CARBOXYLIC ACIDS AND IT'S DERIVATIVE, ALIPHATIC AMINES

EXERCISE # I

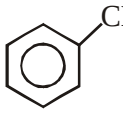
1. In which reaction product is hydrocarbon ?

(A) $RCOOK \xrightarrow{\text{Electrolysis}}$ (B) $RCOOAg \xrightarrow{I_2/\Delta}$

(C) $CH_3–CH_3 \xrightarrow{Cl_2/h\nu}$ (D) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-Cl \xrightarrow{C_2H_5OH}$

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

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

(C)  $\xrightarrow[\Delta]{KMnO_4, \overset{\ominus}{O}H} A \xrightarrow{H_3O^+}$ (D) $CH_3(CH_2)_8CH_2OH \xrightarrow[H_2SO_4]{CrO_3}$

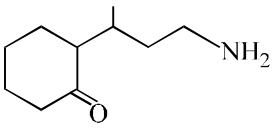
3. In the given reaction,

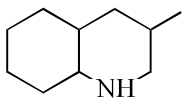
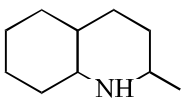
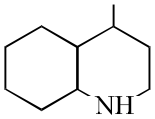
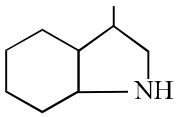
$$C_6H_5-\overset{\displaystyle O}{\overset{||}{C}}-CH_3 \xrightarrow[(ii)\ H^{\oplus}]{(i)\ Br_2/KOH} CHBr_3 + [X]$$

[X] will be :

(A) $C_6H_5–CHO$ (B) C_6H_5COOH (C) $C_6H_5–CH_2OH$ (D) CH_3COOH

4. Reductive amination of A forms:

A : 

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

5. In the given reaction :

[X] + Acetic anhydride ⟶ Aspirin

[X] will be :

(A) Benzoic acid (B) *o*-methoxybenzoic acid

(C) *o*-Hydroxybenzoic acid (D) *p*-Hydroxybenzoic acid

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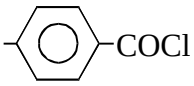
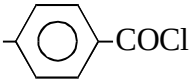
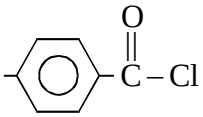
6. Arrange following compounds in decreasing order of reactivity for hydrolysis reaction :

(I) C_6H_5COCl

(II) 

(III) 

(IV) 

(A) II > IV > I > III

(B) II > IV > III > I

(C) I > II > III > IV

(D) IV > III > II > I

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

(A) $C_6H_5-\overset{\overset{O}{\|}}{C}-Cl$

(B) $C_6H_5CONH_2$

(C) $CH_3-\overset{\overset{O}{\|}}{C}-O-\overset{\overset{O}{\|}}{C}-CH_3$

(D) $CH_3COOC_2H_5$

8. In the reaction sequence ,

$$CH_3-\overset{\overset{O}{\|}}{C}-H \xrightarrow[\overset{\ominus}{O}H]{HCN} (A) \xrightarrow{H_2O/H^{\oplus}} \text{Product}$$

Product will be :

(A) $CH_3-\overset{\overset{OH}{|}}{\underset{\underset{H}{|}}{C}}-COOH$

(B) $HOOC-\overset{\overset{OH}{|}}{\underset{\underset{H}{|}}{C}}-CH_3$

(C) Mixture of $CH_3-\overset{\overset{OH}{|}}{\underset{\underset{H}{|}}{C}}-COOH$ and $HOOC-\overset{\overset{OH}{|}}{\underset{\underset{H}{|}}{C}}-CH_3$

(D) $CH_3-\overset{\overset{OH}{|}}{CH}-CONH_2$

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

(I) $CH_3-\underset{\underset{CH_3}{|}}{CH}-COOH$

(II) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-COOH$

(III) $CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-COOH$

(IV) $(CH_3–CH_2)_3C–COOH$

(A) II > I > III > IV (B) I > II > III > IV (C) III >IV > II > I (D) IV > III > II > I

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

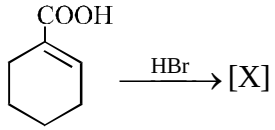
(A) $CH_3-\underset{\underset{OCH_3}{|}}{CH}-COOH$ (B) $CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-COOH$

(C) $CH_3-CH_2-\underset{\underset{CH_2OH}{|}}{CH}-COOH$ (D) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-COOH$

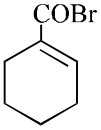
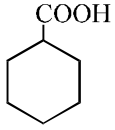
11. Which will form lactone on treatment with NaOH ?

(A) α-Bromo acid (B) β-Bromo acid (C) β-Hydroxy acid (D) δ-Bromo acid

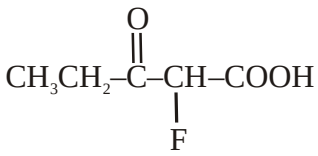
12. In the given reaction:



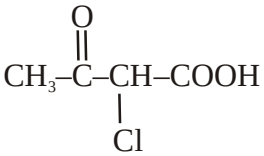
[X] will be :

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

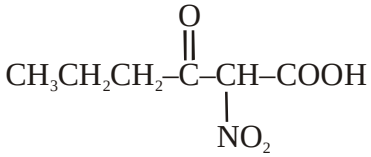
13. Correct order of decarboxylation



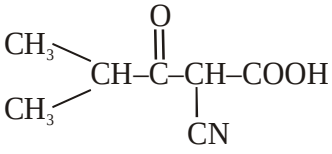
(a)



(b)



(c)



(d)

(A) a > b > c > d (B) c > d > b > a (C) c > d > a > b (D) d > c > a > b

14. N-Ethyl pthalimide on hydrolysis gives:

(A) Methyl alcohol (B) Ethyl amine (C) Dimethyl amine (D) Diethyl amine

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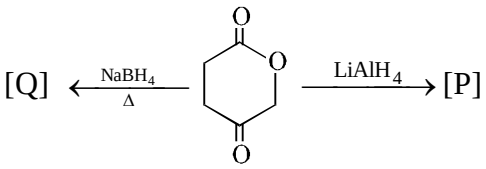
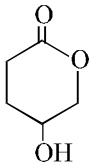
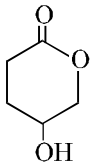
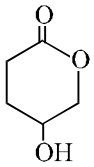
15. In the given reaction:



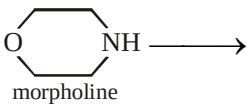
[P] and [Q] respectively be :

(A) $CH_2OH-CH_2-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2OH$ and 

(B)  and $CH_2OH-CH_2-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2OH$

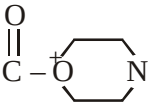
(C) Both are 

(D) Both are $CH_2OH-CH_2-CH_2-\underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{CH}}-CH_2OH$

16. $Ph-\overset{\overset{O}{||}}{C}-Cl$ +  $\longrightarrow$ $\underset{\text{Major}}{A}$ 'A' is

morpholine

(A) $Ph-\overset{\overset{O}{||}}{C}-N$

(B) $Ph-\overset{\overset{O}{||}}{C}-\overset{+}{O}$ 

(C) $Ph-\overset{\overset{O}{||}}{C}-N$

(D) $Ph-\overset{\overset{O}{||}}{C}-NH_2$

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

(A) 'A' is more basic than CH_3NH_2

(B) 'A' is less basic than CH_3NH_2

(C) 'A' is Ter-amine

(D) None

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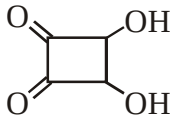
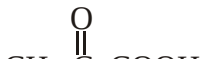
18. Which of the following can released CO_2 with $NaHCO_3$.



(i)

$CH_2(COOH)_2$

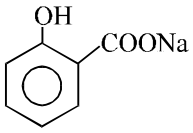
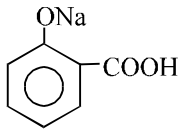
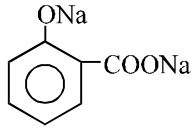
(ii)



(iii)

(A) (i), (ii) & (iii) (B) (i) & (ii) (C) (ii) & (iii) (D) (i) & (ii)

19. Sodium bicarbonate reacts with salicylic acid to form :

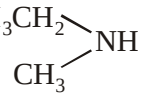
(A) C_6H_5ONa (B)  (C)  (D) 

20. Which of the following diazonium salt is relatively stable at 0-5°C:

(A) $CH_3–N\equiv N\}^{\oplus}Cl^-$ (B) $(CH_3)_2CH–N\equiv N\}^{\oplus}Cl^-$

(C) $C_6H_5–N\equiv N\}^{\oplus}Cl^-$ (D) $(CH_3)_3C–N\equiv N\}^{\oplus}Cl^-$

21. Which is most volatile ?

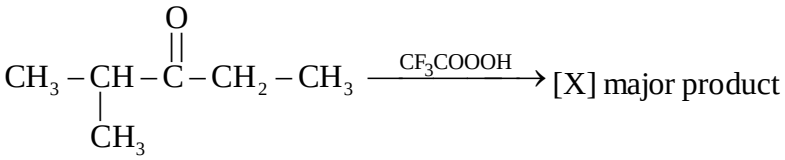
(A) $CH_3CH_2CH_2NH_2$ (B) $(CH_3)_3N$ (C)  (D) CH_3OH

22. $C_6H_5CONH_2 \xrightarrow{Br_2/OD^{\ominus}} P$, 'P' is :

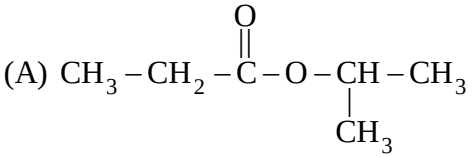
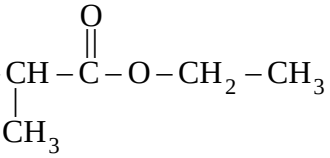
(A) $C_6H_5COND_2$ (B) $C_6H_5ND_2$

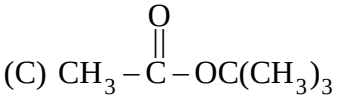
(C) C_6H_5NHD (D) $C_6H_5NH_2$

23. In the given reaction:



[X] will be:

(A)  (B) 

