

EXERCISE - O

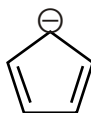
SINGLE CORRECT TYPE QUESTIONS

Electrophillic, aromatic substituan (ESR) direction Nitration, sulphonation

1. Benzene is a resonance hybrid mainly of two Kekule structures. Hence :
 (A) Half of the molecules correspond to one structure, and half of the second structure
 (B) At low temperatures benzene can be separated into two structures
 (C) Two structures make equal contribution to resonance hybrid
 (D) An individual benzene molecule changes back and forth between two structures

CAR110

2. How many π electron are there in the following species:



- (A) 2 (B) 4 (C) 6 (D) 8

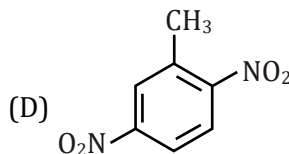
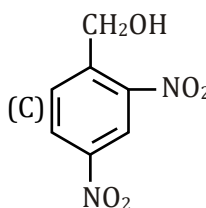
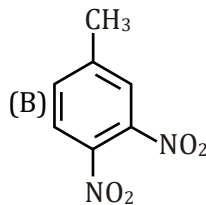
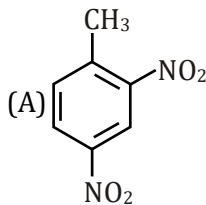
CAR111

3. The number of benzylic hydrogen atoms in ethylbenzene is:

- (A) 3 (B) 5 (C) 2 (D) 7

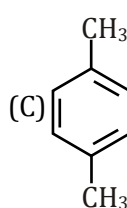
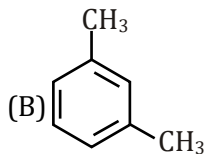
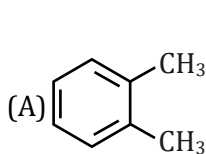
CAR112

4. p-Nitrotoluene on further nitration gives:



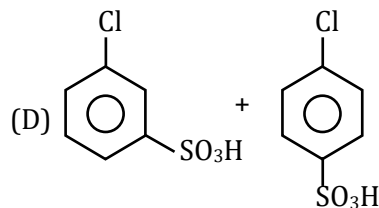
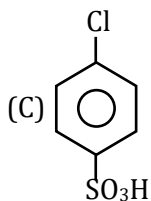
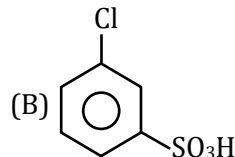
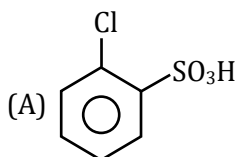
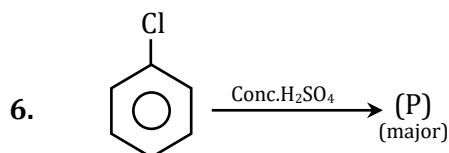
CAR118

5. Ring nitration of dimethyl benzene results in the formation of only one nitro dimethyl benzene. The dimethyl benzene is:



(D) None of these

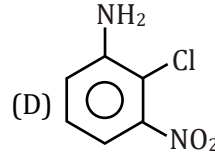
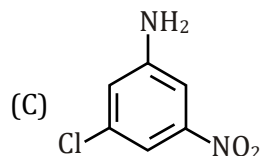
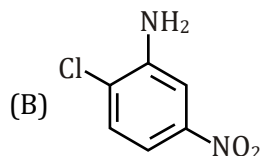
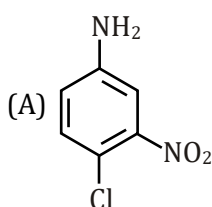
CAR122



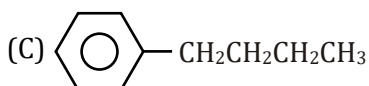
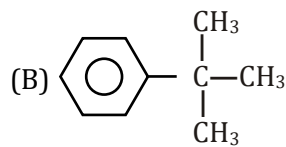
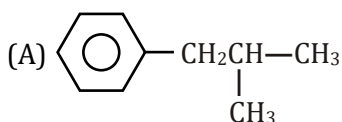
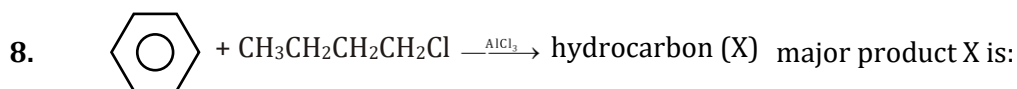
CAR123

Halogenation effect F.C Alkylation, acylation, formylation gattermann koch, Gatterman Aldehyde.

7. If meta-nitroaniline is chlorinated, the major product is:



CAR134



(D) None is correct

CAR128

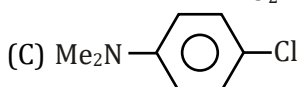
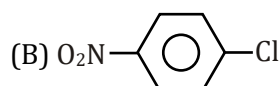
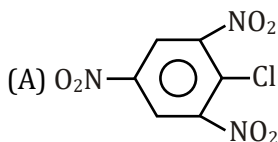
9. When sulphonilic acid (p-H₂NC₆H₄SO₃H) is treated with excess of bromine water, the product is:

(A) Tribromo product
(C) Monobromo product

(B) Dibromo product
(D) Tetrebromo product

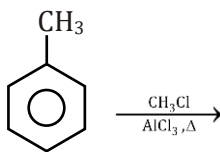
CAR132

10. Which chloroderivative of benzene among the following would undergo-hydrolysis most readily with a NaOH to furnish the corresponding hydroxy derivative.



CAR137

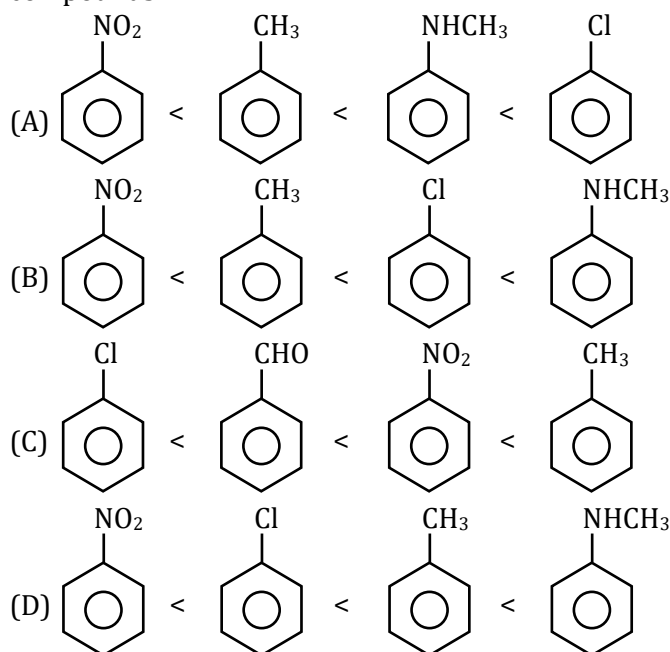
11. Major product of this reaction will be:



- (A) o-Xylene (B) p-Xylene (C) Both (D) m-Xylene

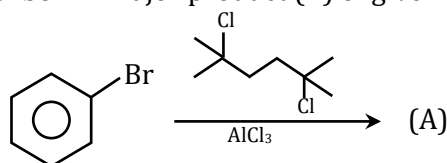
CAR138

12. Identify correct order of reactivity for electrophilic substitution reaction of the following compounds :-



CAR141

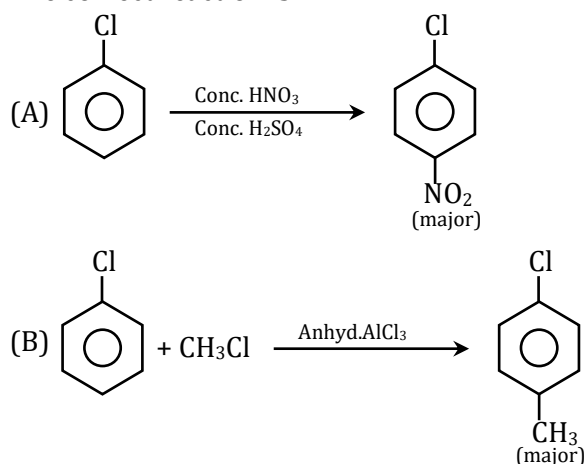
13. The no. of sp^3 hybridized carbon in major product (A) of given below reaction?

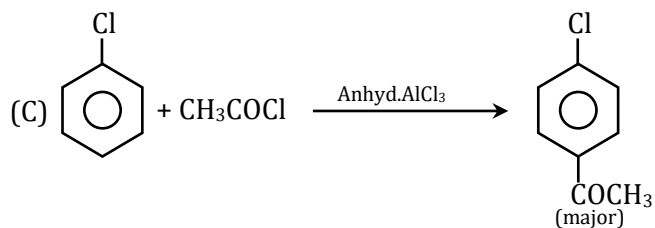


- (A) 2 (B) 4 (C) 6 (D) 8

CAR145

14. The correct reaction is -



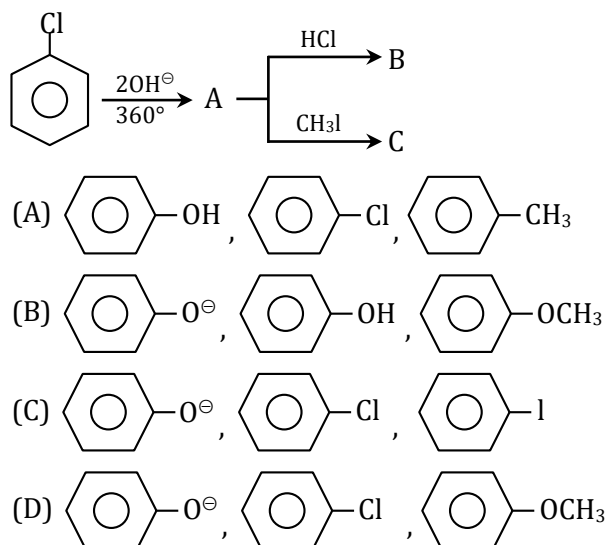


(D) All of these

CAR142

Aromatic nucleophilic substitution of alkyl halide preparation of phenol, by Cumene, Dow's, ArSN

15. The structures of the compounds/ions A, B and C in the reaction sequence are given by the set:



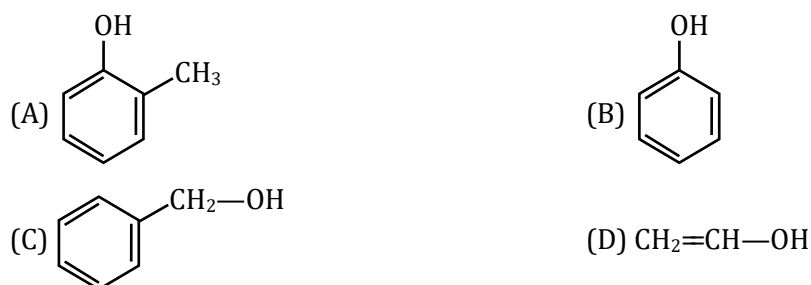
CAR151

16. Which of the following compounds does not show phenolic properties:



CAR152

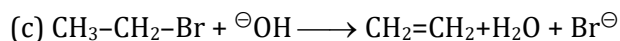
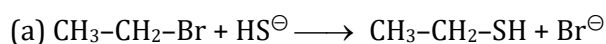
17. Which one is not the vinylic alcohol?



CAR155

18. In following two columns:

Column-I



(A) a, d $\rightarrow$ P ; b $\rightarrow$ S ; c $\rightarrow$ Q

(B) a, d $\rightarrow$ P ; b $\rightarrow$ S ; c $\rightarrow$ Q

(C) a $\rightarrow$ P ; b $\rightarrow$ S ; c $\rightarrow$ Q ; d $\rightarrow$ R

(D) a, c $\rightarrow$ P ; b $\rightarrow$ S ; d $\rightarrow$ Q

Column-II

(P) Nucleophilic substitution

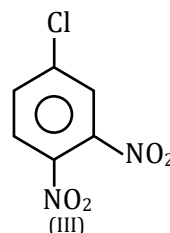
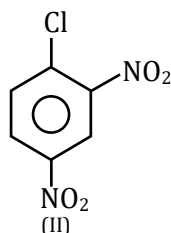
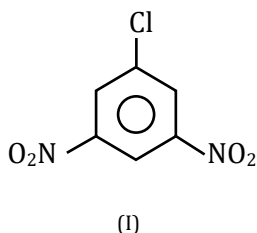
(Q) Elimination

(R) Electrophilic substitution

(S) Electrophilic addition

CAR157

19. Write the correct reactivity order with NaOH for the following compounds.



(A) I > II > III

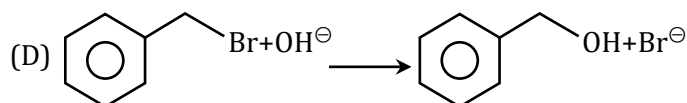
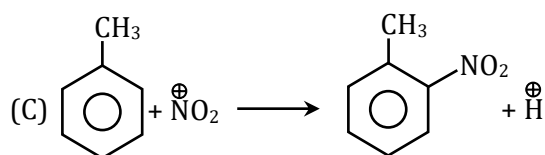
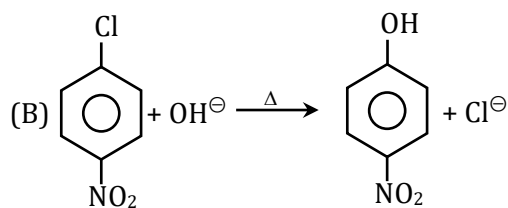
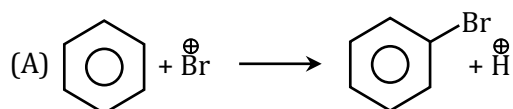
(B) III > I > II

(C) II > III > I

(D) III > II > I

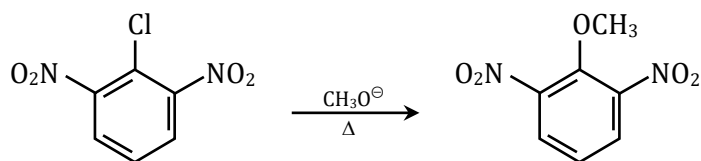
CAR158

20. Which of the following reaction is $\text{S}_\text{N}\text{Ar}$ reaction?



CAR159

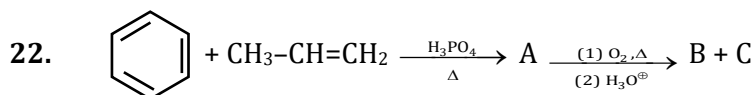
21. The reaction most likely occurs by which of the following mechanism ?



(A) Addition-elimination
(C) Elimination-addition

(B) addition only
(D) Neither of these

CAR162



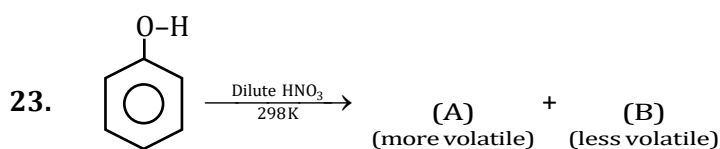
The products B & C are respectively :

(A) Phenol & acetic acid
(C) Benzoic acid & acetone

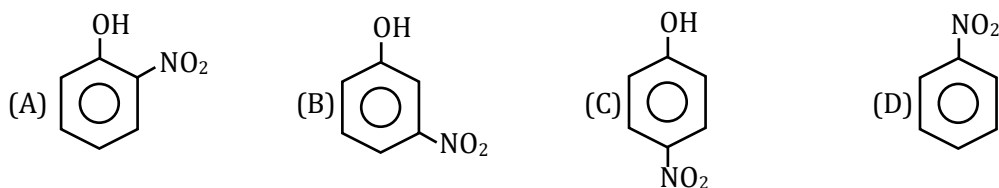
(B) Phenol & acetaldehyde
(D) Phenol & acetone

CAR164

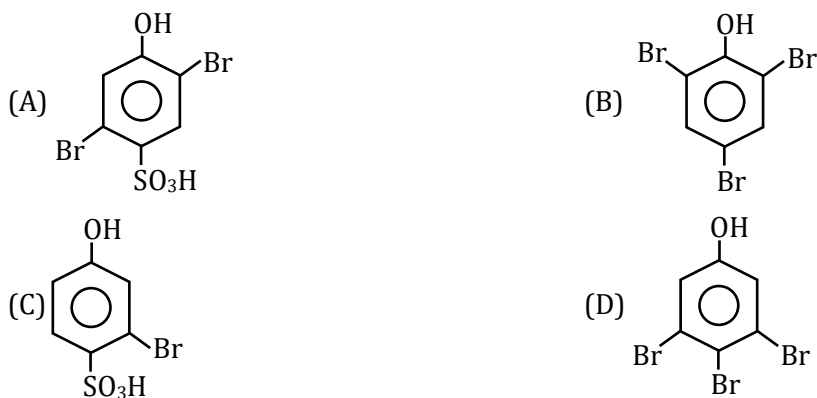
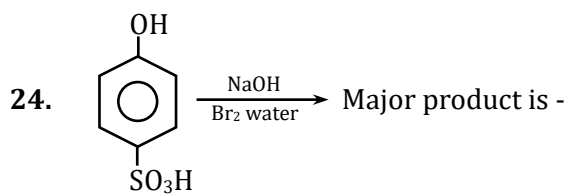
chemical reaction of phenol, RTR, oxidation Dakin reaction, kolbe schmit EAS reactions of aromatic ethers



Product (A) of the above reaction is:

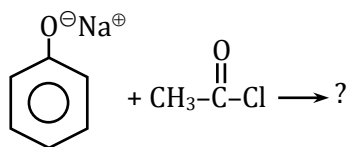


CAR167

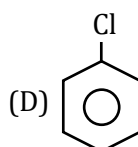
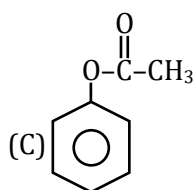
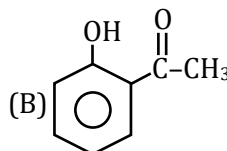
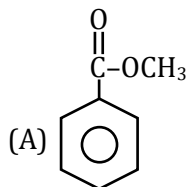


CAR171

25. The major product of given reaction is:

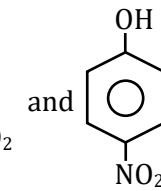
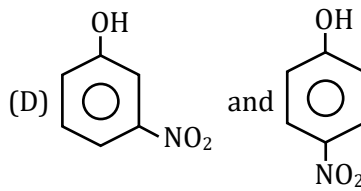
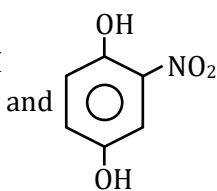
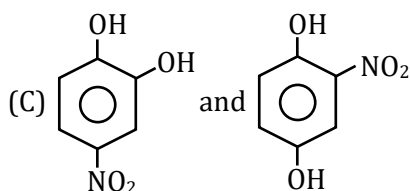
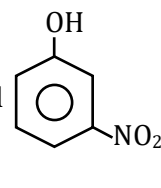
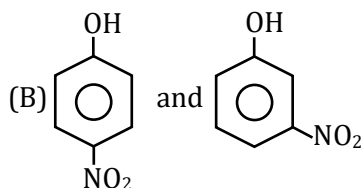
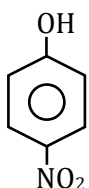
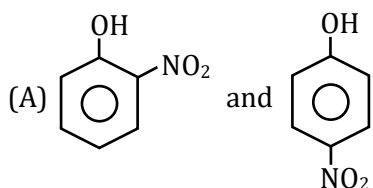


Sodium phenate



CAR173

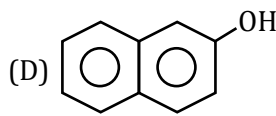
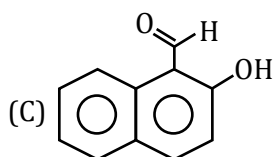
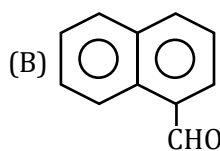
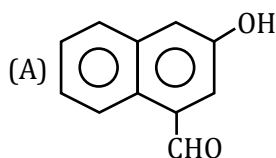
26. Phenol on treatment with dil HNO_3 at low temp (298 K) gives two products P and Q. P is steam volatile but Q is not. P and Q are respectively.



