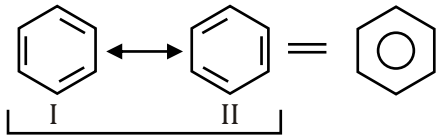
Aromatic Compounds

SOLUTIONS

EXERCISE - O

1. Ans. (C)

Kekule structures of Benzene



Resonance hybrid structure

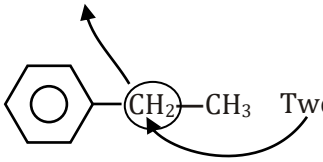
I & II structure make equal contribution to resonance Hybrid Structure.

2. Ans. (C)

If lone pair of $e^{\ominus}$ takes part in resonance then it is considered as $\pi e^{\ominus}$ therefore 6π $e^{\ominus}$ s in above give cyclic Anion.

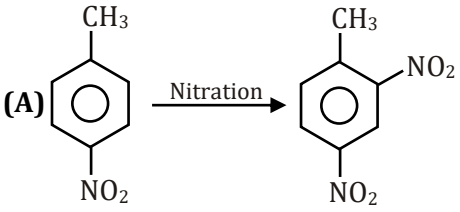
3. Ans. (C)

Those carbon which directly attached with Benzene is known as Benzylic carbon and associated 'H' is known as Benzylic 'H'



Two Benzylic 'H' atom.

4. Ans. (A)

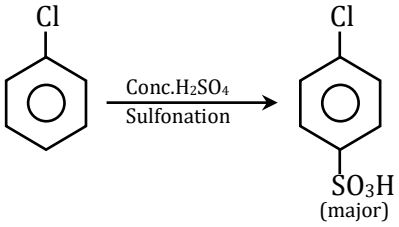


Since $-CH_3$ is electron donating group.

5. Ans. (C)

In P-xylene all positions are identical.

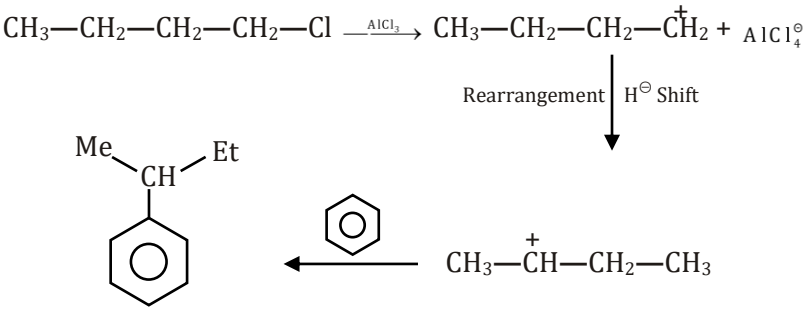
6. Ans. (C)



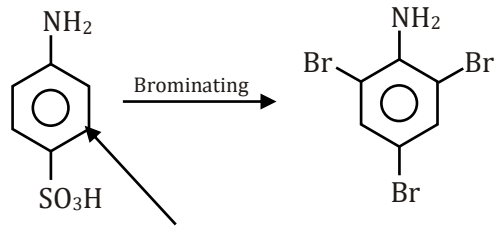
7. Ans. (B)

Attack of electrophiles is govern by activating group ($-NH_2$).

8. Ans. (D)



9. Ans. (A)

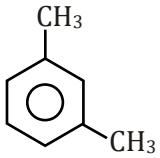


Highly activated ring so all O and P position get Brominated.

10. Ans. (A)

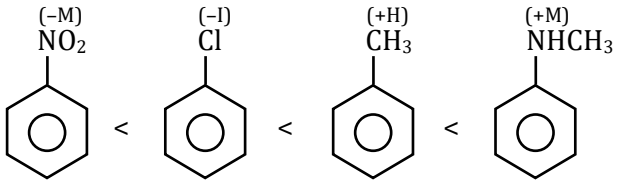
Highly deactivated ring most easily Hydrolysed.

11. Ans. (D)

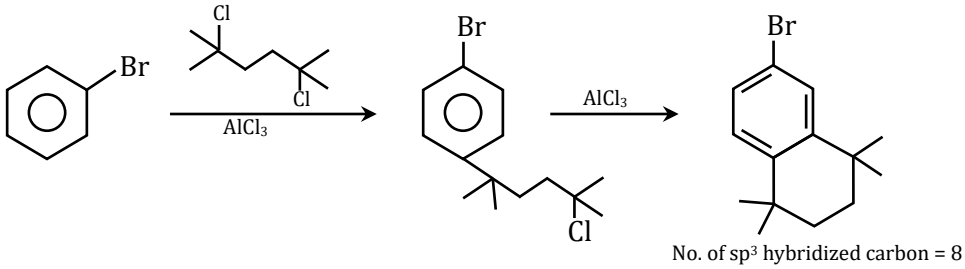


12. Ans.(D)

Electron donating group increases reactivity so correct order is :-



13. Ans. (D)



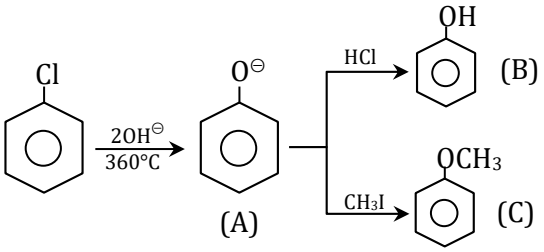
No. of sp^3 hybridized carbon = 8

14. Ans. (D)

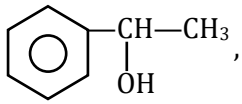
Cl is o/p directing so, all reaction involves attach of electrophile at ortho and para position. but para-product is formed in all cases as major product due to less steric crowding.

15. Ans. (B)

The complete reaction sequence is :

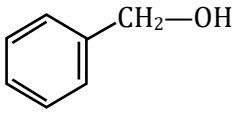


16. Ans. (A)



, because it has alcoholic group. Therefore, it does not show phenolic properties.

17. Ans. (C)



in this 'OH' group is attached with sp^3 carbon. Hence, it's not an example of vinylic alcohol.

18. Ans. (B)

(a) $CH_3–CH_2–Br + HS^{\ominus} \longrightarrow CH_3–CH_2–SH + Br^{\ominus}$

$\rightarrow$ Nucleophilic substitution $\longrightarrow$ (P)

(b) $(CH_3)_2C=CH_2 + HOCl \longrightarrow (CH_3)_2\overset{\overset{OH}{|}}{C}–CH_2–Cl$

$\rightarrow$ Electrophilic addition $\rightarrow$ (S)

(c) $CH_3–CH_2–Br + {}^{\ominus}OH \longrightarrow H_2C=CH_2+H_2O + Br^{\ominus}$

$\rightarrow$ Elimination reaction $\rightarrow$ (Q)

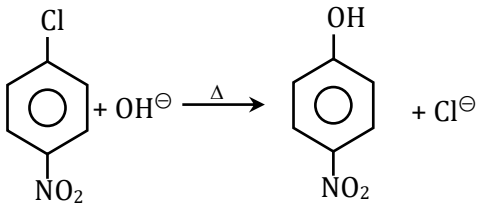
(d) $(CH_3)_3C–CH_2–OH + H–Br \longrightarrow (CH_3)_2\underset{\underset{Br}{|}}{–C}–CH_2–CH_3 + H_2O$

$\rightarrow$ Nucleophilic substitution $\rightarrow$ (P)

19. Ans. (C)

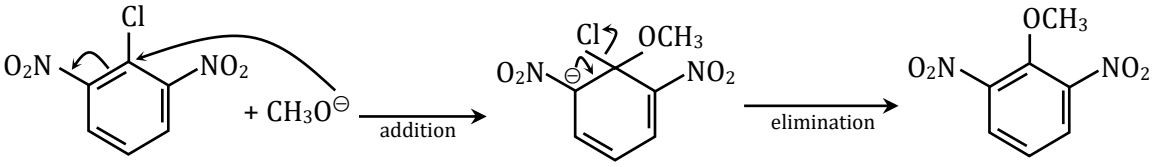
NO_2 group at ortho & para position to Cl group facilitate the nucleophilic attack for substitution reaction.

20. Ans. (B)



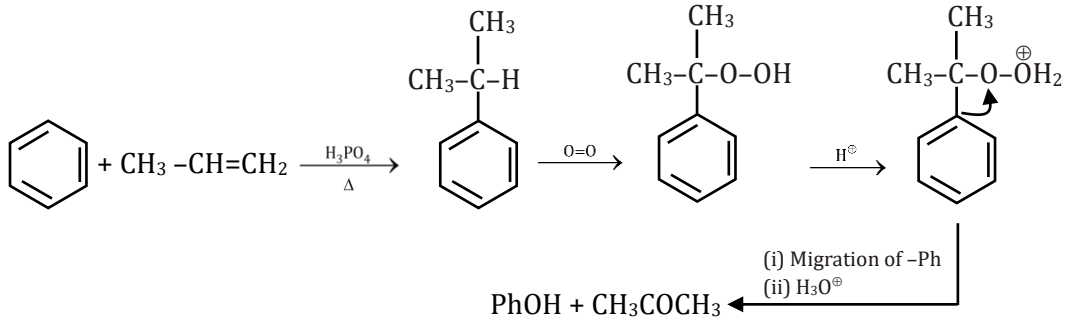
This is an example of S_N2 Ar reaction.

21. Ans. (A)



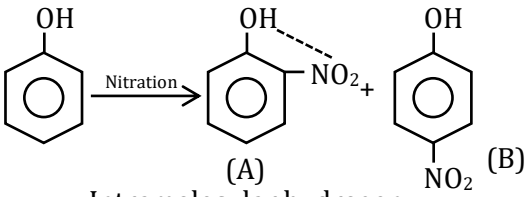
The reaction occurs via addition-elimination reaction.

22. Ans. (D)



23. Ans. (A)

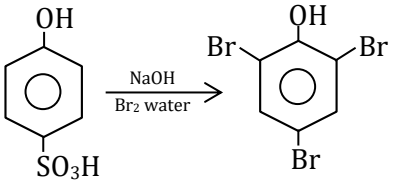
The products formed are



Less volatile due to intermolecular hydrogen bonding

24. Ans. (B)

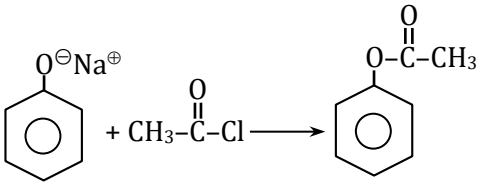
The product formed from the given reaction is :



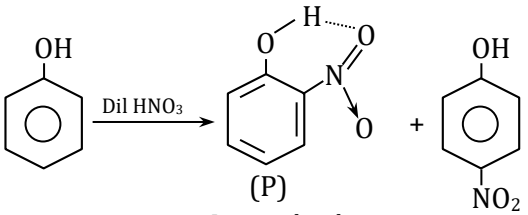
Major product

25. Ans. (C)

The major product formed is:



26. Ans. (A)

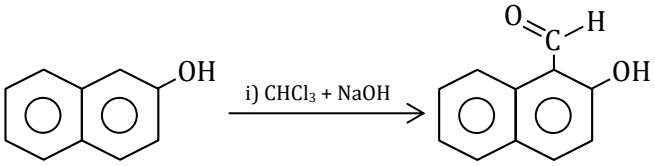


(P)
Intramolecular
Hydrogen boding
[more volatile]

(Q)

27. Ans. (C)

The major product formed is :

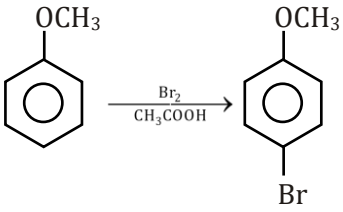


2-naphthol

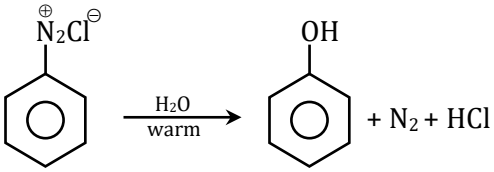
2-hydroxy-1-naphthaldehyde

28. Ans. (B)

If bromine in acetic acid is used, bromination takes place without decarboxylation.

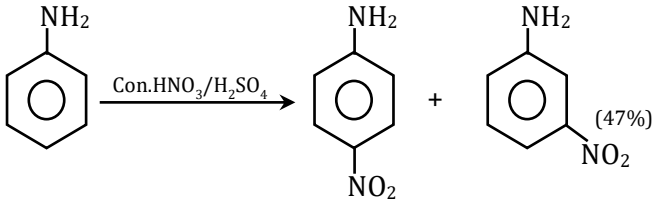


29. Ans. (C)

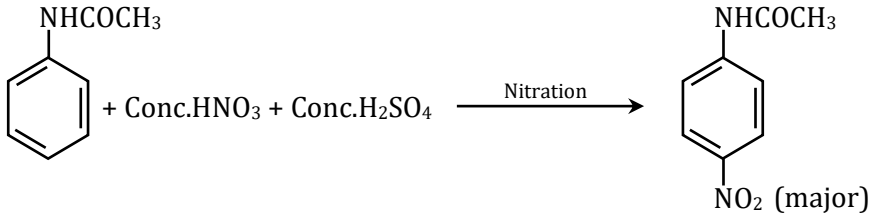


30. Ans. (A)

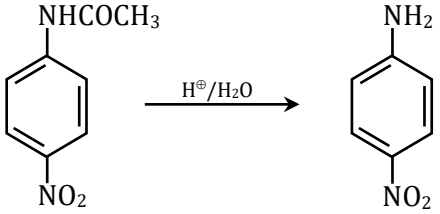
p–Nitroaniline obtain 51% only



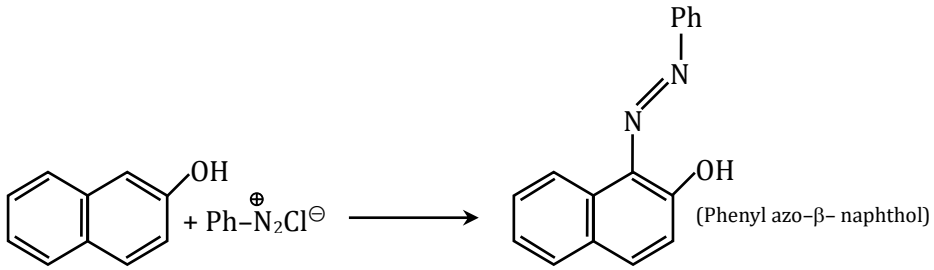
31. Ans. (C)



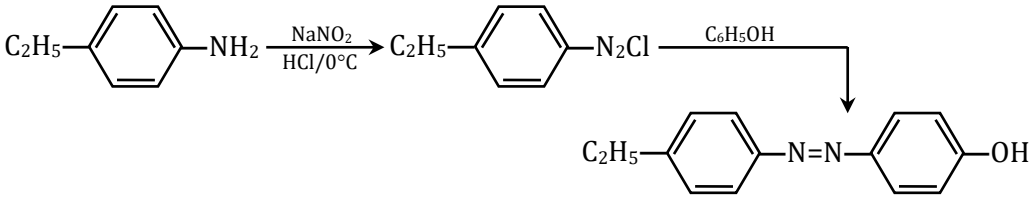
32. Ans. (A)



33. Ans. (A)

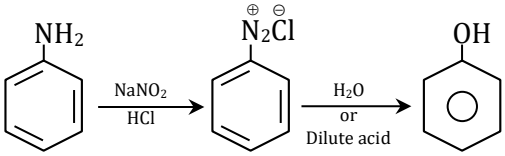


34. Ans. (C)



35. Ans. (B)

The reaction will occur as :



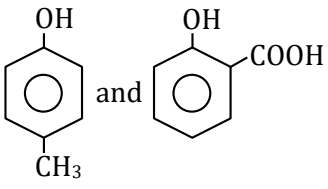
[A]

36. Ans. (D)

Benzylic alcohol do not give positive $FeCl_3$ test.

37. Ans. (A)

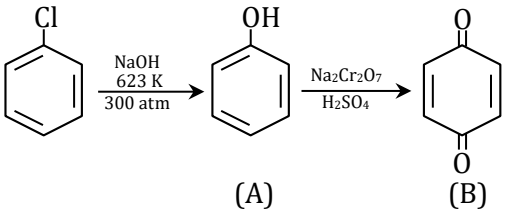
Phenolic group give colouration on reacting with $FeCl_3$.



Give characteristic colour with $FeCl_3$

38. Ans. (C)

The reaction involved is :

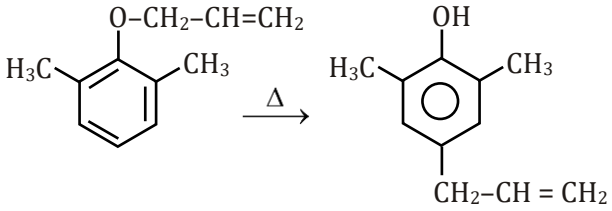


(A) (B)

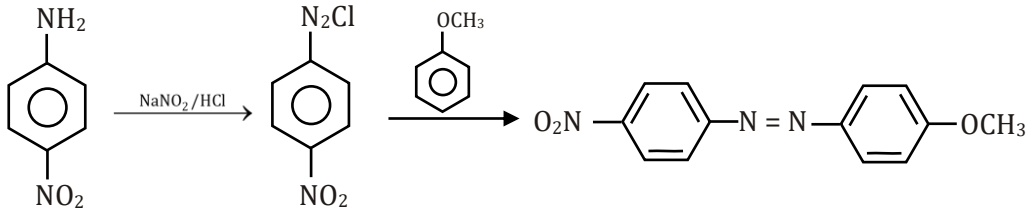
Number of 'C=C' bond = 2

Number of 'C=O' bond = 2

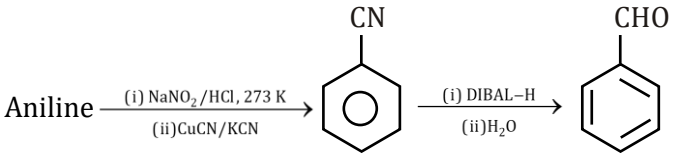
39. Ans. (A)



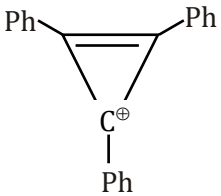
40. Ans. (C)



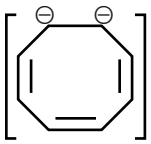
41. Ans. (A)



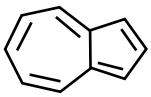
42. Ans. (A,B,C)

[A] 

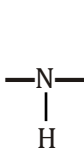
Aromatic

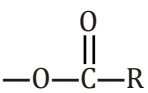
[B] 

Aromatic

[C] 
Azulene
(Aromatic)

43. Ans. (B,C)



and 

is moderately activating groups.

44. Ans. (A,B,C)

Electrophilic attack of $NO_2^{\oplus}$ at meta position occur when deactivating group is present over Benzene Ring.

So, in A, B and C respectively CCl_3, NO_2 and $-N^{\oplus}Me_3$ is deactivating group is present.

45. Ans. (C,D)

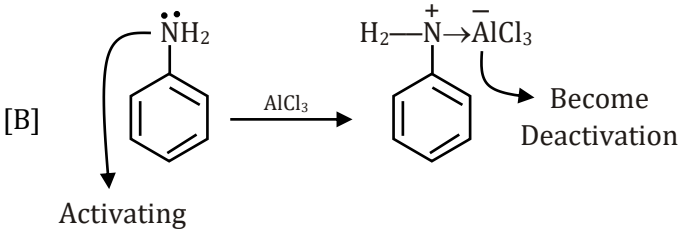
The Compound which gives Electrophile used as reagent in Friedel Craft Reaction.

$CH_3 - CH_2-Cl$ and $CH_2=CH-CH_2-Cl$

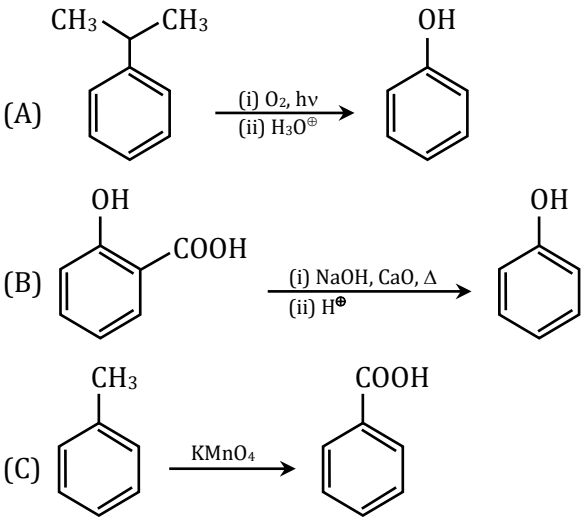
Give Carbocation with Anhyd. $AlCl_3$

46. Ans. (B,C,D)

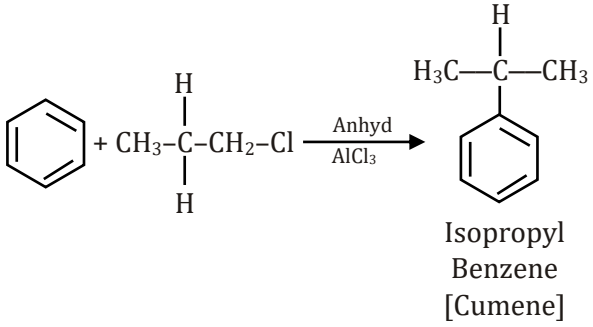
Fridel-Crafts reactions is example of Ar SE Reaction it takes place only in those substituted Benzene in which activating group is present.