(C)  (D) $(CH_3)_3COOCH_3$

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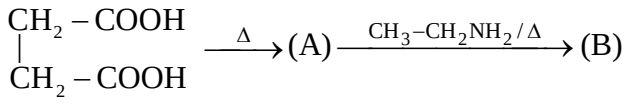
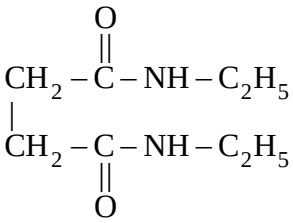
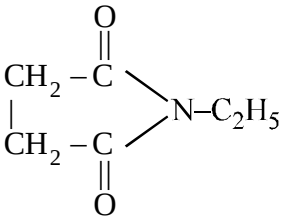
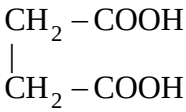
24. In the given reaction sequence:

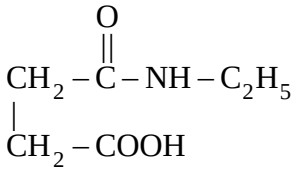


(B) will be:

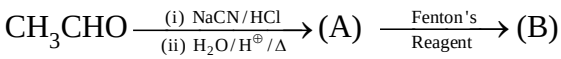
(A) 

(B) 

(C) 

(D) 

25. In the given reaction :



(B) will be :

(A) Acetic acid (B) Oxalic acid (C) Pyruvic acid (D) Citric acid

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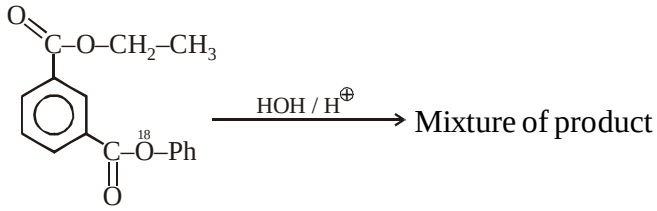
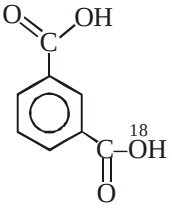
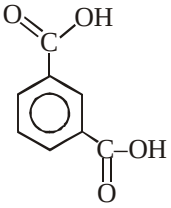
EXERCISE # II

1. Which of the following is/are present in mixture of product :



(A) $CH_3–CH_2–OH$ (B)  (C) $Ph–\overset{18}{O}H$ (D) 

2. Mixture of 1°, 2° and 3° amines can be separated by:

(A) Hinsberg's method (B) Hofmann's isocyanide test

(C) Fractional distillation (D) $NaNO_2$ HCl

3. RCOOR' can be prepared by:

(A) Esterification of RCOOH

(B) Reaction of $CH_3CH=CH_2$ with methanol

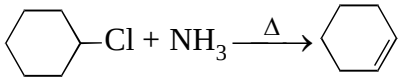
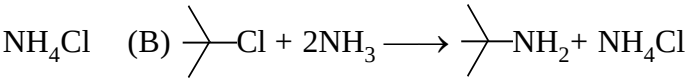
(C) Baeyer-Villiger oxidation of RCOR' with peroxy acid

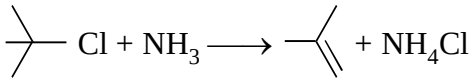
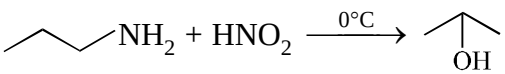
(D) reaction of RCOCl with R'OH

4. Which of the following amine reacts with Hinsberg reagent to give base soluble product :-

(A) Neopentyl amine (B) sec propyl amine (C) diethyl amine (D) ethyl methyl amine

5. Which is/are correct reaction(s):

(A)  (B) 

(C)  (D) 

6. Which of the following will form acetyl chloride with PCl_5?

(A) MeCOOH (B) MeCOOMe (C) MeCOOCOMe (D) $Me–CONH_2$

7. Sodium salt of which compound on electrolysis does not give hydrocarbon:

(A) C_6H_5COOH (B) HCOOH (C) $Me_3C–COOH$ (D) COOH–CH=CH–COOH

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

(A) $H_3C—\overset{\overset{O}{\|}}{C}—OH$ 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-dinitrophenylhydrazise reagent

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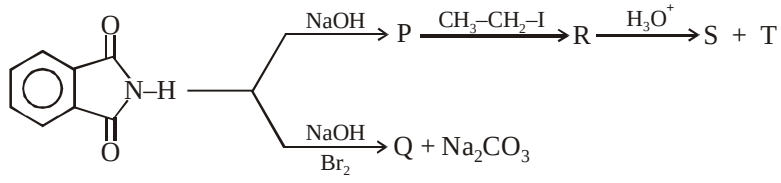
9. 

If T can evolve effervescence of CO_2 with a $NaHCO_3$, then correct statement(s) is/are :

(A) S & Q can be distinguished by dye azo test

(B) T is most acidic among all isomeric benzenoid dicarboxylic acid

(C) Q & S can be distinguished by mustered oil test

(D) P, Q & T all are soluble in a $NaHCO_3$

10. Acetic anhydride and ammonia gives the product:

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

11. $CH_3-\overset{\overset{O}{\|}}{C}-O-CH_2-CH_3 \underset{}{\overset{^{18}HOH\,/\,H^{\oplus}}{\rightleftharpoons}}$ Ethanoic acid + Ethanol

Isotopic oxygen of water will be present with

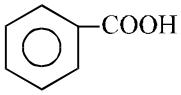
(A) Ethanoic acid

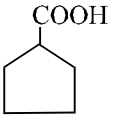
(B) Ethanol

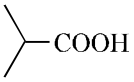
(C) After some time it will also be present in some molecules of ester

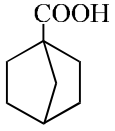
(D) None of these

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

(A) 

(B) 

(C) 

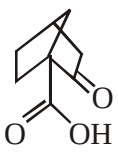
(D) 

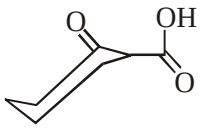
13. $RCH_2CONH_2 + NaOBr \longrightarrow ?$

Rate of reaction will be faster if 'R' is

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

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

(A) $F_3C-\overset{\overset{O}{\|}}{C}-OH$ (B) $H_2C=CH-\overset{\overset{O}{\|}}{C}-OH$ (C) 

(D) 

15. Which of the following compounds will give acetic acid with $KMnO_4/H^{\oplus}/\Delta$:

(A) CH_3-CHO (B) $CH_3-CH=CH-CH_3$

(C) $CH_3-C\equiv C-CH_3$ (D) CH_3CH_2OH

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16. Hofmann degradation is given by:

(A) Succinimide (B) Acid chloride (C) Acid anhydride (D) Acetamide

17. The presence of primary amine can be confirmed by its reaction with :

(A) HNO_2 (B) $CHCl_3$ + NaOH (C) CS_2 & $HgCl_2$ (D) H_2SO_4

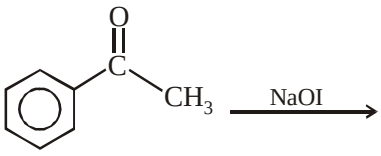
18. Total number of compounds which are soluble in hot a NaOH are :

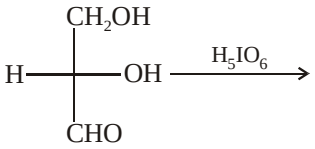
(i) Salicyclic acid (ii) Aspirine (iii) Carbolic acid (iv) Acetic acid

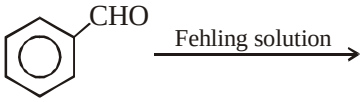
(v) Succinic anhydride (vi) Cyclohexanone (vii) Benzene sulphonamide (viii) Cyclohexene

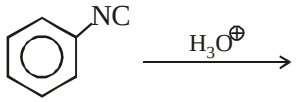
(A) 5 (B) 6 (C) 7 (D) 8

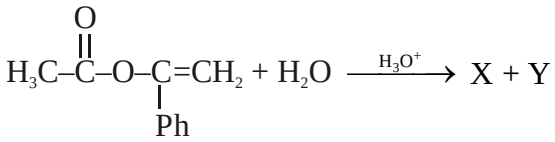
19. Number of oxidation reactions in which organic reactant gets oxidised & one of the major product is carboxylic acid/salt :

(A) 

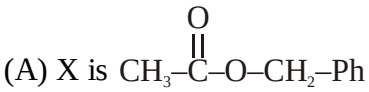
(B) 

(C) 

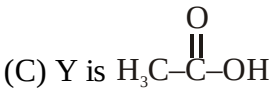
(D) 

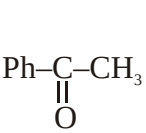
20. 

X and Y are :

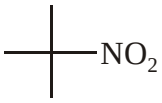
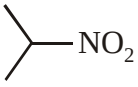
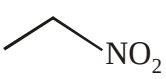
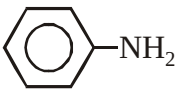
(A) X is 

(B) Y is PhCHO

(C) Y is 

(D) X is 

21. Which of the following compound react with HNO_2 :

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

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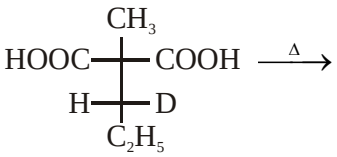
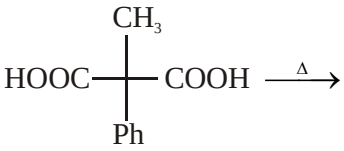
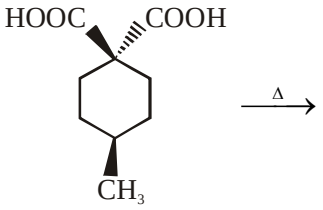
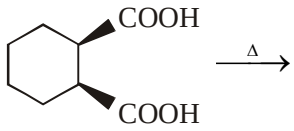
EXERCISE # III

Matching Type Questions

1. Match the following question :

Column - I **(Reaction)**	**Column-II** **(Products)**
(A) 	(P) Diastereomers
(B) 	(Q) Racemic mixture
(C) 	(R) Meso comp.
(D) 	(S) CO_2 gas will evolve

2. Match the following question :

Column I **(Organic compounds oxidised by HIO_4)**	**Column II** **(Products of HIO_4 oxidation)**
(A) CH_3COCHO	(P) PhCH = O + HCOOH
(B) 1,2-cyclohexane dione	(Q) $CH_3CH_2CHO + HOOCCH_3$
(C) PhCH (OH) CHO	(R) HOOC $(CH_2)_4$COOH
(D) CH_3CH_2CH (OH) $COCH_3$	(S) CH_3COOH + HCOOH

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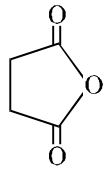
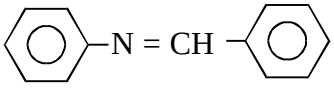
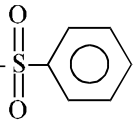
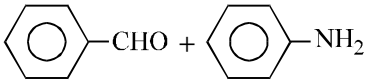
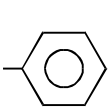
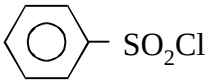
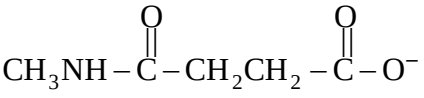
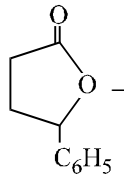
3. Match the following question :

Column I (Reactions)	**Column II (Products)**
(A) CH_3NH_2 + 	(P) 
(B) $(CH_3)_2NH + C_6H_5COCl$	(Q) $CH_3 - NH$— 
(C) 	(R) $(CH_3)_2N–C$ 
(D) CH_3NH_2 + 	(S) 

4. Match the following question :

Column I	**Column II**
(Correct about product)	
(A) $R – CN \xrightarrow{H_3O^+}$	(P) Product is yellow oily liquid
(B) $R – NH_2 \xrightarrow[KOH]{CHCl_3}$	(Q) Gives red colour with CAN
(C) $R – NH_2 \xrightarrow[HCl]{NaNO_2}$	(R) Gives fruity smell with CH_3OH
(D) $R_2NH \xrightarrow[HCl]{NaNO_2}$	(S) Foul smelling compound is formed.

