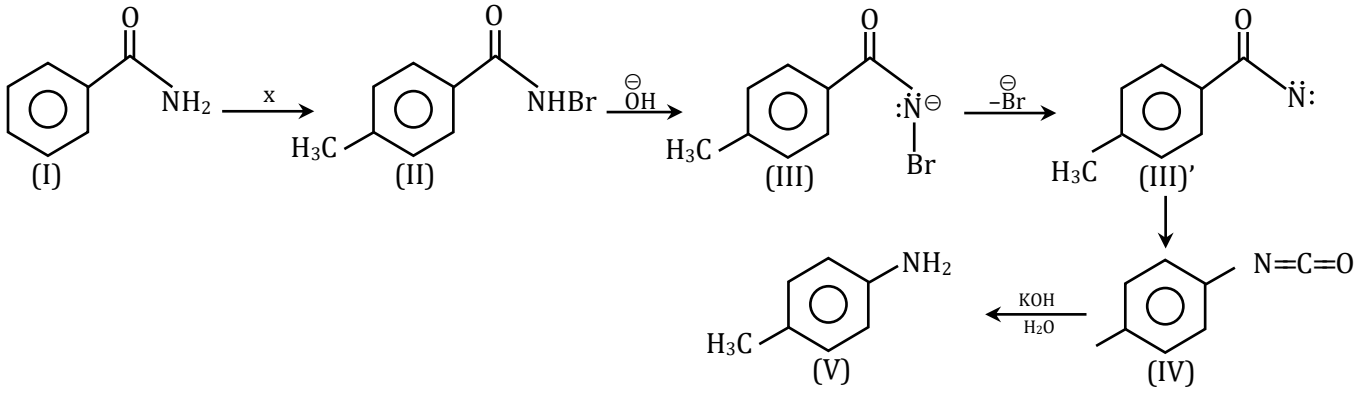
(B) 

(C) 

(D) 

CCD064

Paragraphs for Questions 15 and 16

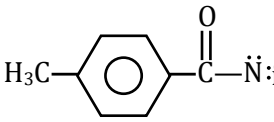


15. Which reagent (X) is used to convert I to II ?

(A) NaOBr (B) Br_2/CCl_4 (C) Br_2/H_2O (D) Na_2CO_3 with H_2SO_4

CCD065

16. Which is true for the above reaction ?

(A)  is formed during the reaction

(B) The rate determining step is migration of para tolyl group

(C) Formation of II is rds.

(D) All are correct

CCD066

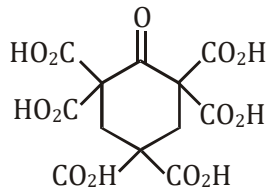
SECTION-V

- This section contains **FOUR** questions.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 6.25, 7.00, –0.33, –.30, 30.27, –127.30, if answer is 11.36777..... then both 11.36 and 11.37 will be correct).
- Answer to each question will be evaluated according to the following marking scheme:

  Full Marks : +3, if ONLY the correct numerical value is entered as answer.

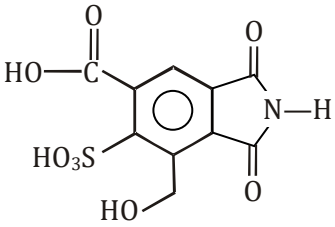
  Zero Marks : 0, in all other cases.

17. Write the number of CO_2 molecule released only on heating following molecule.



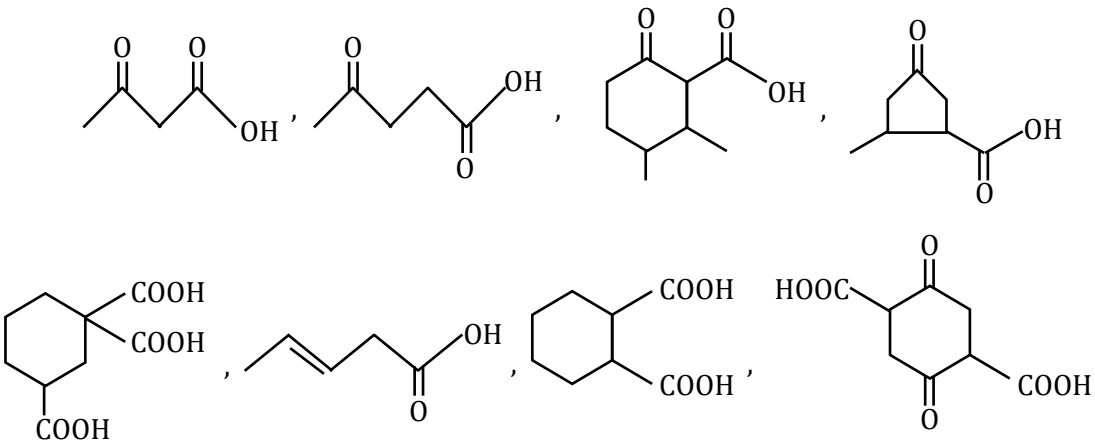
CCD067

18. How many moles of NaOH would be required for complete neutralization of following compound ?



CCD068

19. Examine the structure of following compounds, and find out number of compounds that will undergo decarboxylation in presence of heat.



CCD069

20. $CH_3CH_2-\underset{\underset{NH_2}{|}}{CH}-COOH \xrightarrow{\Delta}$ P (no. of products)

$CH_3CH_2-\underset{\underset{OH}{|}}{CH}-COOH \xrightarrow{\Delta}$ Q (no. of products)

$CH_3\underset{\underset{OH}{|}}{CH}-CH_2-COOH \xrightarrow{\Delta}$ R (no. of products)

$\underset{\underset{OH}{|}}{CH_2}CH_2-CH_2-COOH \xrightarrow{\Delta}$ S (no. of products)

In all reactions the sum of product is.

CCD070

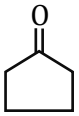
ANSWER KEY

EXERCISE - O

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	B	B	D	C	C	A	B	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	C	A	C	B	A	B	B	C	C
Que.	21	22	23							
Ans.	A	A	A							

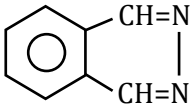
EXERCISE - S

1. **(4)**

2. 

3. $(CH_3)_2CH-CH_2-\overset{\overset{O}{\|}}{C}-H$

4. **(3)**

5. 

6. **(6)**

7. 

8. $CH_3-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{C}(CH_2-CH_2-CH_3)-CO_2Et$

9. 1. H_3O^+, 2. $SOCl_2$, 3. CH_3-NH_2

10. **(3)**

EXERCISE - JEE (Main) PYQ

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	4	2	2,3,4	1	4	1	3	4	3	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	4	1	4	1	4	3	1	2	4	2

EXERCISE - JEE (Advanced) PYQ

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	C	C	A	C	A	A,C,D	2	A	A	B
Que.	11	12	13	14						
Ans.	B,C	D	B	C,D						

JEE (Main) Practice Paper

Section-A	**Q.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	A.	1	2	2	3	3	1	2	3	1	3
	Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	A.	4	2	3	2	1	3	2	3	2	3
Section-B	**Q.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	A.	2	1	3	2	3	6	3	3	3	2

JEE (Advanced) Practice Paper

Section-I	**Q.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	A.	A	A	C	C	A	C	B	B
Section-II	**Q.**	**9**	**10**						
	A.	A,B,C	B,C						
Section-III	**Q.**	**11**	**12**						
	A.	A	A						
Section-IV	**Q.**	**13**	**14**	**15**	**16**				
	A.	C	C	A	A,B				
Section-V	**Q.**	**17**	**18**	**19**	**20**				
	A.	5	4	5	9				