47. Ans. (A,B)

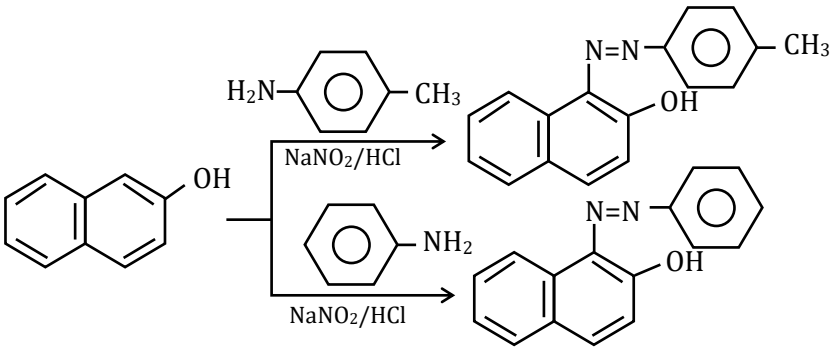


48. Ans. (B,D)



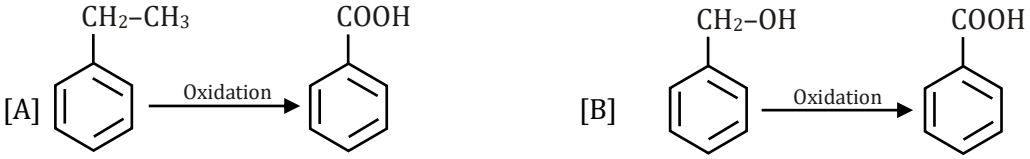
Isopropyl Benzene [Cumene]

49. Ans. (B,D)



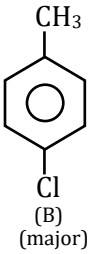
Coloured dyes

50. Ans. (A,B)



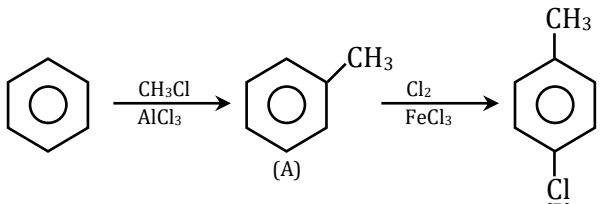
EXERCISE - S

1. Ans.



(B)
(major)

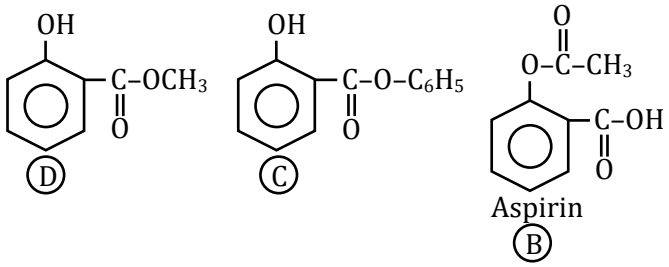
The complete reaction sequence is



(A)

(B)
(major)

2. Ans.



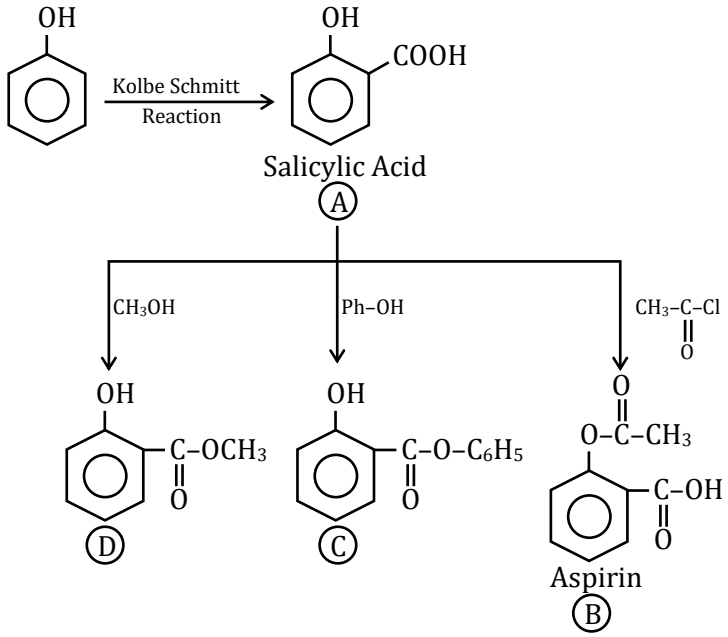
(D)

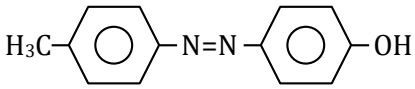
(C)

Aspirin

(B)

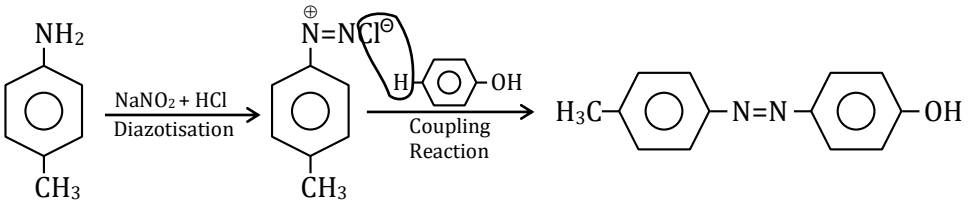
The given reaction sequence can be completed as :

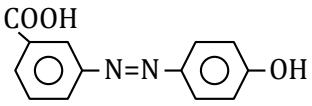


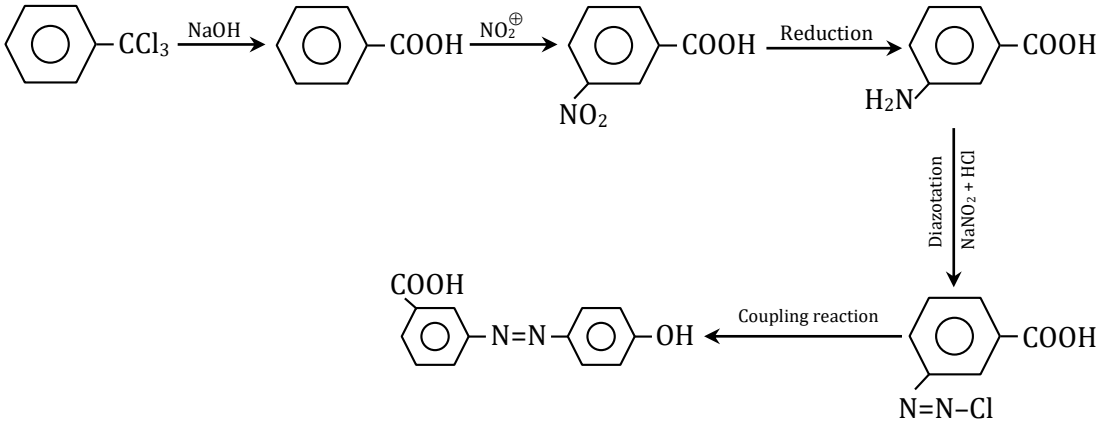
3. **Ans.** 

(B)

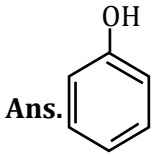
The complete reaction sequence is:

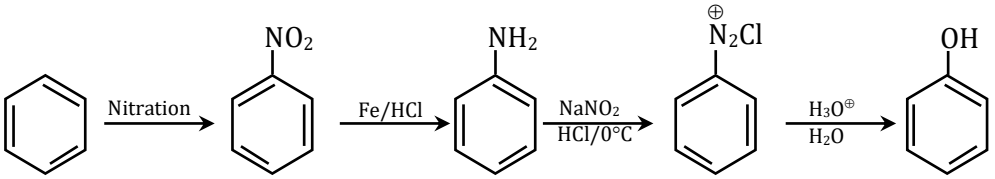


4. **Ans.** 

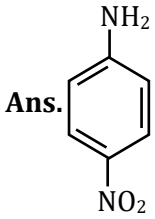


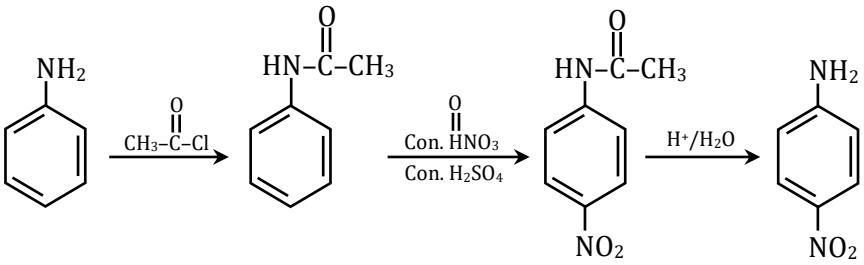
5. **Ans.**



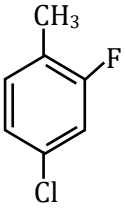


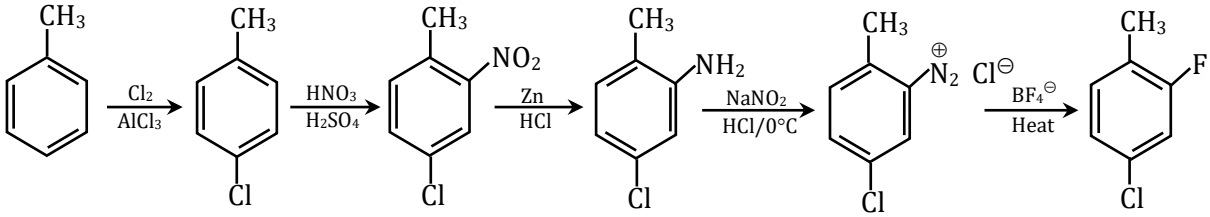
6. **Ans.**



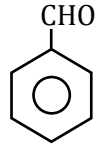


7. **Ans.**

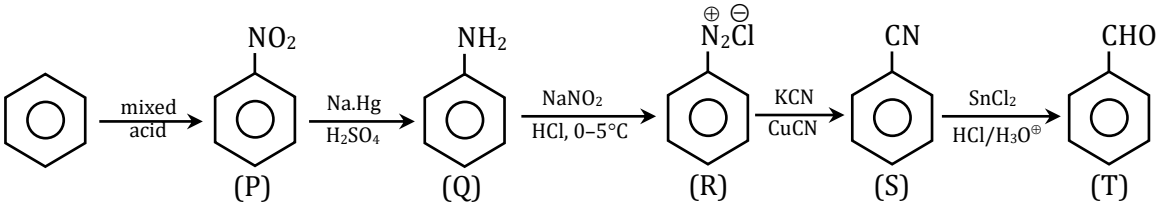




8. **Ans.**

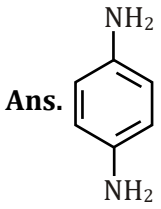


(T)

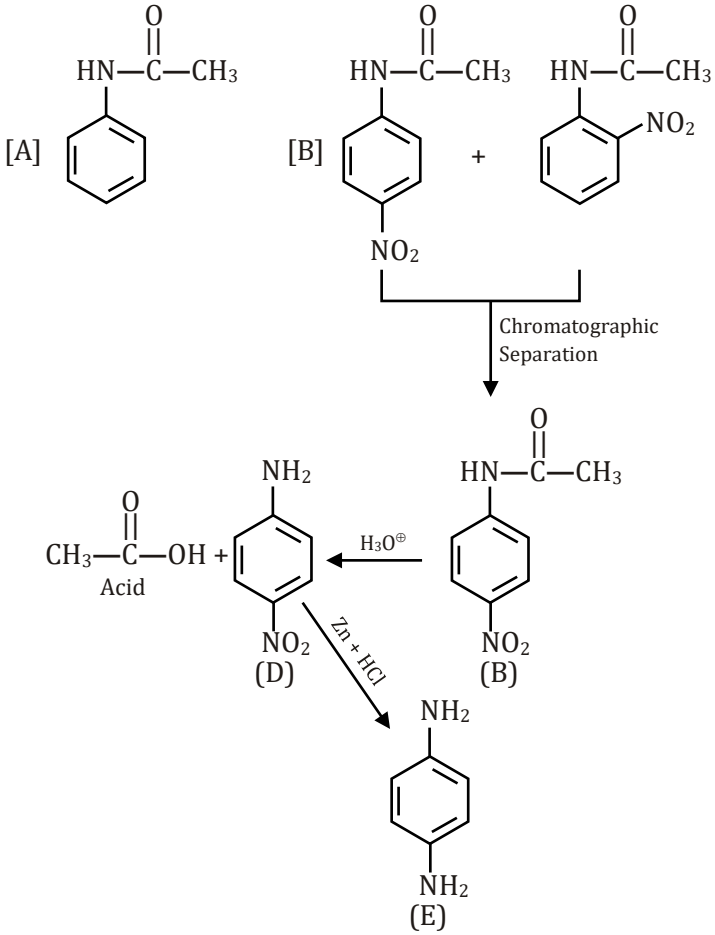


(P) (Q) (R) (S) (T)

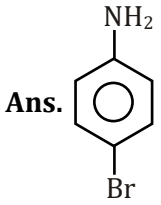
9. **Ans.**

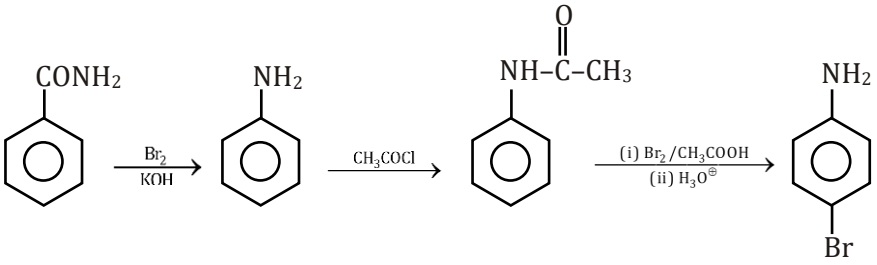


(E)


[A]
[B]
+
Chromatographic
Separation
Acid
$H_3O^{\oplus}$
Zn + HCl
(D)
(B)
(E)

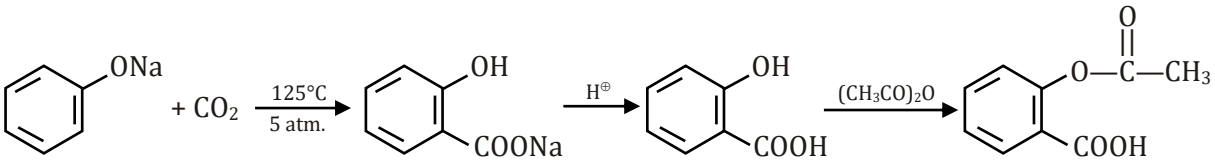
10. **Ans.**



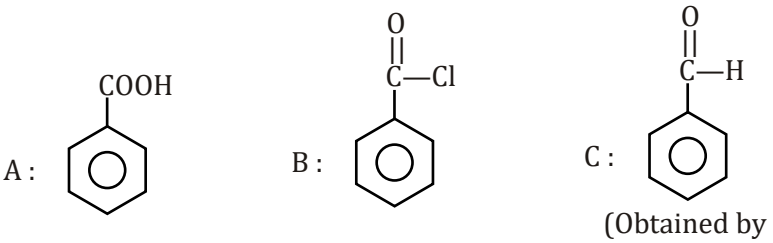

Br_2
KOH
CH_3COCl
(i) Br_2/CH_3COOH
(ii) $H_3O^{\oplus}$

EXERCISE - JEE (Main) PYQ

1. Ans. (3)



2. Ans. (2)

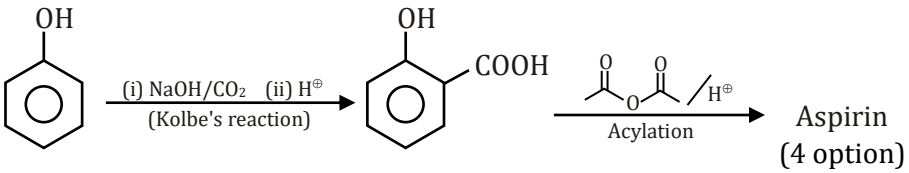


(Obtained by resenmund's reaction)

3. Ans.(3)

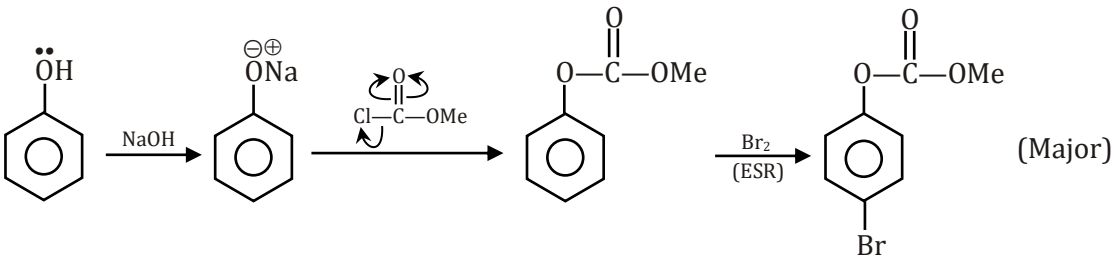
On direct nitration of aniline meta product is obtained in significant amount (47%).

4. Ans. (4)



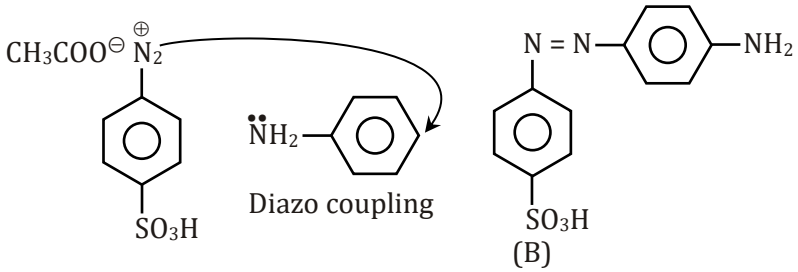
Aspirin
(4 option)

5. Ans. (2)

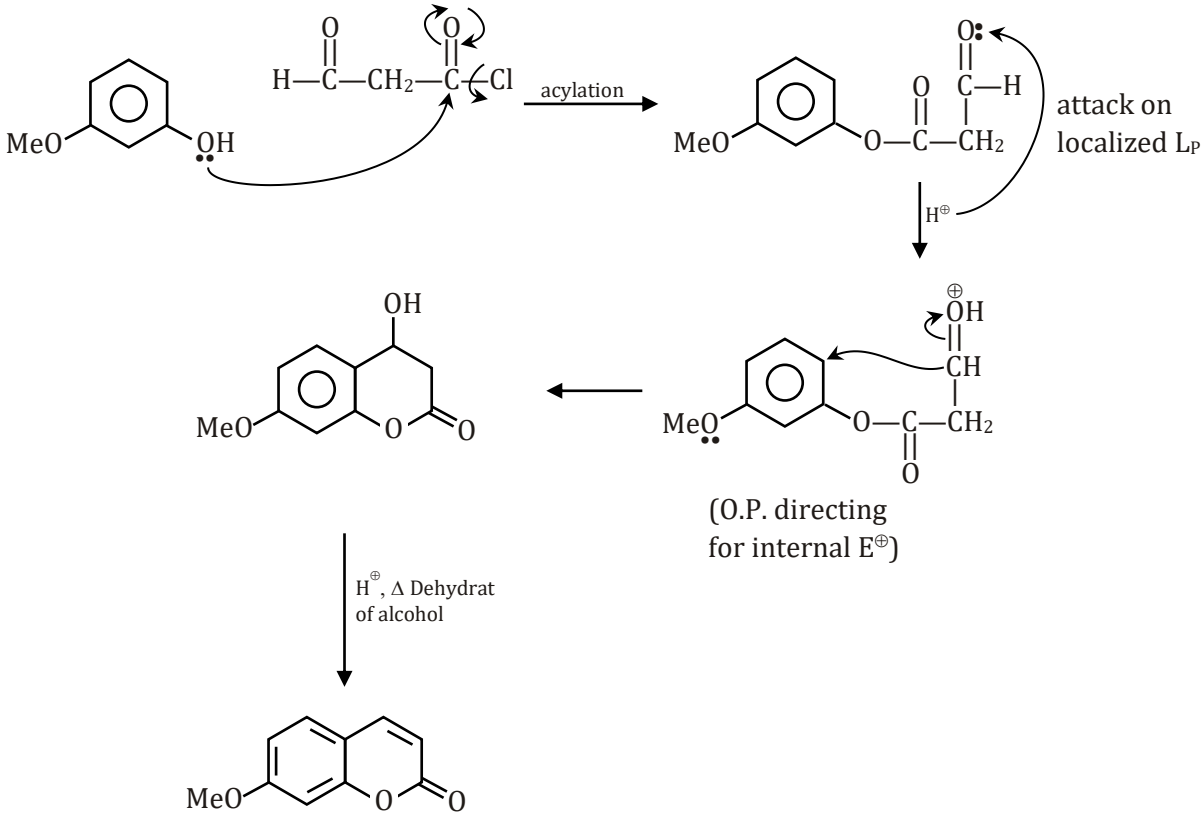


(Major)