5. Match the following question :

Column I	**Column II**
(A) $PhCONH_2 \longrightarrow Ph–C\equiv N$	(P) P_2O_5
(B)  $\longrightarrow CH_2OH–(CH_2)_2–CHOH–C_6H_5$	(Q) $LiAlH_4$
(C) $CH_3–C(=O)–OCH_3 \longrightarrow CH_3CH=O$	(R) $H_2/Pd–BaSO_4$
(D) $CH_3COCl \longrightarrow CH_3–CHO$	(S) DIBALH

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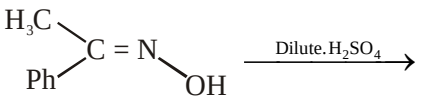
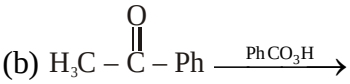
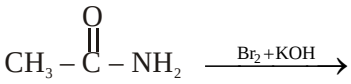
6. Match the following question :

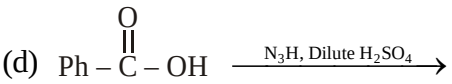
Column I	**Column II**
(A) $RCN \xrightarrow{\text{reduction}}$	(P) 1° Amine
(B) $RCN \xrightarrow[(ii)\,H_2O]{(i)\,CH_3MgBr}$	(Q) Alcohol
(C) $RNC \xrightarrow{\text{hydrolysis}}$	(R) Ketone
(D) $RNH_2 \xrightarrow{HNO_2}$	(S) Acid

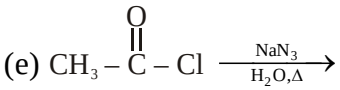
7. Find out number of reactions which involve electron dificient nitrogen [Nitrene character] during reaction mechanism.

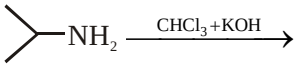
(a) 

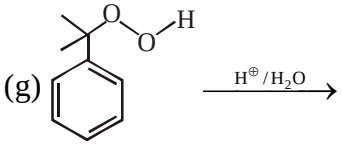
(b) 

(c) 

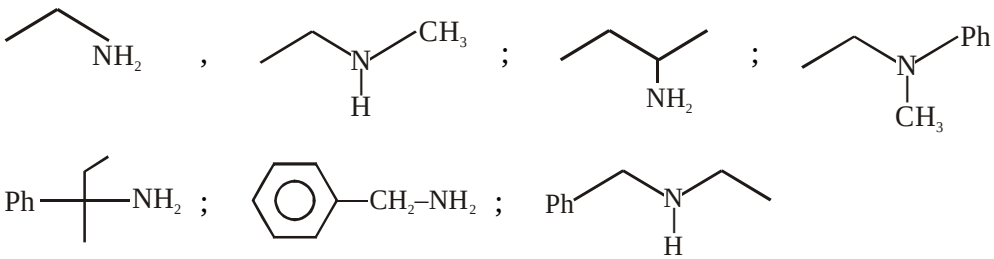
(d) 

(e) 

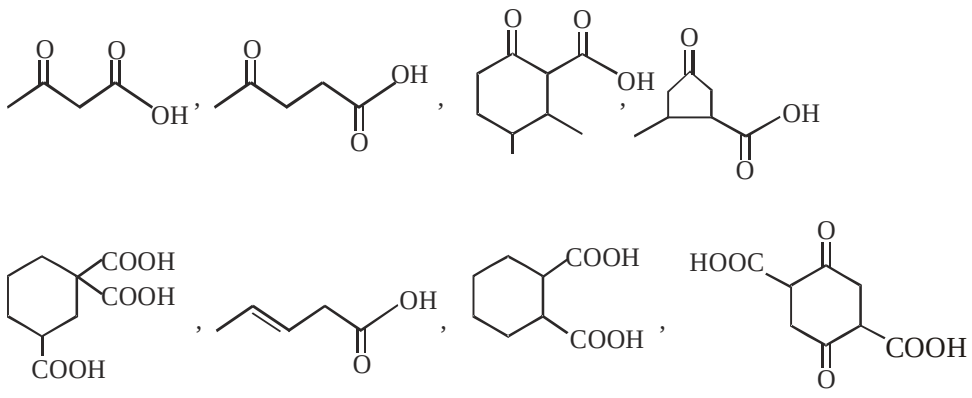
(f) 

(g) 

8. Of the following amines how many can be seperated by Hoffmann's mustard oil reaction.



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



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10. $CH_3CH_2-\underset{\underset{NH_2}{|}}{CH}-COOH \xrightarrow{\Delta}$ 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.

How will you bring about the following transformation:

11. Propanoic acid into lactic acid.

12. Ethyl benzene to 2-phenyl propionic acid.

13. Acetamide from acetone.

EXERCISE # IV (A) (JEE-MAIN)

1. Reaction - **[AIEEE-2002]**

Primary amine + $CHCl_3$ + KOH $\rightarrow$ product, here product will be -

(1) Cyanide (2) Isocyanide (3) Amine (4) Alcohol

2. The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is- **[AIEEE-2004]**

(1) $Fe_4[Fe(CN)_6]_3$ (2) $Na_3[Fe(CN)_6]$ (3) $Fe(CN)_3$ (4) $Na_4[Fe(CN)_5)NOS]$

3. Which one of the following methods is neither meant for the synthesis nor for separation of amines-

(1) Hofmann method (2) Hinsberg method **[AIEEE-2005]**

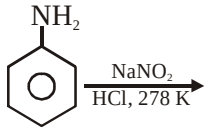
(3) Curtius reaction (4) Wurtz reaction

4. In the chemical reaction, $CH_3CH_2NH_2 + CHCl_3 + 3KOH \rightarrow$ (A) + (B) + $3H_2O$, the compounds (A) and (B) are respectively - **[AIEEE-2007]**

(1) C_2H_5CN and 3KCl (2) CH_3CH_2 $CONH_2$ and 3KCl

(3) C_2H_5NC and K_2CO_3 (4) C_2H_5NC and 3KCl

5. In the chemical reactions, **[AIEEE-2010]**



, the compounds 'A' and 'B' respectively are :-

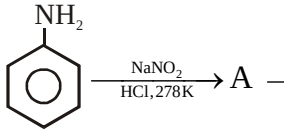
(1) Nitrobenzene and chlorobenzene

(2) Nitrobenzene and fluorobenzene

(3) Phenol and benzene

(4) Benzene diazonium chloride and fluorobenzene

6. In the chemical reactions



, the compounds A and B respectively are : **[AIEEE-2011]**

(1) Fluorobenzene and phenol (2) Benzene diazonium chloride and benzonitrile

(3) Nitrobenzene and chlorobenzene (4) Phenol and bromobenzene

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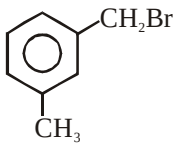
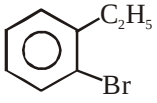
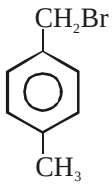
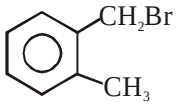
7. Compound (A), C_8H_9Br, gives a white precipitate when warmed with alcoholic $AgNO_3$. Oxidation of (A) gives an acid (B), $C_8H_6O_4$. (B) easily forms anhydride on heating. Identify the compound (A): **[AIEEE-2013]**

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

8. An organic compound A upon reacting with NH_3 gives B. On heating, B gives C. C in presence of KOH reacts with Br_2 to give $CH_3CH_2NH_2$. A is :- **[AIEEE-2013]**

(1) CH_3COOH (2) $CH_3CH_2CH_2COOH$

(3) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$ (4) CH_3CH_2COOH

9. On heating an aliphatic primary amine with chloroform & ethenolic potassium hydroside the organic compound formed is **[AIEEE-2014]**

(1) An alkyl cyanide (2) An alkyl isocyanide

(3) an alkanol (4) an alkanediol

10. In the reaction $CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_5} B \xrightarrow{alc.KOH} C$ 'C' is **[AIEEE-2014]**

(1) Ethylene (2) Acetyl chloride (3) Acetaldehyde (4) Acetylene.