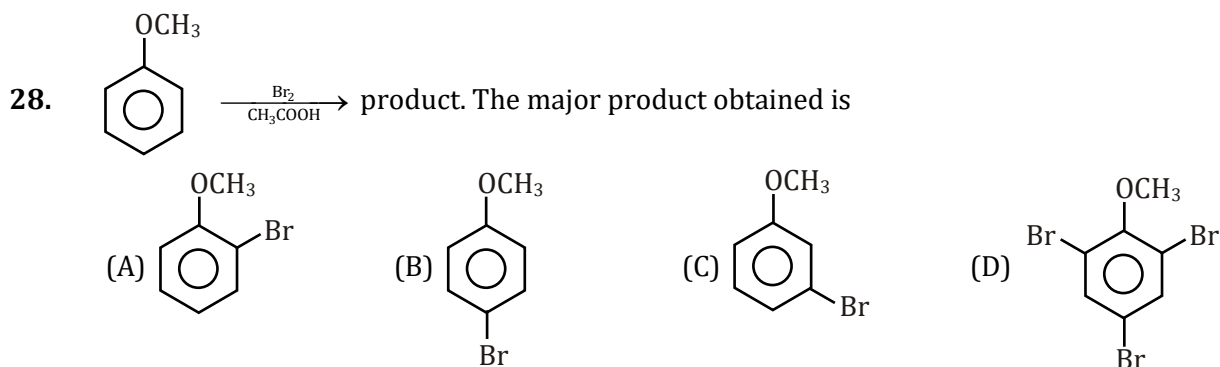
CAR177

27. $\xrightarrow{\text{(i) CHCl}_3 + \text{NaOH}}$ $\xrightarrow{\text{P}}$ Identify the structure of 'P':-

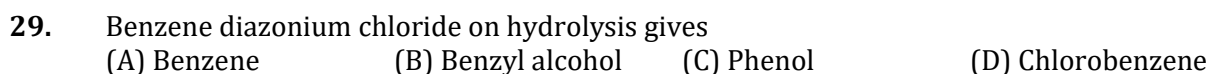
Major Product



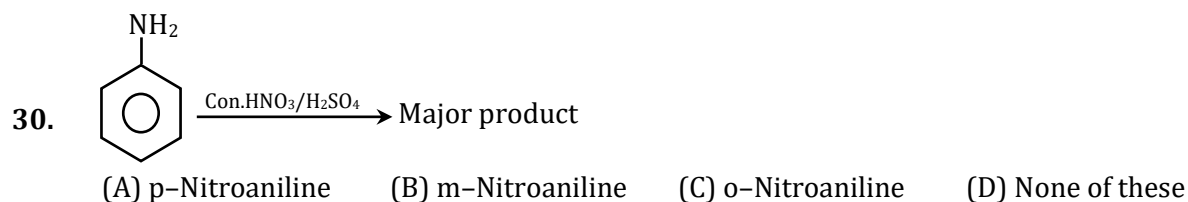
CAR181



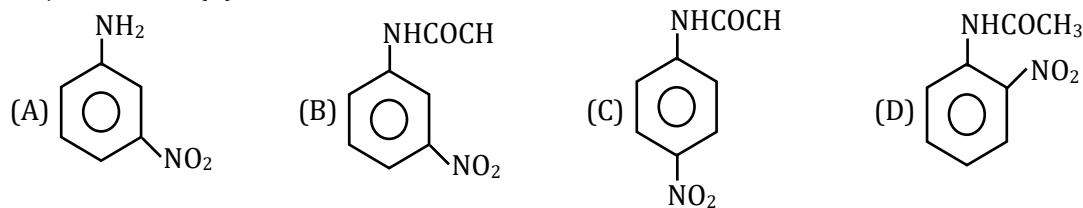
CAR186

diazo, BDC, Sand meyer, Coupling reaction of $\text{C}_6\text{H}_5\text{-NH}_2$, $\text{C}_2\text{H}_5\text{OH}$, libermann nitroso test

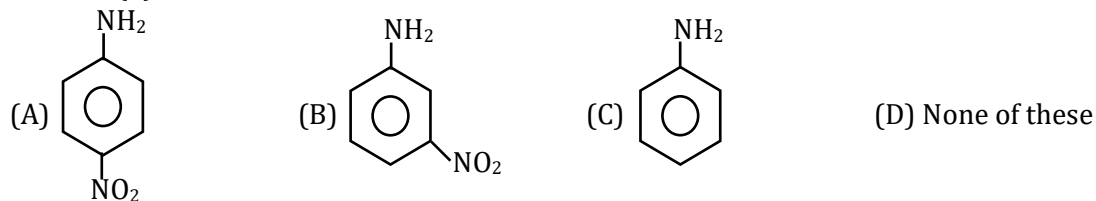
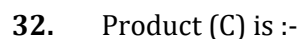
CAR187



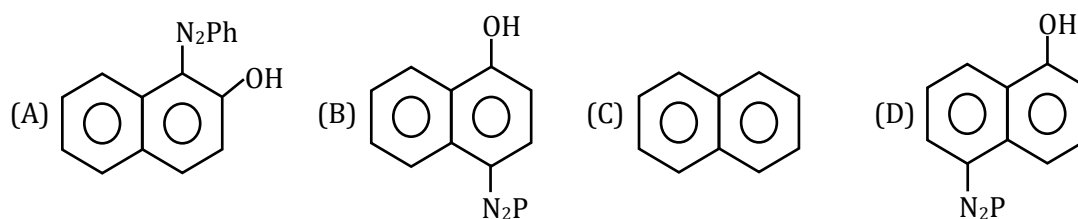
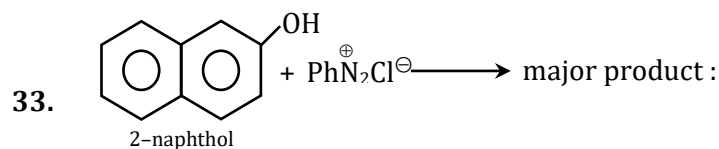
CAR195



CAR197

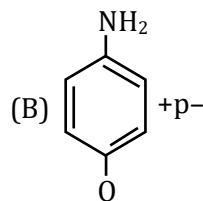
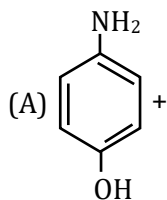
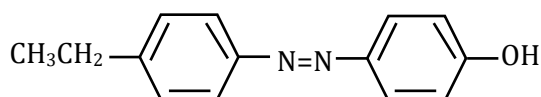


CAR198



CAR201

34. Which is the starting reagent used to make the azo compound ?

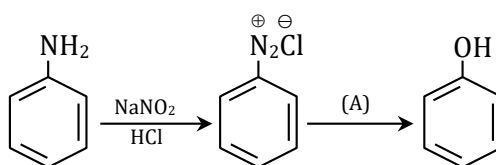


(C) p-ethylaniline and phenol

(D) Aniline and p-ethyphenol

CAR203

35. In the reaction given below



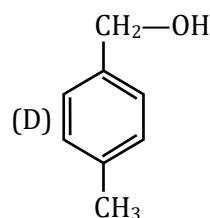
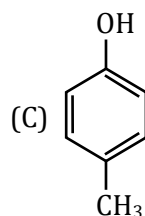
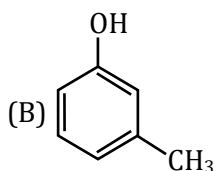
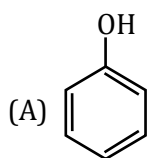
What is (A)?

- (A) Dichloromethane (B) Dilute acid (C) NaCl (D) Benzene

CAR204

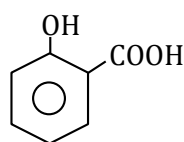
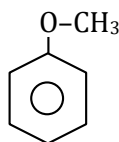
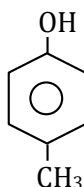
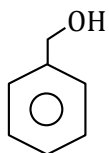
Rerrangement (fries, claisen, dienone phenol rearrangement, quick recap of C_6H_6 , toluene and other derivatives of C_6H_6 , Test for phenol, FeCl_3 Test, Reaction of Aniline

36. Which of the following compound does not give FeCl_3 test.



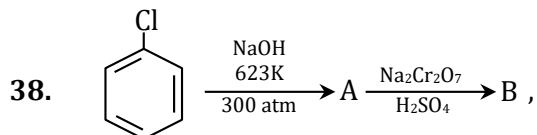
CAR210

37. Which of the following can give purple colour with neutral FeCl_3 ?



- (A) II and IV (B) I and III (C) II and III (D) III and IV

CAR211

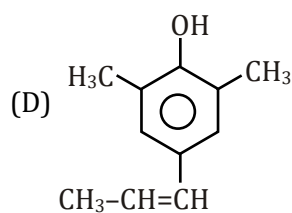
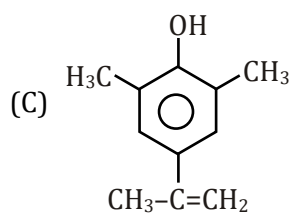
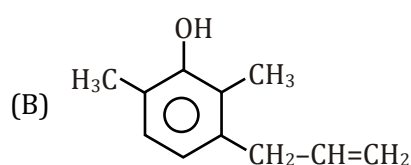
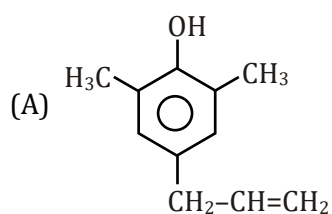
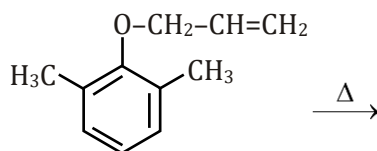


Find the number of C=C and C=O bond in B, respectively:

- (A) 2, 3 (B) 3, 1 (C) 2, 2 (D) 3, 2

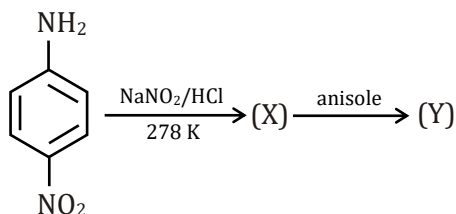
CAR217

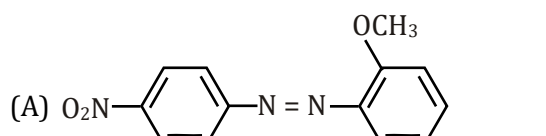
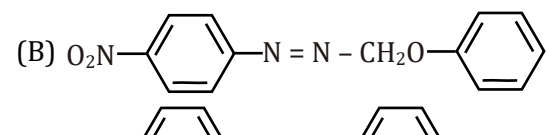
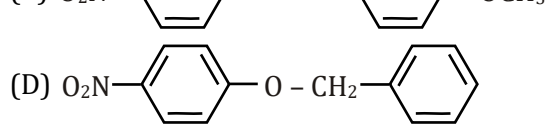
39. Give the product of the following reactions:



CAR218

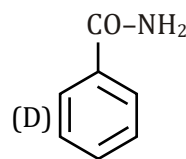
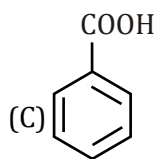
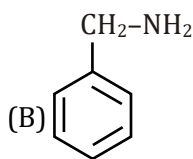
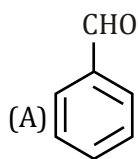
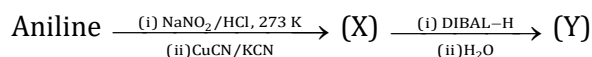
40. The structure of the final product (Y) formed in the following reaction sequence is :



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

CAR219

41. The major product Y in the following sequence of reaction is :



CAR220

MULTIPLE CORRECT TYPE QUESTIONS

Electrophillic, aromatic substitution (ESR) direction Nitration, sulphonation

42. Which of the following are classified as aromatic?

- (A) 1, 2, 3-Triphenylcyclopropenium cation (B) Cyclooctatetraenyl dianion
(C) Azulene (D) Cyclobutadiene

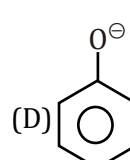
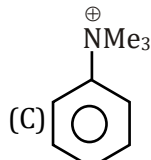
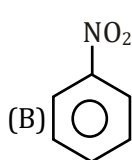
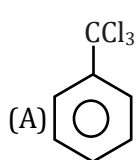
CAR127

43. Amongst the following, the moderately activating group is

- (A) —NHR (B) —NHCOCH₃ (C) —O—C(=O)—R (D) —NO₂

CAR126

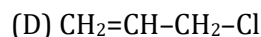
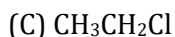
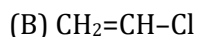
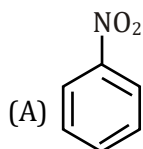
44. Electrophilic attack of NO₂⁺ at meta position is observed in:



CAR124

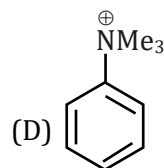
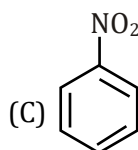
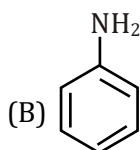
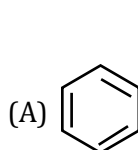
Halogenation effect F.C Alkylation, acylation, formylation gattermann koch, Gatterman Aldehyde.

45. Which of the following can be used as reagent in Friedel Crafts reaction?



CAR146

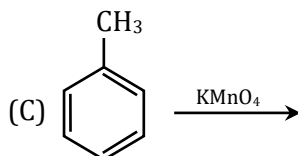
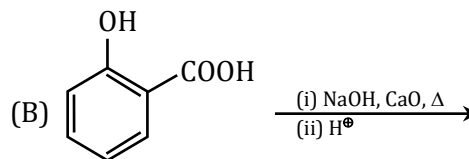
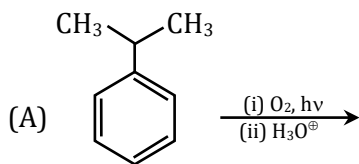
46. Which of the following does not gives Fridel-Crafts reaction?



CAR147

Aromatic nucleophilic substitution of alkyl halide preparation of phenol, by Cumene, Dow's, ArSN

47. In which of the following reaction phenol obtained as product



(D) None of these

CAR165

48. Benzene reacts with n-propyl chloride in the presence of anhydrous AlCl_3 to give predominantly:

(A) n-Propylbenzene

(B) Isopropylbenzene

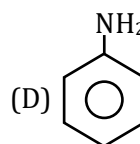
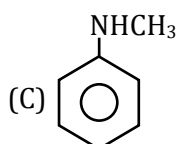
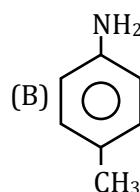
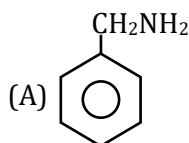
(C) 3-Propyl-1-chlorobenzene

(D) Cumene

CAR166

diazo, BDC, Sand meyer, Coupling reaction of $\text{C}_6\text{H}_5\text{-NH}_2$, $\text{C}_2\text{H}_5\text{OH}$, libermann nitroso test

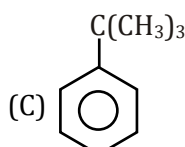
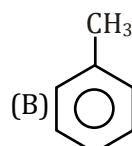
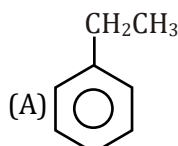
49. Which of the following amines after diazotization will form deeply coloured **azodye** with alkaline solution of β -Naphthol ?



CAR206

Rerrangement (fries, claisen, dienone phenol rearrangement, quick recap of C_6H_6 , tolueue and other derivatives of C_6H_6 , Test for phenol, FeCl_3 Test, Reaction of Aniline

50. Benzoic acid may be prepared by the oxidation of:



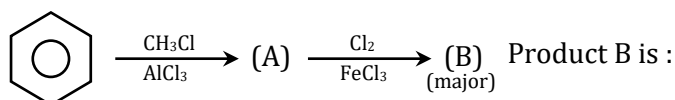
(D) None

CAR226

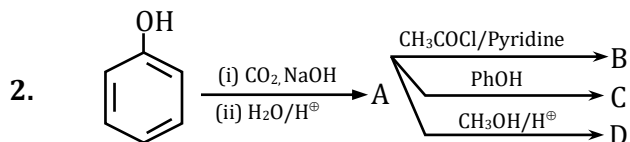
EXERCISE - S

Reaction of Alcohols

1. For the reaction

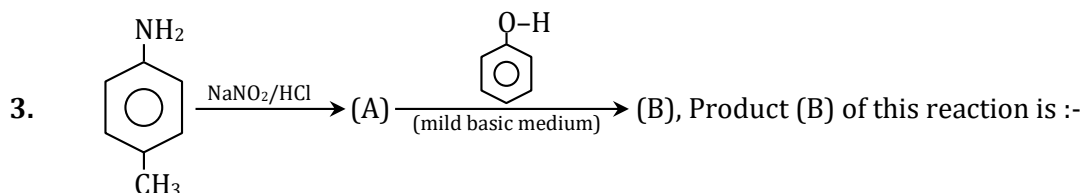


CAR140



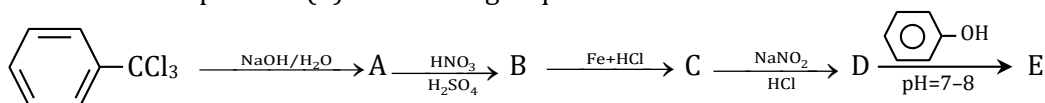
B, C & D are respectively:-

CAR176



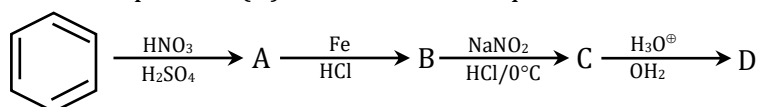
CAR188

4. Select the final product (E) of following sequence of reaction:

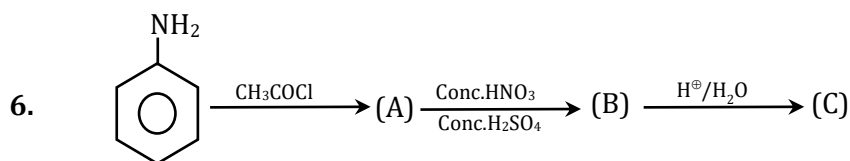


CAR189

5. What is the product (D) of the reaction sequence ?



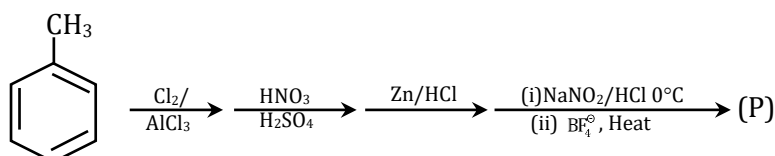
CAR194



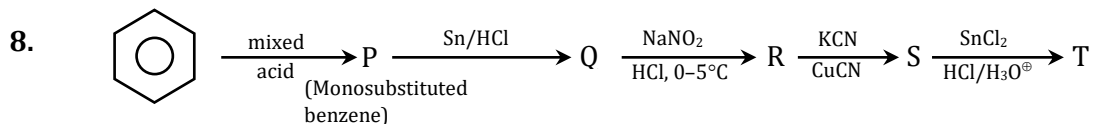
Product C is :