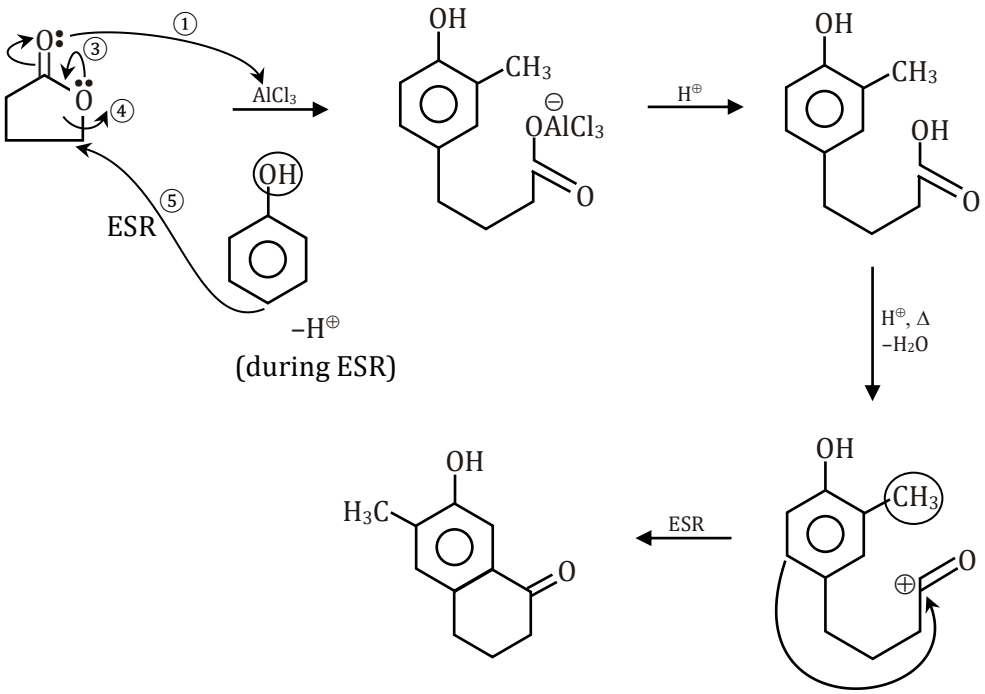
6. Ans. (3)



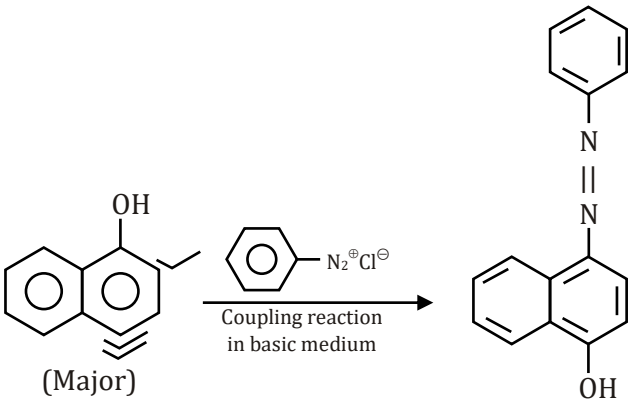
7. Ans. (4)


MeO
OH
H—C—CH2—C—Cl
acylation
attack on
localized LP
H⊕
(O.P. directing
for internal E⊕)
H⊕, Δ Dehydrat
of alcohol

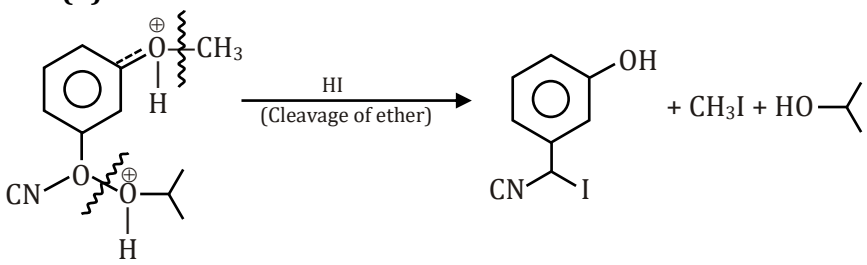
8. Ans. (1)


AlCl3
ESR
–H⊕
(during ESR)
H⊕
H⊕, Δ
–H2O
ESR

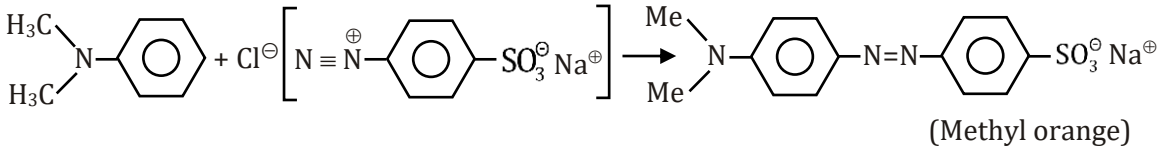
9. Ans. (3)



10. Ans. (1)



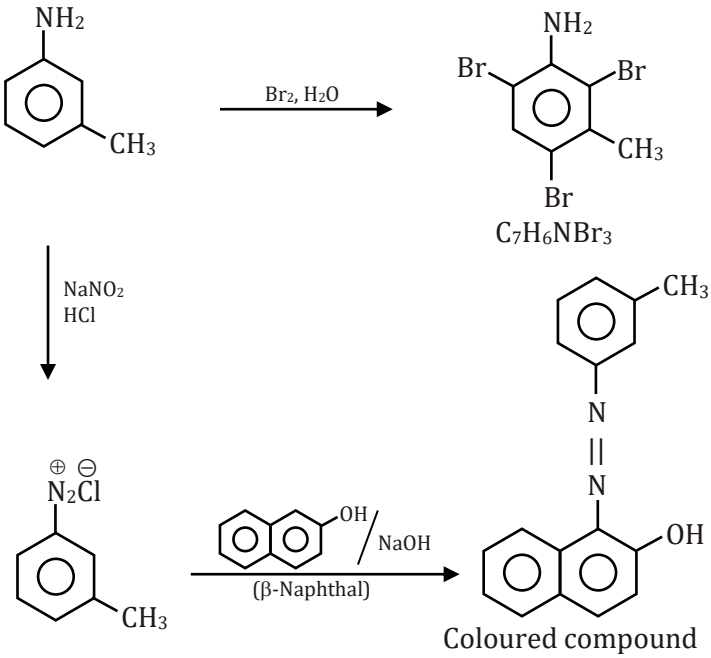
11. Ans. (1)



(Methyl orange)

It is an acid base indicator

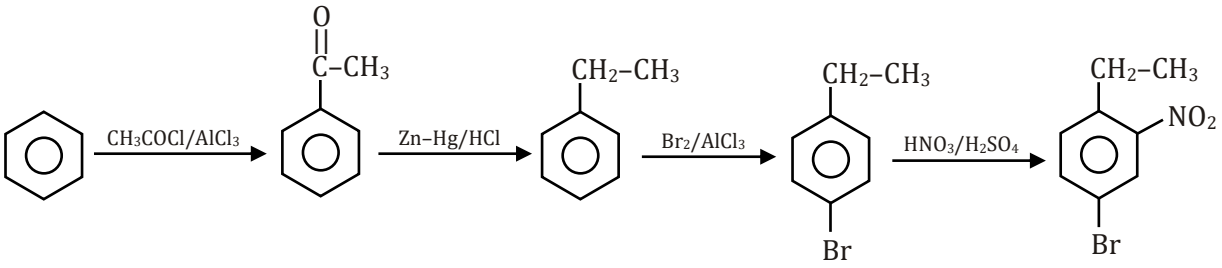
12. Ans. (2)



13. Ans. (4)

The number of sp^2 hydrid orbitals in Benzene molecule = 18.

14. Ans. (4)

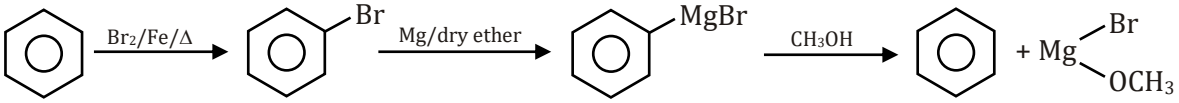


15. Ans. (1)

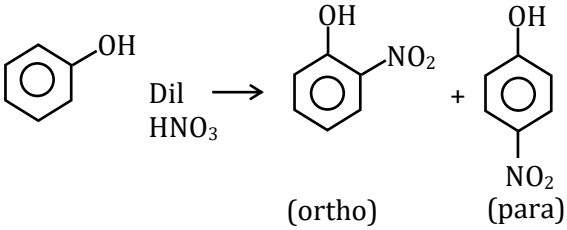
$A(C_6H_6O)$ give dark green colouration with $FeCl_3$.

$\therefore$ It is phenol.

16. Ans. (2)



17. Ans. (3)

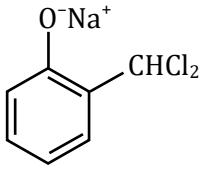


Para product has higher boiling point than ortho as intermolecular H-bond is possible in former, whereas intramolecular H-bond is possible in ortho product.

Steam distillation can separate them as ortho product is steam volatile.

18. Ans. (3)

It's a classic Reimer-Tiemann reaction.

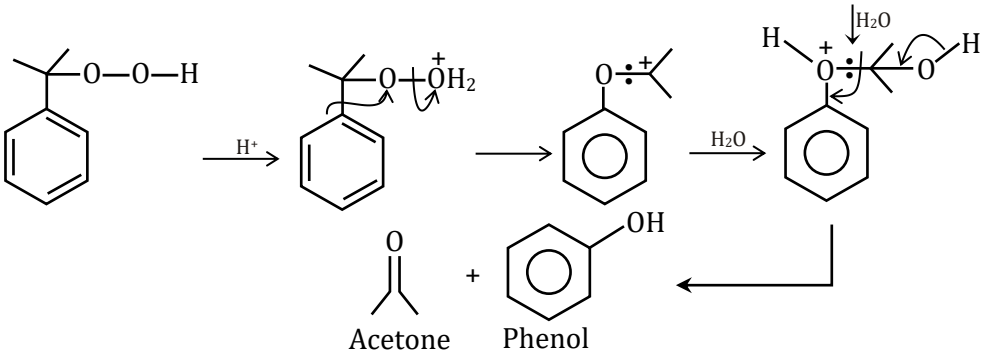


Will be the intermediate formed.

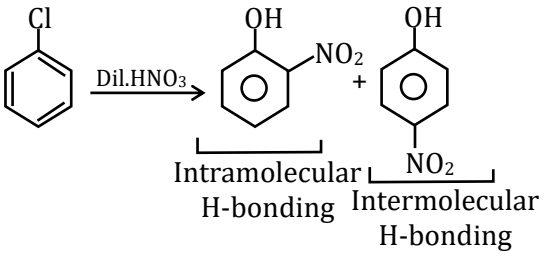
19. Ans. (3)

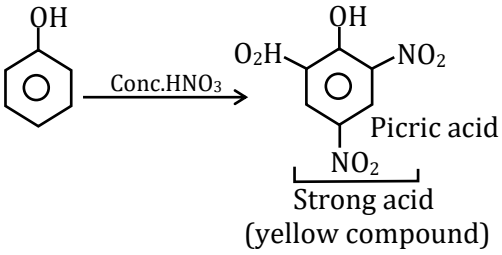
Given reaction is cumene-Peroxide method for the preparation of phenol.

In this reaction

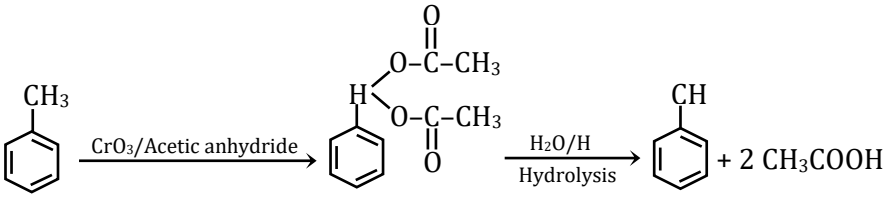


20. Ans. (7)





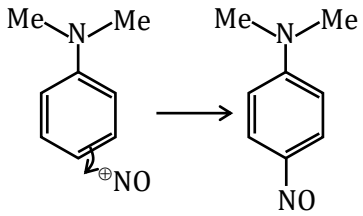
21. Ans. (2)



22. Ans. (2)

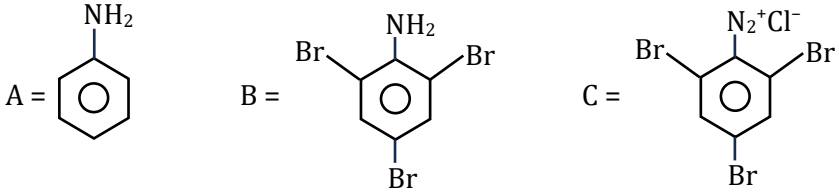
$NaNO_2 + HX \rightarrow HNO_2 + NaX$

$H-O-N=O \xrightarrow[-H_2O]{H^{\oplus}} NO^{\oplus}$ (Nitrosonium ion)

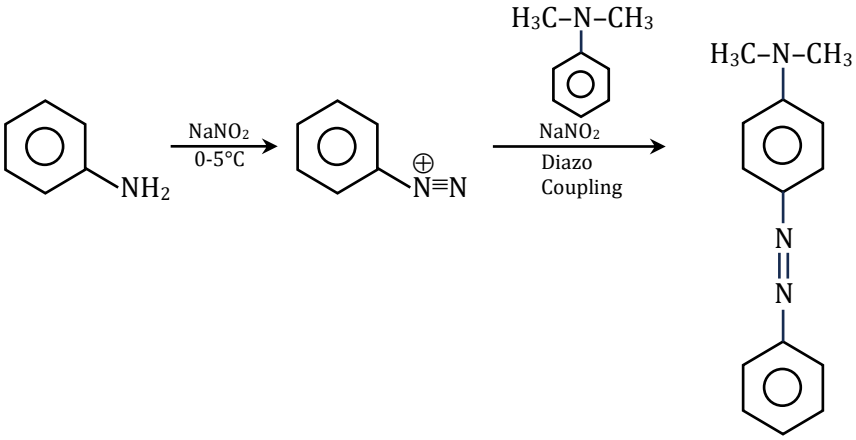


P – Nitroso product

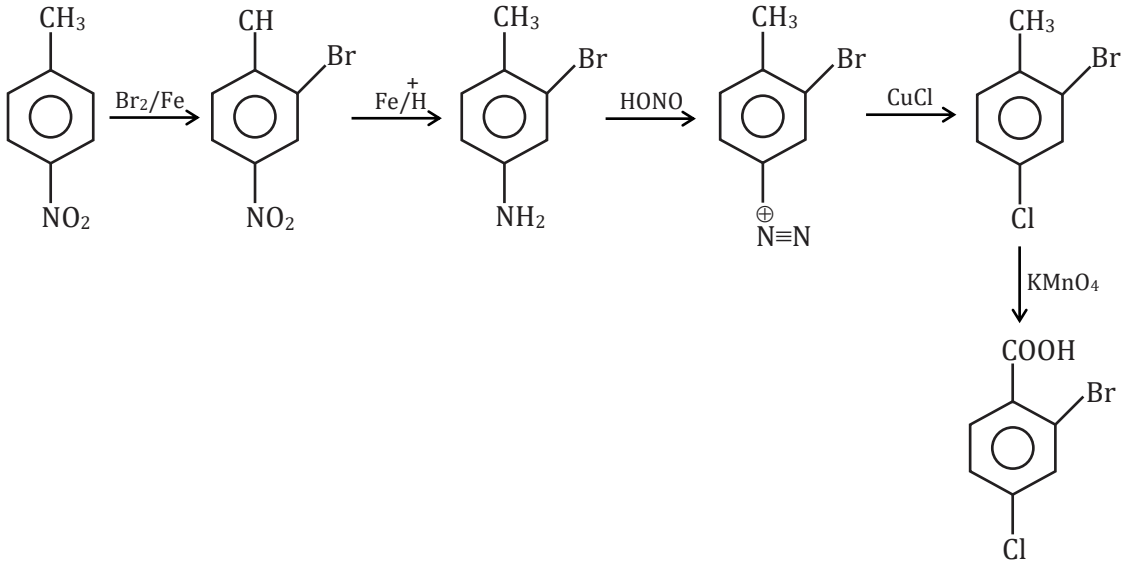
23. Ans. (4)



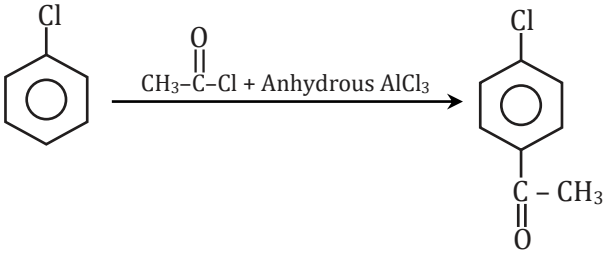
24. Ans. (2)



25. Ans. (3)



26. Ans. (1)

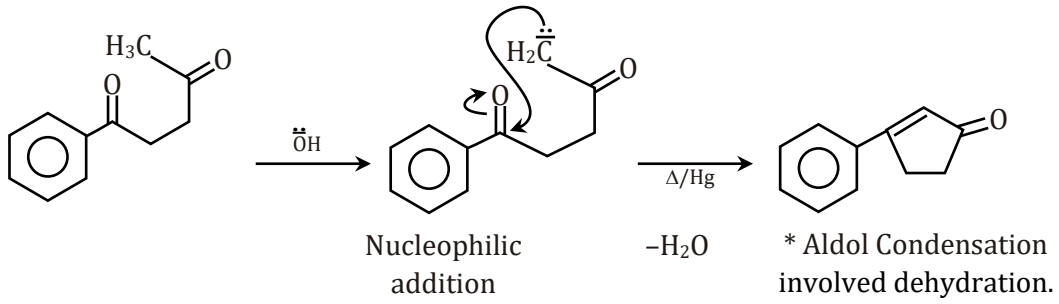


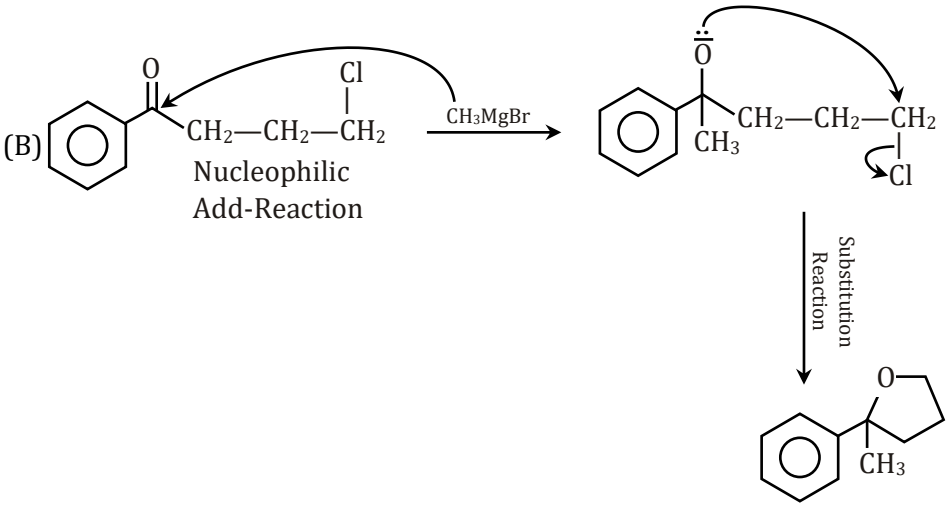
Chlorine is ortho/para directing, para is major.

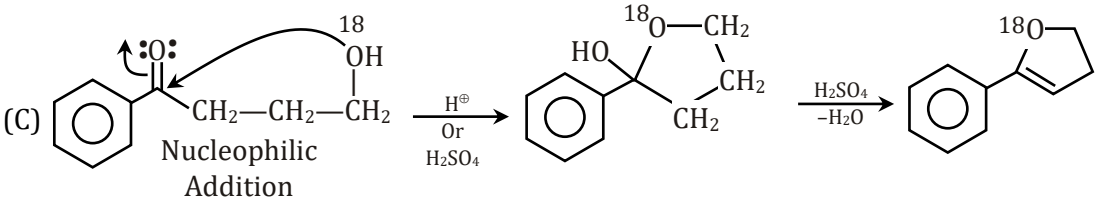
EXERCISE - JEE (Advanced) PYQ

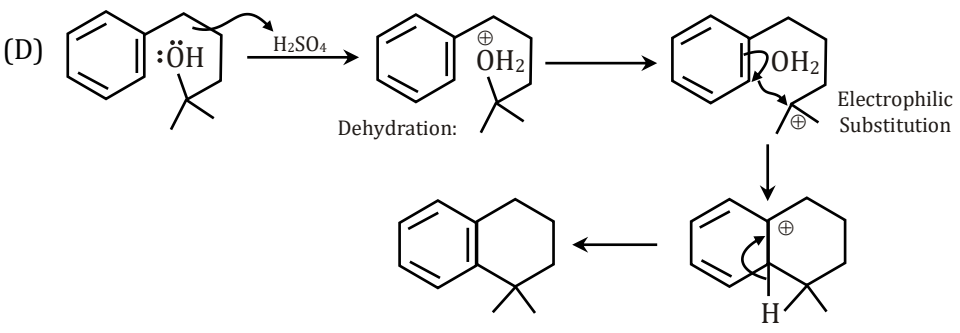
1. Ans. (A)

(A) → is an Example of Aldol condensation.