11. In the presence of a small amount of phosphorous, aliphatic carboxylic acids react with chlorine or bromine to yield a compound in which α - hydrogen has been replaced by halogen. This reaction is known as : **[JEE(Main)-2015]**

(1) Etard reaction (2) Hell - Volhard - Zelinsky reaction

(3) Wolff - Kischner reaction (4) Rosenmund reaction

12. In the Hofmann bromamide degradation reaction, the number of moles of NaOH and Br_2 used per mole of amine produced are : **[JEE(Main)-2016]**

(1) Four moles of NaOH and one mole of Br_2

(2) One mole of NaOH and one mole of Br_2

(3) Four moles of NaOH and two moles of Br_2

(4) Two moles of NaOH and two moles of Br_2

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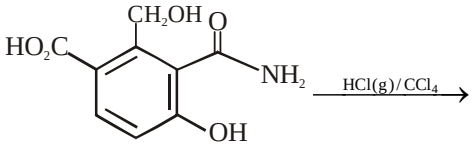
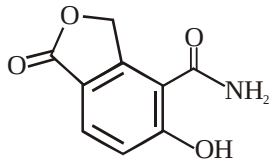
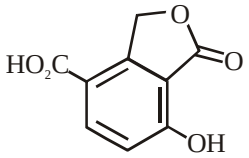
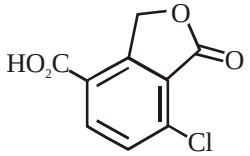
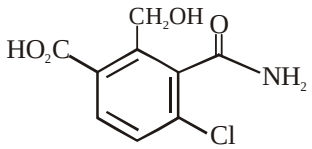
13. The major product expected from the following reaction is : **[JEE(Main On-Line)-2017]**



(1) 

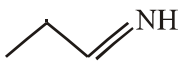
(2) 

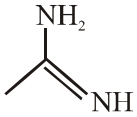
(3) 

(4) 

14. The increasing order of basicity of the following compounds is : **[JEE(Main)-2018]**

(a) 

(b) 

(c) 

(d) 

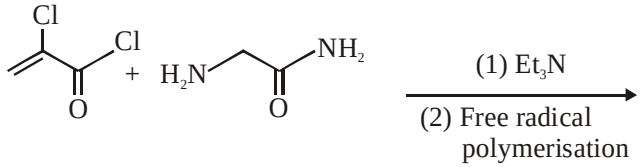
(1) (b) < (a) < (c) < (d)

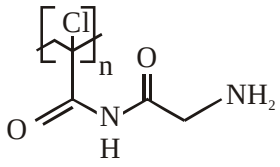
(2) (b) < (a) < (d) < (c)

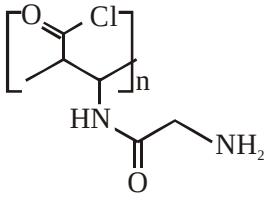
(3) (d) < (b) < (a) < (c)

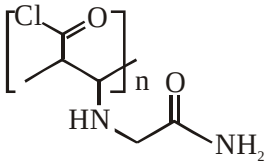
(4) (a) < (b) < (c) < (d)

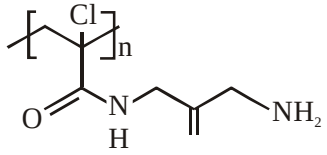
15. Major product of the following reaction is : **[JEE Main (Jan)-2019]**



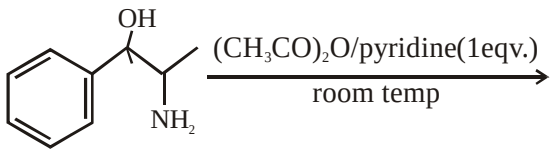
(1) 

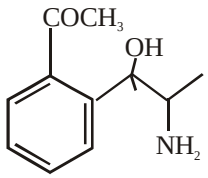
(2) 

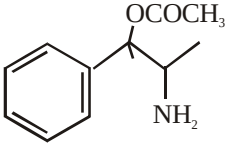
(3) 

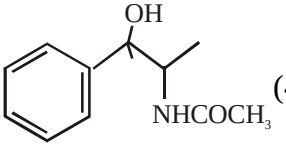
(4) 

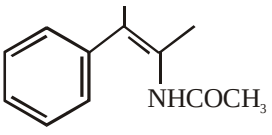
16. The major product obtained in the following reaction is : **[JEE Main (Jan)-2019]**



(1) 

(2) 

(3) 

(4) 

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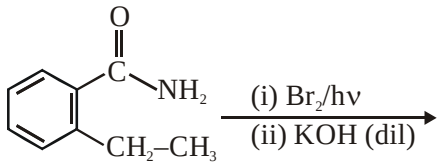
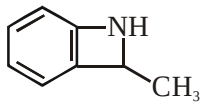
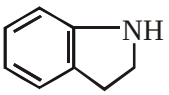
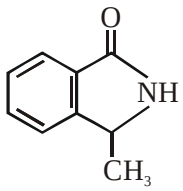
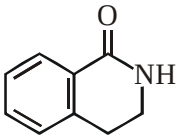
17. The major product of the following reaction is : **[JEE Main (Jan)-2019]**



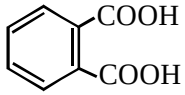
(1) 

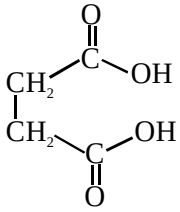
(2) 

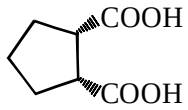
(3) 

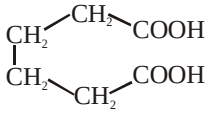
(4) 

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

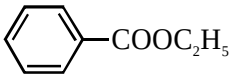
(1) 

(2) 

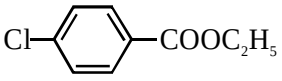
(3) 

(4) 

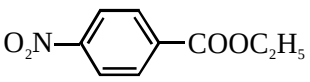
19. The decreasing order of ease of alkaline hydrolysis for the following esters is : **[JEE Main (Jan)-2019]**



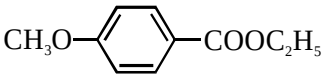
I



II



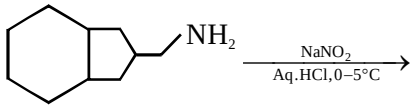
III

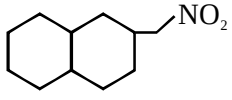


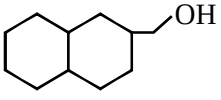
IV

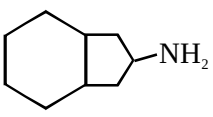
(1) IV > II > III > I (2) III > II > I > IV (3) III > II > IV > I (4) II > III > I > IV

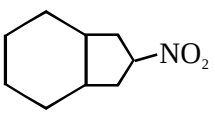
20. The major product formed in the reaction given below will be : **[JEE Main (Jan)-2019]**



(1) 

(2) 

(3) 

(4) 

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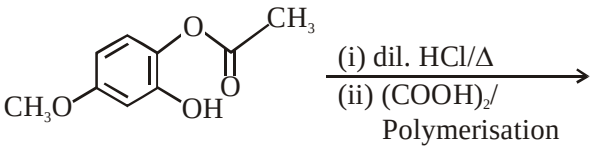
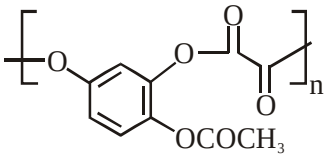
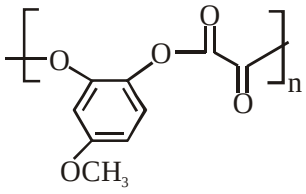
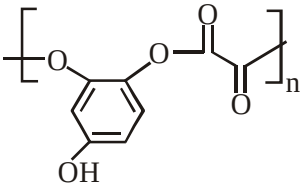
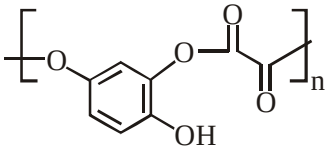
21. The major product of the following reaction is: **[JEE Main (Jan)-2019]**



(1) 

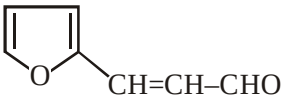
(2) 

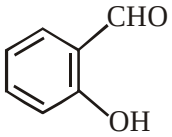
(3) 

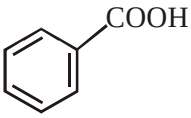
(4) 

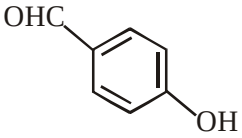
22. An aromatic compound 'A' having molecular formula $C_7H_6O_2$ on treating with aqueous ammonia and heating forms compound 'B'. The compound 'B' on reaction with molecular bromine and potassium hydroxide provides compound 'C' having molecular formula C_6H_7N. The structure of 'A' is :

[JEE Main (Jan)-2019]

(1) 

(2) 

(3) 

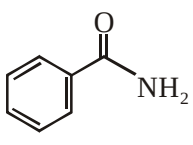
(4) 

23. A compound 'X' on treatment with Br_2/NaOH, provided C_3H_9N, which gives positive carbylamine test. Compound 'X' is :- **[JEE Main (Jan)-2019]**

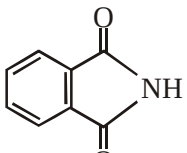
(1) $CH_3COCH_2NHCH_3$ (2) $CH_3CH_2COCH_2NH_2$

(3) $CH_3CH_2CH_2CONH_2$ (4) $CH_3CON(CH_3)_2$

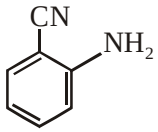
24. The increasing order of reactivity of the following compounds towards reaction with alkyl halides directly is : **[JEE Main (Jan)-2019]**



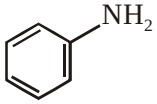
(A)



(B)



(C)



(D)

(1) (B) < (A) < (D) < (C) (2) (B) < (A) < (C) < (D)

(3) (A) < (C) < (D) < (B) (4) (A) < (B) < (C) < (D)

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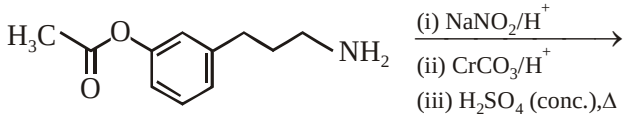
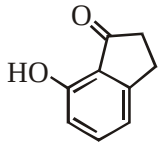
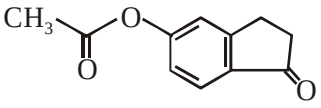
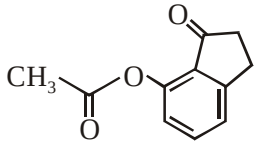
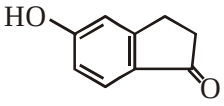
25. The major product of the following reaction is: **[JEE Main (Jan)-2019]**



(1) 

(2) 

(3) 

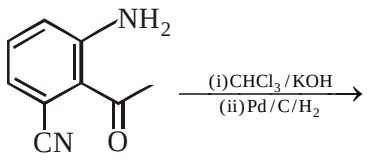
(4) 

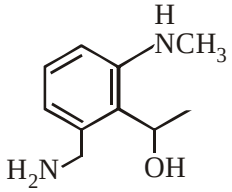
26. Which of the following amines can be prepared by Gabriel phthalimide reaction ?