CAR196

7. Predict the final product (P) of the following reaction sequence :-

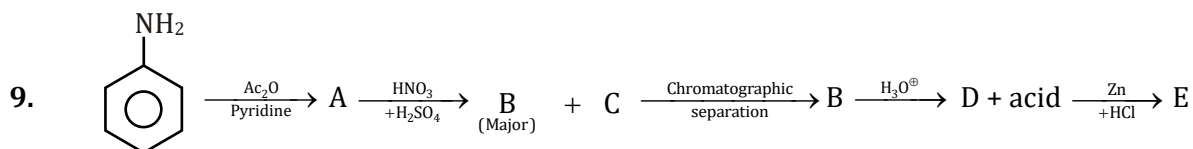


CAR199



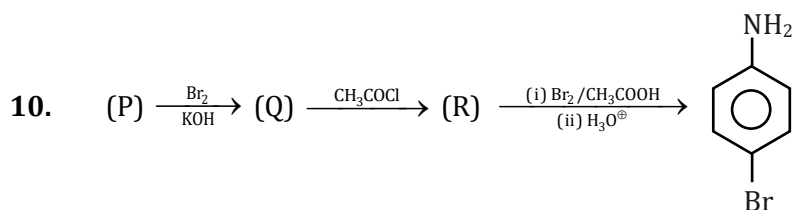
The product T is:

CAR205



The product E is:

CAR214

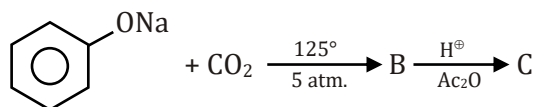


The reactant (P) is :

CAR225

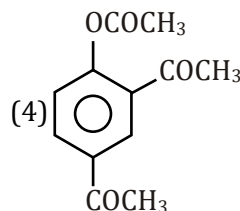
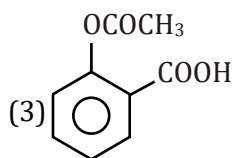
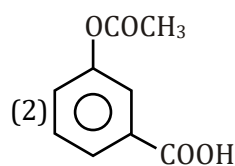
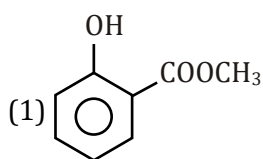
EXERCISE - JEE (Main) PYQ

1. Sodium phenoxide when heated with CO_2 under pressure at 125°C yields a product which on acetylation produces C.



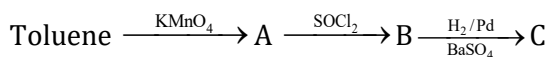
The major product C would be :

[JEE (Main) 2014]



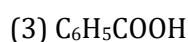
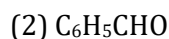
CAR033

2. In the following sequence of reactions :



the product C is :-

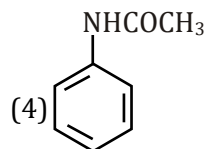
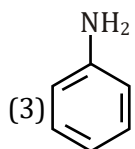
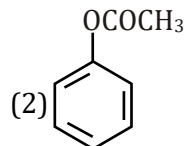
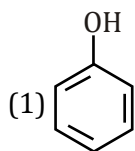
[JEE (Main) 2015]



CAR034

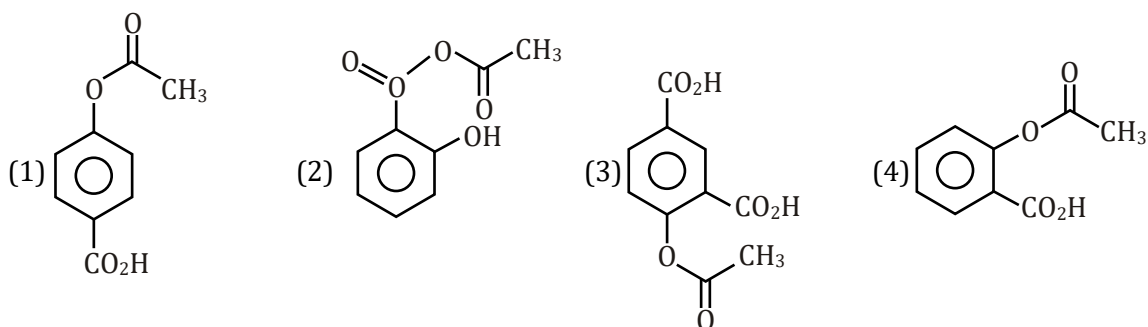
3. Which of the following compounds will significant amount of meta product during mono-nitration reaction ?

[JEE (Main) 2017]



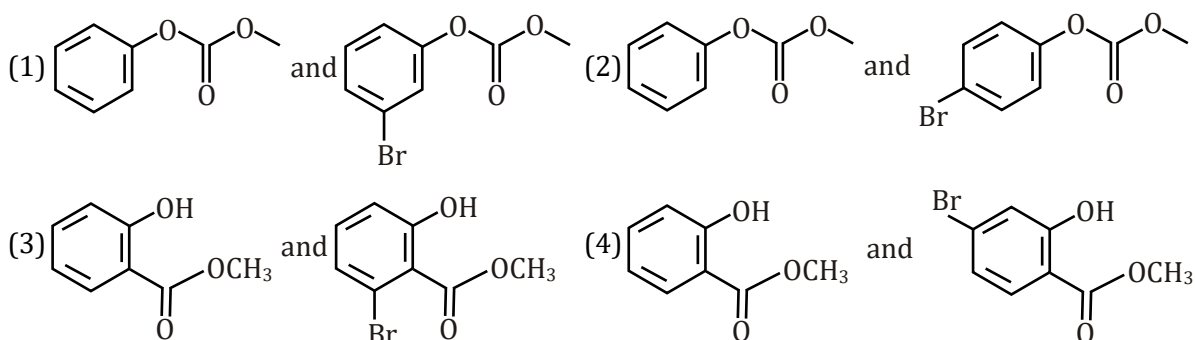
CAR035

4. Phenol on treatment with CO_2 in the presence of NaOH followed by acidification produces compound X as the major product. X on treatment with $(\text{CH}_3\text{CO})_2\text{O}$ in the presence of catalytic amount of H_2SO_4 produces : [JEE (Main) 2018]



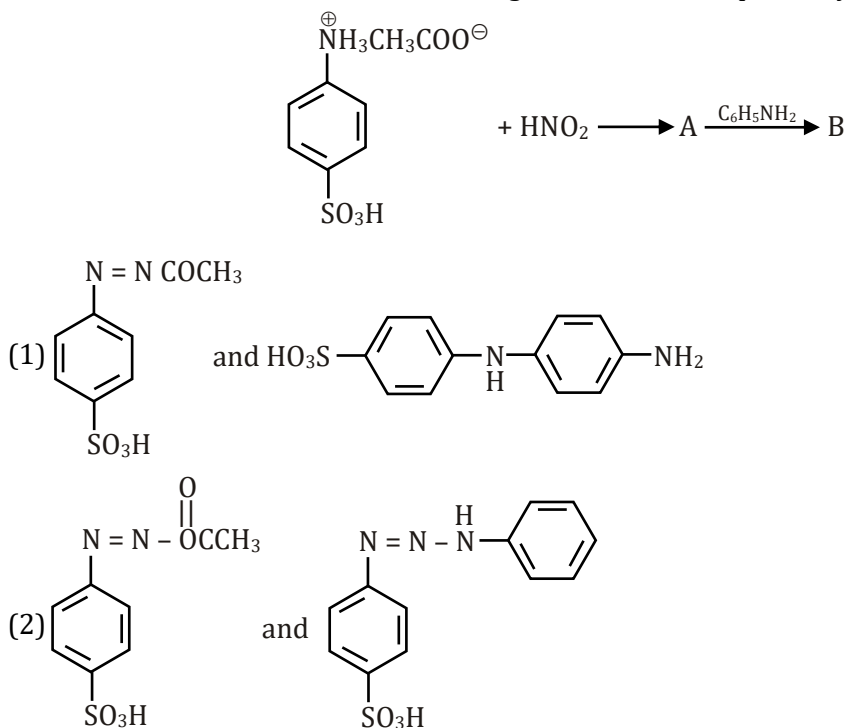
CAR036

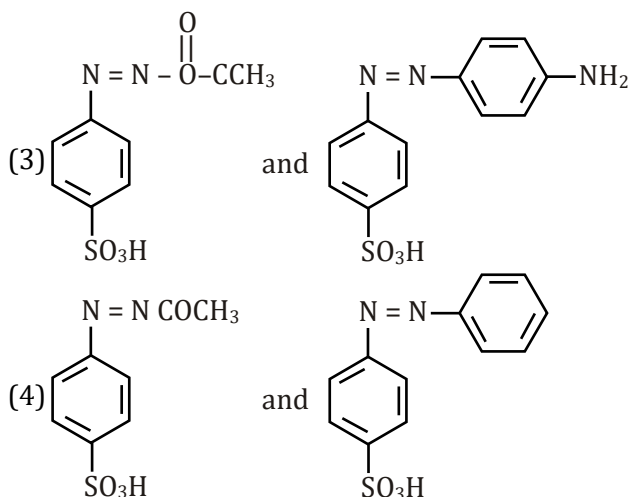
5. Phenol reacts with methyl chloroformate in the presence of NaOH to form product A. A reacts with Br_2 to form product B. A and B are respectively : [JEE (Main) 2018]



CAR037

6. Products A and B formed in the following reactions are respectively : [JEE (Main) 2018]

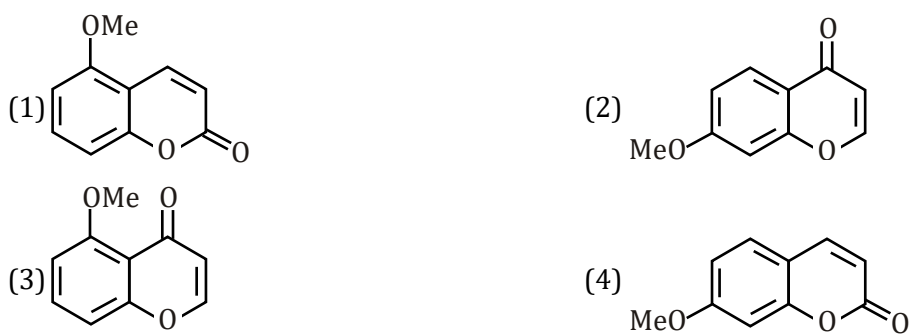
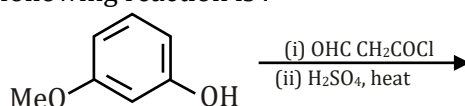




CAR038

7. The major product of the following reaction is :

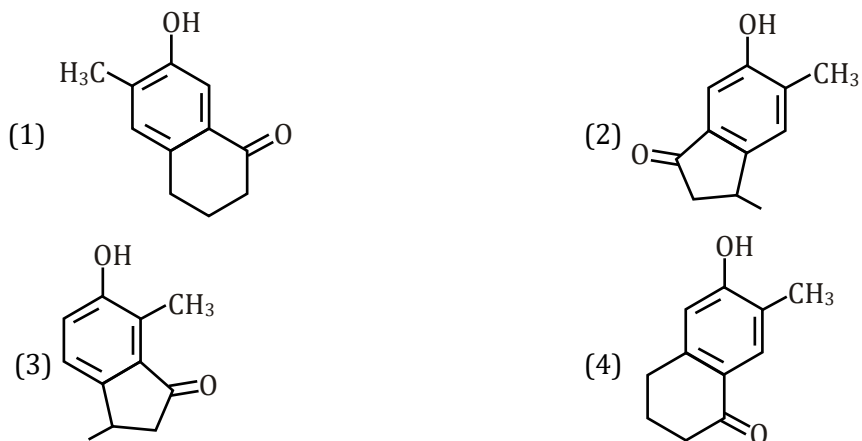
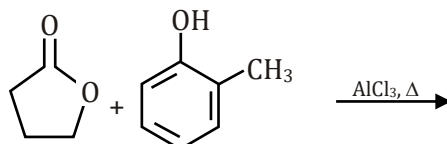
[JEE (Main) 2018]



CAR039

8. The major product of the following reaction is:

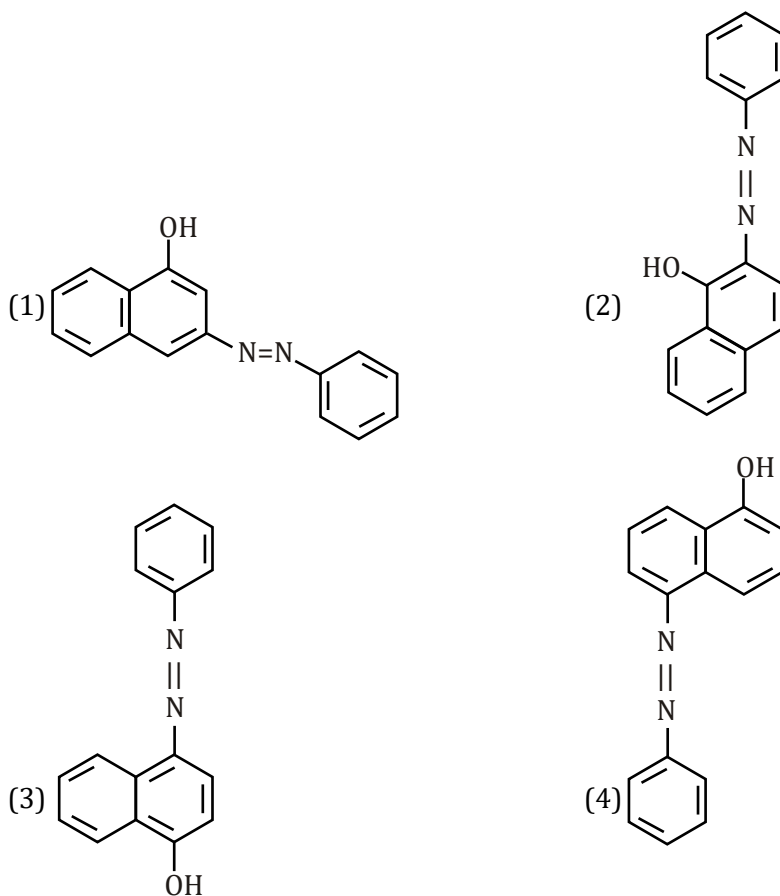
[JEE (Main) 2019]



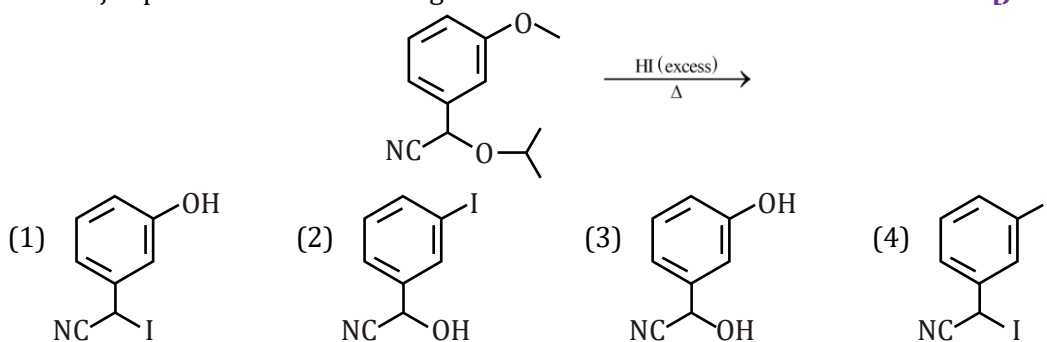
CAR040

9. Coupling of benzene diazonium chloride with 1-naphthol in alkaline medium will give

[JEE (Main) 2019]

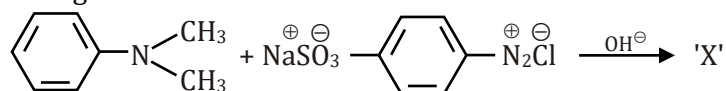


10. The major product of the following reaction is :

CAR041
[JEE (Main) 2019]

11. Consider the following reaction :

CAR042



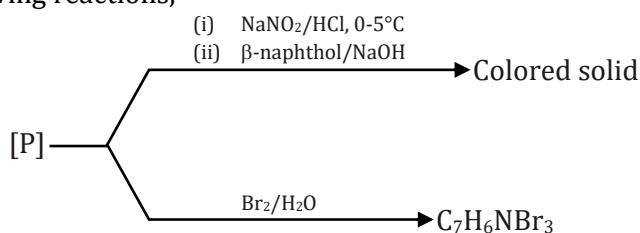
The product 'X' is used :

[JEE (Main) 2020]

- (1) in acid base titration as an indicator
- (2) in protein estimation as an alternative to ninhydrin
- (3) in laboratory test for phenols
- (4) as food grade colourant

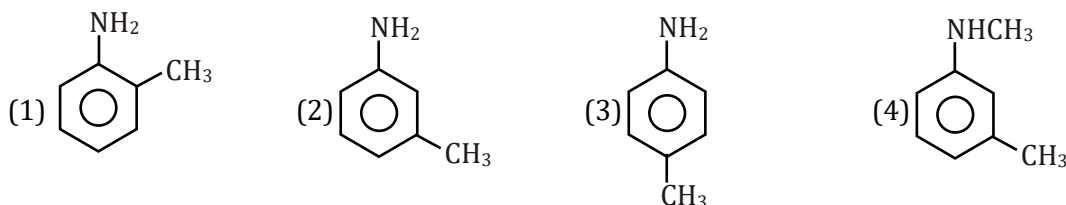
CAR043

12. Consider the following reactions,



The compound [P] is :

[JEE (Main) 2020]



CAR044

13. The number of sp^2 hybrid orbitals in a molecule of benzene is :

[JEE (Main) 2020]

- (1) 24 (2) 6 (3) 12 (4) 18

CAR045

14. The correct sequence of reagents used in the preparation of 4-bromo-2-nitroethyl benzene from benzene is :

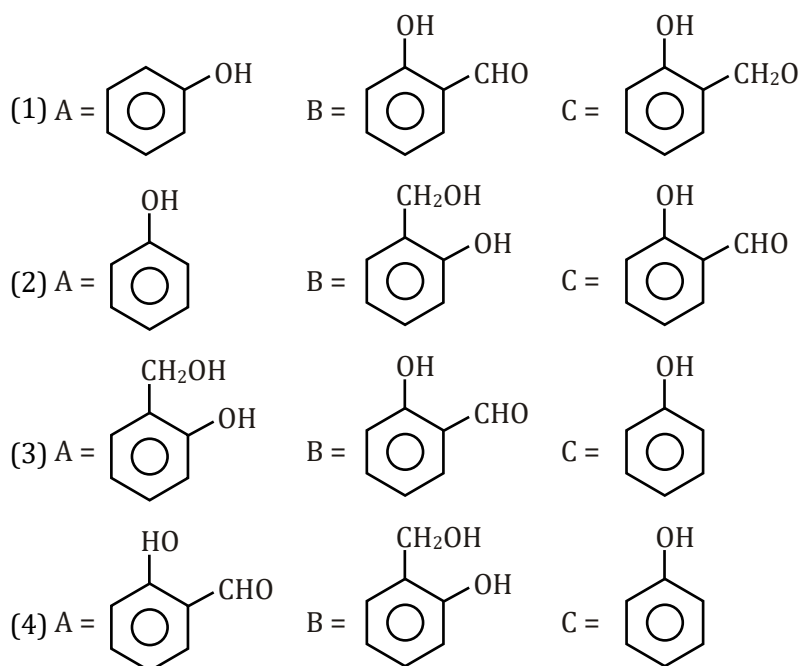
[JEE (Main) 2021]

- (1) $\text{HNO}_3/\text{H}_2\text{SO}_4$, $\text{Br}_2/\text{AlCl}_3$, $\text{CH}_3\text{COCl}/\text{AlCl}_3$, $\text{Zn-Hg}/\text{HCl}$
 (2) $\text{Br}_2/\text{AlBr}_3$, $\text{CH}_3\text{COCl}/\text{AlCl}_3$, $\text{HNO}_3/\text{H}_2\text{SO}_4$, Zn/HCl
 (3) $\text{CH}_3\text{COCl}/\text{AlCl}_3$, $\text{Br}_2/\text{AlBr}_3$, $\text{HNO}_3/\text{H}_2\text{SO}_4$, Zn/HCl
 (4) $\text{CH}_3\text{COCl}/\text{AlCl}_3$, $\text{Zn-Hg}/\text{HCl}$, $\text{Br}_2/\text{AlBr}_3$, $\text{HNO}_3/\text{H}_2\text{SO}_4$

CAR046

15. An organic compound A ($\text{C}_6\text{H}_6\text{O}$) gives dark green colouration with ferric chloride. On treatment with CHCl_3 and KOH , followed by acidification gives compound B. Compound B can also be obtained from compound C on reaction with pyridinium chlorochromate (PCC). Identify A, B and C.