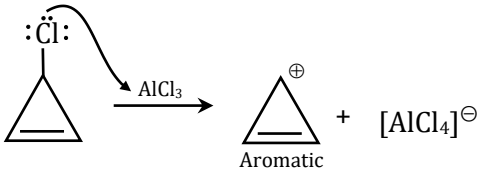




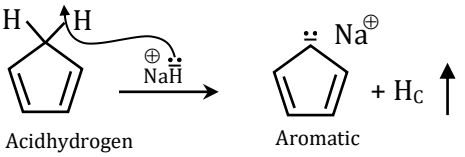


2. Ans. (A,B,C,D)

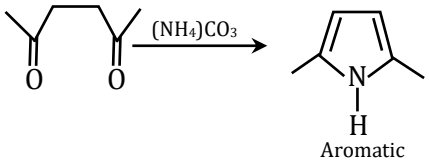
(1)



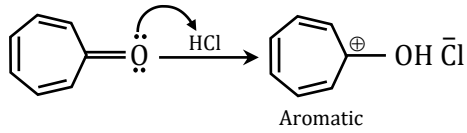
(2)



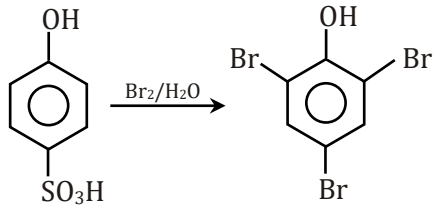
(3)



(4)

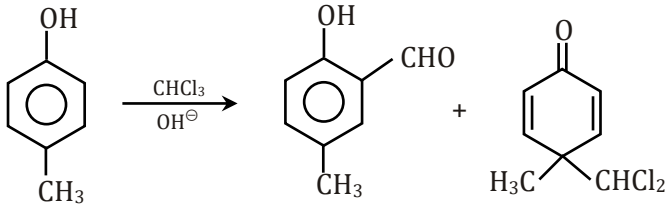


3. Ans. (B)



4. Ans. (B,D)

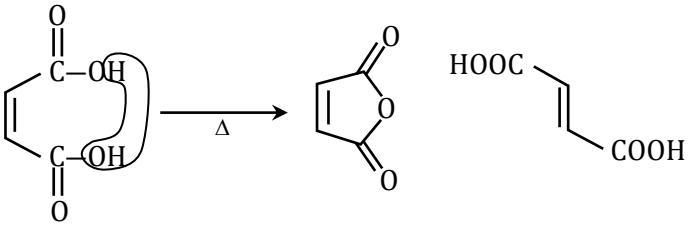
It is an example of Riemer Tiemann reaction.



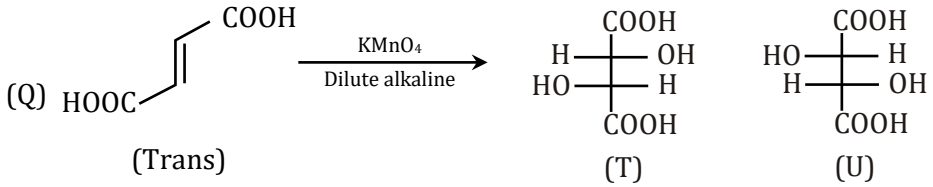
5. Ans. (A)

P and Q are DI carboxylic acid which Decolorize Br_2/H_2O : P on heating gives anhydride

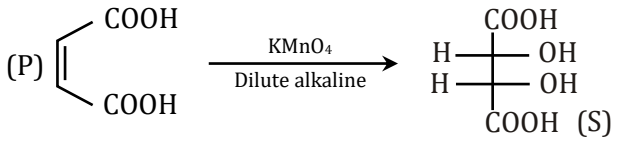
So,



(P) Cis (Q) Trans



(Trans) (T) (U)



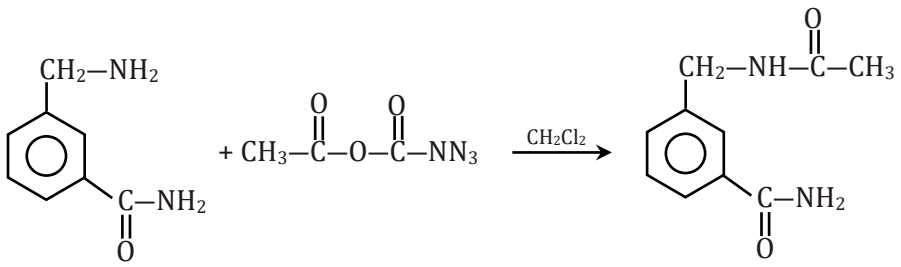
(Cis) Meso

6. Ans. (B)

P → S Optically inactive

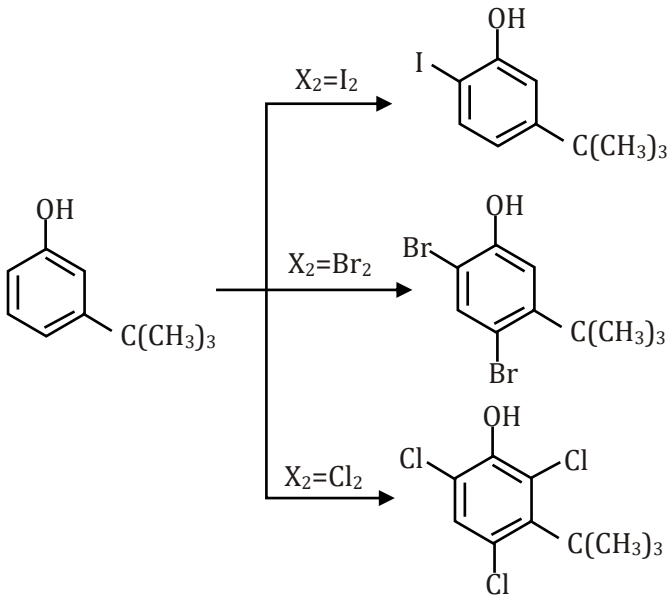
Q → T | U Optical active

7. Ans. (A)



$-CH_2-NH_2$ is more nucleophilic then $-\overset{\overset{O}{\|}}{C}-NH_2$

8. Ans. (A,B,C)



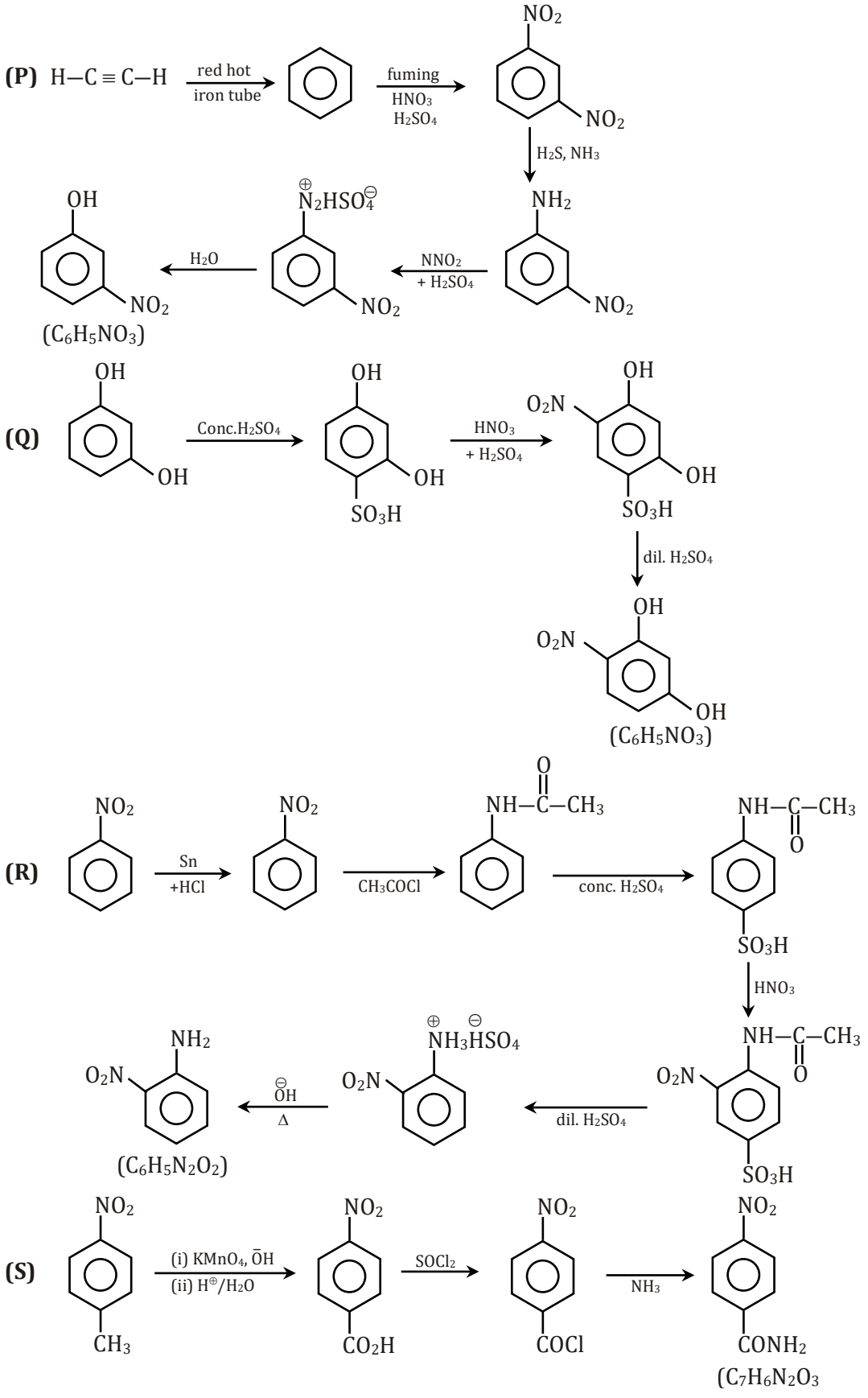
Orientation in electrophilic substition reaction is decided by

(A) The steric effect of the halogen

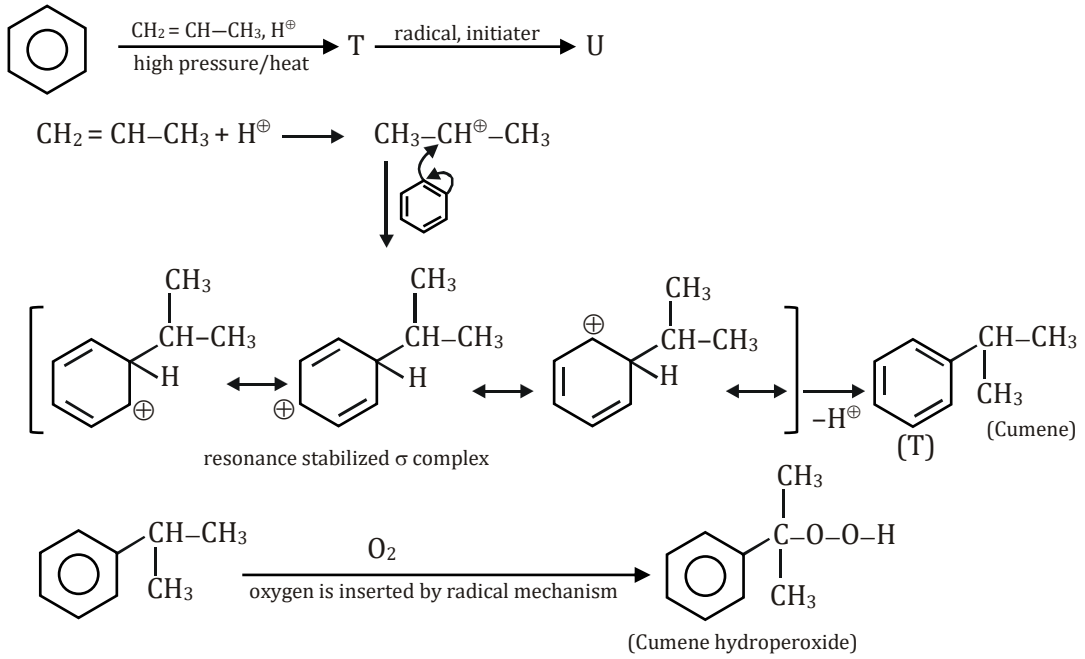
(B) The steric effect of the tert-butyl group

(C) The electronic effect of the phenolic group

9. Ans. (C)


(P)
H—C ≡ C—H
red hot iron tube
fuming HNO3 H2SO4
NO2
NO2
H2S, NH3
NH2
NO2
NNO2 + H2SO4
N2HSO4
NO2
H2O
OH
NO2
(C6H5NO3)
(Q)
OH
OH
Conc.H2SO4
OH
OH
SO3H
HNO3 + H2SO4
O2N
OH
OH
SO3H
dil. H2SO4
O2N
OH
OH
(C6H5NO3)
(R)
NO2
Sn +HCl
NO2
CH3COCl
NH—C—CH3
O
conc. H2SO4
NH—C—CH3
O
SO3H
HNO3
NH—C—CH3
O
O2N
SO3H
dil. H2SO4
NH3HSO4
O2N
OH Δ
NH2
O2N
(C6H5N2O2)
(S)
NO2
CH3
(i) KMnO4, OH
(ii) H⊕/H2O
NO2
CO2H
SOCl2
NO2
COCl
NH3
NO2
CONH2
(C7H6N2O3

10. Ans. (B)

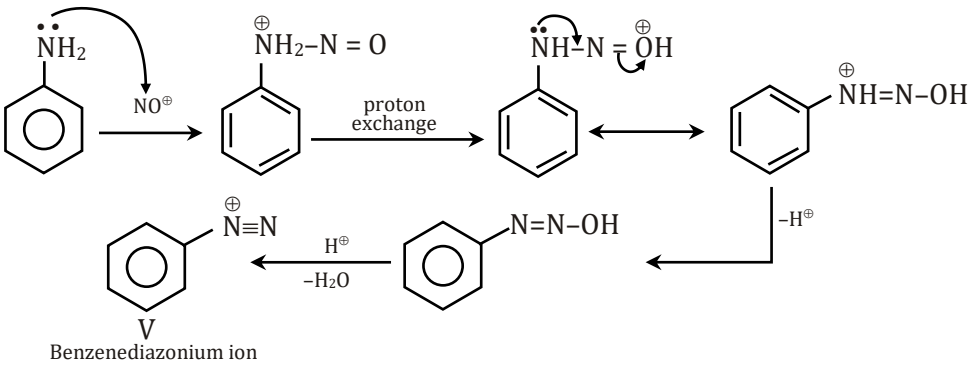


11. Ans. (A)

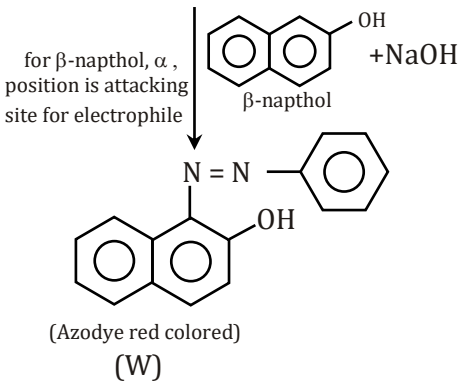
$NaNO_2 + HCl \longrightarrow HNO_2 + NaCl$

$HNO_2 + HCl \rightleftharpoons H_2NO_2^{\oplus} + Cl^{\ominus}$

$H_2NO_2^{\oplus} \longrightarrow H_2O + NO^{\oplus}$

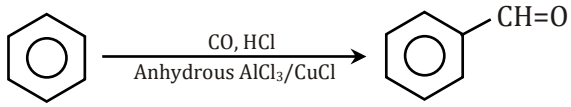


The formation of V is example of diazotisation reaction.

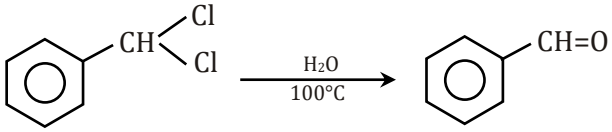


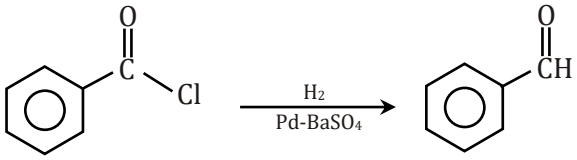
The formation of W from V is example of diazocoupling reaction.

12. Ans. (4)

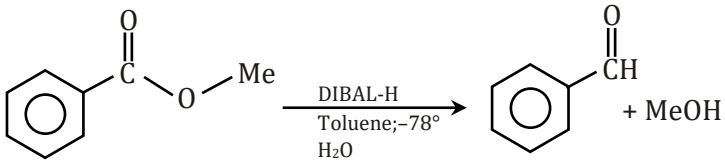
I. 

This reaction is called Gattermann koch synthesis

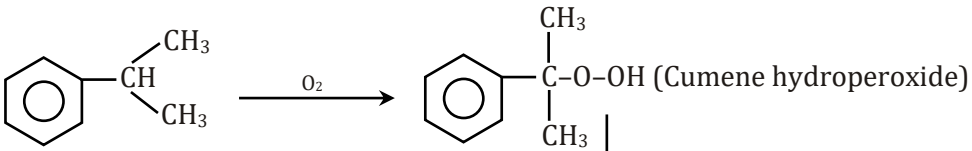
II. 

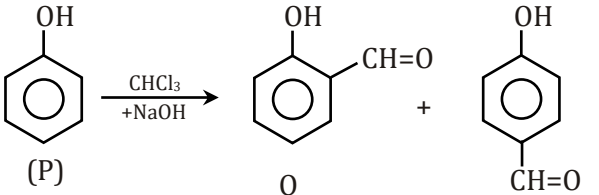
III. 

This reaction is called Rosenmund reduction

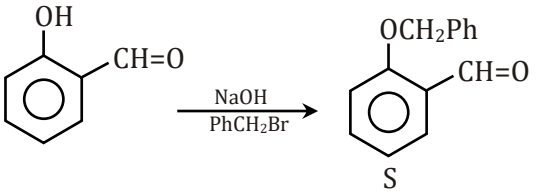
IV. 