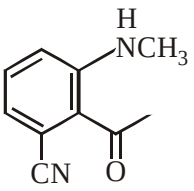
[JEE Main (Apr)-2019]

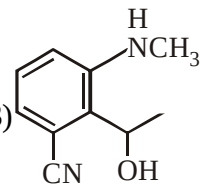
(1) Neo-pentylamine (2) n-butylamine (3) triethylamine (4) t-butylamine

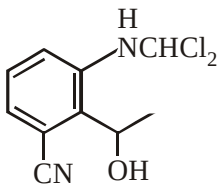
27. The major product obtained in the following reaction is : **[JEE Main (Apr)-2019]**



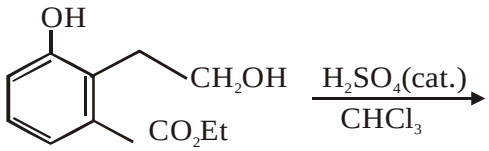
(1) 

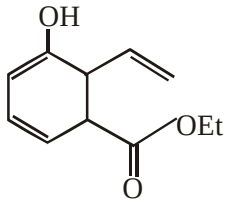
(2) 

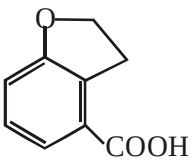
(3) 

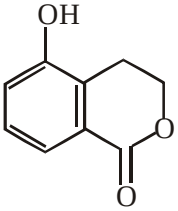
(4) 

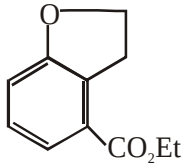
28. The major product of the following reaction is: **[JEE Main (Apr)-2019]**



(1) 

(2) 

(3) 

(4) 

29. Hinsberg's reagent is : **[JEE Main (Apr)-2019]**

(1) $C_6H_5SO_2Cl$ (2) C_6H_5COCl (3) $SOCl_2$ (4) $(COCl)_2$

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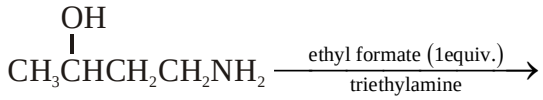
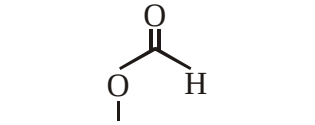
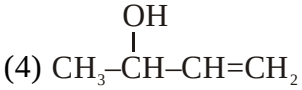
30. The major product of the following reaction is : **[JEE Main (Apr)-2019]**



(1) 

(2) $CH_3CH=CH-CH_2NH_2$

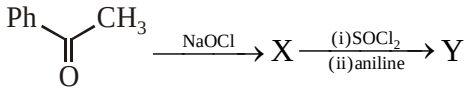
(3) 

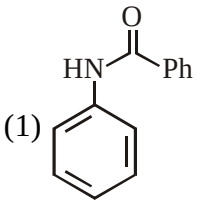
(4) 

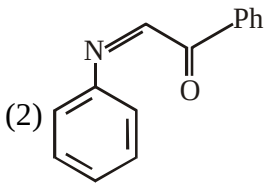
31. Ethylamine ($C_2H_5NH_2$) can be obtained from N-ethylphthalimide on treatment with : **[JEE Main (Apr)-2019]**

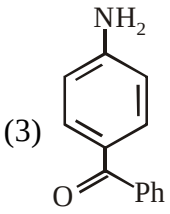
(1) $NaBH_4$ (2) CaH_2 (3) H_2O (4) NH_2NH_2

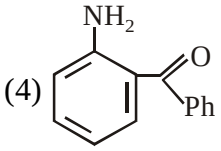
32. The major product 'Y' in the following reaction is:- **[JEE Main (Apr)-2019]**



(1) 

(2) 

(3) 

(4) 

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EXERCISE # IV (B) (JEE ADVANCED)

1. Which of the following carboxylic acids undergo decarboxylation easily: **[IIT 1995]**

(A) $C_6H_5CO–CH_2COOH$ (B) $C_6H_5COCOOH$

(C) $C_6H_5\underset{\underset{OH}{|}}{CH_2} - COOH$ (D) $C_6H_5\underset{\underset{NH_2}{|}}{CH_2} - COOH$

2. The molecular weight of benzoic acid in benzene as determined by depression in freezing point method corresponds to : **[IIT 1996]**

(A) Ionization of benzoic acid

(B) Dimerisation of benzoic acid

(C) Trimerisation of benzoic acid

(D) Solvation of benzoic acid

3. When propionic acid is treated with aqueous $NaHCO_3$, CO_2 is liberated. The 'C' of CO_2 comes from.

(A) Methyl group (B) Carboxylic acid group

(C) methylene group (D) bicarbonate **[IIT 1999]**

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

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

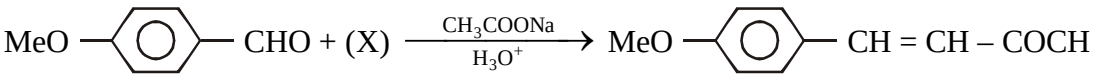
5. Which of the following acids has the smallest dissociation constant? **[IIT 2002]**

(A) $CH_3CHFCOOH$ (B) FCH_2CH_2COOH

(C) $BrCH_2CH_2COOH$ (D) $CH_3CHBrCOOH$

6. When benzamide is treated with $POCl_3$, the product is: **[IIT 2004]**

(A) Benzonitrile (B) Aniline (C) Chlorobenzene (D) Benzylamine

7. 

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

(A) $(CH_3CO)_2O$ (B) Br CH_2 – COOH

(C) CH_3COOH (D) CHO – COOH

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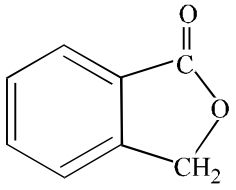
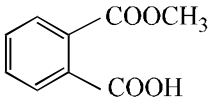
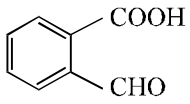
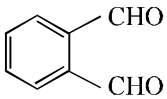
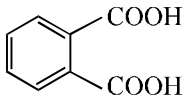
8. Which of the following reactants on reaction with conc. NaOH followed by acidification gives the following lactone as the only product? **[IIT 2006]**



(A) 

(B) 

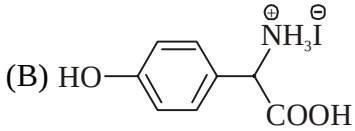
(C) 

(D) 

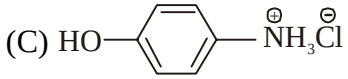
9. Match the compounds in **Column I** with their characteristic test(s)/reaction(s) given in **Column II**. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS. **Column-I** **Column-II** **[IIT 2008]**

(A) $H_2N - \overset{\oplus}{N}H_3\overset{\ominus}{Cl}$

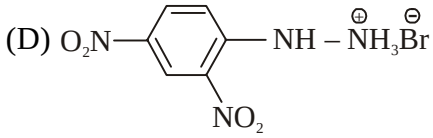
(P) Sodium fusion extract of the compound gives Prussian blue colour with $FeSO_4$

(B) 

(Q) Gives positive $FeCl_3$ test

(C) 

(R) Gives white precipitate with $AgNO_3$

(D) 

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

10. Match each of the compound in Column I with its characteristic reaction(s) in Column II.

Column-I **Column-II** **[IIT 2009]**

(A) $CH_3CH_2CH_2CN$

(P) Reduction with Pd–C / H_2

(B) $CH_3CH_2OCOCH_3$

(Q) Reduction with $SnCl_2$ / HCl

(C) $CH_3 - CH = CH - CH_2OH$

(R) Development of foul smell on treatment with chloroform and alcoholic KOH

(D) $CH_3CH_2CH_2CH_2NH_2$

(S) Reduction with diisobutylaluminium hydride (DIBAL-H)

(T) Alkaline hydrolysis

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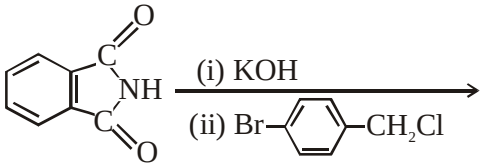
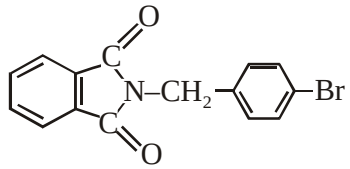
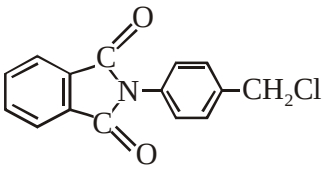
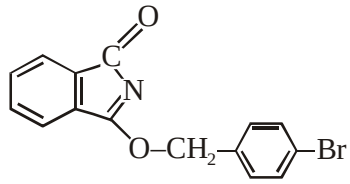
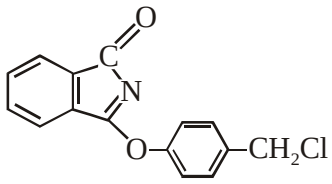
11. The major product of the following reaction is **[IIT 2011]**



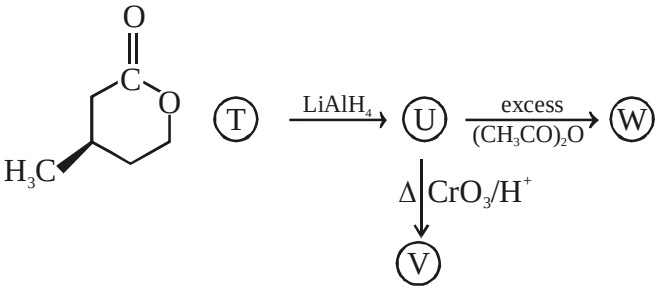
(A) 

(B) 

(C) 

(D) 

12. With reference the scheme given, which of the given statement(s) about T, U, V & W is/are correct **[IIT 2012]**



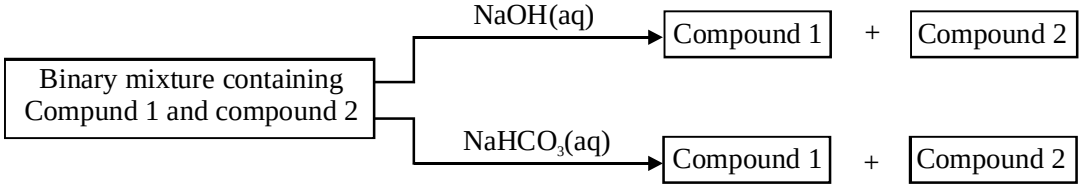
(A) 'T' is soluble in hot aq NaOH

(B) 'U' is optically active

(C) mol formula of W is $C_{10}H_{18}O_4$

(D) V gives effervescence with aq $NaHCO_3$

13. Identify the binary mixtures (s) that can be separated into the individual compounds, by differential extraction, as shown in the given scheme - **[IIT 2012]**