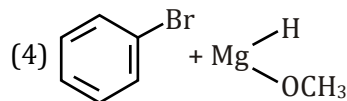
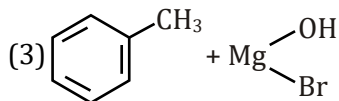
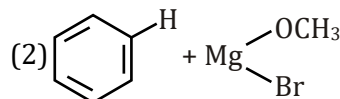
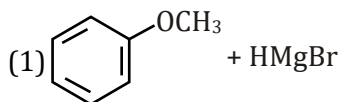
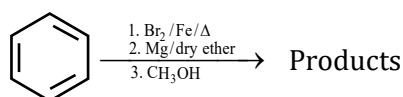
[JEE (Main) 2021]



CAR047

16. For the following :

[JEE (Main) 2021]



CAR048

17. Phenol on reaction with dilute nitric acid, gives two products. Which method will be most effective for large scale separation? [JEE (Main) 2022]

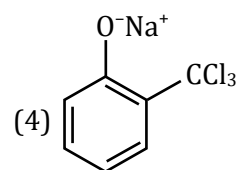
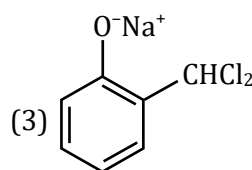
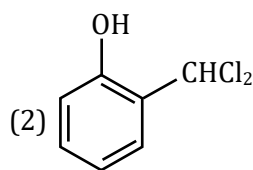
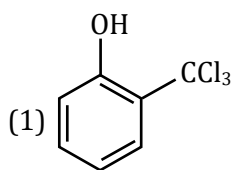
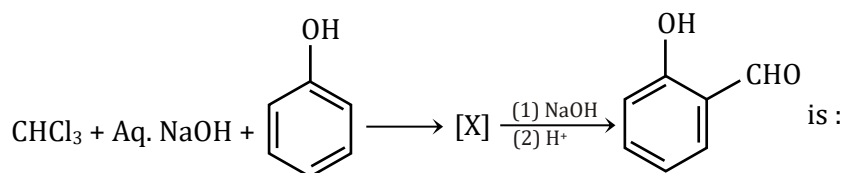
- (1) Chromatographic separation
(3) Steam distillation

- (2) Fractional Crystallisation
(4) Sublimation

CAR227

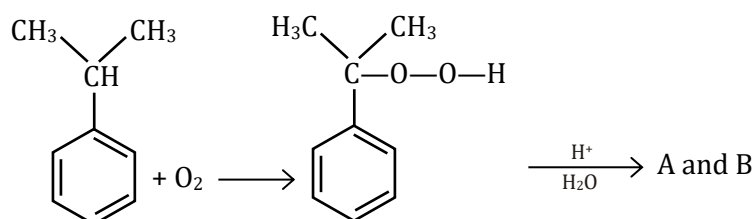
18. The intermediate X, in the reaction

[JEE (Main) 2022]



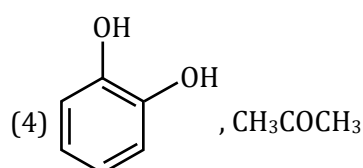
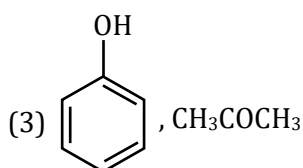
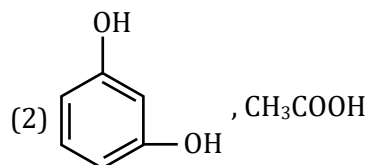
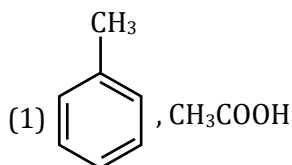
CAR228

19. In the following reaction :



The compounds A and B respectively are :-

[JEE (Main) 2022]



CAR229

20. Compound 'P' on nitration with dil. HNO_3 yields two isomers (A) and (B). These isomers can be separated by steam distillation. Isomers (A) and (B) show the intramolecular and intermolecular hydrogen bonding respectively. Compound (P) on reaction with conc. HNO_3 yields a yellow compound 'C', a strong acid. The number of oxygen atoms is present in compound 'C' ____.

[JEE (Main) 2022]

CAR230

21. Oxidation of toluene to Benzaldehyde can be easily carried out with which of the following reagents?

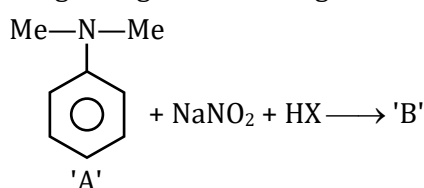
[JEE (Main) 2022]

- (1) $\text{CrO}_3/\text{acetic acid}, \text{H}_3\text{O}^+$ (2) $\text{CrO}_3/\text{acetic anhydride}, \text{H}_3\text{O}^+$
(3) $\text{KMnO}_4/\text{HCl}, \text{H}_3\text{O}^+$ (4) $\text{CO}/\text{HCl}, \text{anhydrous AlCl}_3$

CAR231

22. The incorrect statement regarding the reaction given below is

[JEE (Main) 2023]

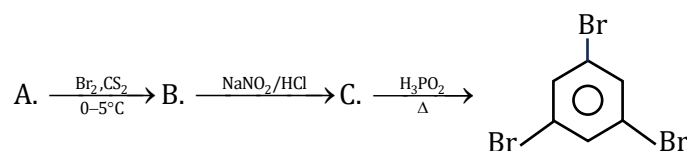


- (1) The electrophile involved in the reaction is NO^+
(2) 'B' is N-nitroso ammonium compound
(3) The reaction occurs at low temperature
(4) The product 'B' formed in the above reaction is p-nitroso compound at low temperature

CAR232

23. Compound A from the following reaction sequence is:

[JEE (Main) 2023]

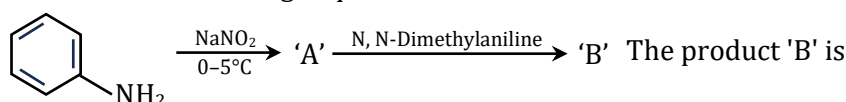


- (1) Benzoic Acid (2) Phenol
(3) Salicylic Acid (4) Aniline

CAR233

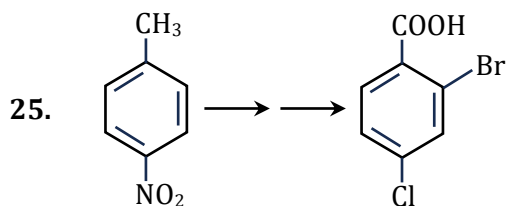
24. Consider the following sequence of reactions:

[JEE (Main) 2023]



- (1) $\text{H}_2\text{NHN}-\text{C}_6\text{H}_4-\text{C}_6\text{H}_4-\text{N}(\text{CH}_3)_2$ (2) $\text{C}_6\text{H}_5-\text{N}=\text{N}-\text{C}_6\text{H}_4-\text{N}(\text{CH}_3)_2$
(3) $\text{C}_6\text{H}_5-\text{N}(\text{H})=\text{N}-\text{C}_6\text{H}_4-\text{N}(\text{CH}_3)_2$ (4) $\text{C}_6\text{H}_5-\text{N}(\text{CH}_3)=\text{N}-\text{C}_6\text{H}_4-\text{NH}_2$

CAR234



In the above conversion the correct sequence of reagents to be added is

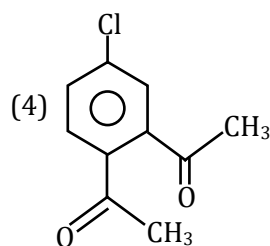
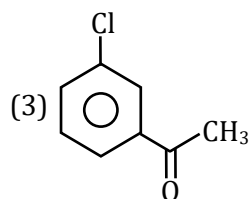
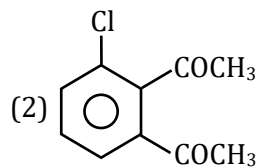
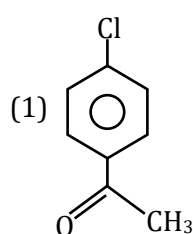
[JEE (Main) 2023]

- (1) (i) Fe/H^+ , (ii) HONO , (iii) CuCl , (iv) KMnO_4 , (v) Br_2
- (2) (i) KMnO_4 , (ii) Br_2/Fe , (iii) Fe/H^+ , (iv) Cl_2
- (3) (i) Br_2/Fe , (ii) Fe/H^+ , (iii) HONO , (iv) CuCl , (v) KMnO_4
- (4) Br_2/Fe , (ii) Fe/H^+ , (iii) KMnO_4 , (iv) Cl_2

CAR235

26. The major product formed in the Friedel-Craft acylation of chlorobenzene is.

[JEE (Main) 2023]

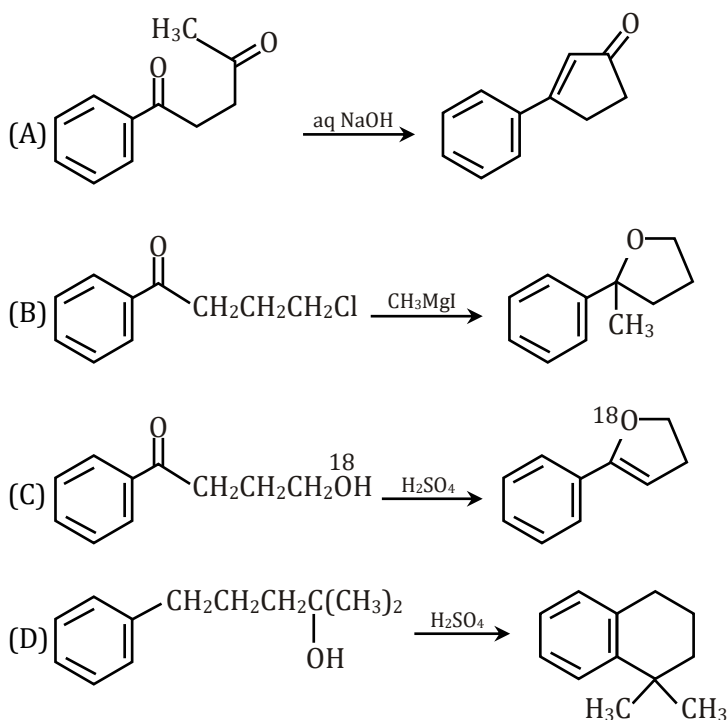


CAR236

EXERCISE - JEE (Advanced) PYQ

1. Match the reactions in **Column-I** with appropriate types of step/reactive intermediate involved in these reactions as given in **Column-II** [IIT-2012]

Column-I



Column-II

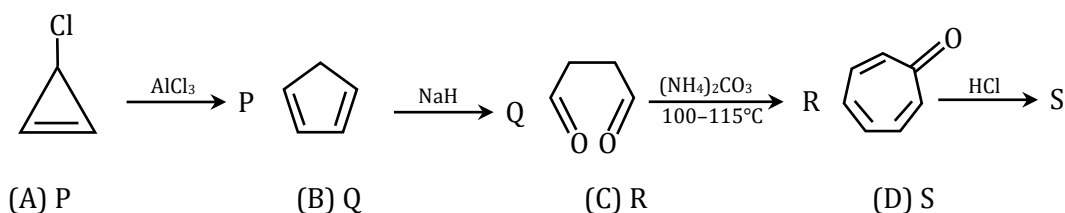
- (P) Nucleophilic substitution
- (Q) Electrophilic substitution
- (R) Dehydration
- (S) Nucleophilic addition
- (T) Carbanion

CAR069

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

2. Among P, Q, R and S, the aromatic compound(s) is / are :

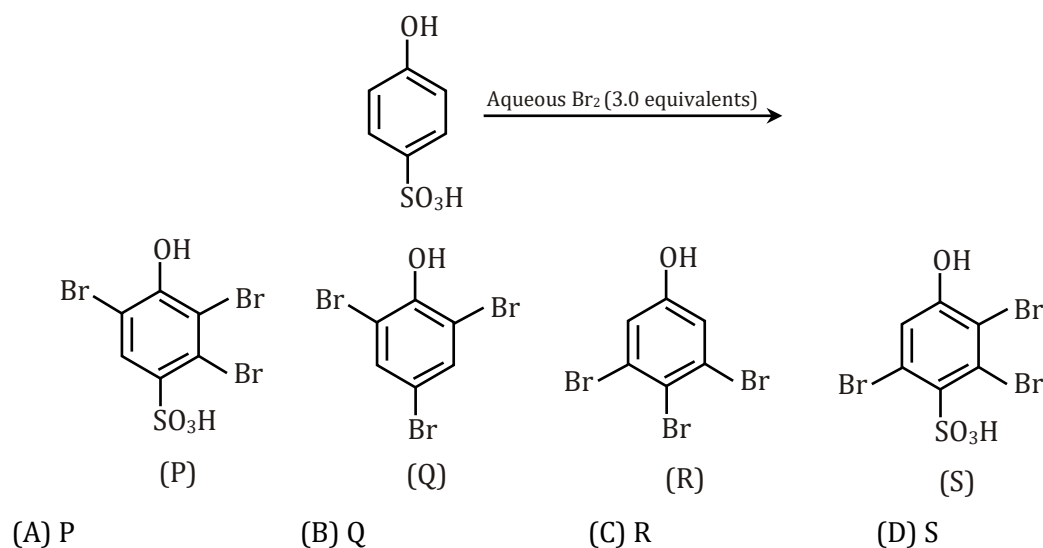
[JEE (Advanced) 2013]



CAR070

3. The major product(s) of the following reaction is (are) -

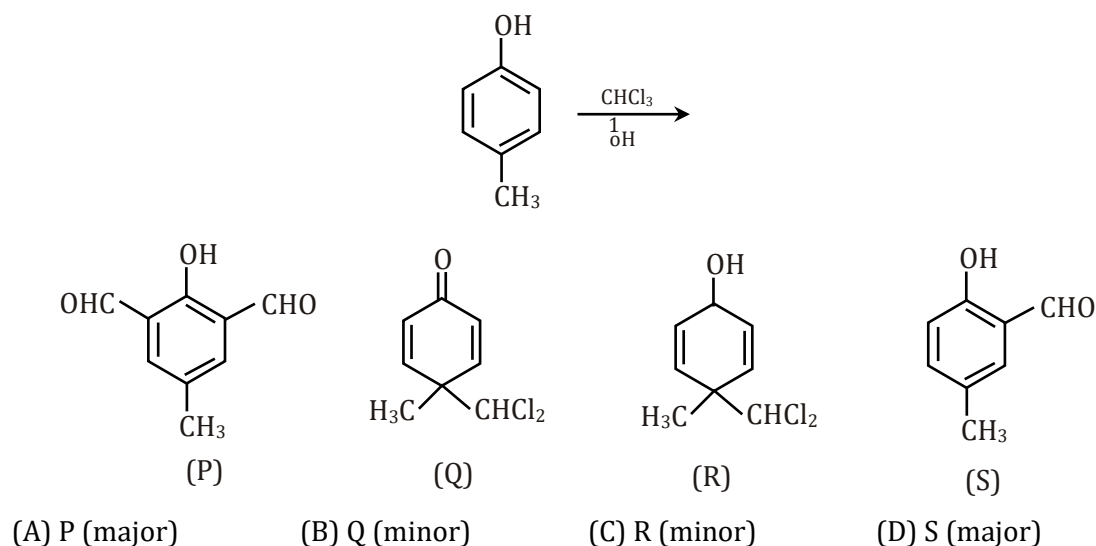
[JEE (Advanced) 2013]



CAR071

4. In the following reaction, the product (s) formed is (are)

[JEE (Advanced) 2013]

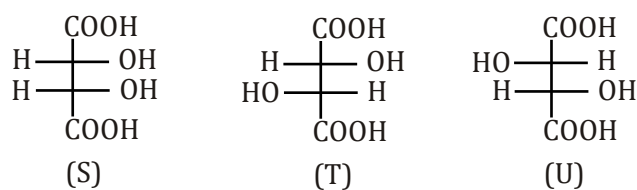


CAR072

Paragraph for Question 5 and 6

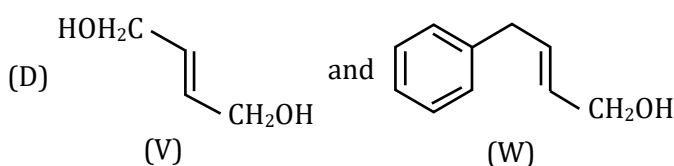
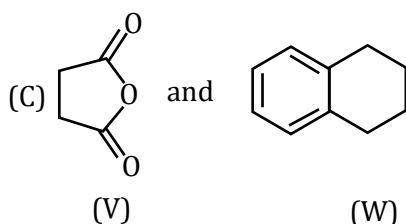
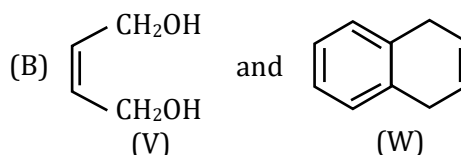
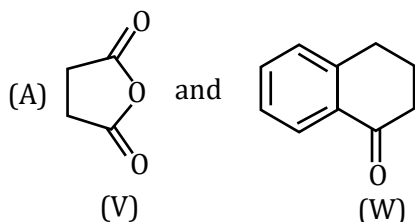
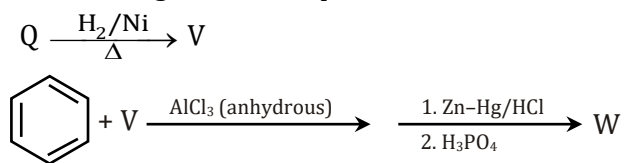
P & Q are isomers of dicarboxylic acid $C_4H_4O_4$. Both decolourize Br_2/H_2O , on heating P forms the cyclic anhydride.

Upon treatment with dilute alkaline $KMnO_4$, P as well as Q could produce one or more than one from S, T and U.