13. Ans. (B,C)





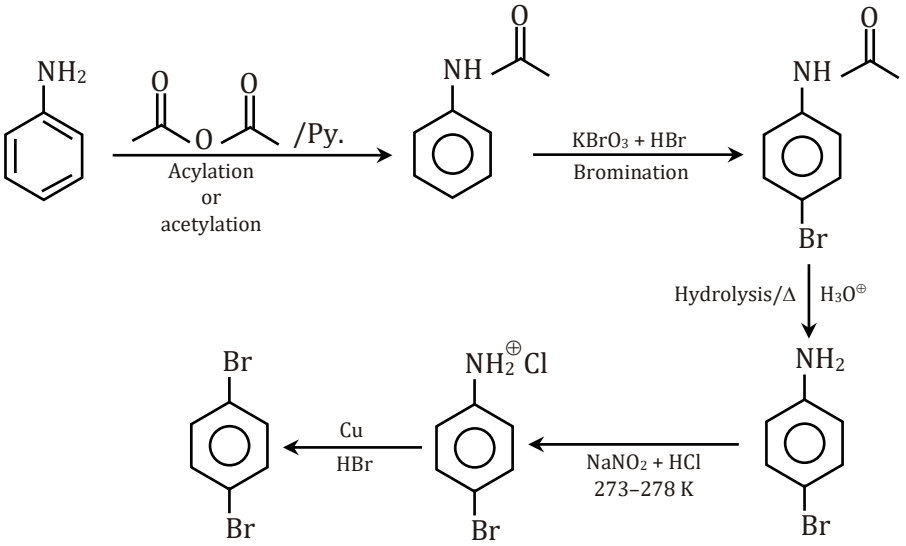
High boiling point due to inter molecular H-bonding So, R is not steam volatile



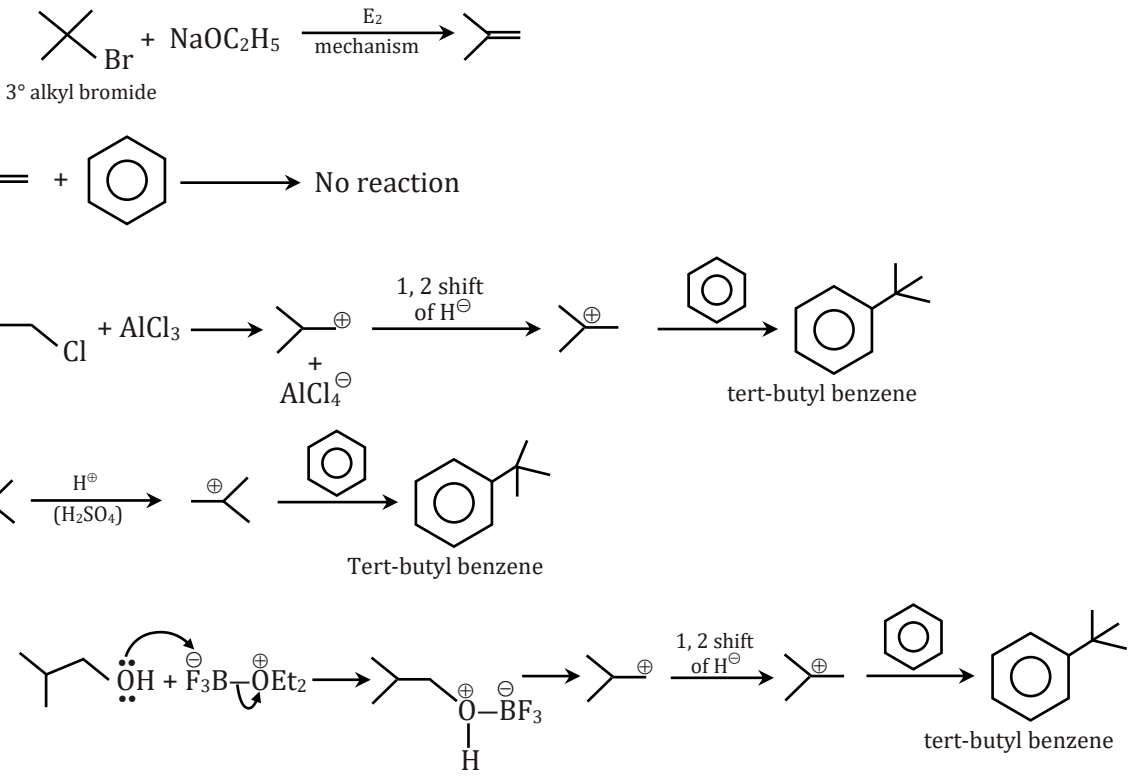
(Does not give dark violet coloration with 1% $FeCl_3$ solution)

Q gives dark violet coloration with 1% aqueous $FeCl_3$ solution because it has phenolic (–OH) group.

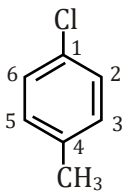
14. Ans. (B)



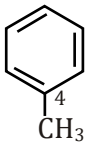
15. Ans. (B,C,D)



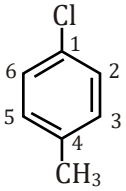
16. Ans. (B,C)



1-Chloro-4-methylbenzene



IUPAC Name- "Toluene" is accepted by IUPAC as a name of parent carbon chain.

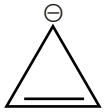


So, it can also be named as 4-chlorotoluene.

17. Ans. (5)

Cyclooctatetraene ; **non aromatic**

Due to nonplanarity of ring the π-electrons are not delocalised.



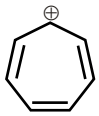
Cyclopropenyl anion ; **Anti aromatic**

4π-electrons delocalised.

Cyclopropenyl cation ; **Aromatic**

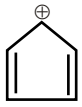
2π-electrons delocalised.

Benzene : Aromatic



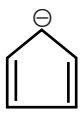
Tropylium ion : **Aromatic**

6π-electrons delocalised.



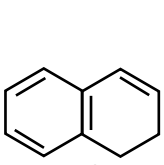
Cyclo pentadienyl cation ; **Anti-aromatic**

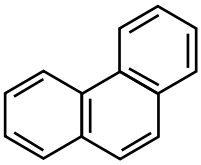
4π-electrons delocalised.



Cyclo pentadienyl anion ; **Aromatic**

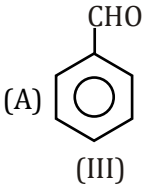
6π-electrons delocalised.

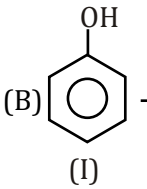

aromatic

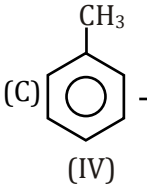

aromatic
14π e⁻ s
(delocalised)

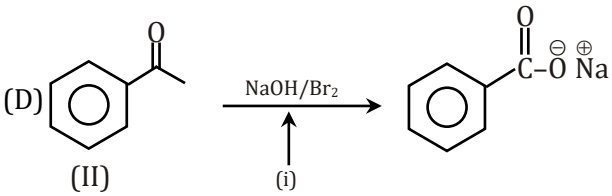
18. Ans. (D)

(II)(i)(S)


(A) → Benzoic acid is not formed (R)
(III) (iv)

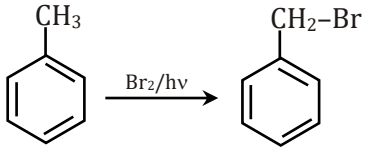

(B) → Benzoic acid is not formed (P)
(I) (ii)


(C) → Benzoic acid is not formed (Q)
(IV) (iv)

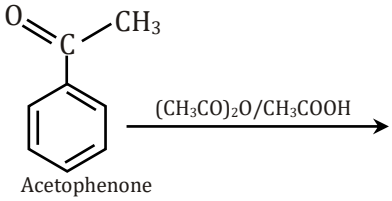

(D) → + $CHBr_3$ (haloform reaction) (S)
(II) (i)

19. Ans. (B)

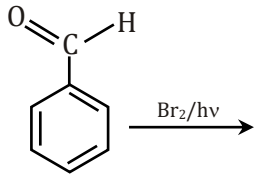
(A)

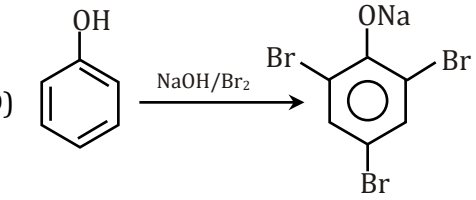


mechanism involved is free radical substitution


(B) → Condensation reaction
Acetophenone

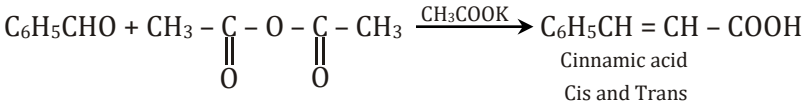
(No radical mechanism involved)

(C)  Condensation is not involved.

(D) 

(No free radical mechanism)

20. Ans. (B)

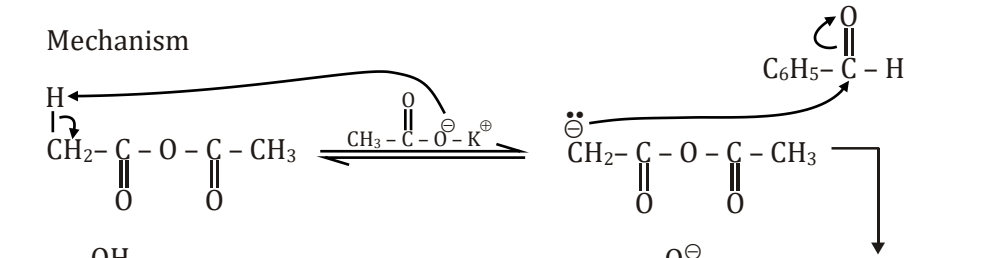


Cinnamic acid

Cis and Trans

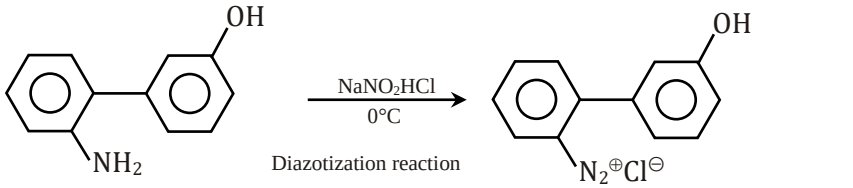
It is perkin condensation reaction

Mechanism



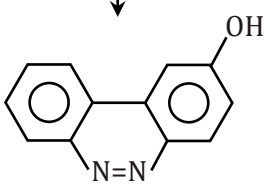
Cis / Trans

21. Ans.(C)



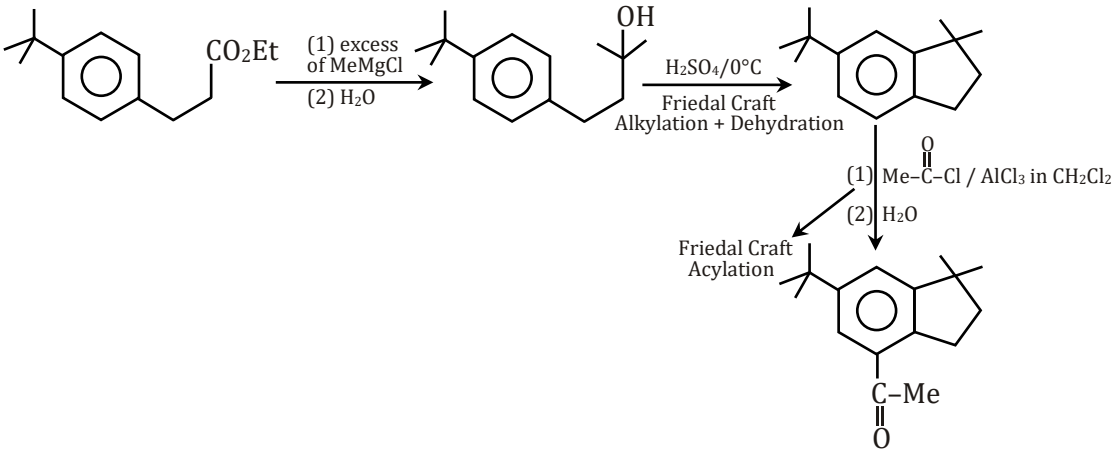
Diazotization reaction

aq. NaOH Diazocoupling on phenolic ring in basic medium

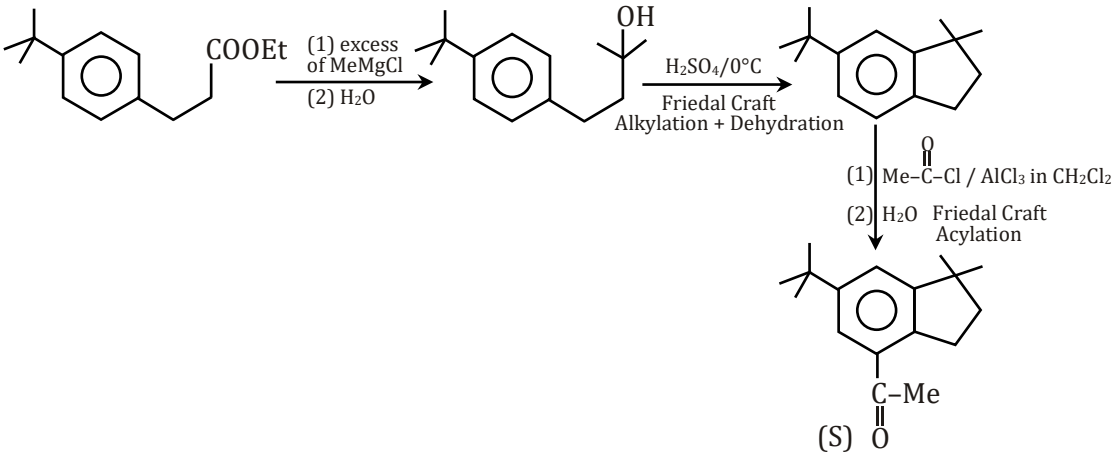


Para is less hindered

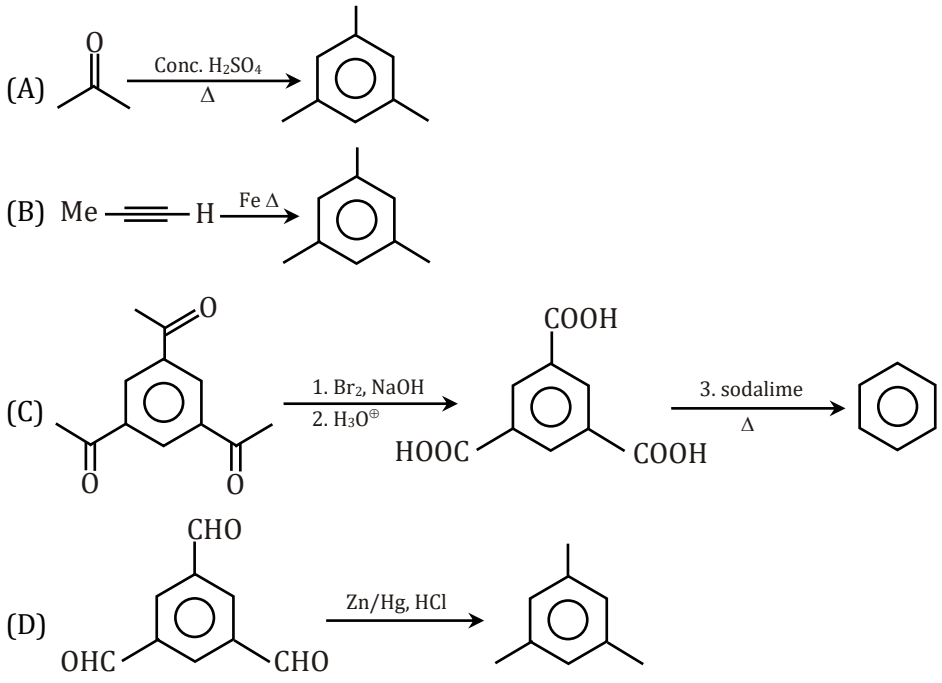
22. Ans. (B)



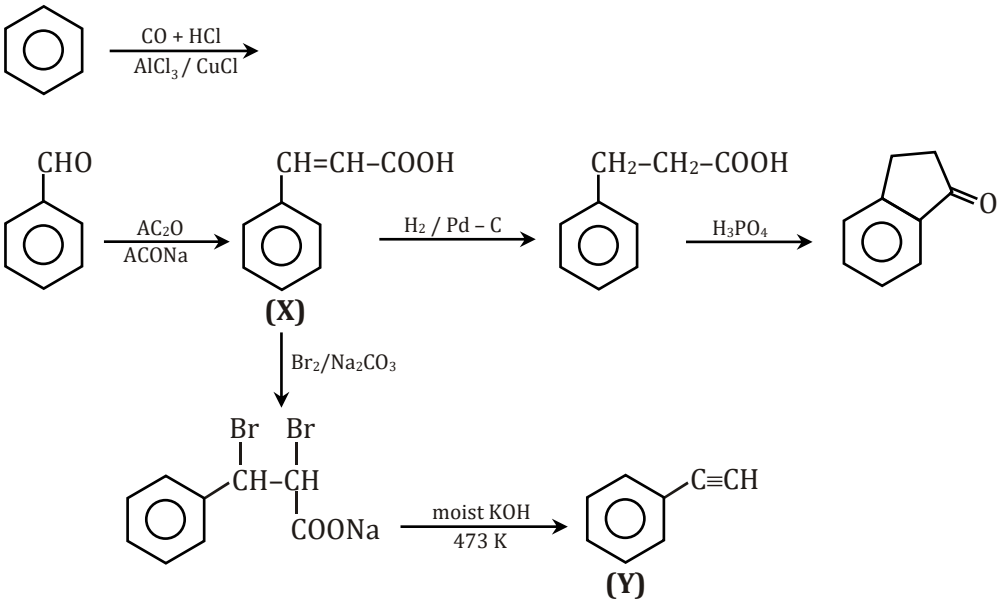
23. Ans. (D)



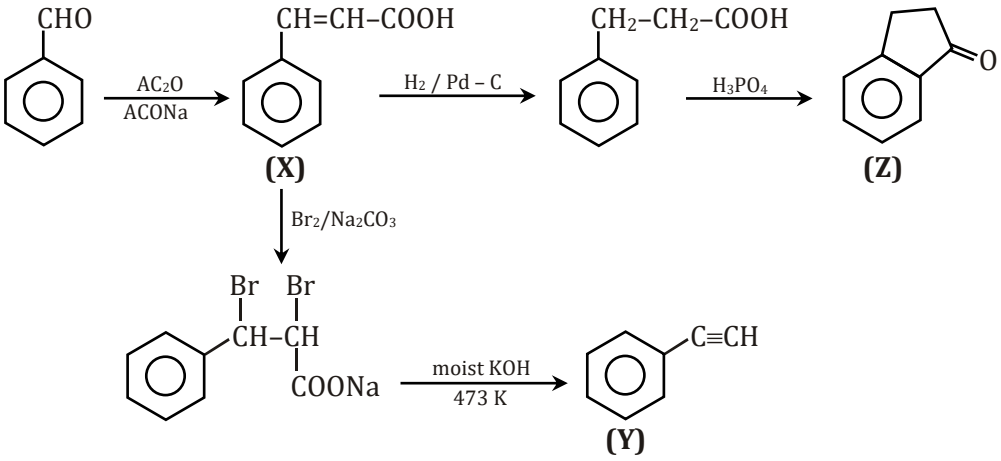
24. Ans. (A,B,D)



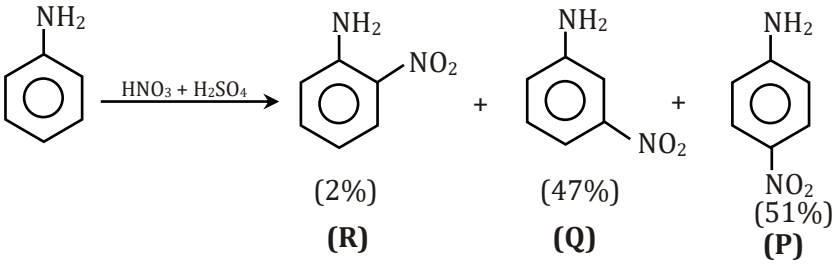
25. Ans. (C)