(A) C_6H_5OH and C_6H_5COOH

(B) C_6H_5COOH and $C_6H_5CH_2OH$

(C) $C_6H_5CH_2OH$ and C_6H_5OH

(D) $C_6H_5CH_2OH$ and $C_6H_5CH_2COOH$

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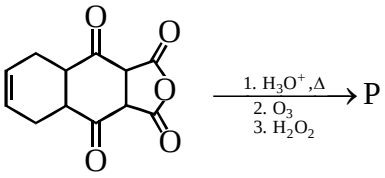
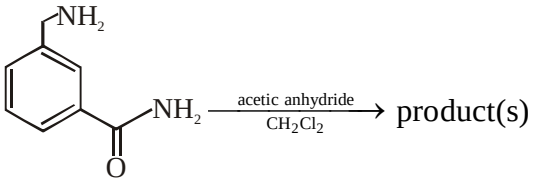
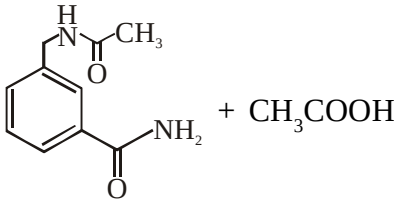
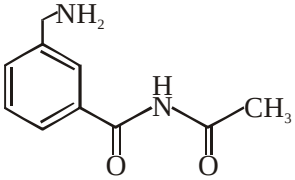
14. The total number of carboxylic acid groups in the product P is **[IIT 2013]**

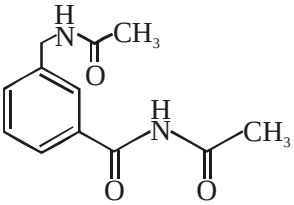


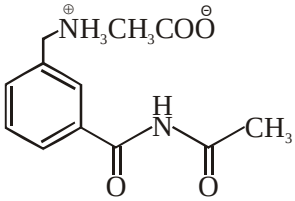
15. In the reaction shown below, the major product(s) formed is / are : **[IIT 2014]**



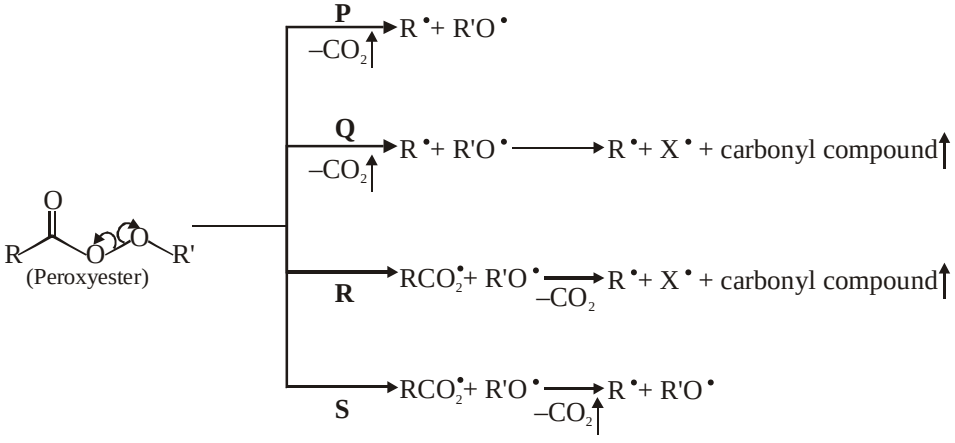
(A)  + CH_3COOH

(B)  + CH_3COOH

(C)  + H_2O

(D) 

16. 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]**



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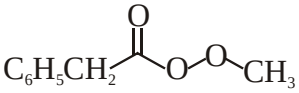
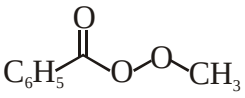
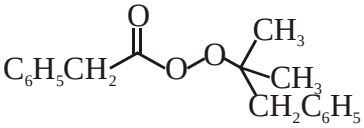
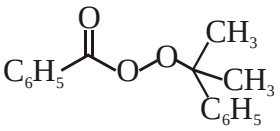
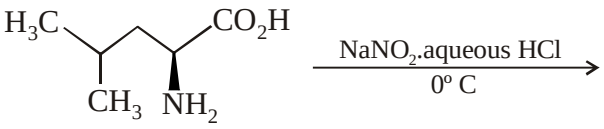
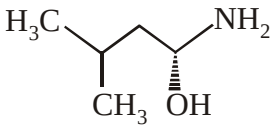
List-I	List-II
(P) Pathway **P**	(1) 
(Q) Pathway **Q**	(2) 
(R) Pathway **R**	(3) 
(S) Pathway **S**	(4) 

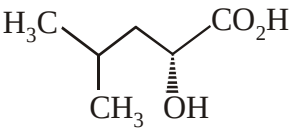
Code :

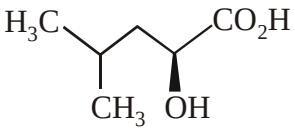
	P	**Q**	**R**	**S**
(A)	1	3	4	2
(B)	2	4	3	1
(C)	4	1	2	3
(D)	3	2	1	4

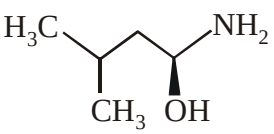
17. The major product of the reaction is : **[IIT 2015]**



(A) 

(B) 

(C) 

(D) 

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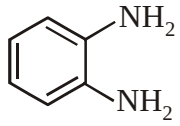
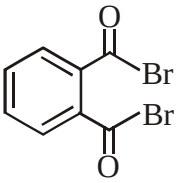
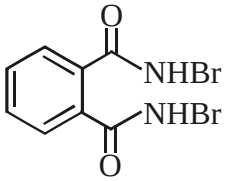
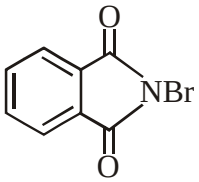
PARAGRAPH FOR NO. 18 & 19

Treatment of compound **O** with $KMnO_4 / H^+$ gave **P**, which on heating with ammonia gave The compound **Q** on treatment with Br_2 / NaOH produced **R**. On strong heating, **Q** gave **S**, which on further treatmenet with ethyl 2-bromopropanoate in the presence of KOH following by acidification, gave a compound **T**. **[IIT-JEE-2016]**

(O)

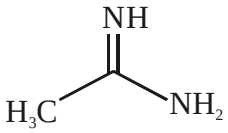
18. The compound **R** is :

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

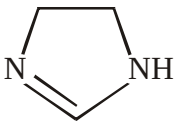
19. The compound **T** is :

(A) Glycine (B) Alanine (C) Valine (D) Serine

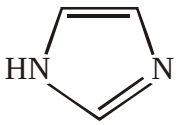
20. The order of basicity among the following compounds is **[IIT-JEE(Adv.)-2017]**



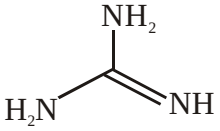
I



II



III



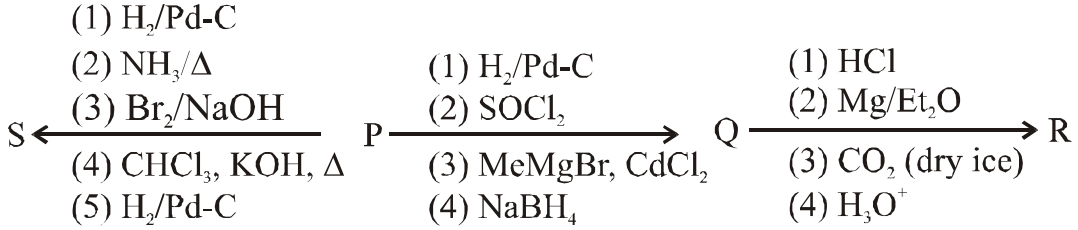
IV

(A) II > I > IV > III (B) IV > II > III > I

(C) I > IV > III > II (D) IV > I > II > III

PARAGRAPH FOR NO. 21 & 22

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.** **[IIT-JEE(Adv.)-2018]**



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

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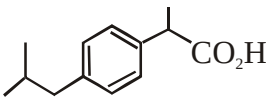
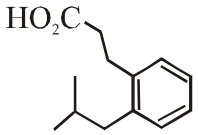
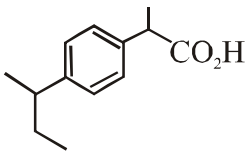
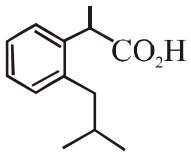
21. The compound **R** is

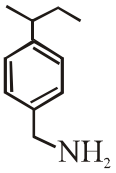
(A) 

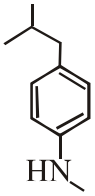
(B) 

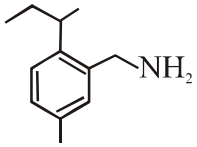
(C) 

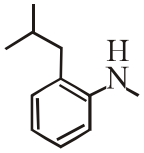
(D) 

22. The compound **S** is

(A) 

(B) 

(C) 

(D) 

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ANSWER-KEY

EXERCISE # I

1.	**Ans. (A)**	**2.**	**Ans. (B)**	**3.**	**Ans. (B)**	**4.**	**Ans. (C)**
5.	**Ans. (C)**	**6.**	**Ans. (A)**	**7.**	**Ans. (B)**	**8.**	**Ans. (C)**
9.	**Ans. (A)**	**10.**	**Ans. (C)**	**11.**	**Ans. (D)**	**12.**	**Ans. (B)**
13.	**Ans. (B)**	**14.**	**Ans. (B)**	**15.**	**Ans. (A)**	**16.**	**Ans. (A)**
17.	**Ans. (B)**	**18.**	**Ans. (C)**	**19.**	**Ans. (B)**	**20.**	**Ans. (C)**
21.	**Ans. (B)**	**22.**	**Ans. (B)**	**23.**	**Ans. (A)**	**24.**	**Ans. (B)**
25.	**Ans. (C)**						

EXERCISE # II

1.	**Ans. (A,C,D)**	**2.**	**Ans. (A,C)**	**3.**	**Ans. (A,C,D)**	**4.**	**Ans. (A,B)**
5.	**Ans. (A,C,D)**	**6.**	**Ans. (A,B,C)**	**7.**	**Ans. (B,C)**	**8.**	**Ans. (C)**
9.	**Ans. (A,B,D)**	**10.**	**Ans. (A)**	**11.**	**Ans. (A,C)**	**12.**	**Ans. (B,C)**
13.	**Ans. (B)**	**14.**	**Ans. (A,B,C)**	**15.**	**Ans. (A,B,C,D)**	**16.**	**Ans. (A,D)**
17.	**Ans. (A,B,C)**	**18.**	**Ans. (B)**	**19.**	**Ans. (A,B,D)**	**20.**	**Ans. (C,D)**
21.	**Ans. (B,C,D)**						