5. In the following reaction sequences V and W are, respectively -

[JEE (Advanced) 2013]



CAR073

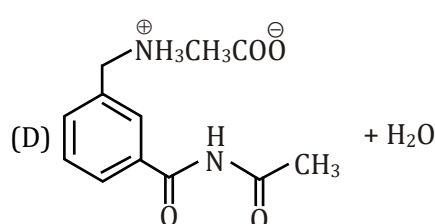
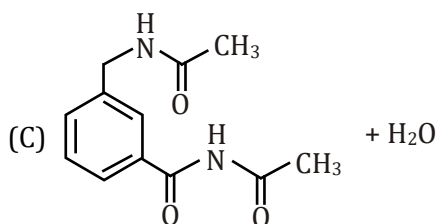
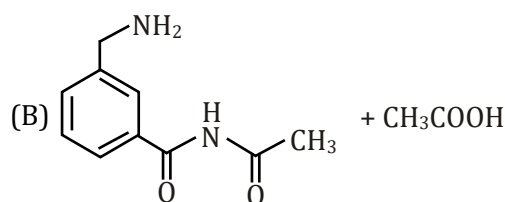
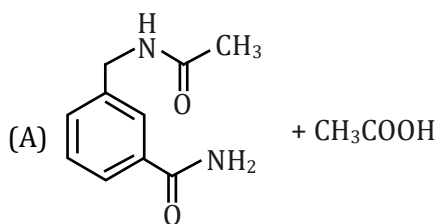
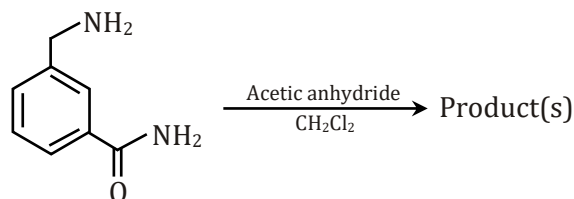
6. Compounds formed from P and Q are respectively
 (A) Optically active S and optically active pair (T, U)
 (B) Optically inactive S and optically inactive pair (T, U)
 (C) Optically active pair (T, U) and optically active S
 (D) Optically inactive pair (T, U) and optically inactive S

[JEE (Advanced) 2013]

CAR074

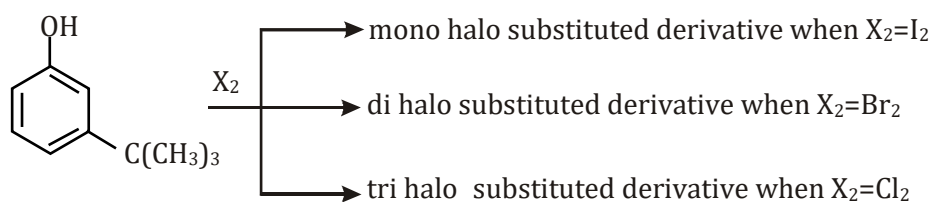
7. In the reaction shown below, the major product(s) formed is / are :

[JEE (Advanced) 2014]



CAR075

8. The reactivity of compound Z with different halogens under appropriate conditions is given below :



The observed pattern of electrophilic substitution can be explained by –

[JEE (Advanced) 2014]

- (A) The steric effect of the halogen
 (B) The steric effect of the tert-butyl group
 (C) The electronic effect of the phenolic group
 (D) The electronic effect of the tert-butyl group

CAR076

9. Match the four starting materials (P, Q, R, S) given in List I with the corresponding reaction scheme (I, II, III, IV) provided in List - II and select the correct answer using the code given below in lists.

List - I		List - II	
P		1	Scheme I (i) $\text{KMnO}_4, \text{HO}^\ominus$, heat (ii) $\text{H}^\oplus, \text{H}_2\text{O}$ (iii) SOCl_2 (iv) NH_3 $? \longrightarrow \text{C}_7\text{H}_6\text{N}_2\text{O}_3$
Q		2	Scheme II (i) Sn/HCl (ii) CH_3COCl (iii) conc. H_2SO_4 (iv) HNO_3 (v) dil. H_2SO_4 , heat (vi) $\text{HO}^\ominus$ $? \longrightarrow \text{C}_6\text{H}_6\text{N}_2\text{O}_2$
R		3	Scheme III (i) red hot iron, 873 K (ii) fuming $\text{HNO}_3, \text{H}_2\text{SO}_4$, heat (iii) $\text{H}_2\text{S.NH}_3$ (iv) $\text{NaNO}_2, \text{H}_2\text{SO}_4$ (v) hydrolysis $? \longrightarrow \text{C}_6\text{H}_5\text{NO}_3$
S		4	Scheme IV (i) conc. $\text{H}_2\text{SO}_4, 60^\circ\text{C}$ (ii) conc. HNO_3 , conc. H_2SO_4 (iii) dil. H_2SO_4 , heat $? \longrightarrow \text{C}_6\text{H}_5\text{NO}_4$

[JEE (Advanced) 2014]

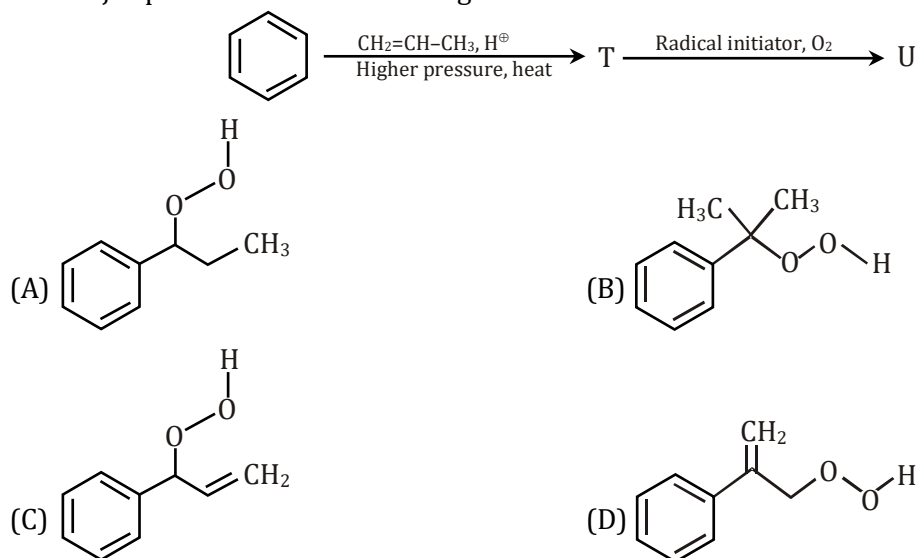
Code :

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

CAR077

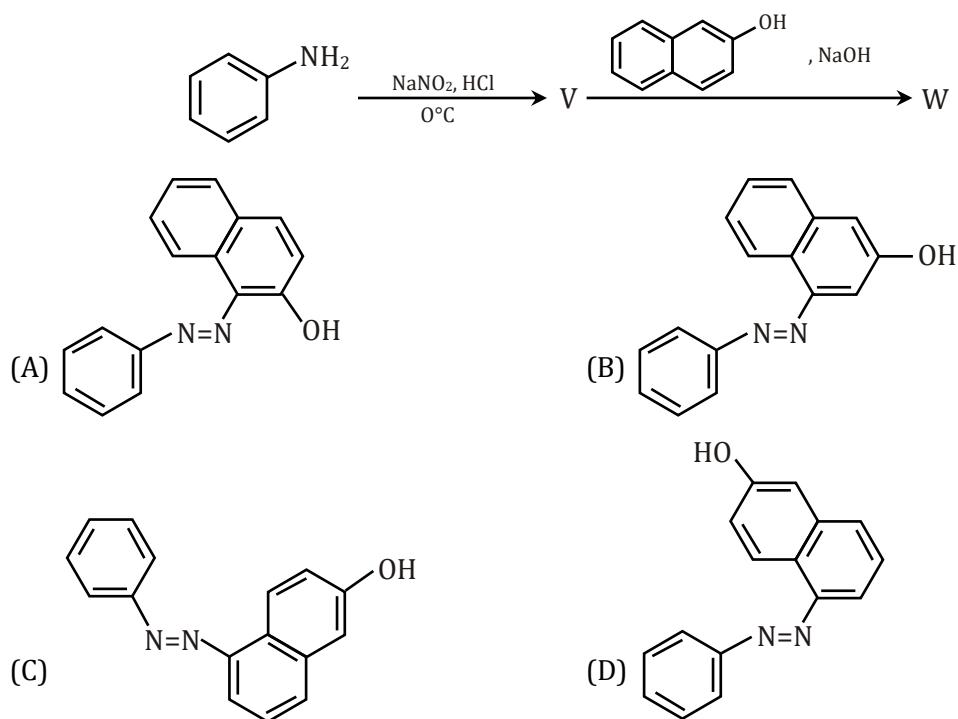
10. The major product U in the following reactions is :

[JEE (Advanced) 2015]



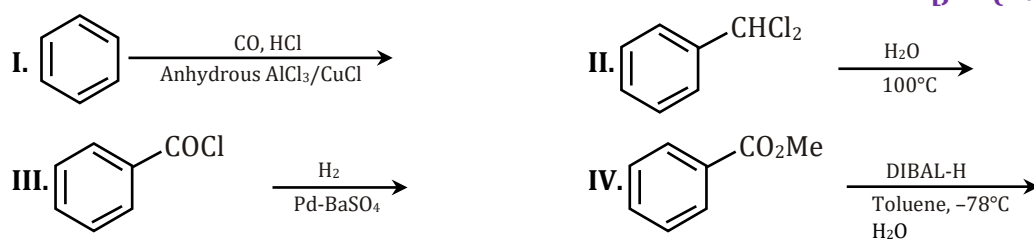
11. In the following reactions, the major product W is :

CAR078
[JEE (Advanced) 2015]



12. Among the following the number of reaction(s) that produce(s) benzaldehyde is :

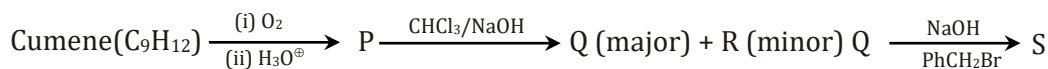
CAR079
[JEE (Advanced) 2015]



CAR080

13. The correct statement(s) about of the following reaction sequence is(are)

[JEE (Advanced) 2016]

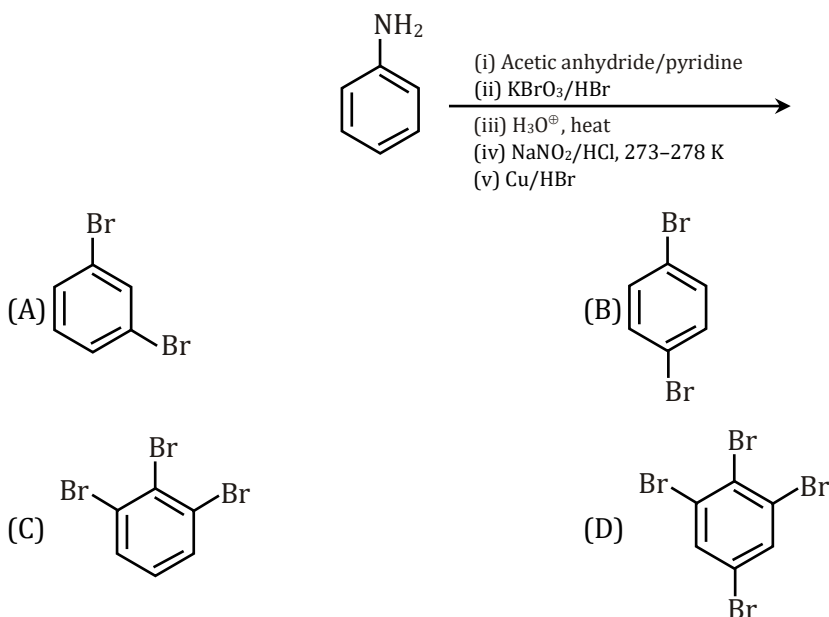


- (A) R is steam volatile
 (B) Q gives dark violet coloration with 1% aqueous FeCl_3 solution
 (C) S gives yellow precipitate with 2, 4-dinitrophenylhydrazine
 (D) S gives dark violet coloration with 1% aqueous FeCl_3 solution

CAR081

14. The product(s) of the following reaction sequence is(are)

[JEE (Advanced) 2016]



CAR082

15. Among the following reaction(s) which gives (give) tert-butyl benzene as the major product is(are)

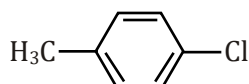
[JEE (Advanced) 2016]



CAR083

16. The IUPAC name(s) of the following compound is(are) :

[JEE (Advanced) 2017]

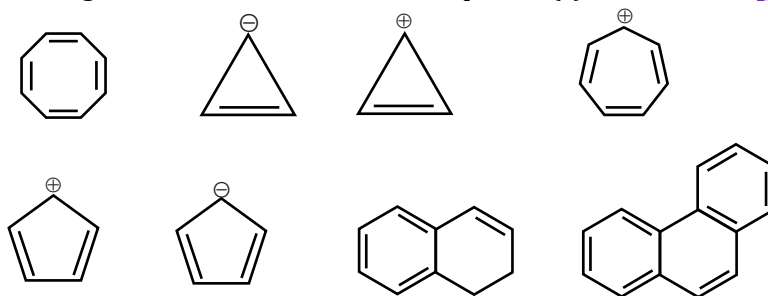


- (A) 4-methylchlorobenzene
 (B) 4-chlorotoluene
 (C) 1-chloro-4-methylbenzene
 (D) 1-methyl-4-chlorobenzene

CAR084

17. Among the following, the number of aromatic compound (s) is :

[JEE (Advanced) 2017]



CAR085

Answer 18, 19 and 20 by appropriately matching the information given in the three columns of the following table.

Columns 1, 2 and 3 contains starting materials, reaction conditions, and type of reactions, respectively.

Column 1

- (I) Toluene
- (II) Acetophenone
- (III) Benzaldehyde
- (IV) Phenol

Column 2

- (i) NaOH/Br₂
- (ii) Br₂ / hν
- (iii) (CH₃CO)₂O/CH₃COOK
- (iv) NaOH/CO₂

Column 3

- (P) Condensation
- (Q) Carboxylation
- (R) Substitution
- (S) Haloform

18. For the synthesis of benzoic acid, the only CORRECT combination is

[JEE (Advanced) 2017]

- (A) (III) (iv) (R)
- (B) (IV) (ii) (P)
- (C) (I) (iv) (Q)
- (D) (II) (i) (S)

CAR086

19. The only CORRECT combination in which the reaction proceeds through radical mechanism is

[JEE (Advanced) 2017]

- (A) (I) (ii) (R)
- (B) (II) (iii) (R)
- (C) (III) (ii) (P)
- (D) (IV) (i) (Q)

CAR087

20. The only CORRECT combination that gives two different carboxylic acids is

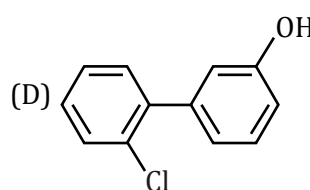
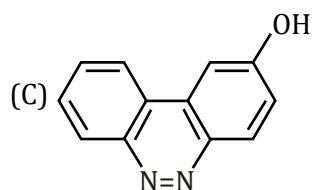
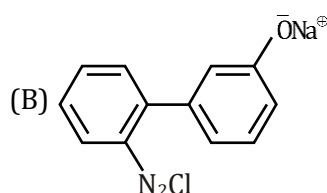
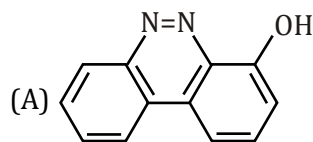
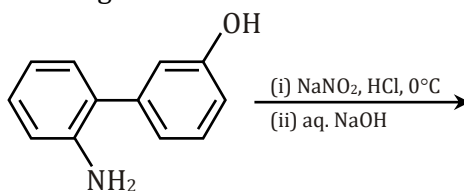
[JEE (Advanced) 2017]

- (A) (IV) (iii) (Q)
- (B) (III) (iii) (P)
- (C) (II) (iv) (R)
- (D) (I) (i) (S)

CAR088

21. The major product of the following reaction is :

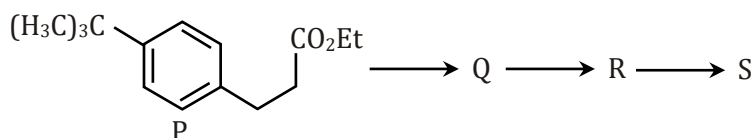
[JEE (Advanced) 2017]



CAR089

Paragraph for # 22 & 23

The reaction of compound **P** with CH_3MgBr (excess) in $(\text{C}_2\text{H}_5)_2\text{O}$ followed by addition of H_2O gives **Q**. The compound **Q** on treatment with H_2SO_4 at 0°C gives **R**. The reaction of **R** with CH_3COCl in the presence of anhydrous AlCl_3 in CH_2Cl_2 followed by treatment with H_2O produces compounds **S**. [Et it compounds **P** is ethyl group]



22. The reactions, **Q** to **R** and **R** to **S**, are -

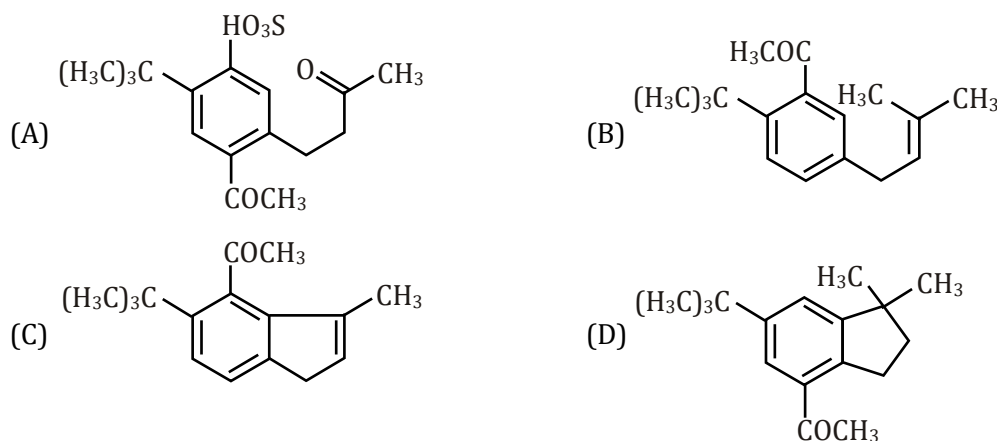
[JEE (Advanced) 2017]

- (A) Dehydration and Friedel-Crafts acylation
 (B) Friedel-Crafts alkylation, dehydration and Friedel-Crafts acylation
 (C) Aromatic sulfonation and Friedel-Crafts acylation
 (D) Friedel-Crafts alkylation and Friedel-Crafts acylation

CAR090

23. The product **S** is -

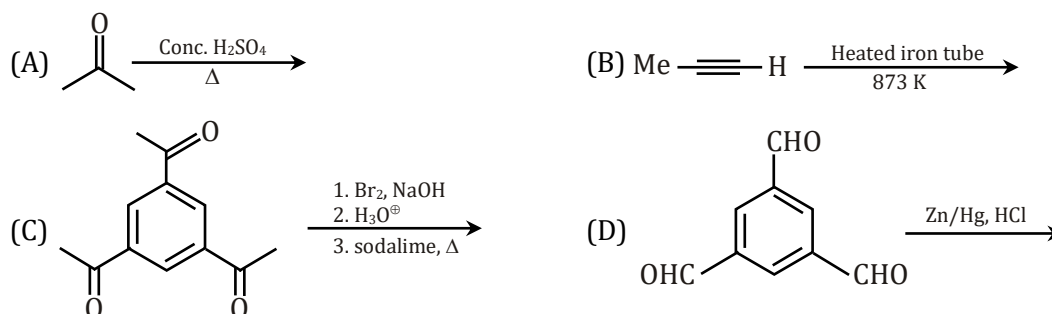
[JEE (Advanced) 2017]



CAR091

24. The reaction(s) leading to the formation of 1,3,5-trimethylbenzene is (are)

[JEE (Advanced) 2018]



CAR092

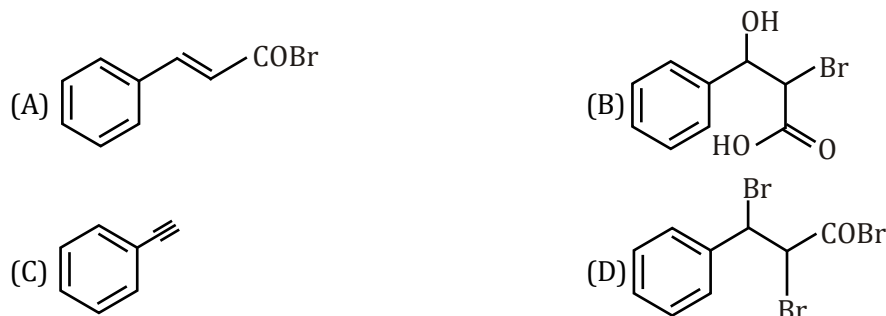
Paragraph for # 25 & 26

Treatment of benzene with CO/HCl in the presence of anhydrous $\text{AlCl}_3/\text{CuCl}$ followed by reaction with $\text{Ac}_2\text{O}/\text{NaOAc}$ gives compound X as the major product. Compound X upon reaction with $\text{Br}_2/\text{Na}_2\text{CO}_3$, followed by heating at 473 K with moist KOH furnishes Y as the major product. Reaction of X with $\text{H}_2/\text{Pd-C}$, followed by H_3PO_4 treatment gives Z as the major product.