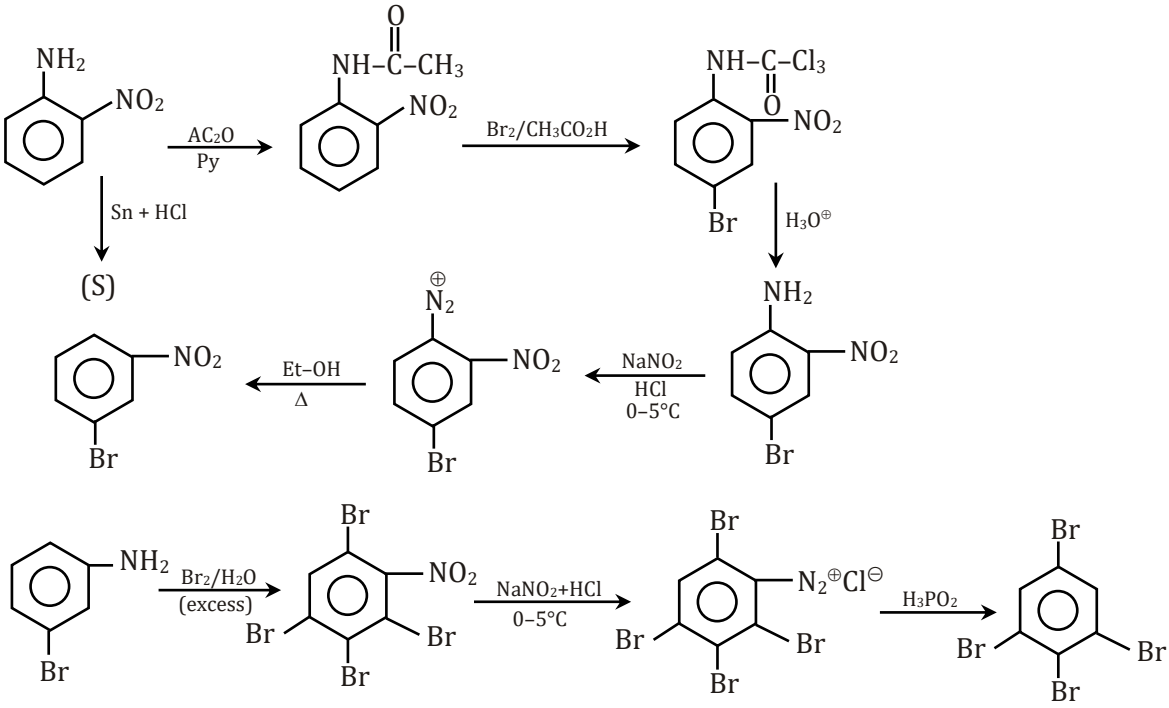


26. Ans. (A)

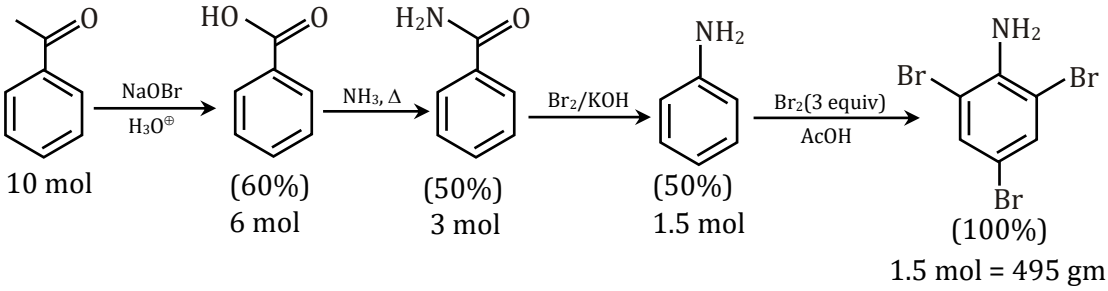


27. Ans. (D)



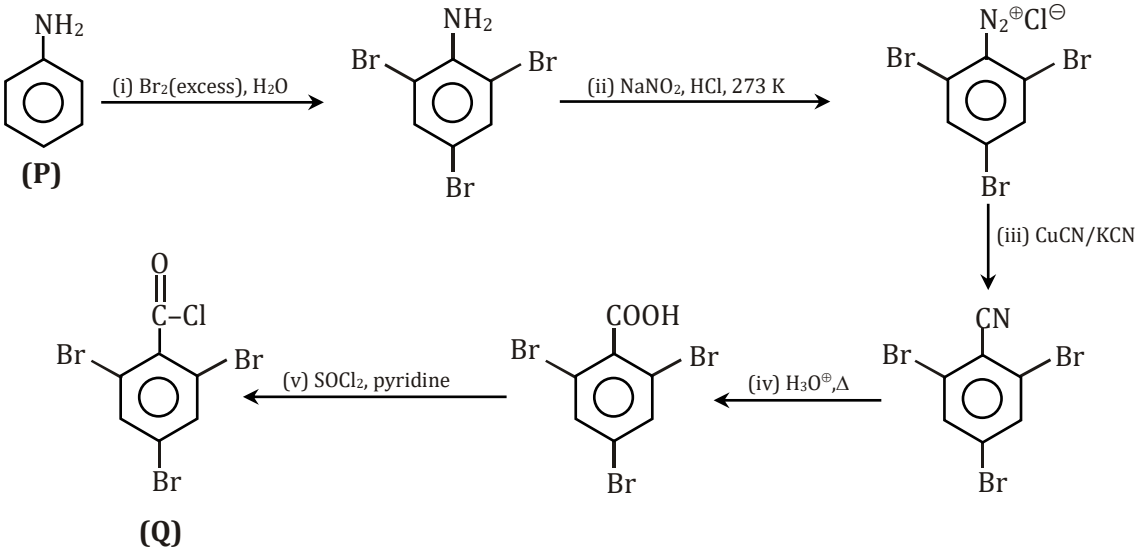


28. Ans. (495)

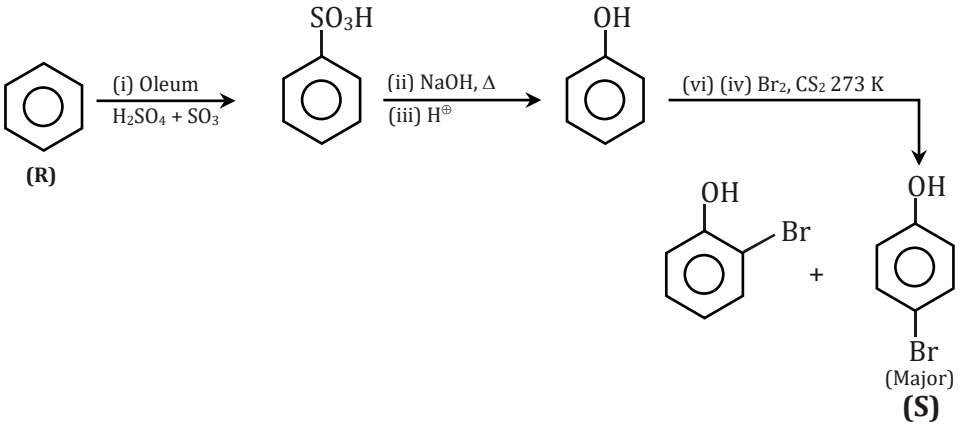


29. Ans. (4.00)

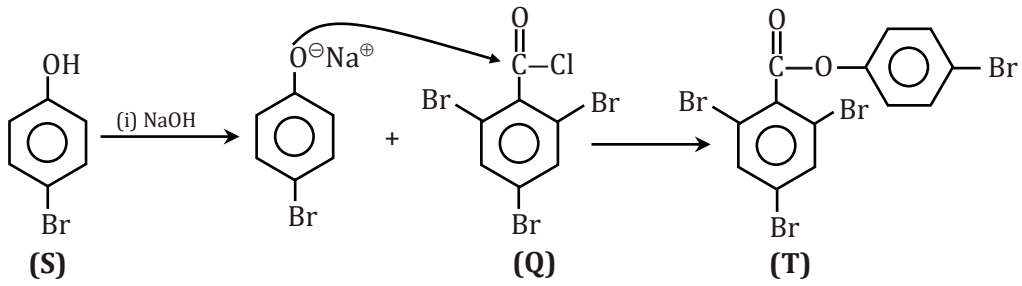
Scheme 1 :



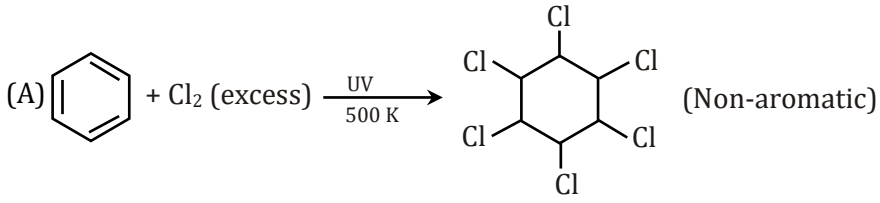
Scheme 2 :

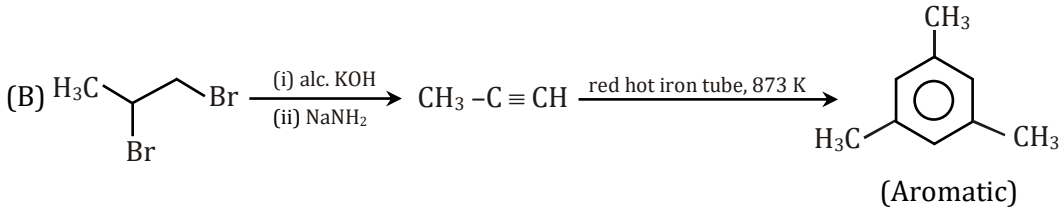


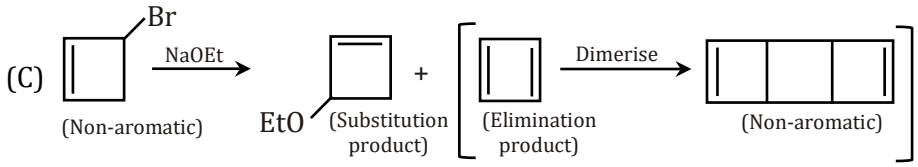
Scheme 3 :

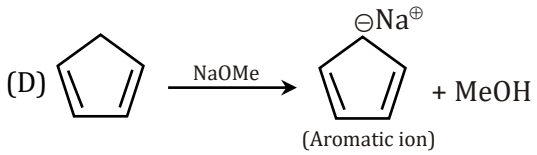


30. Ans. (B,D)

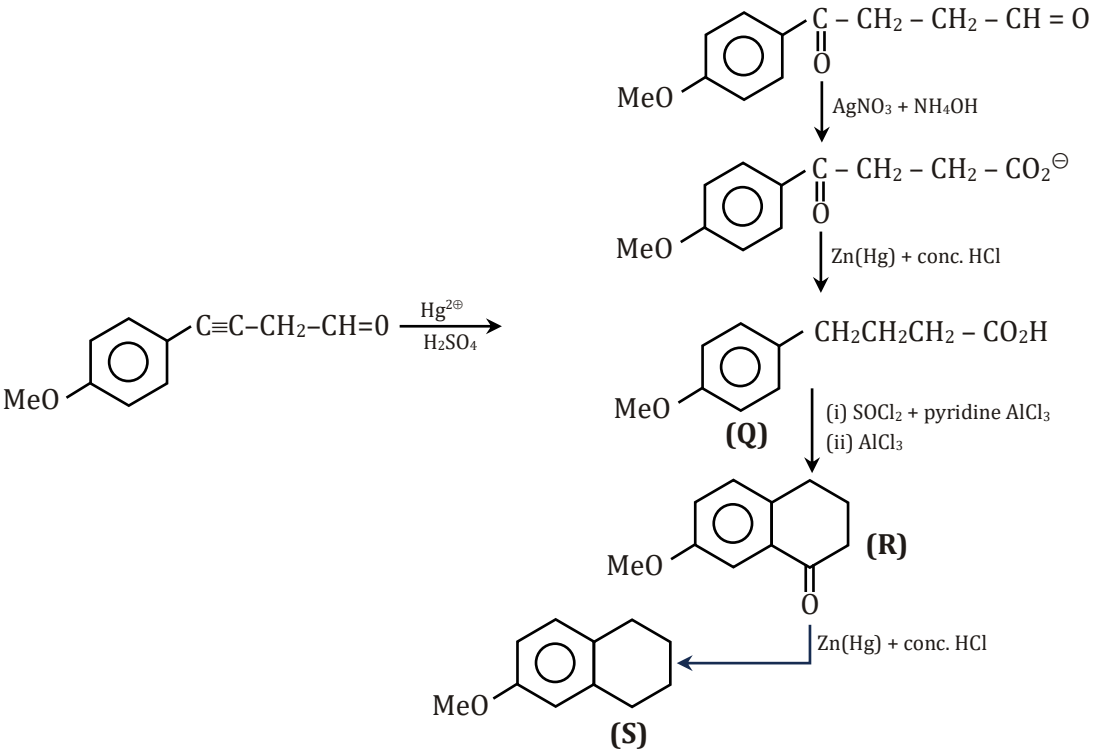




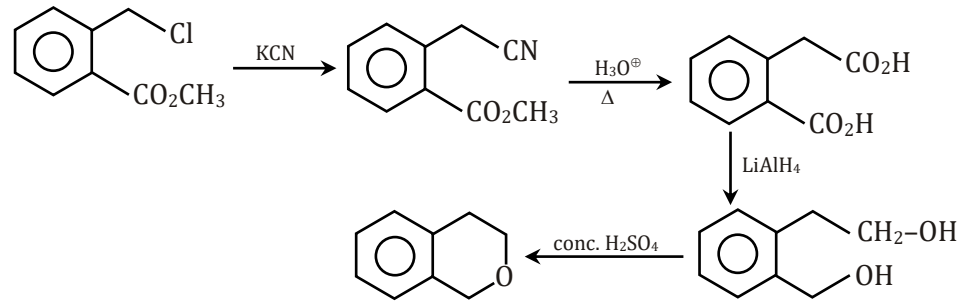




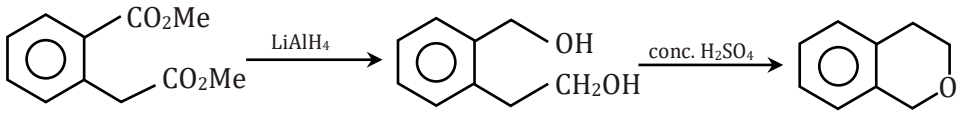
31. Ans. (B,D)



32. Ans. (B)

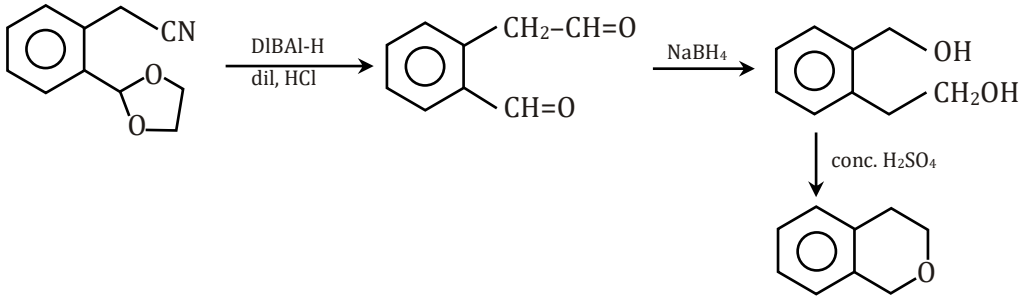


III, T, Q, R

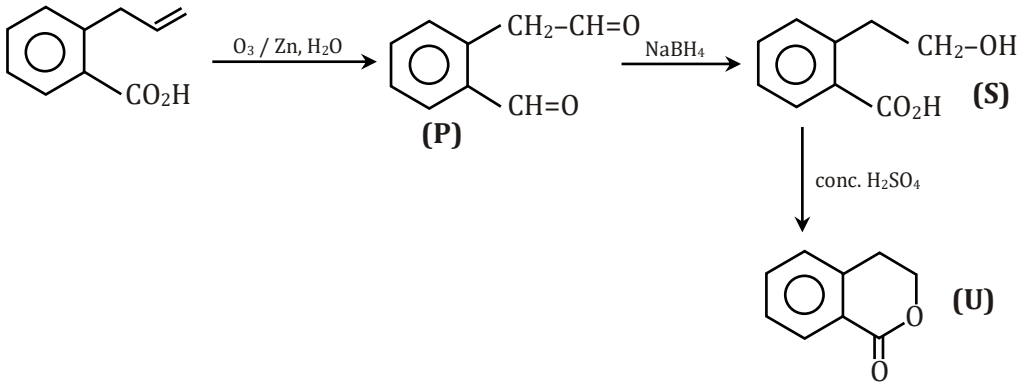


IV, Q, R(2)

33. Ans. (B)

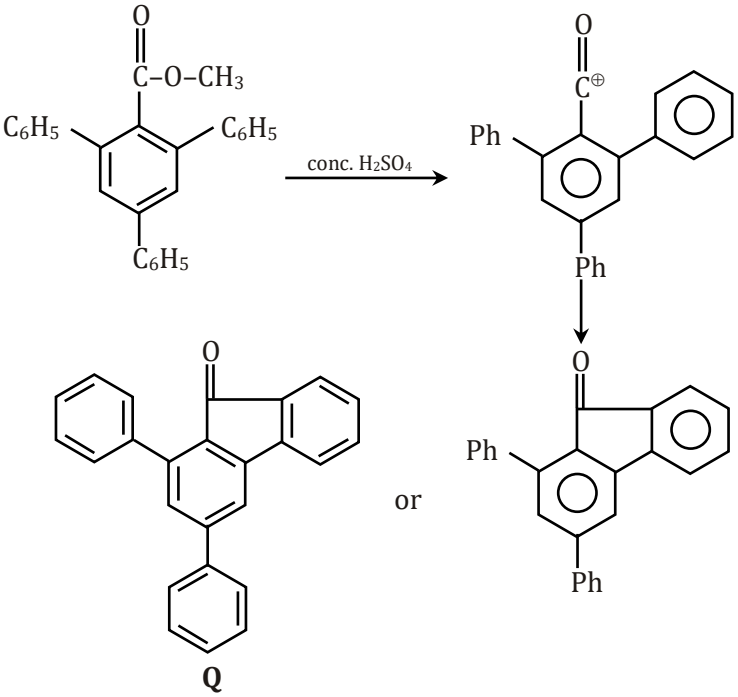


I, Q, R



II, P, S, U

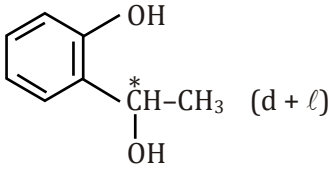
34. Ans. (18.00)



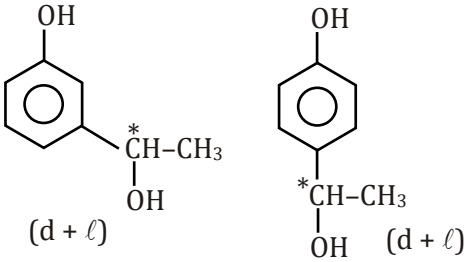
Q

Degree of unsaturation = 18

35. Ans. (6)

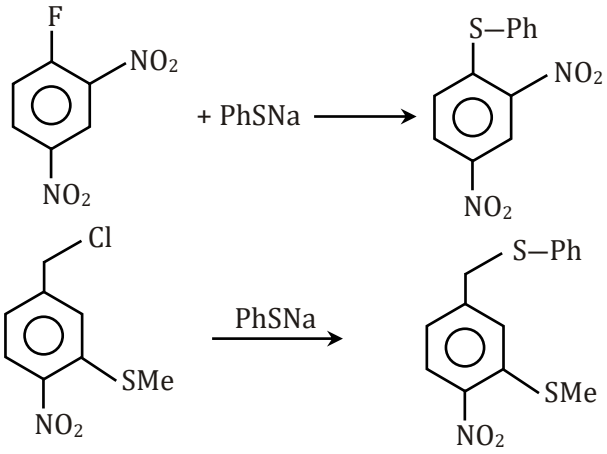


Since compound give +ve test with neutral $FeCl_3$ so it is phenol.



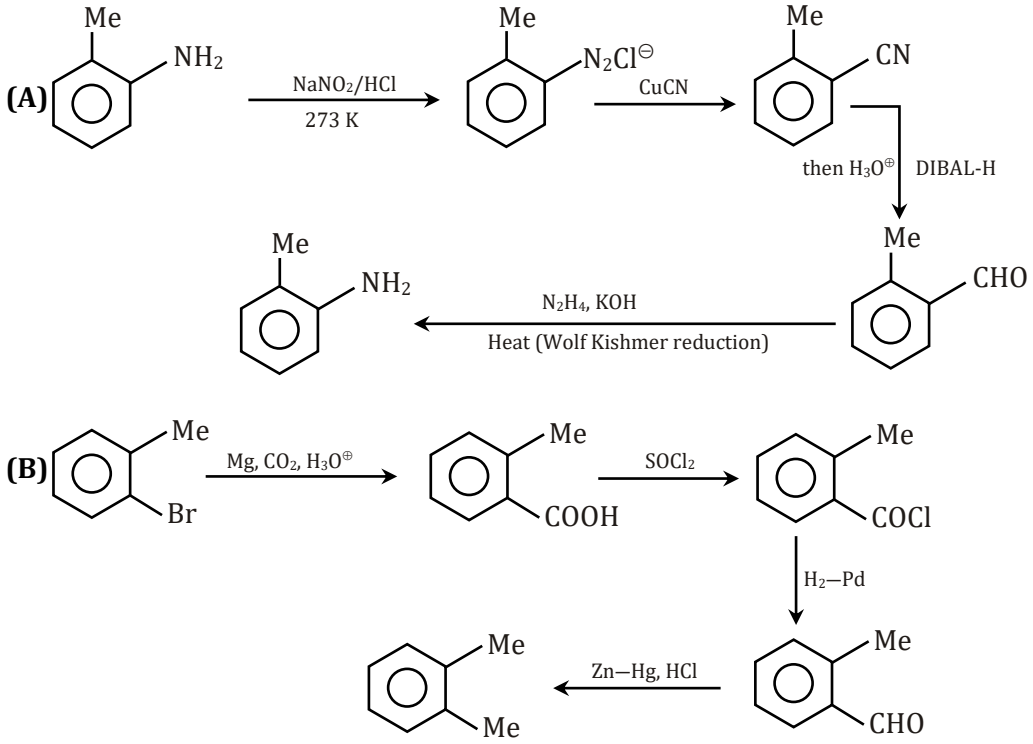
Total 6 isomers

36. Ans. (A,D)

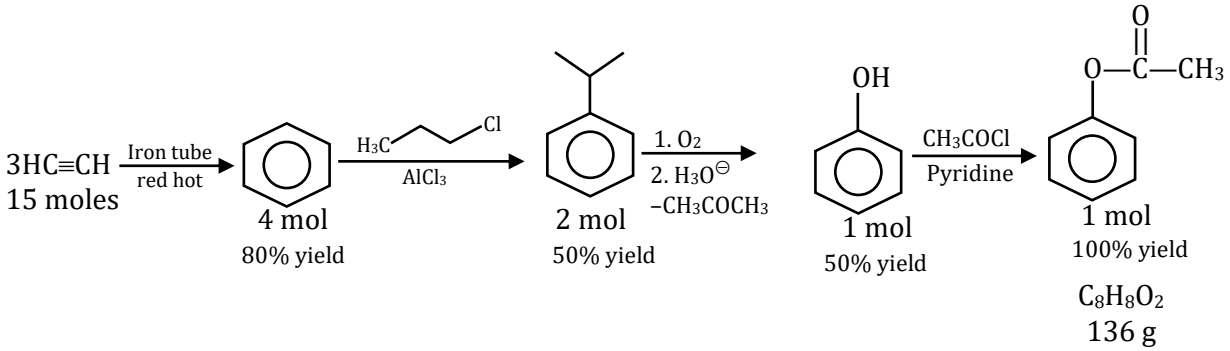


Compound B and C do not react with PhSNa

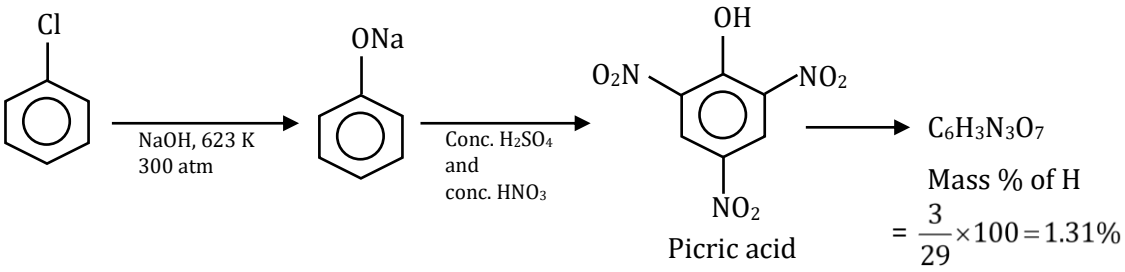
37. Ans. (A,B)