EXERCISE # III

1. **Ans. (A)→P, S ; (B)→Q, S ; (C)→P, S ; (D)→R**

2. **Ans. (A)→S ; (B)→R ; (C)→P ; (D)→Q** **3.** **Ans. (A)→S ; (B)→R ; (C)→P ; (D)→Q**

4. **Ans. (A)→R ; (B)→S ; (C)→Q ; (D)→P** **5.** **Ans. (A)→P ; (B)→Q ; (C)→S ; (D)→R, S**

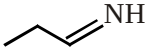
6. **Ans. (A)→P ; (B)→R ; (C)→P, S ; (D)→Q**

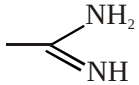
7.	**Ans. (4)**	**8.**	**Ans. (4)**	**9.**	**Ans. (5)**	**10.**	**Ans. (9)**

EXERCISE # IV (A) (JEE-MAIN)

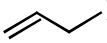
1.	**Ans. (2)**	**2.**	**Ans. (1)**	**3.**	**Ans. (4)**	**4.**	**Ans. (4)**
5.	**Ans. (4)**	**6.**	**Ans. (2)**	**7.**	**Ans. (4)**	**8.**	**Ans. (4)**
9.	**Ans. (2)**	**10.**	**Ans. (1)**	**11.**	**Ans. (2)**	**12.**	**Ans. (1)**
13.	**Ans. (1)**						
14.	**Ans. (2)**						

Sol. Order of base nature depends on electron donation tendency.

In compound  nitrogen is sp^2 hybridized so least basic among all given compound.

compound  is very strong nitrogeneous organic base as lone pair of one nitrogen delocalize in resonance and make another nitrogen negativly charged and conjugate acid have two equivalent resonating structure.

Thus it is most basic in given compouds.

 (secondary amine) more basic than  (primary amine)

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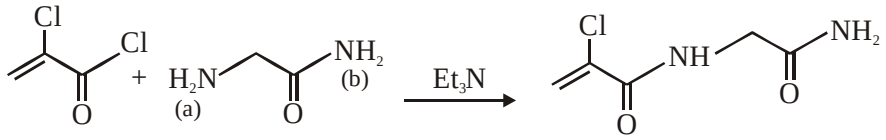
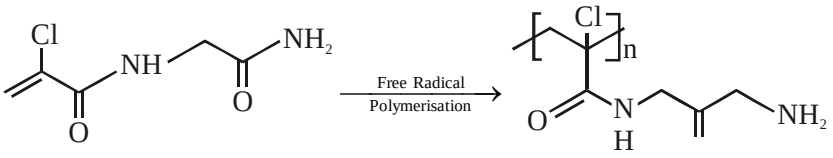
15. Ans. (4)

Sol.

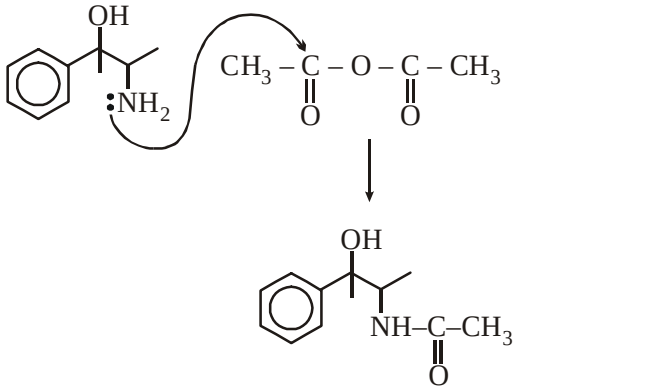


NH_2(a) will wact as nucleophile as (b) is having delocalised lonepair.



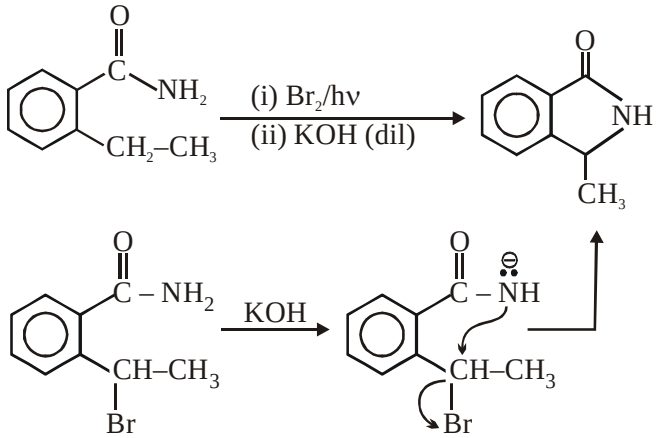
16. Ans. (3)

Sol.



17. Ans. (3)

Sol.



18. Ans. (4)

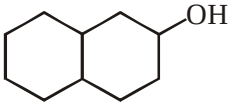
Sol. Adipic acid $CO_2H–(CH_2)_4–CO_2H \xrightarrow[\text{agent}]{\text{dehydrating}}$ 7 membered cyclic anhydride (Very unstable)

19. Ans. (2)

Sol. More is the electrophilic character of carbonyl group of ester faster is the alkaline hydrolysis.

20. Ans. (Bonus)

Sol. Answer should be



21. Ans. (2)

22. Ans. (3)

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23. Ans. (3)

Sol. $[X] \xrightarrow[NaOH]{Br_2} C_3H_9N \xrightarrow[KOH]{CHCl_3} CH_3CH_2CH_2{-}NC$

Hoff mann's Bromaide degradation

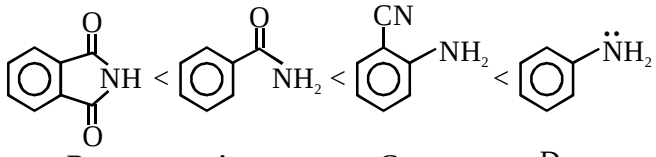
Carbylamine Reaction

Thus [X] must be aride with oen carbon more than is amine.

Thus [X] is $CH_3CH_2CH_2CONH_2$

24. Ans. (2)

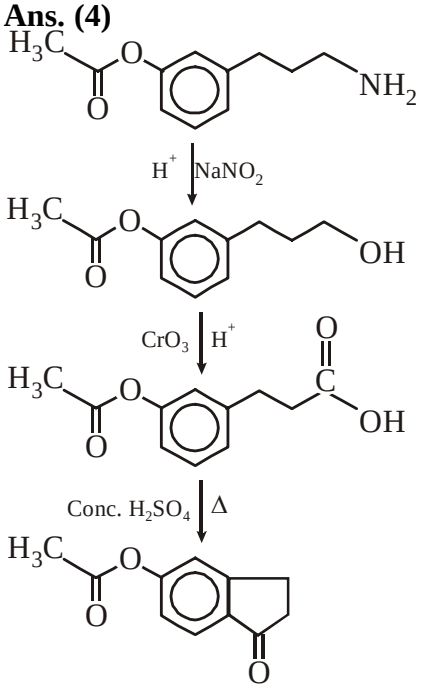
Sol. Nucleophilicity order



B A C D

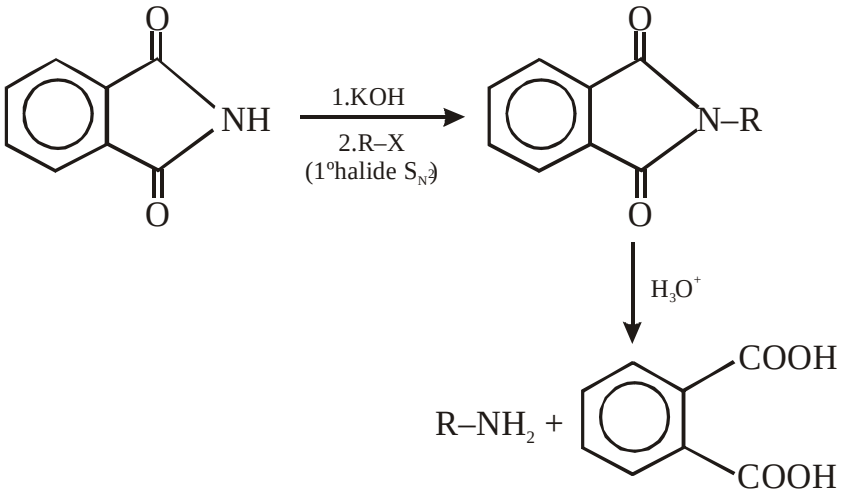
25. Ans. (4)

Sol.



26. Ans. (2)

Sol. Gabriel phthalimide synthesis :



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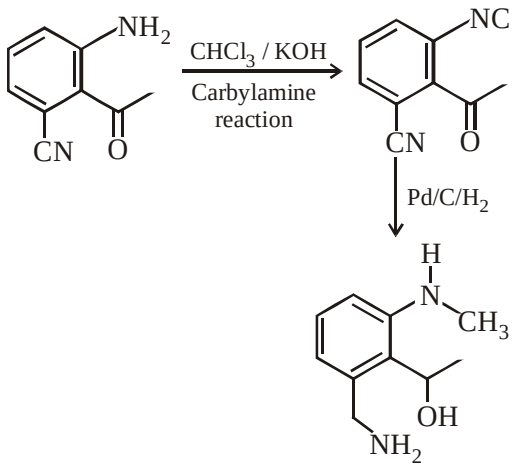
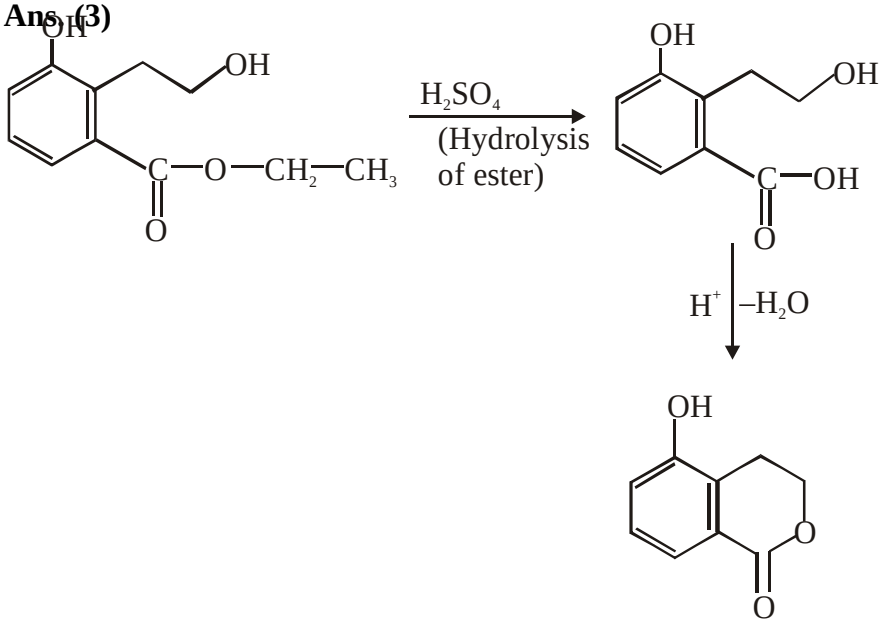
27. Ans. (1)

Sol.



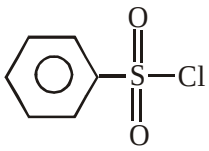
28. Ans. (3)

Sol.



29. Ans.(1)

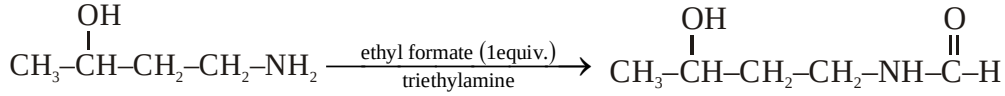
Sol. Hinsberg Reagenl ⇒



[Benzene Sulphonyl chloride]

30. Ans. (1)

Sol.



as NH_2 is a better nucleophile than OH.

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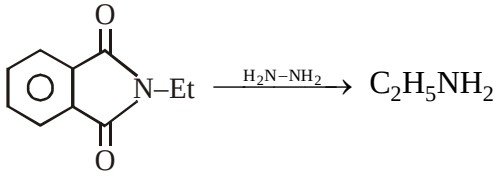
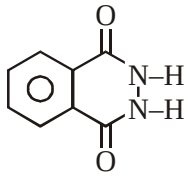
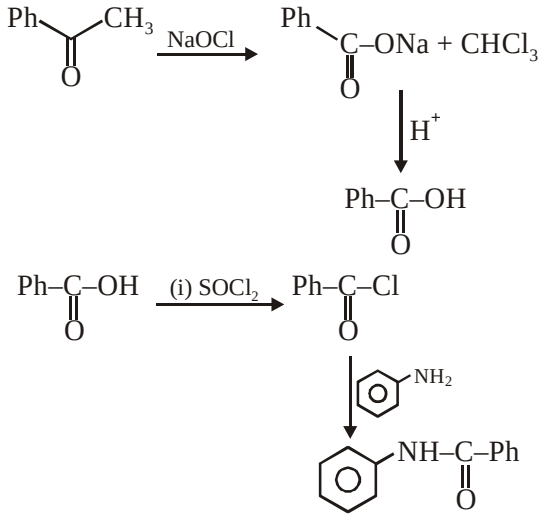
31. Ans. (4)

Sol. 

reagent is $NH_2–NH_2$ byproduct will be



32. Ans. (1)

Sol. 

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EXERCISE # IV (B) (JEE ADVANCED)

1. **Ans. (A)** **2.** **Ans. (B)** **3.** **Ans. (D)**

4. **Ans. (C)** **5.** **Ans. (C)** **6.** **Ans. (A)** **7.** **Ans. (A)**

8. **Ans. (C)** **9.** **Ans. (A)→R, S ; (B)→P, Q ; (C)→P, Q, R ; (D)→P,S**

10. Ans. **(A)→P, Q, S, T ; (B)→P, S, T ; (C)→P ; (D)→R** **11.** **Ans. (A)**

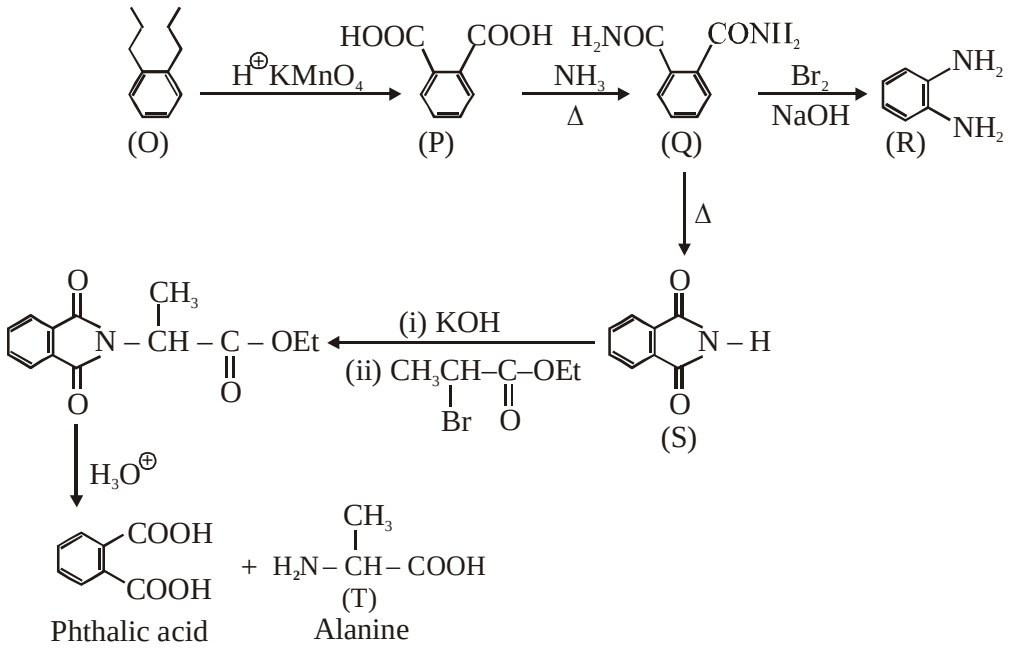
12. **Ans. (A,C,D)** **13.** **Ans. (B,D)** **14.** **Ans. (2)** **15.** **Ans. (A)**

16. **Ans. (A)** **17.** **Ans. (C)**

18. **Ans. (A)**

19. **Ans. (B)**

Solution 18 & 19.



Q to R is Hoffmann's bromamide degradation reaction

S to T is Gabriel's phthalimide sysnthesis

20. **Ans. (D) IV > I > II > III**

Sol. **Basic strength $\propto$ stability of conjugated acid.**

$\propto$ **+ M / +H / +I**

21. **Ans. (A)**

22. **Ans. (B)**

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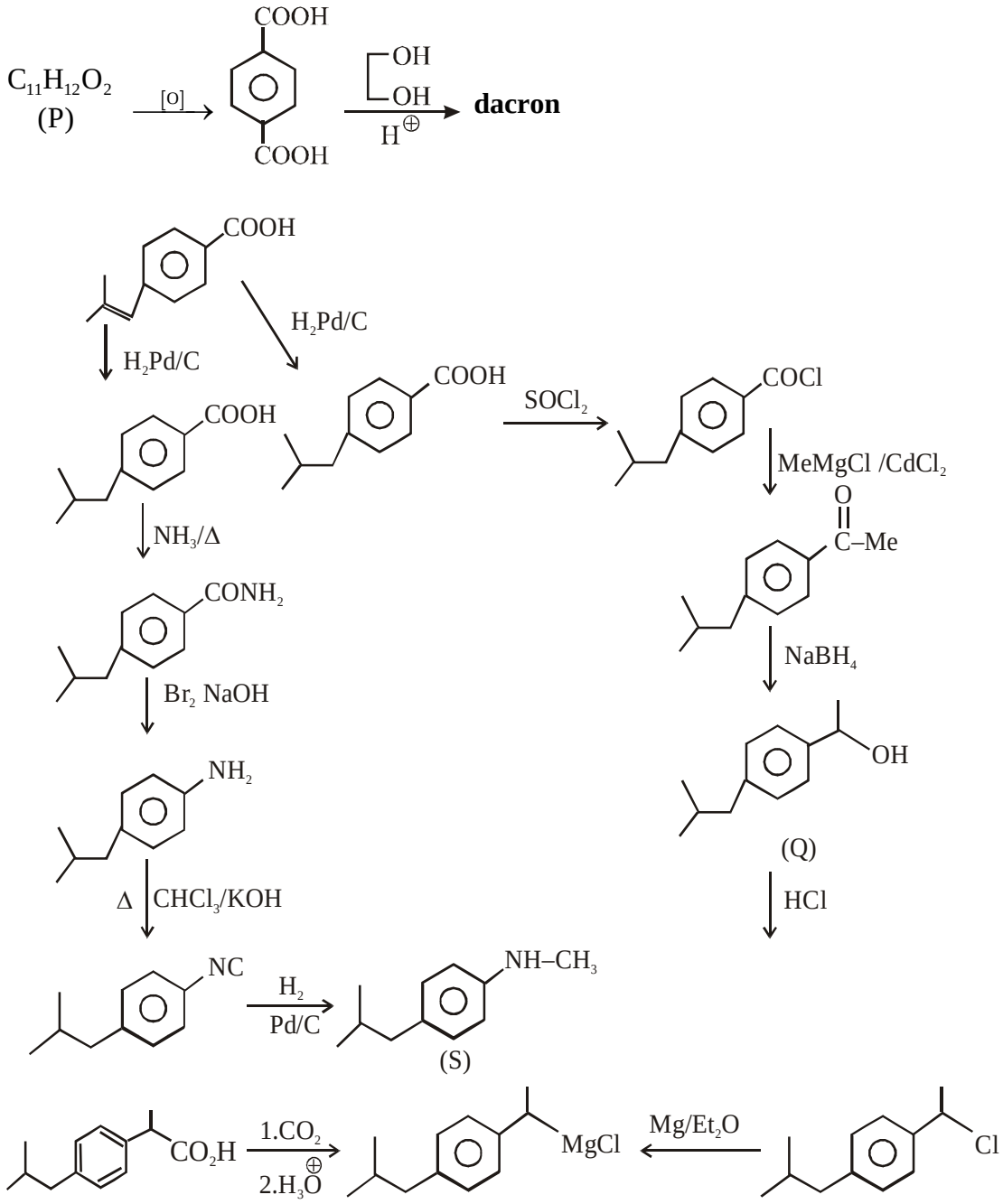
Solution 21 & 22.



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Important Notes

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