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

25. The compound Y is :-

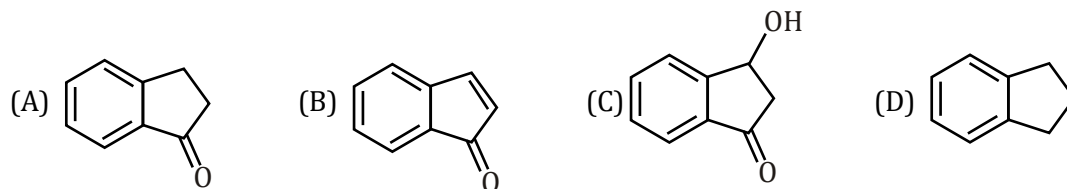
[JEE (Advanced) 2018]



CAR093

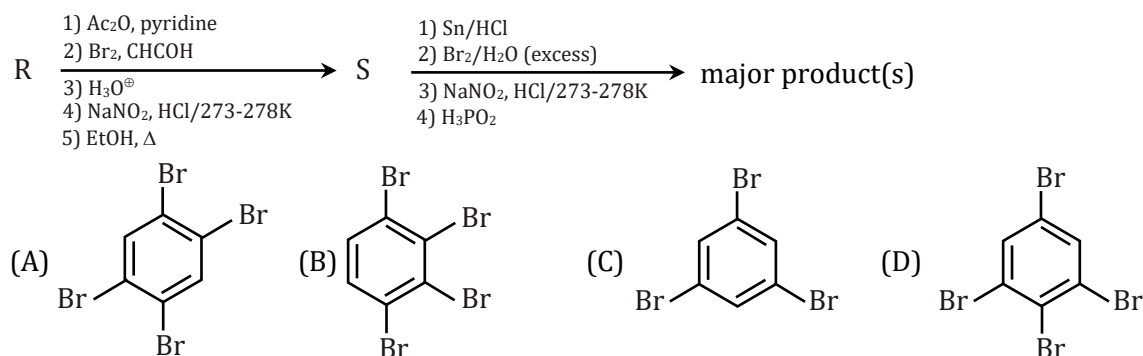
26. The compound Z is :-

[JEE (Advanced) 2018]



CAR094

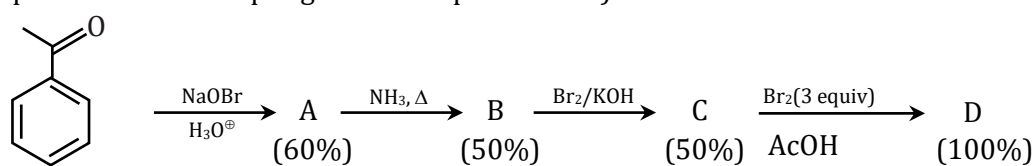
27. Aniline reacts with mixed acid (conc. HNO_3 and conc. H_2SO_4) at 288 K to give P (51%), Q (47%) and R (2%). The major product(s) the following reaction sequence is (are) :- [JEE (Advanced) 2018]



CAR095

28. In the following reaction sequence, the amount of D (in g) formed from 10 moles of acetophenone is ____.

(Atomic weight in g mol^{-1} : H = 1, C = 12, N = 14, O = 16, Br = 80. The yield (%) corresponding to the product in each step is given in the parenthesis)



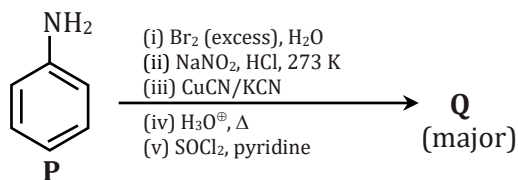
[JEE (Advanced) 2018]

CAR096

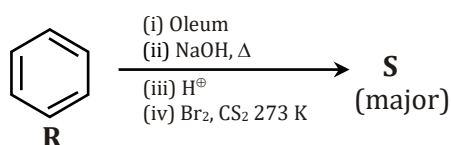
29. Scheme 1 and 2 describe the conversion of **P** to **Q** and **R** to **S**, respectively. Scheme 3 describes the synthesis of **T** from **Q** and **S**. The total number of Br atoms in a molecule of **T** is _____

[JEE (Advanced) 2019]

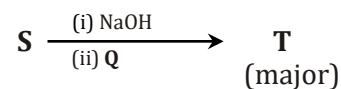
Scheme 1 :



Scheme 2 :



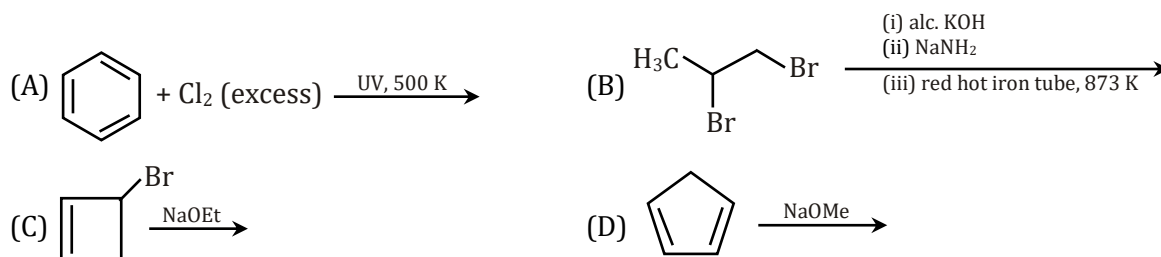
Scheme 3 :



CAR097

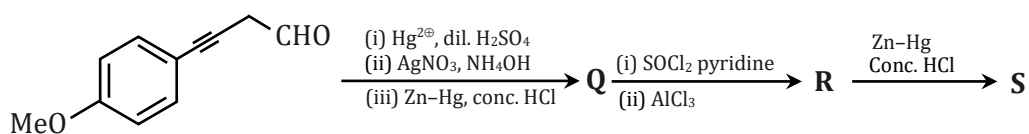
30. Choose the correct option(s) that give(s) an aromatic compound as the major product.

[JEE (Advanced) 2019]

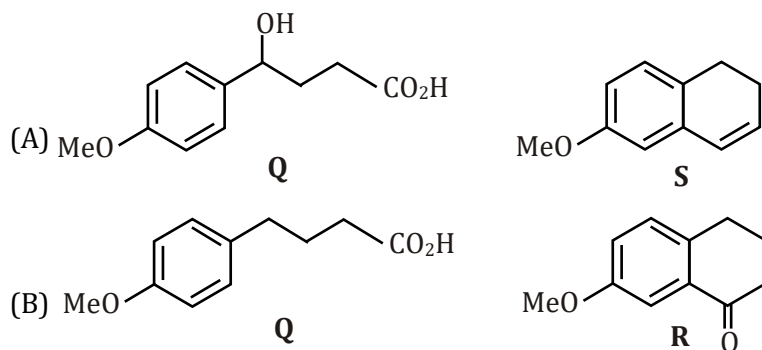


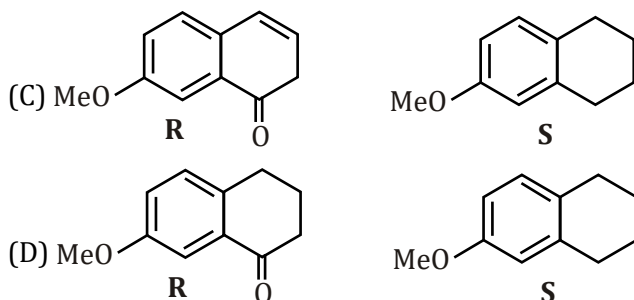
CAR098

31. Choose the correct option(s) for the following reaction sequence

Consider **Q**, **R** and **S** as major products

[JEE (Advanced) 2019]

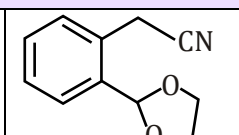
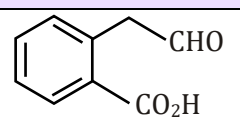
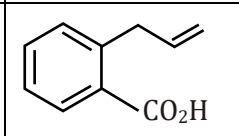
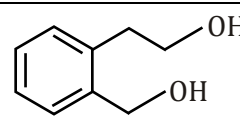
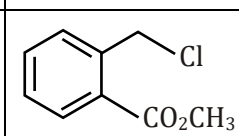
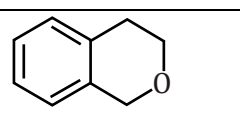
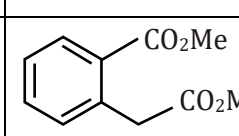
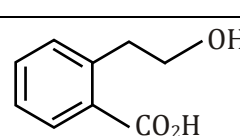
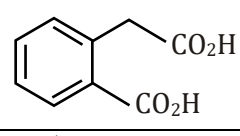
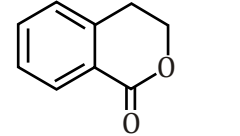




CAR099

Answer the following by appropriately matching the lists based on the information given in the paragraph for Q.32 and Q.33

List-I includes starting materials and reagents of selected chemical reactions. List-II gives structures of compounds that may be formed as intermediate products and/or final products from the reactions of List-I

List-I		List-II	
I	 (i) DIBAL-H (ii) dil. HCl (iii) NaBH ₄ (iv) conc. H ₂ SO ₄	P	 CHO CO ₂ H
II	 (i) O ₃ (ii) Zn, H ₂ O (iii) NaBH ₄ (iv) conc. H ₂ SO ₄	Q	 OH OH
III	 (i) KCN (ii) H ₃ O ⁺ , Δ (iii) LiAlH ₄ (iv) conc. H ₂ SO ₄	R	 O
IV	 (i) LiAlH ₄ (ii) conc. H ₂ SO ₄	S	 OH CO ₂ H
		T	 CO ₂ H CO ₂ H
		U	 O

32. Which of the following options has correct combination considering List-I and List-II?

[JEE (Advanced) 2019]

(A) (III), (S), (R)

(B) (IV), (Q), (R)

(C) (III), (T), (U)

(D) (IV), (Q), (U)

CAR100

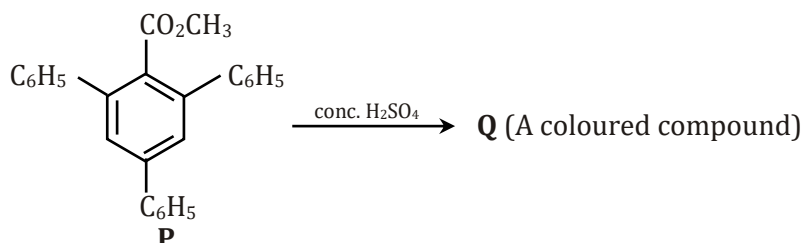
33. Which of the following options has correct combination considering **List-I** and **List-II**?

[JEE (Advanced) 2019]

- (A) (I), (Q), (T), (U) (B) (II), (P), (S), (U)
(C) (II), (P), (S), (T) (D) (I), (S), (Q), (R)

CAR101

34. In the following reaction, compound **Q** is obtained from compound **P** via an ionic intermediate



What is the degree of unsaturation of **Q**?

[JEE (Advanced) 2020]

CAR102

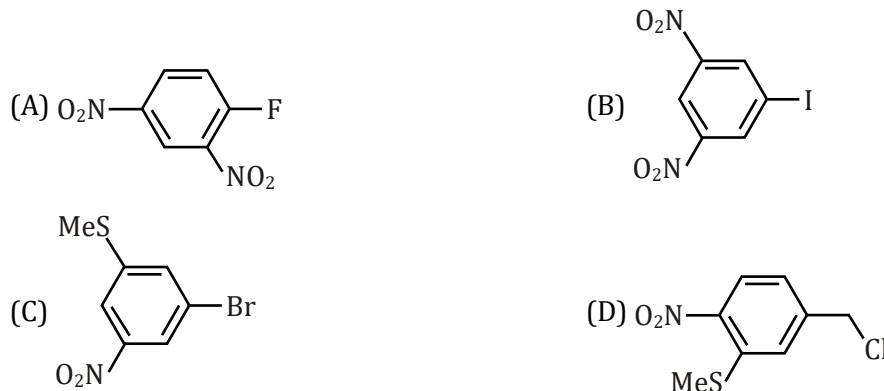
35. An organic compound ($\text{C}_8\text{H}_{10}\text{O}_2$) rotates plane-polarized light. It produces pink color with neutral FeCl_3 solution. What is the total number of all the possible isomers for this compound?

[JEE (Advanced) 2020]

CAR103

36. The reaction of **Q** with PhSNa yields an organic compound (major product) that gives positive Carius test on treatment with Na_2O_2 followed by addition of BaCl_2 . The correct option(s) for **Q** is (are).

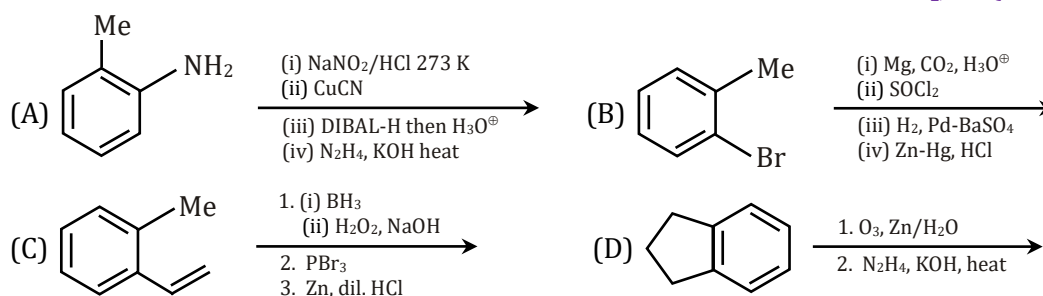
[JEE (Advanced) 2021]



CAR104

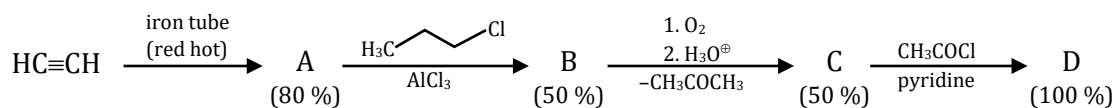
37. The reaction sequence(s) that would lead to o-xylene as the major product is (are)

[JEE (Advanced) 2021]



CAR105

38. If the reaction sequence given below is carried out with 15 moles of acetylene, the amount of the product **D** formed (in g) is ____.



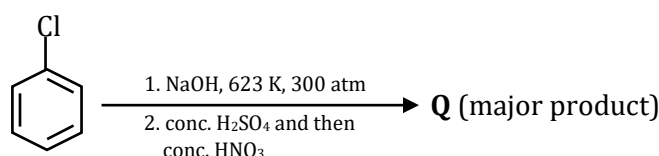
The yields of **A**, **B**, **C** and **D** are given in parentheses.

[Given : Atomic mass of H = 1, C = 12, O = 16, Cl = 35]

[JEE (Advanced) 2022]

CAR106

39. The weight percentage of hydrogen in **Q**, formed in the following reaction sequence, is ____.

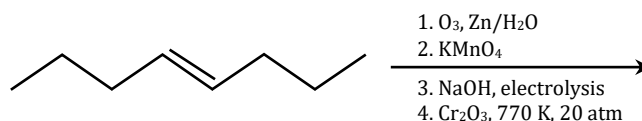


[Given : Atomic mass of H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35]

[JEE (Advanced) 2022]

CAR107

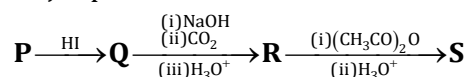
40. The number of $-\text{CH}_2-$ (methylene) groups in the product formed from the following reaction sequence is ____.



[JEE (Advanced) 2022]

CAR237

41. In the given reaction scheme, **P** is a phenyl alkyl ether, **Q** is an aromatic compound; **R** and **S** are the major products.



The correct statement about **S** is

[JEE (Advanced) 2023]

- (A) It primarily inhibits noradrenaline degrading enzymes.
 (B) It inhibits the synthesis of prostaglandin.
 (C) It is a narcotic drug.
 (D) It is *ortho*-acetylbenzoic acid.

CAR238

Paragraph for # 42 & 43

A trinitro compound, 1, 3,5 tris-(4-nitrophenyl) benzene, on complete reaction with an excess of Sn/HCl gives major product, which on treatment with an excess of NaNO₂/HCl at 0°C provides **P** as the product. **P**, upon treatment with excess of H₂O at room temperature, gives the product **Q**. Bromination of **Q** in aqueous medium furnishes the product **R**. The compound **P** upon treatment with an excess of phenol under basic conditions gives the product **S**.

The molar mass difference between compounds **Q** and **R** is 474 mol⁻¹ and between compounds **P** and **S** is 172.5 g mol⁻¹.

42. The number of heteroatoms present in one molecule of **R** is ____.

[Use: Molar mass (in g mol⁻¹): H = 1, C = 12, N = 14, O = 16, Br = 80, Cl = 35.5]

Atoms other than C and H are considered as heteroatoms]

[JEE (Advanced) 2023]

CAR239

43. The total number of carbon atoms and heteroatoms present in one molecule of **S** is ____.

[Use: Molar mass in g mol⁻¹]: H = 1, C = 12, N = 14, O = 16, Br = 80, Cl = 35.5]

Atoms other than C and H are considered as heteroatoms

[JEE (Advanced) 2023]

CAR240

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.)