38. Ans. (136)



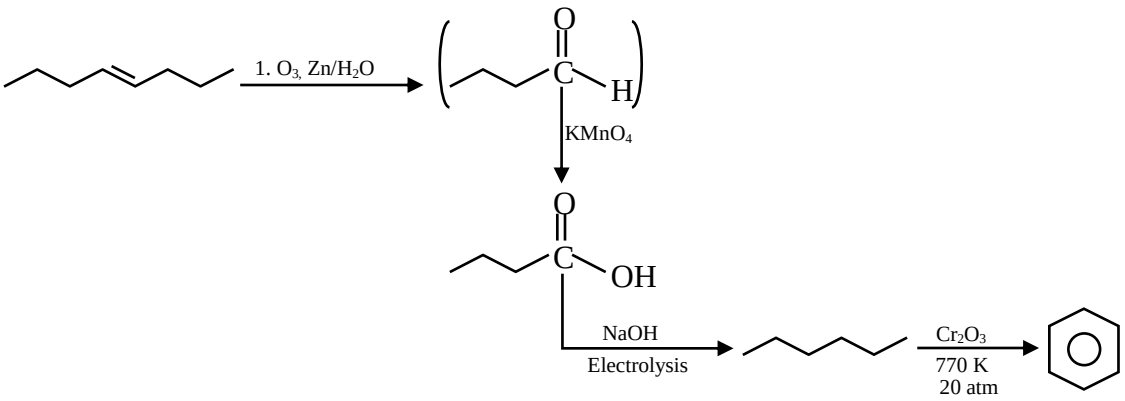
39. Ans. (1.31)



Mass % of H

$= \frac{3}{29} \times 100 = 1.31\%$

40. Ans. (0)



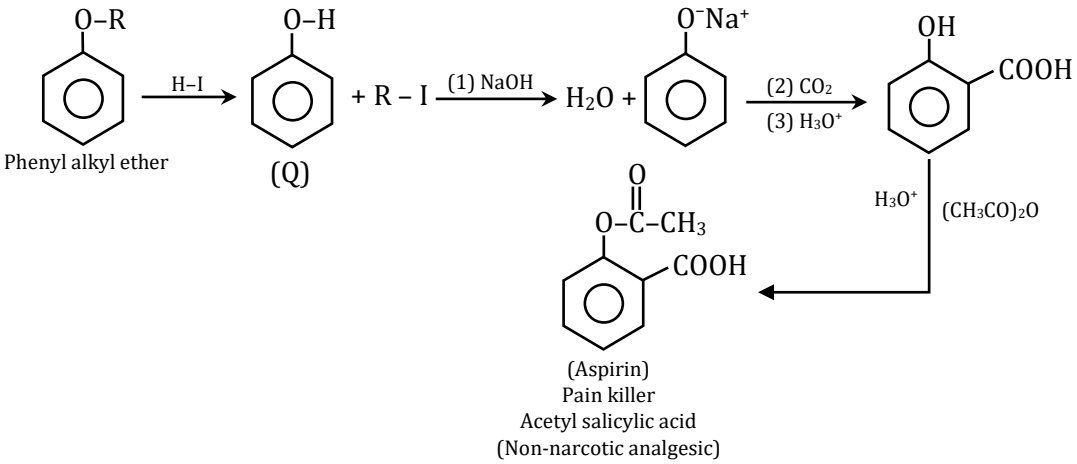
41. Ans. (B)

P is phenyl alkyl ether

Q is aromatic compound

R and S are the major product

i.e.



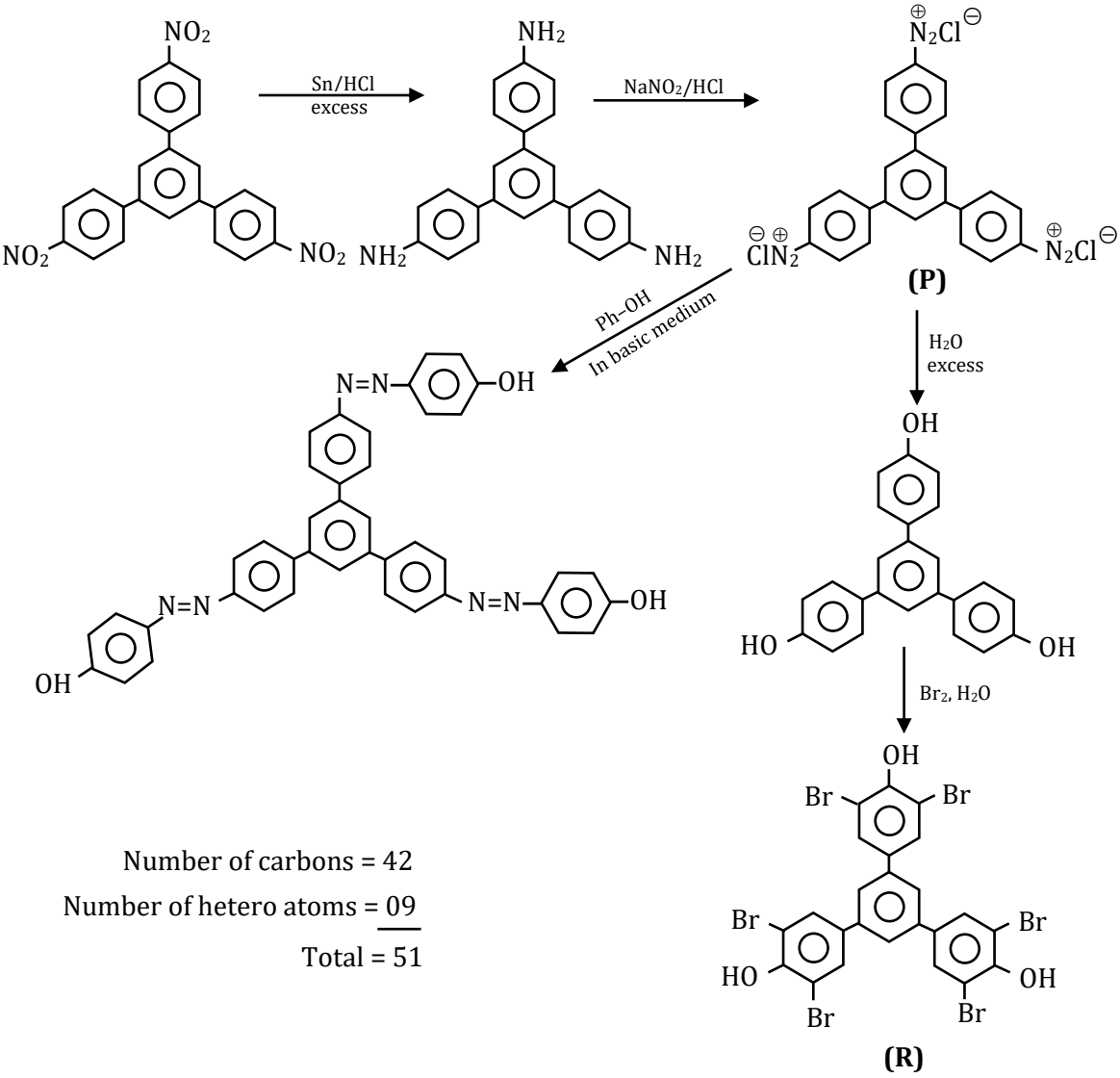
Correct answer is (B)

Aspirin inhibits the synthesis of chemicals known as prostaglandin's.

42. Ans. (9.00)

43. Ans. (51.00)

Common solution for Q.no. 42 and 43



Number of carbons = 42

Number of hetero atoms = 09

Total = 51

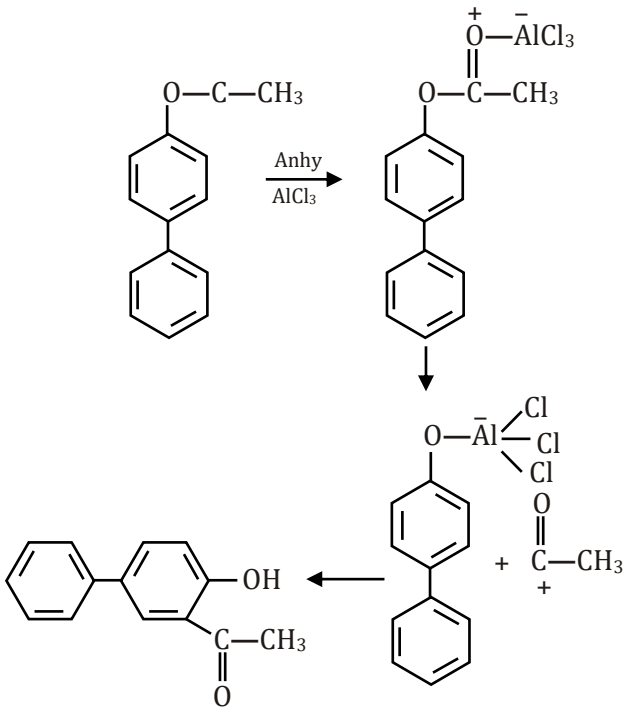
(R)

Number of hetero atoms in R is 9

JEE (Main) Practice Paper

SECTION-A

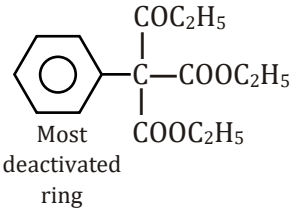
1. Ans. (1)



2. Ans. (2)

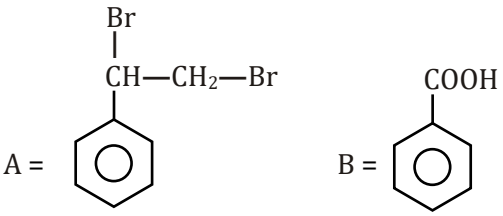
Ease of attack of electrophile (SO_3) α electron density of Benzene ring.

3. Ans. (4)



Most deactivated ring

4. Ans. (4)



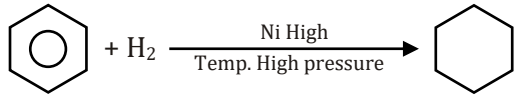
5. Ans. (3)

All are oxidized into C_6H_5COOH

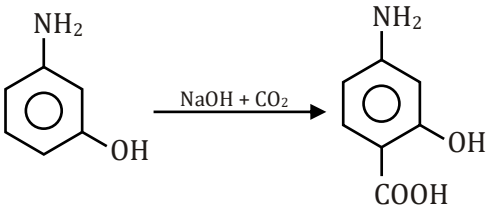
6. Ans. (4)

Maleic anhydrides.

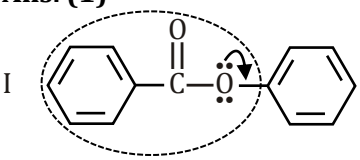
7. Ans. (1)



8. **Ans. (3)**

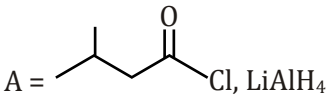


9. **Ans. (1)**



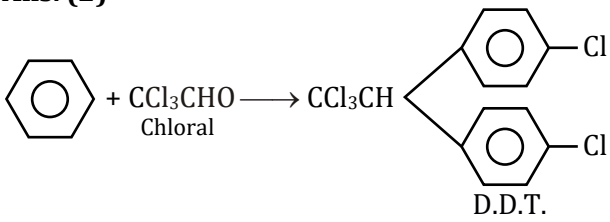
Activating group
(+R group)

10. **Ans. (4)**



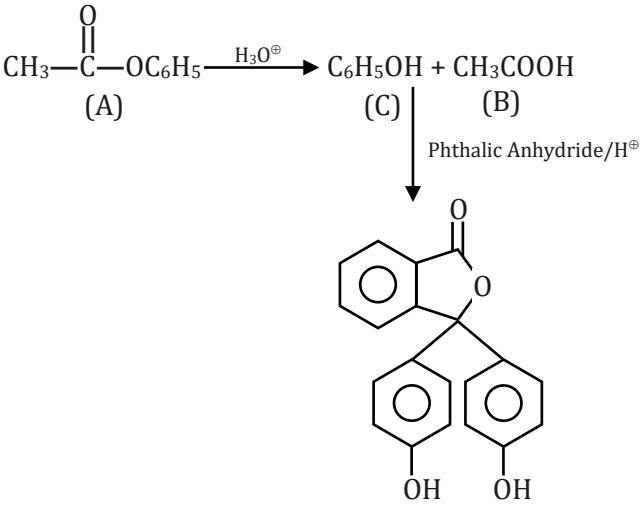
B = Zn(Hg) + Conc. HCl ⇒ First acylation then reduction.

11. **Ans. (2)**

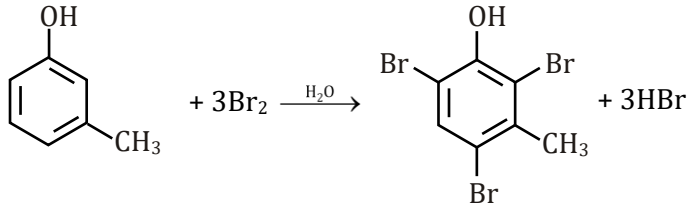


D.D.T.

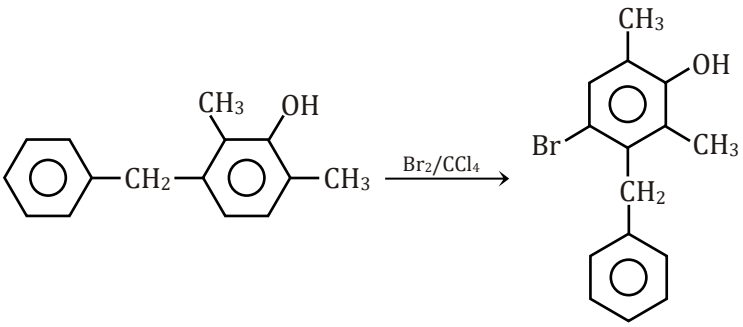
12. **Ans. (3)**



13. **Ans. (2)**



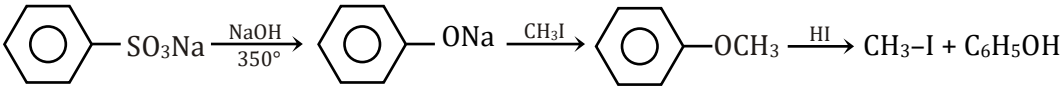
14. Ans. (2)



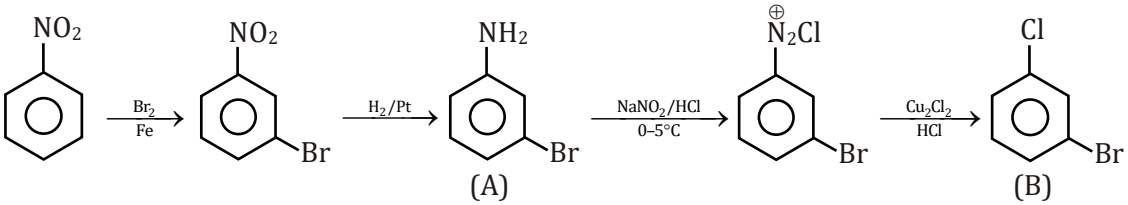
15. Ans. (4)

Electrophilic substitution reaction.

16. Ans. (3)



17. Ans. (2)



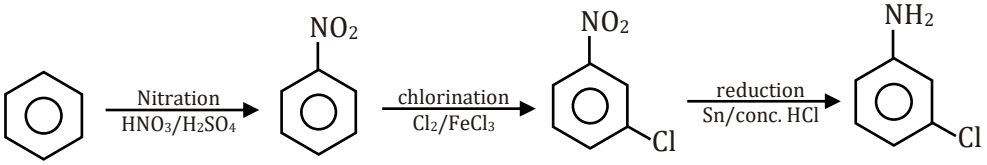
18. Ans. (2)

Aniline prefer coupling in slightly acidic medium.

19. Ans. (1)

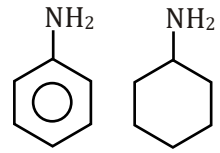
Phenol prefer coupling in slightly basic medium.

20. Ans. (3)



SECTION-B

1. Ans. (5)



(i) Both are Primary amine

(ii) Both can be acylated by RCOCl

(iii) Both reacts with $CHCl_3/KOH$

(iv) Both reacts with $NaNO_2/HCl$ at 0 – 5°C

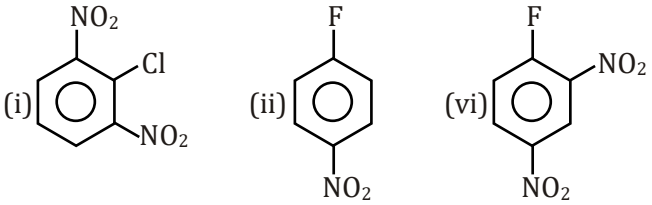
(v) Both reacts with $PhSO_2Cl$ to give a base (KOH) soluble compound.

Above characteristics are common.

(vi) only aniline coupling reaction with phenol

(vii) only aniline gives electrophilic substitution reactions.

2. Ans. (3)

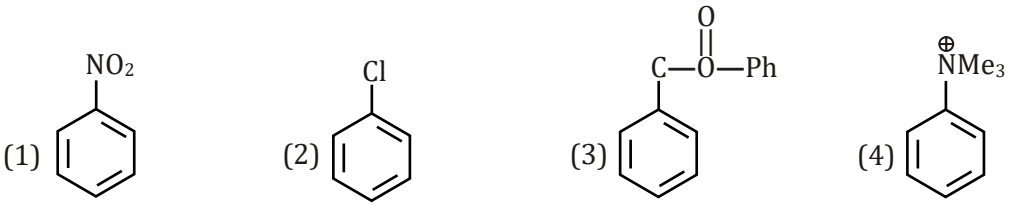


3. Ans. (5)

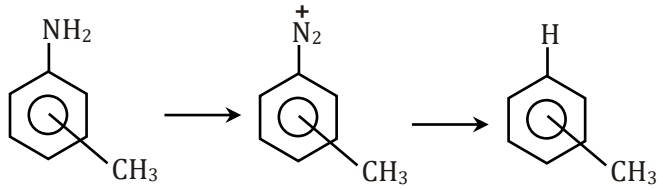
Sulphonation of Benzene is example of Ar S.E. Reaction.

In case of substituted Benzene if +R/+H/+I group is present over Benzene then such substituted Benzene molecule is more reactive than Benzene towards Ar SE Reaction and if –R/–H/–I group is present over Benzene; such molecule is less reactive than Benzene towards Ar SE Reaction.

So,

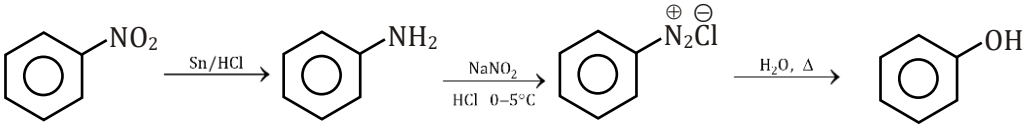


4. Ans. (3)



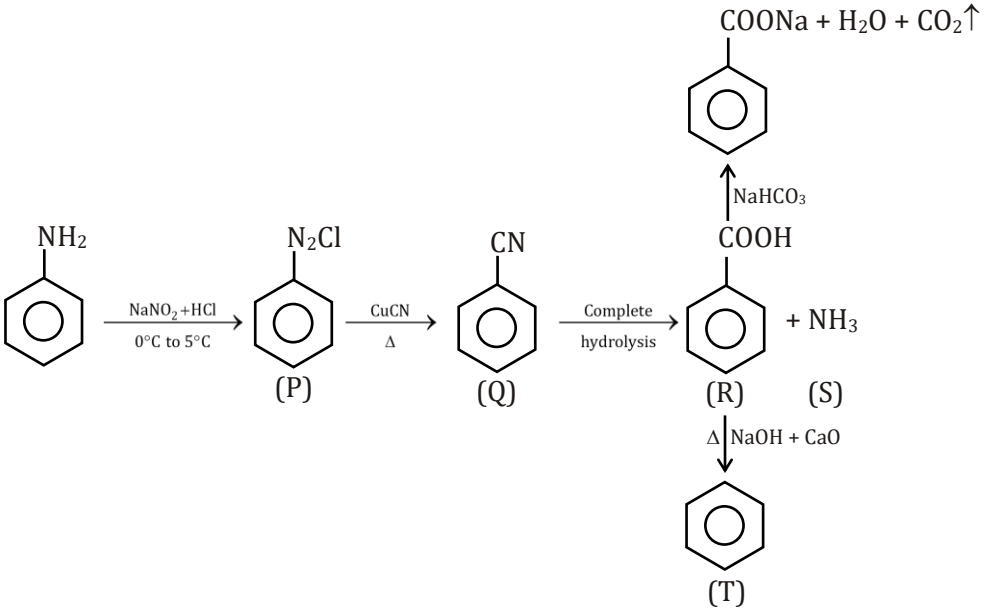
o, *m*, *p* isomer of toluidine's will give toluene with $NaNO_2/HCl$ followed by H_3PO_2 treatment.