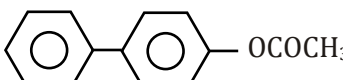
SECTION-A

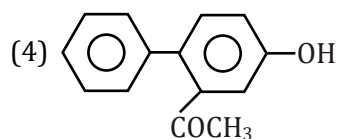
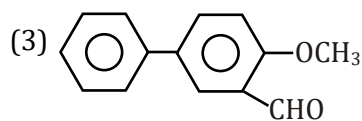
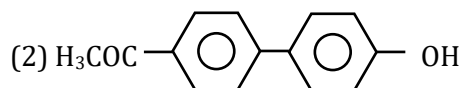
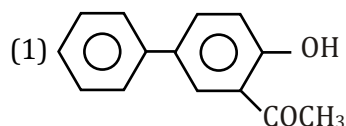
- This section contains **TWENTY** questions.
- Each question has **FOUR** options (1), (2), (3) and (4). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following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



CAR001

2. Reaction of SO_3 is easier in:

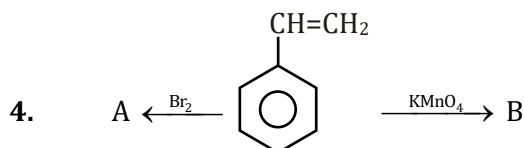
- (1) Benzene (2) Toluene (3) Nitrobenzene (4) chlorobenzene

CAR002

3. The highest yield of m-product is possible by the electrophilic substitution of the following:

- (1) $\text{C}_6\text{H}_5\text{CH}_3$ (2) $\text{C}_6\text{H}_5\text{CH}_2\text{COOC}_2\text{H}_5$
 (3) $\text{C}_6\text{H}_5\text{CH}(\text{COOC}_2\text{H}_5)_2$ (4) $\text{C}_6\text{H}_5\text{C}(\text{COOC}_2\text{H}_5)_3$

CAR003

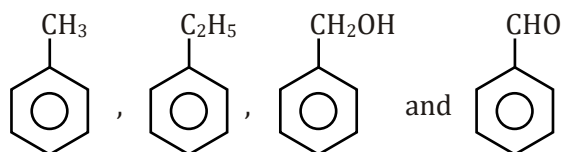


Compound A and B respectively are:

- (1) o-Bromostyrene, benzoic acid (2) p-Bromostyrene, benzaldehyde
 (3) m-Bromostyrene, benzaldehyde (4) Styrene dibromide, benzoic acid

CAR004

5. If the mixture of the following four aromatic compounds on oxidation by strong oxidising agent gives:



- (1) Mixture of $C_6H_5CH_2OH + C_6H_5COOH$ (2) Mixture of $C_6H_5CHO + C_6H_5COOH$
 (3) Only C_6H_5COOH (4) None of the above

CAR005

6. Which of the following is/are produced when a mixture of benzene vapour and oxygen is passed over V_2O_5 catalyst at 775 K?

- (1) Oxalic acid (2) Glyoxal (3) Fumaric acid (4) Maleic anhydride

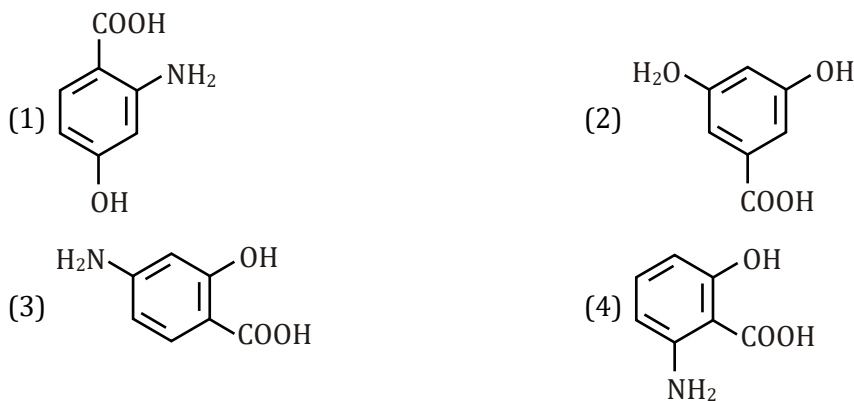
CAR006

7.  + $H_2 \xrightarrow[\text{High pressure}]{\text{Ni, high temp.}}$ (A). Which of the following can be isolated as the product of this reaction.



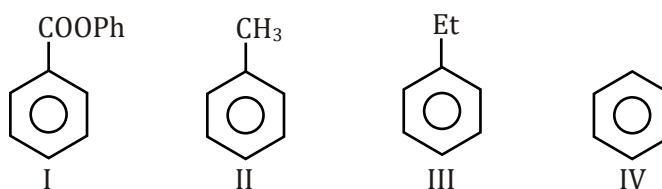
CAR007

8. m-Aminophenol on treatment with NaOH and CO_2 gives which of the following as major product?



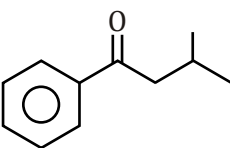
CAR008

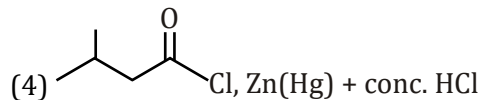
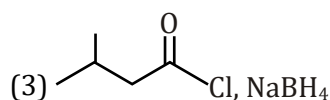
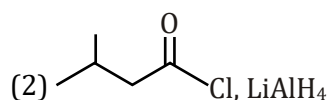
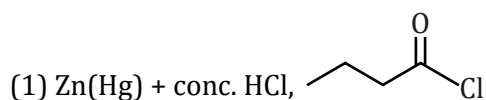
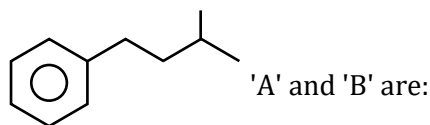
9. Decide the correct order of reactivity of following compounds towards halogenation with $(Cl_2 + AlCl_3)$.



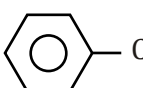
- (1) I > II > III > IV (2) II > III > IV > I
 (3) III > II > IV > I (4) II > III > I > IV

CAR009

10. Benzene on reaction with 'A' forms  which on reaction with 'B' forms



CAR010

11. Chloral +  $\xrightarrow{\text{Conc. H}_2\text{SO}_4}$ product. The product is:

(1) Lindane

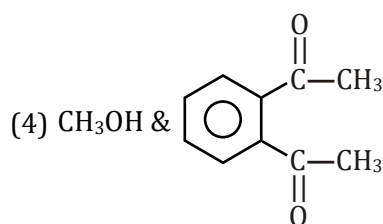
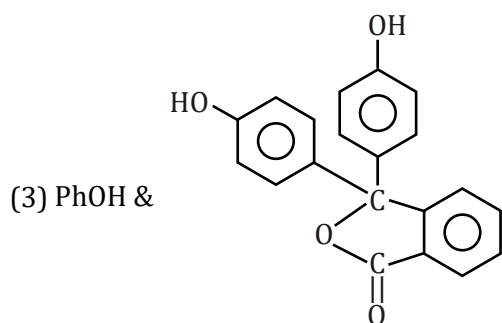
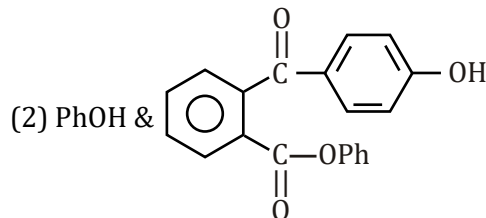
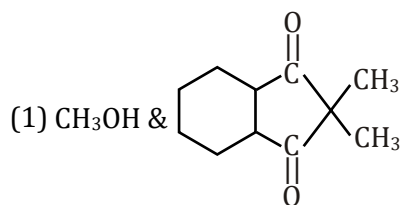
(2) DDT

(3) Teflon

(4) Ethaneperchlorate

CAR011

12. Acetophenone $\xrightarrow{\text{HCO}_3\text{H}}$ A $\xrightarrow{\text{H}_3\text{O}^+}$ B + C $\xrightarrow[\text{H}^+]{\text{Phthalic Anhydride}}$ Indicator (D) ; C & D are



CAR012

13. An organic compound having the molecular formula of $\text{C}_7\text{H}_8\text{O}$ is insoluble in NaHCO_3 solution but dissolves in aqueous NaOH . When treated with bromine water the compound rapidly forms a precipitate having the molecular formula $\text{C}_7\text{H}_5\text{OBr}_3$. The organic compound is

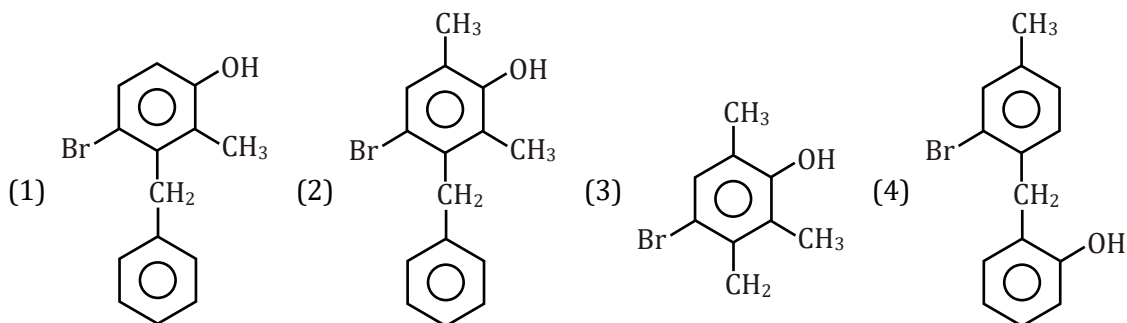
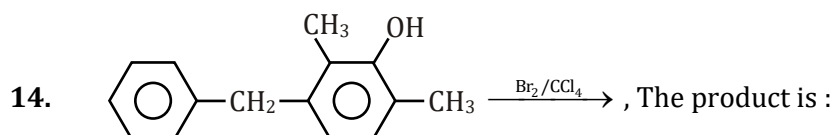
(1) o-cresol

(2) m-cresol

(3) p-cresol

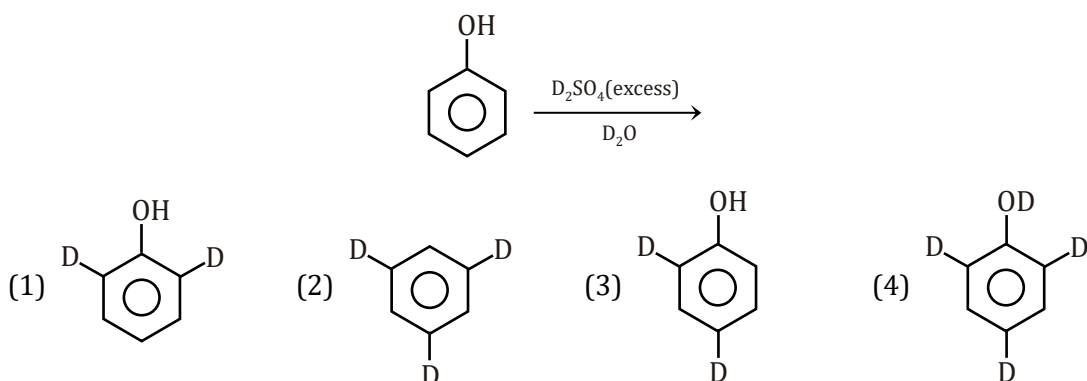
(4) anisole

CAR013

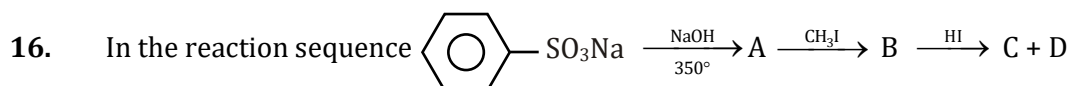


CAR014

15. Identify the product in following reaction?



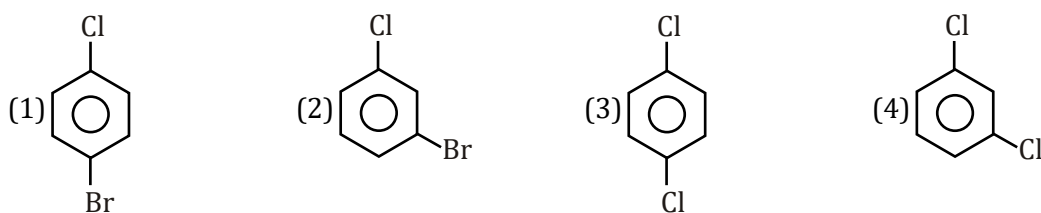
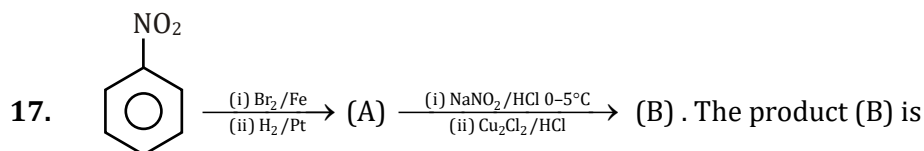
CAR015



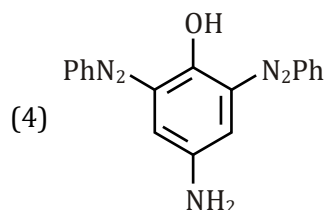
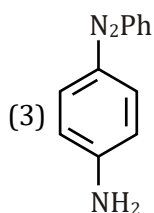
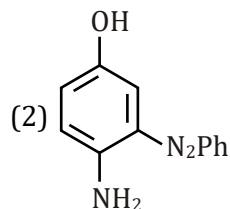
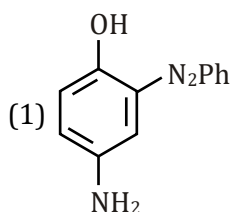
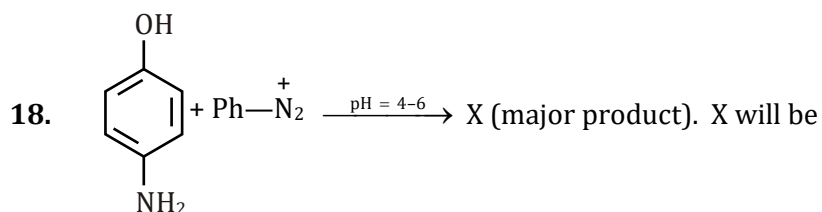
A, B, C and D are given by the set :

- (1) Sodium phenate, anisole, C_6H_5I , CH_3OH (2) Sodium phenate, phenitole, C_2H_5I , C_6H_5OH
 (3) Sodium phenate, anisole, C_6H_5OH , CH_3I (4) Sodium phenate, phenitole, C_6H_5I , C_2H_5OH

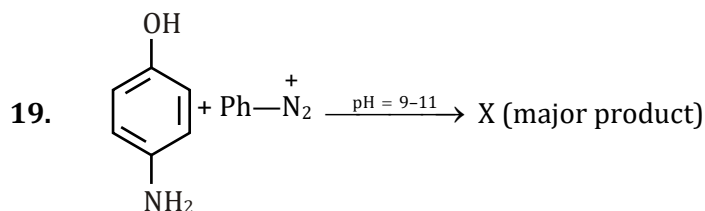
CAR016



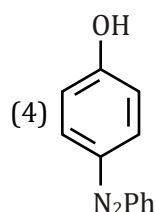
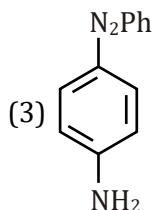
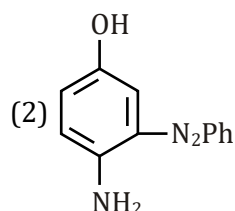
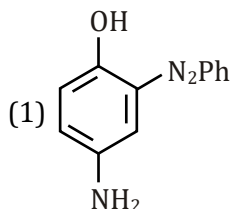
CAR017



CAR018



X - will be:



CAR019

20. Which of the following sequence is best suited to convert benzene to 3-chloro aniline ?

- (1) nitration, reduction, chlorination
- (2) chlorination, nitration, reduction
- (3) nitration, chlorination, reduction
- (4) nitration, reduction, acetylation, chlorination, hydrolysis

CAR020

SECTION-B

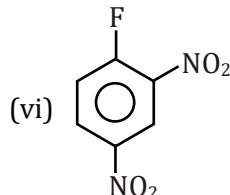
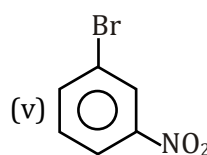
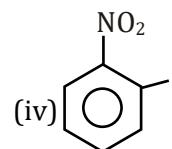
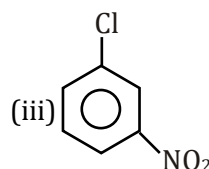
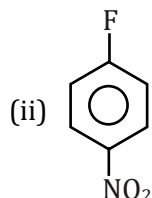
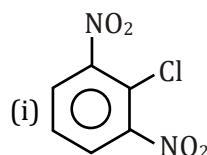
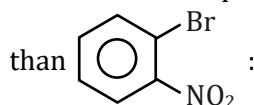
- This section will have **TEN questions**. Candidate can choose to attempt any 5 questions out of these 10 questions. In case if candidate attempts more than 5 questions, first 5 attempted questions will be considered for marking.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, 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. Compare the given characteristics of aniline and cyclohexanamine :

- Both are primary amine
 - Both can be acylated by RCOCl
 - Both reacts with CHCl_3/KOH
 - Both reacts with $\text{NaNO}_2 + \text{HCl}$ at $0-5^\circ\text{C}$
 - Both reacts with PhSO_2Cl to give a compound which is soluble in KOH
 - Both gives coupling reaction with phenol
 - Both gives electrophilic substitution reaction
- How many of the given characteristics are correct?

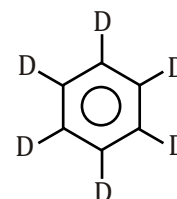
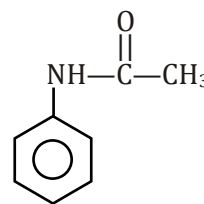
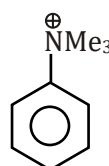
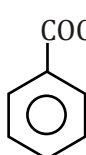
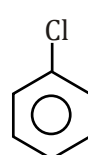
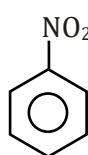
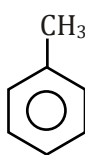
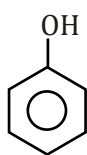
CAR021

2. Number of compounds which can show faster rate of nucleophilic substitution of halogen



CAR022

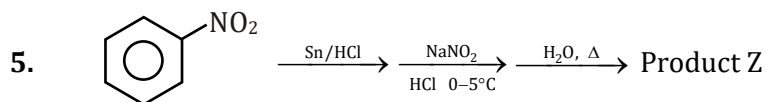
3. How many of following compounds are less reactive than benzene for sulphonation by conc. H_2SO_4 :



CAR023

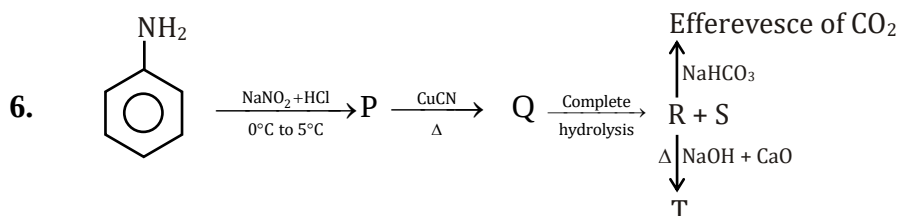
4. How many toluidine's on reaction with NaNO_2/HCl followed by H_3PO_2 treatment gives Toluene.

CAR024



Find the molecular weight of Z.

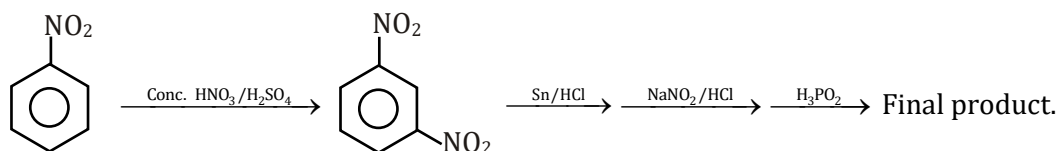
CAR025



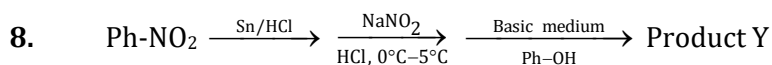
Molecular weight of T will be:

CAR026

7. How many N atom are present in final product



CAR027



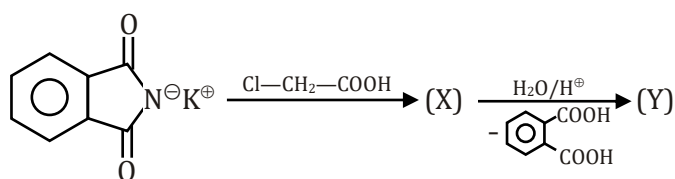
Find the molecular weight of Y report your answer as $\frac{\text{Molecular weight}}{2}$.

CAR028

9. If p-methoxy toluene is nitrated, the number of hydrogen atom in major product is:

CAR135

10. Identify molecular weight of final product (Y)



CAR030

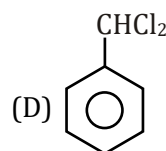
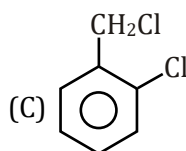
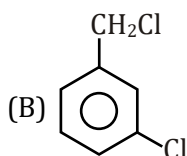
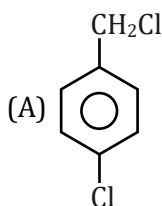
JEE (Advanced) Practice Paper

(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 **TEN** 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. An aromatic compound 'A' $C_7H_6Cl_2$, gives AgCl on bonding with alcoholic $AgNO_3$ solution, and yields C_7H_7OCl on treatment with sodium hydroxide. 'A' on oxidation gives a mono chlorobenzoic acid and A affords only one mononitro derivative. The compound A is:



CAR049

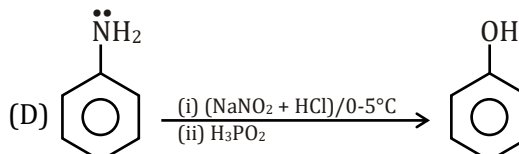
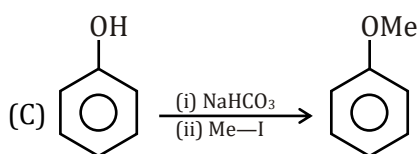
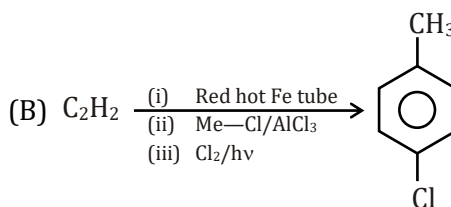
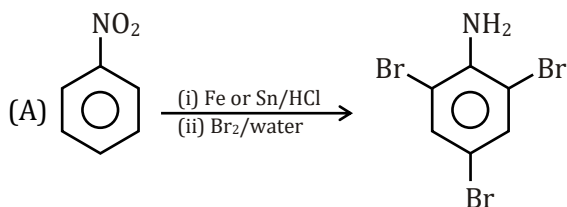
2. Phenol $\xrightarrow[2. CO_2/140^\circ C]{1. NaOH}$ A $\xrightarrow{H^+/H_2O}$ B $\xrightarrow{Ac_2O}$ C

In this reaction, the end product C is:

- (A) salicylaldehyde (B) salicylic acid (C) phenyl acetate (D) aspirin

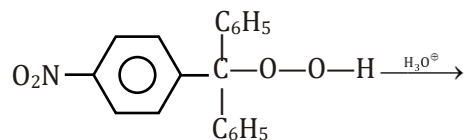
CAR050

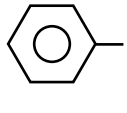
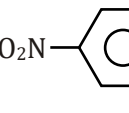
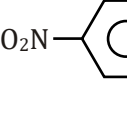
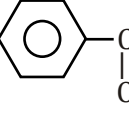
3. Select the reaction giving correct major product :



CAR051

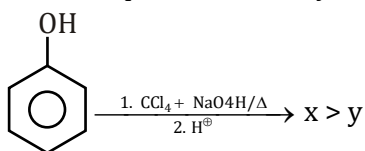
4. Identify the product in the following reaction.



- (A)  + $\text{C}_6\text{H}_5\text{OH}$ (B)  + $\text{C}_6\text{H}_5-\text{C}(=\text{O})-\text{C}_6\text{H}_5$
- (C)  + $\text{C}_6\text{H}_5\text{OH}$ (D)  + C_6H_6

CAR052

5. Compare the properties of two isomeric products x and y formed in the following reaction.



Option	Acid Strength	H ₂ O Solubility	Volatility	Melting Point
(A)	y > x	y > x	x > y	y > x
(B)	x > y	x > y	y > x	x > y
(C)	y > x	x > y	y > x	y > x
(D)	x > y	y > x	x > y	y > x

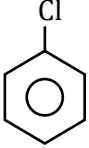
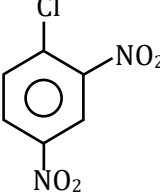
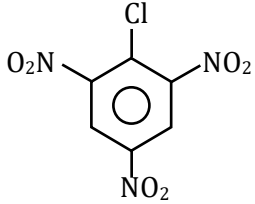
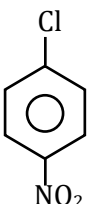
CAR053

6. Which can be used to generate NO_2^+ in nitration of benzene ring

- (A) $\text{HNO}_3 + \text{H}_2\text{SO}_4$ (B) $\text{HNO}_3 + \text{HClO}_4$
 (C) N_2O_5 (D) All

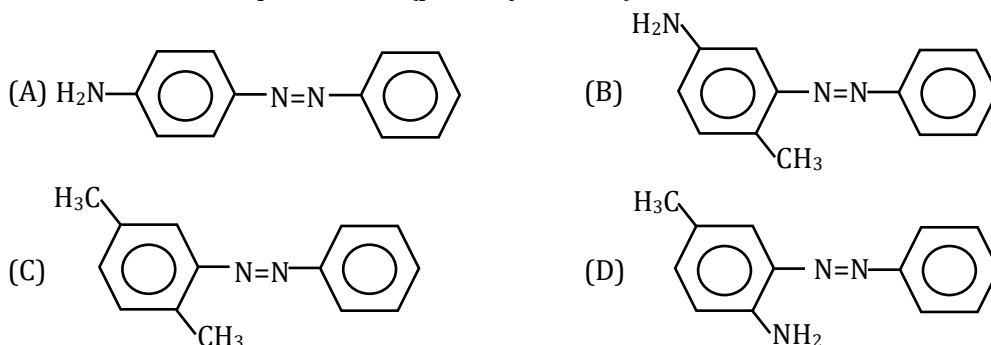
CAR115

7. Which of the following compound gives fastest $\text{S}_{\text{N}}\text{Ar}$ reaction?

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

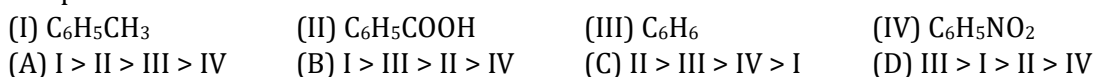
CAR160

8. What one of the principal product when aniline is treated with NaNO_2 and HCl at $0-5^\circ\text{C}$ and this mixture is added to p-toluidine (p-methyl aniline)?

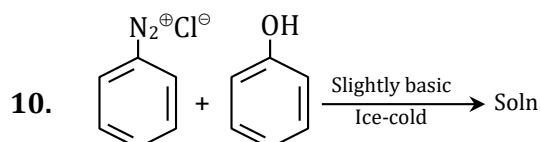


CAR202

9. Which order is correct for the decreasing reactivity to ring monobromination of the following compounds:



CAR130



The colour of the dye formed is :-

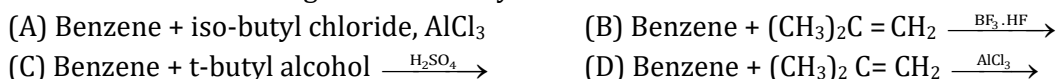
- (A) yellow (B) orange (C) violet (D) green

CAR192

SECTION-II

- This section contains **FOUR** question.
- 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.
Zero Marks : 0, if none of the options is chosen (i.e. the question is unanswered).
Negative Marks: -2 in all other cases.

11. In which of the following reaction t-butylbenzene is formed:



CAR054

12. The replacement of a hydrogen atom in benzene by alkyl group can be brought about with the following reagents :

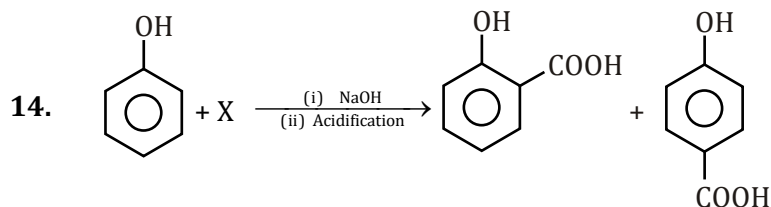


CAR055

13. The good method for converting benzene into n-propyl benzene is:

- (A) $C_6H_6 + CH_3CH_2CH_2Cl + \text{Anhyd. } AlCl_3$
 (B) $C_6H_6 + CH_3CH_2COCl + \text{Anhyd. } AlCl_3$ and then treatment with $Zn/Hg/HCl$
 (C) $C_6H_6 + CH_3CH_2COCl + \text{Anhyd. } AlCl_3$ and then treatment with H_2/Ni
 (D) $C_6H_6 + \text{Anhyd. } AlCl_3 + \text{cyclopropane}$

CAR056



X is/are -

- (A) $CHCl_3$ (B) CCl_4 (C) CO_2 (D) $HCOOH$

CAR058

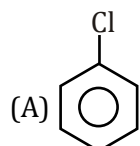
SECTION-III

- This section contains **ONE** question.
- 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.

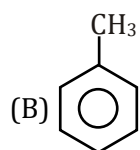
15. Match the following:

Column I
(Compound)

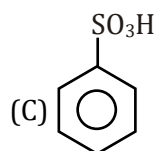
Column II
(Properties)



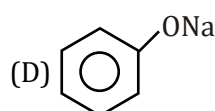
(P) o-p directing



(Q) m-directing



(R) Activating towards electrophile



(S) Deactivating towards electrophile

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

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

CAR061

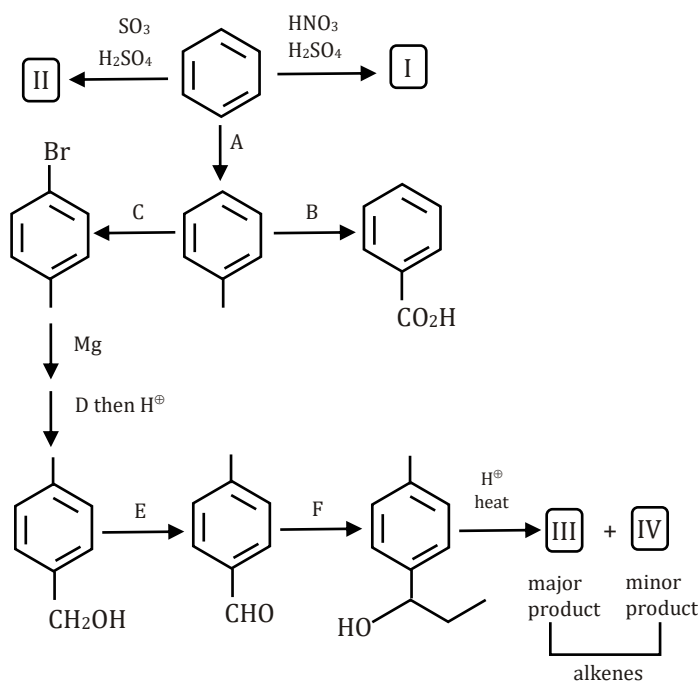
SECTION-IV

- This section contains **ONE** paragraph.
- 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:

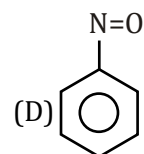
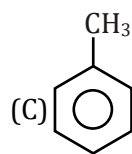
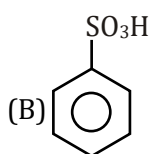
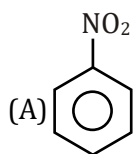
Full Marks	:	+3	if only the bubble corresponding to the correct answer is darkened.
Zero Marks	:	0	in all other cases.

Paragraph for Q. 16 to 17

Identify reagent used and intermediate products in following conversion.

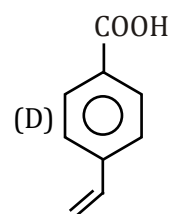
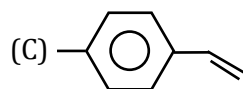
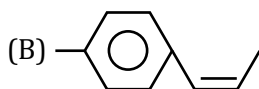
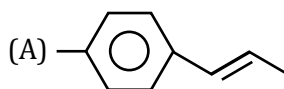


16. Identify II product -



CAR064

17. (III) major product is ?

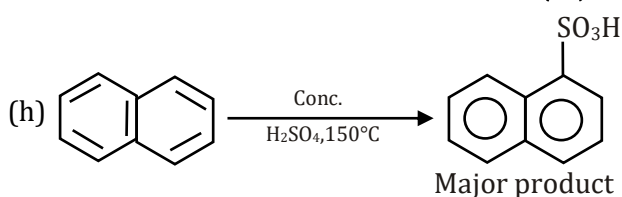
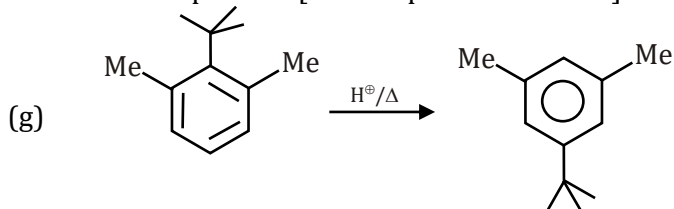
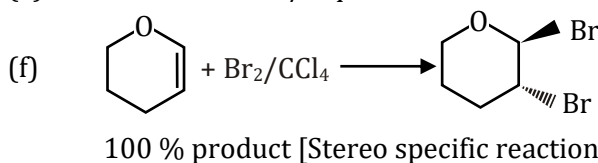
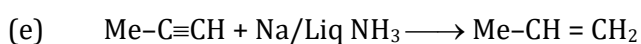
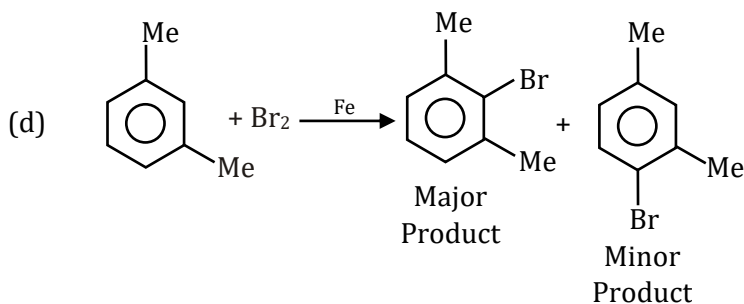
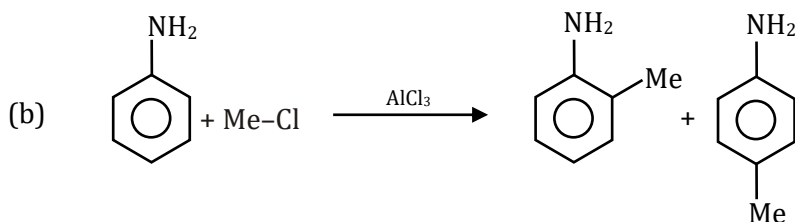
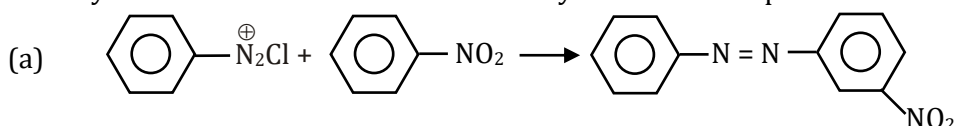


CAR065

SECTION-V

- This section contains a question.
- 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.

18. Identify total number of reactions incorrectly match with its product ?



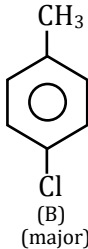
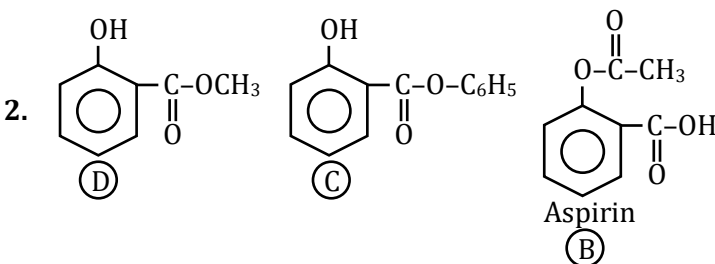
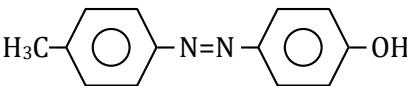
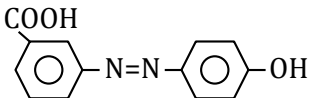
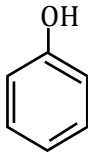
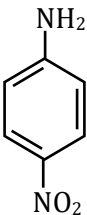
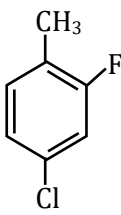
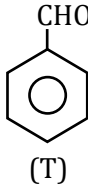
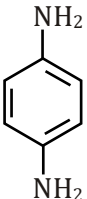
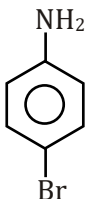
CAR068

ANSWER KEY

EXERCISE - O

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	C	C	C	A	C	C	B	D	A	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	D	D	D	D	B	A	C	B	C	B
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	A	D	A	B	C	A	C	B	C	A
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	C	A	A	C	B	D	A	C	A	C
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	A	ABC	BC	ABC	CD	BCD	AB	BD	BD	AB

EXERCISE - S

1. 
(B)
(major)
2. 
(D) (C) (B)
Aspirin
3. 
(B)
4. 
5. 
6. 
7. 
8. 
(T)
9. 
(E)
10. 

EXERCISE - JEE (Main) PYQ

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	2	3	4	2	3	4	1	3	1
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	1	2	4	4	1	2	3	3	3	7
Que.	21	22	23	24	25	26				
Ans.	2	2	4	2	3	1				

EXERCISE - JEE (Advanced) PYQ

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	ABCD	B	BD	A	B	A	ABC	C	B
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	A	4	BC	B	BCD	BC	5	D	B	B
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	C	B	D	ABD	C	A	D	495	4.00	BD
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	BD	B	B	18.00	6	AD	AB	136	1.31	0
Que.	41	42	43							
Ans.	B	9.00	51.00							

JEE (Main) Practice Paper

Section-A	Q.	1	2	3	4	5	6	7	8	9	10
	A.	1	2	4	4	3	4	1	3	1	4
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	2	3	2	2	4	3	2	2	1	3
Section-B	Q.	1	2	3	4	5	6	7	8	9	10
	A.	5	3	5	3	94	78	0	99	9	75

JEE (Advanced) Practice Paper

Section-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	A	D	A	C	D	D	C	D	B	B
Section-II	Q.	11	12	13	14						
	A.	ABCD	ABD	BD	BC						
Section-III	Q.	15									
	A.	B									
Section-IV	Q.	16	17								
	A.	B	A								
Section-V	Q.	18									
	A.	7.00									