5. Ans. (94)



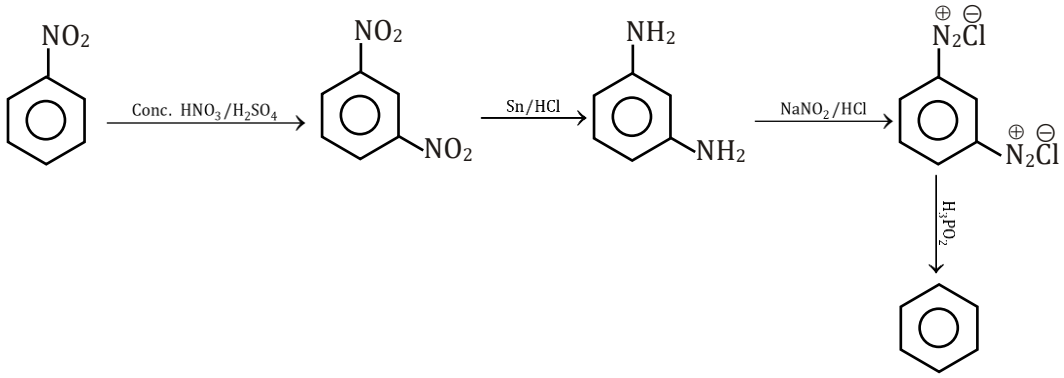
molecular weight of Z = 94

6. Ans. (78)

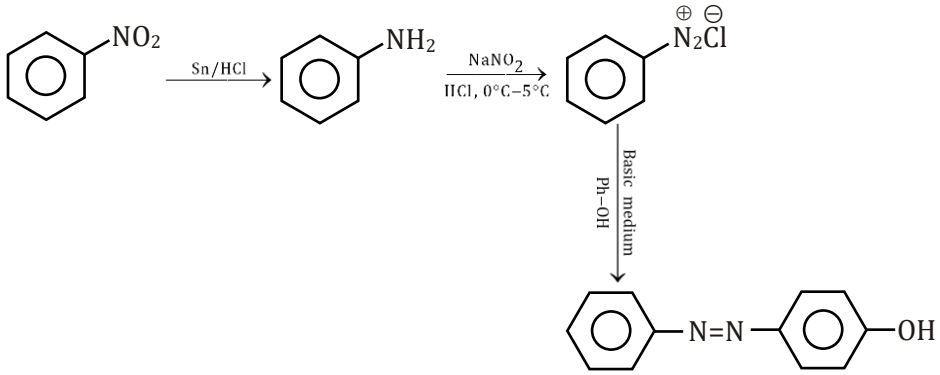


Molecular weight = 12 × 6 + 6 = 78

7. Ans. (0)



8. Ans. (99)

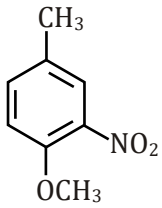


Molecular weight = 198

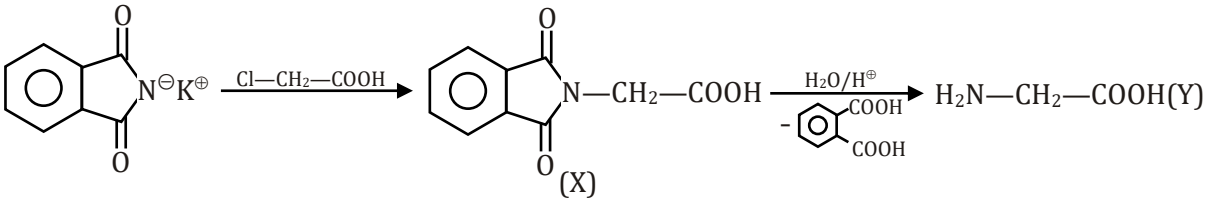
$\frac{198}{2}$ = 99

9. Ans. (9)

Activating efficiency $-OCH_3 > -CH_3$, i.e. attack $-NO_2$ at O-Position of $-OCH_3$.



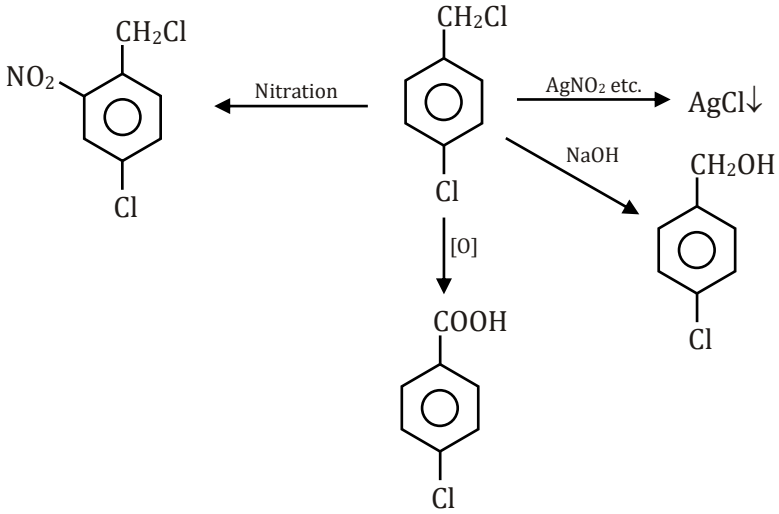
10. Ans. (75)



Molecular weight of Y = 75

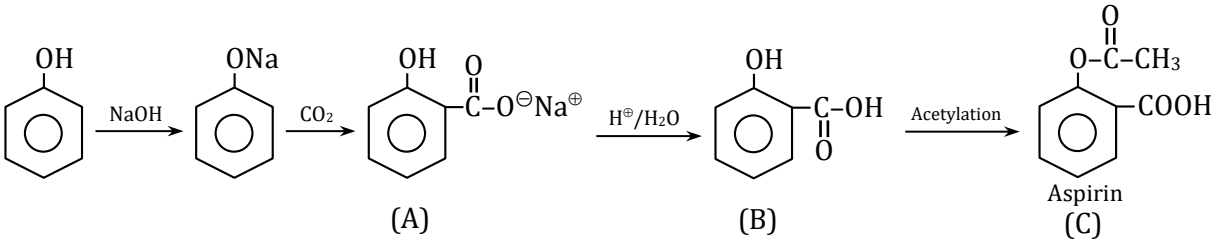
JEE (Advanced) Practice Paper

1. Ans. (A)



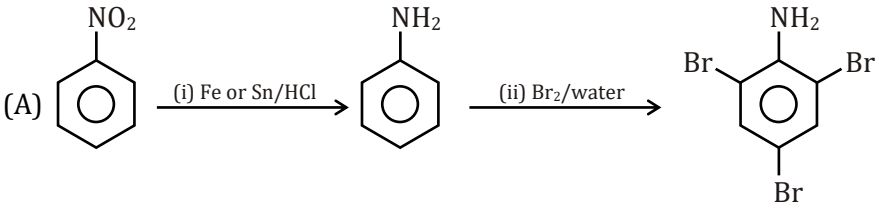
2. Ans. (D)

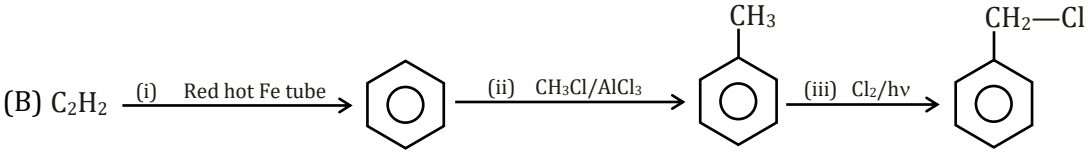
The complete reaction sequence is:

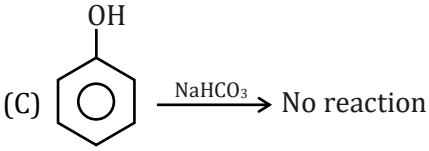


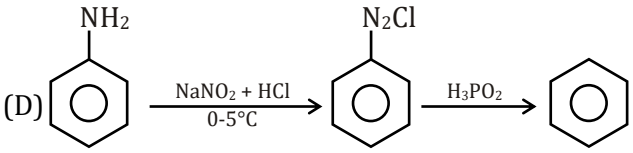
3. **Ans. (A)**

Major Product of A, B, C, D are

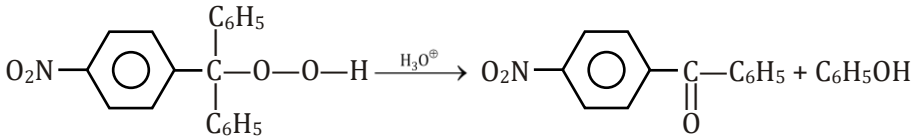




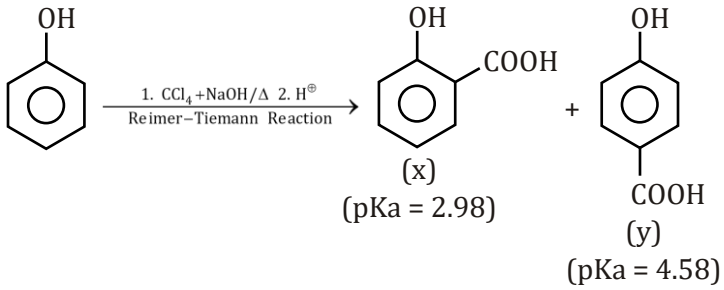




4. **Ans. (C)**

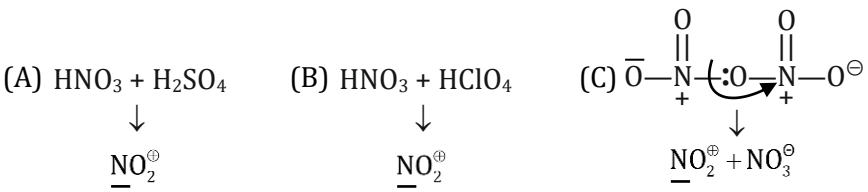


5. **Ans. (D)**



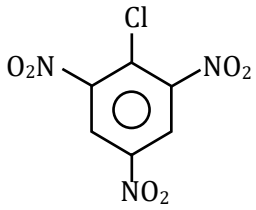
(Ka) = x > y (Carboxylate anion stabilized By H-bonding)
(Sol.) = y > x (Intermolecular H-bonding in y)
(Vol.) = x > y (Intramolecular H-bonding in x)
(MP) = y > x (More symmetrical structure of y)

6. **Ans. (D)**



7. **Ans. (C)**

More the electron withdrawing groups attached to benzene ring more will be its reactivity towards S_NAr reaction so most reactive is



8. **Ans. (D)**

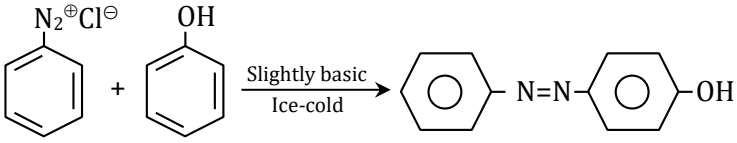
If para position in aniline is occupied, ortho coupling occurs with diazonium salt.

9. **Ans. (B)**

Ease of attack of electrophile α electron density of Benzene ring.

10. **Ans. (B)**

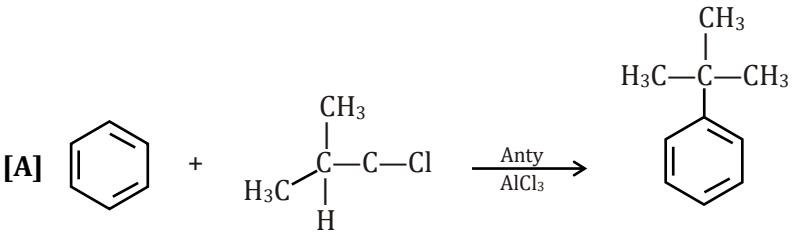
The dye is formed according to the reaction.

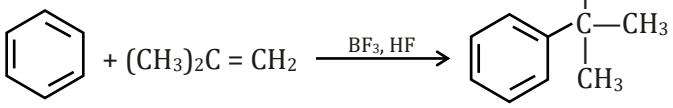


Orange solution

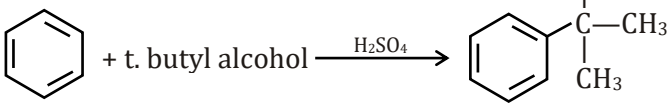
11. **Ans. (A,B,C,D)**

[A] Benzene + Isobutyl Chloride $\xrightarrow[AlCl_3]{Anty}$ t-Butyl Benzene

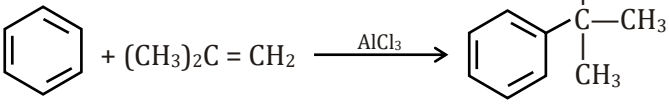


[B] 

t-Butyl Benzene

[C] 

t-Butyl Benzene

[D] 

t-Butyl Benzene

12. Ans. (A,B,D)

The replacement of a hydrogen atom in benzene by alkyl group take place when alkyl carbocation ($E^{\oplus}$) is attack over benzene ring. [Electrophilic Substitution Reaction.]

So,

[A] $R—Cl + AlCl_3 \longrightarrow R^{\oplus}\ (E^{\oplus}) + AlCl_4^{\ominus}$

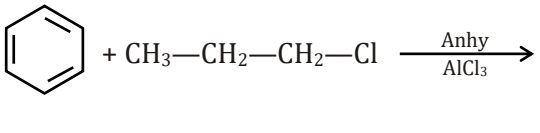
[B] $R—CH = CH_2 + AlCl_3 \longrightarrow (E^{\oplus})$ $\qquad R—\overset{\oplus}{C}H—CH_2—\overset{\ominus}{Al}Cl_3$

[C] $R—OH + \bar{O}H \longrightarrow R—\bar{O} + H_2O$
(Alkali) (Alkoxide)
(Not $E^{\oplus}$)

[D] $R - OH + H^{\oplus} \longrightarrow R^{\oplus}\ (E^{\oplus}) + H_2O$

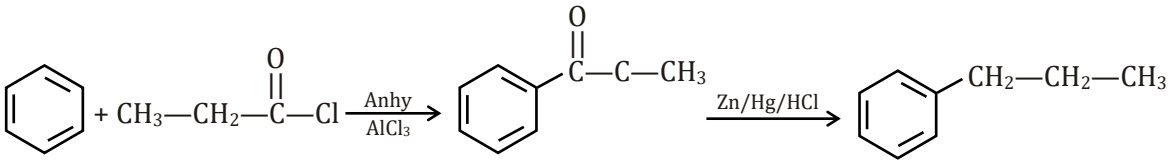
So, except [C] all are correct.

13. Ans. (B,D)

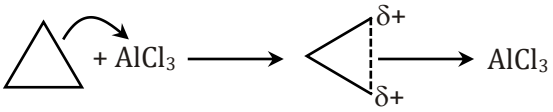
[A] 

Major

$CH_3—CH_2—CH_2—Cl + AlCl_3 \rightarrow CH_3—CH_2—\overset{\oplus}{C}H_2 + AlCl_4^{\ominus} \xrightarrow{1,2-\text{hydride Shift}} CH_3—\overset{\oplus}{C}H—CH_3$
More stable

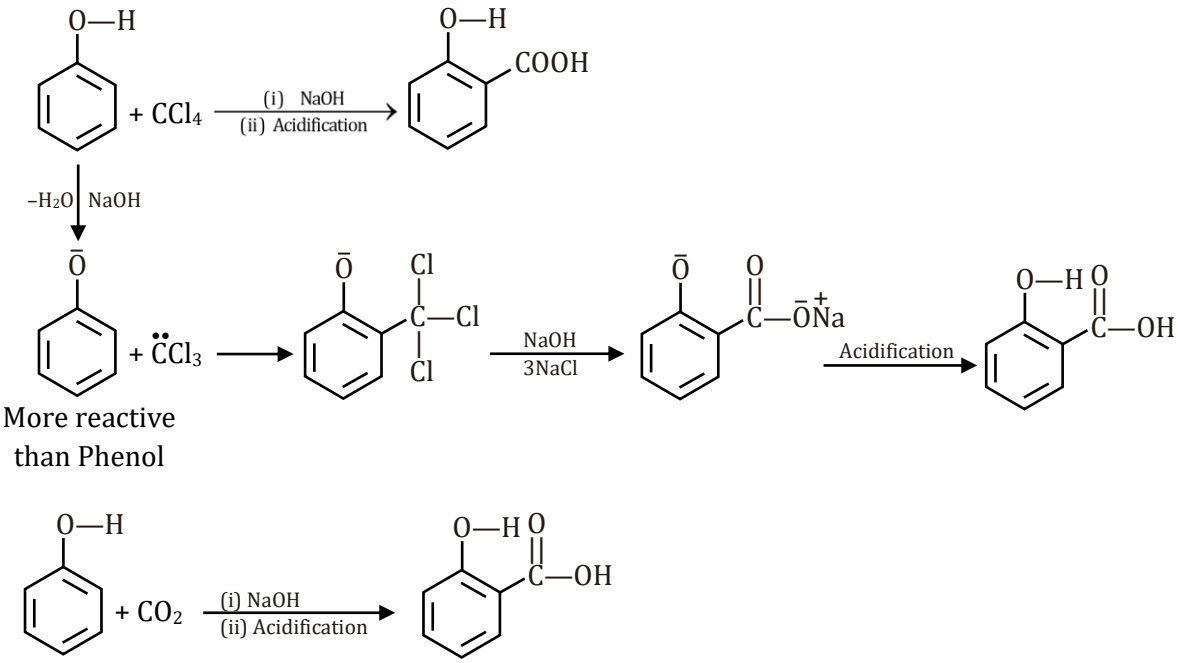
[B] 

n-propyl benzene

[D] 

Without rearrangement

14. Ans. (B,C)



15. Ans. (B)

[A→ P, S]

Cl is O, P directing, Deactivating towards Electrophile]

[B→ P, R]

CH_3 – O, P directing and Activating]

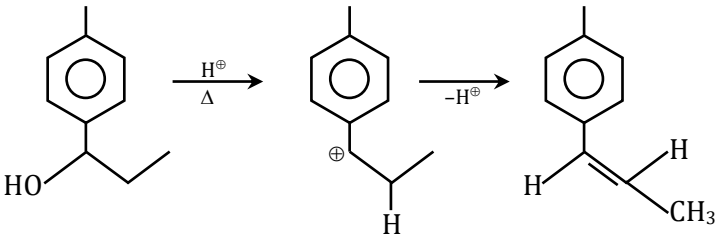
[C→ Q, S]

[D→P, R]

16. Ans. (B)

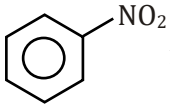
This is a case of ESR, sulphonation reaction.

17. Ans. (A)



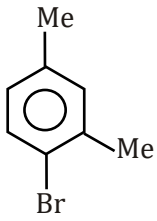
Trans alkene is Major Product.

18. Ans. (7.00)

(a) It is incorrect as is  is highly deactivated compound, it cannot show coupling reaction

(b) Friedel craft's reaction is difficult in aniline. It is incorrect.

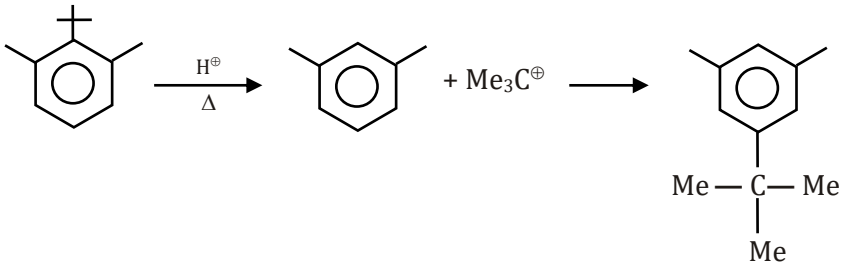
(c) It is incorrect. Since H_2SO_4 is an oxidising agent, it oxidises HI to I_2.

(d) Major product mentioned is incorrect. Major product of the reaction will be 

(e) It is incorrect as Birch reduction is not applicable on terminal alkyne

$$CH_3-C\equiv CH \xrightarrow[LiqNH_3]{Na} CH_3-C\equiv \overset{\ominus}{C}Na^{\oplus}$$

(f) It is not correct. Mixture of products will be obtain. Since it is not 100% anti addition, here carbocation is formed as intermediate.

(g) 

Here dealkylation and Alkylation will take place

(h) It is incorrect. As correct major product of sulphonation of Naphthalene at higher temperature is β: