ANSWERS

I. Multiple Choice Questions (Type-I)

1. (ii)	2. (iv)	3. (iii)	4. (i)	5. (iii)	6. (ii)
7. (iii)	8. (iv)	9. (iii)	10. (iv)	11. (ii)	12. (ii)
13. (iv)	14. (iii)	15. (ii)	16. (iii)	17. (iii)	18. (ii)
19. (i)	20. (ii)	21. (ii)	22. (iv)	23. (iii)	24. (iv)
25. (i)	26. (ii)	27. (iii)			

II. Multiple Choice Questions (Type-II)

28. (iii), (iv)	29. (i), (ii), (iii)	30. (i), (ii)	31. (ii), (iii)
32. (i), (ii)	33. (i), (ii), (iii)	34. (i), (ii)	35. (i), (iii)
36. (i), (ii)	37. (i), (ii)		

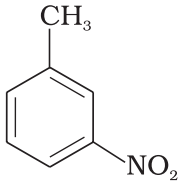
III. Short Answer Type

38. HNO_3 acts as a base in the nitrating mixture and provides the electrophile, NO_2^+ .

39. See NCERT textbook for Class XII.

40. $C_6H_5CH_2OH$

41. Reduction of nitriles with sodium/alcohol or $LiAlH_4$ gives primary amine.

42. 

43. Benzene sulphonylchloride.

44. Benzene diazonium chloride is very unstable.

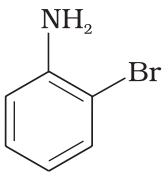
45. See NCERT textbook for Class XII.

46. Nitrogen is less electronegative than oxygen therefore lone pair of electrons on nitrogen is readily available for donation. Hence, $MeNH_2$ is more basic than MeOH.

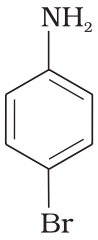
47. Pyridine and other bases are used to remove the side product i.e. HCl from the reaction mixture.

48. Reaction is done in mild basic conditions.

49. A mixture of 2-bromoaniline and 4-bromoaniline is formed.



(2-Bromoaniline)



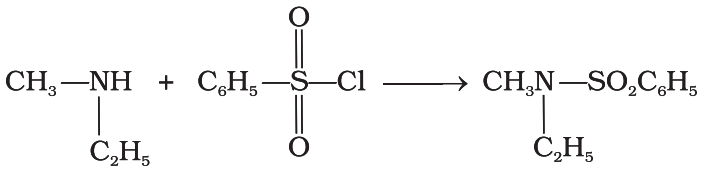
(4-Bromoaniline)

50. $CH_3CH_2CH_3 < CH_3CH_2NH_2 < CH_3CH_2OH$

51. $CH_2{=}CH{-}CH_2{-}NH_2$, prop-2-en-1-amine

52. N, N-Dimethylbenzenamine

53. Z is an aliphatic amine which gives a solid insoluble in base. This implies that reaction with $C_6H_5SO_2Cl$ must give a product without any replaceable hydrogen attached to nitrogen. In other words, the amine must be a secondary amine. i.e. Z is ethylmethylamine.

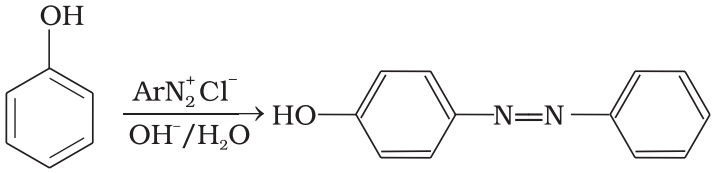


N-Ethyl-N-methyl benzene sulphonamide

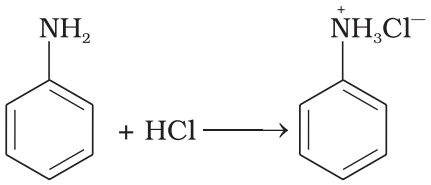
54. $RNH_2 \xrightarrow{KOH/CHCl_3} RNC \xrightarrow{H_2/Pd} RNHCH_3$

Carbylamine reaction is shown by 1° amine only which results in the replacement of two hydrogen atoms attached to nitrogen atom of NH_2 group by one carbon atom. On catalytic reduction the isocyanide will give a secondary amine with one methyl group.

55. The reaction exhibits azo-coupling of phenols. In mild alkaline conditions phenol moiety participates in the azo-coupling and para position of phenol is occupied.



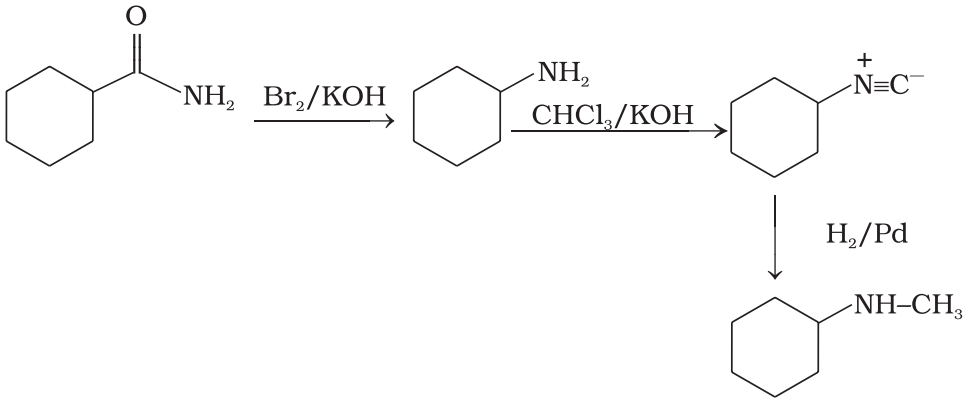
56. Aniline forms the salt anilinium chloride which is water soluble.



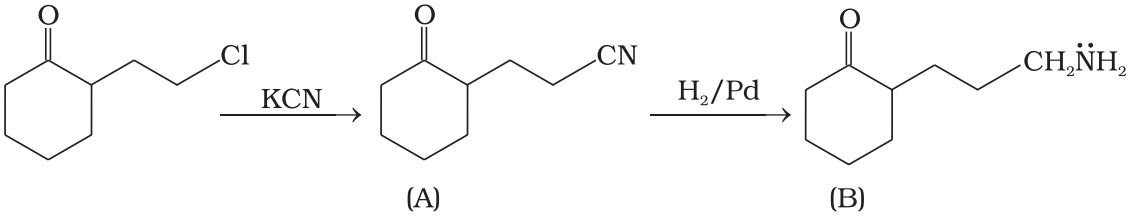
(A) Aniline (Colourless liquid, sparingly soluble in water)

(B) Anilinium chloride (Water soluble salt)

57.

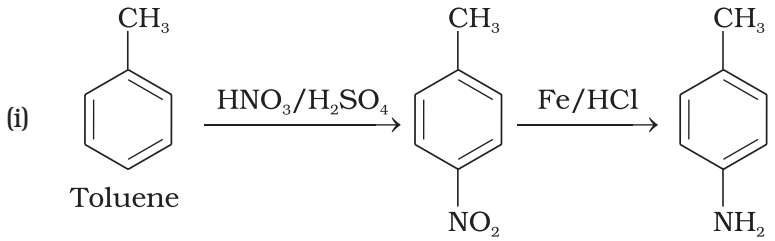


58.



(A) (B)

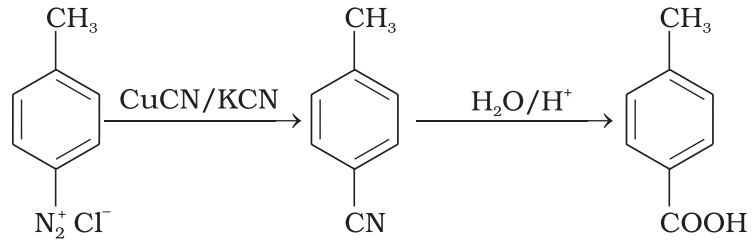
59.



Toluene

p-Toluidine

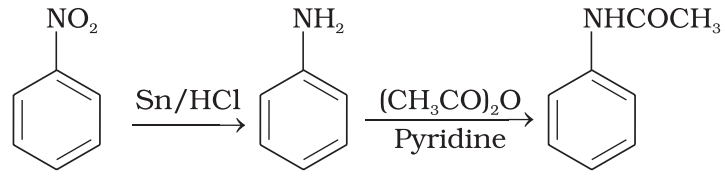
(ii)



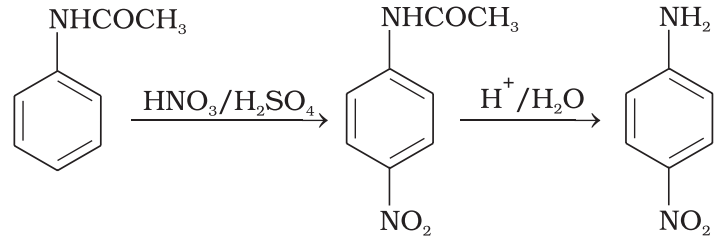
p-Toluic acid

60.

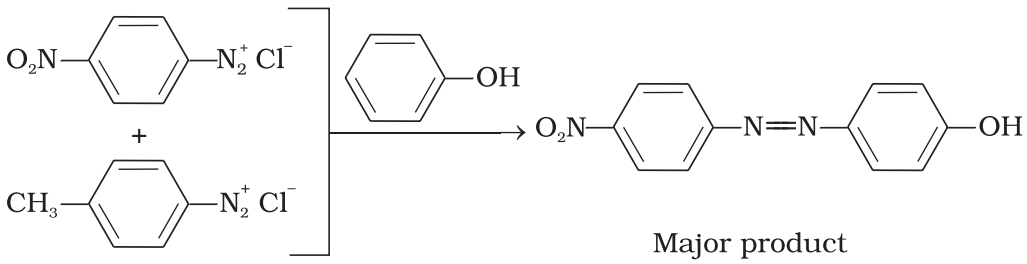
(i)



(ii)

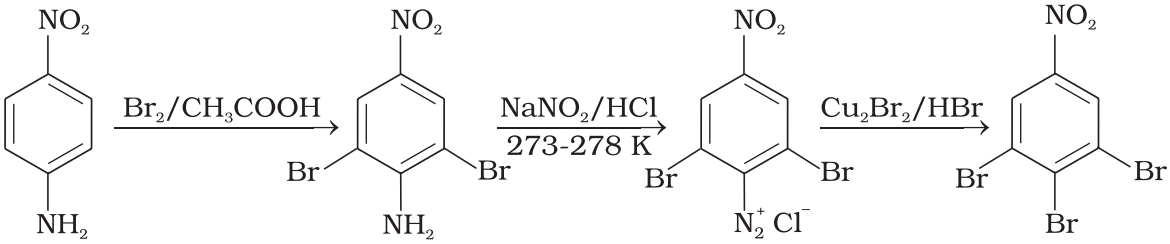


61. This reaction is an example of electrophilic aromatic substitution. In alkaline medium, phenol generates phenoxide ion which is more electron rich than phenol and hence more reactive for electrophilic attack. The electrophile in this reaction is aryldiazonium cation. Stronger the electrophile faster is the reaction. *p*-Nitrophenyldiazonium cation is a stronger electrophile than *p*-toluene diazonium cation. Therefore, it couples preferentially with phenol.

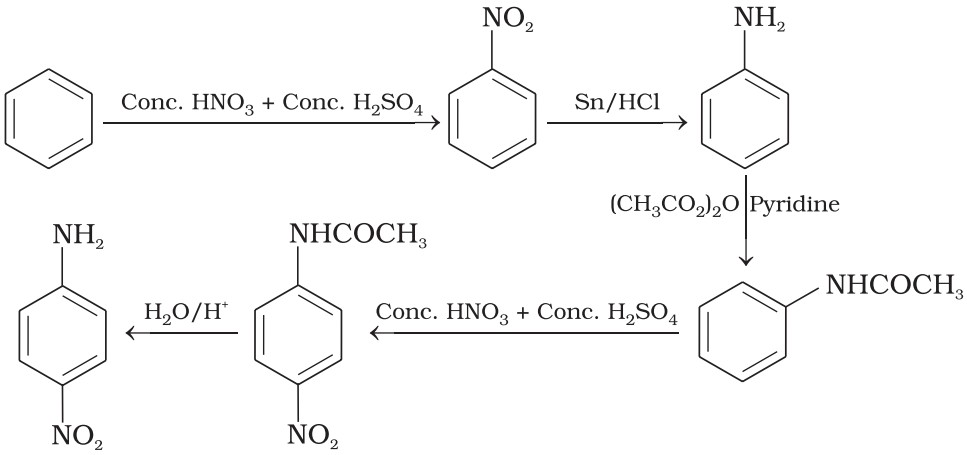


Major product

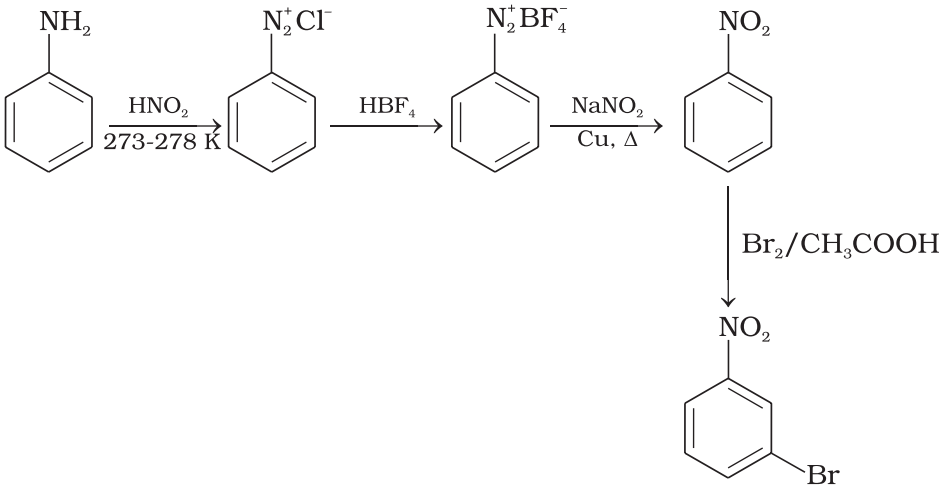
62.


NO2
NH2
Br2/CH3COOH
Br
NaNO2/HCl
273-278 K
N2+ Cl−
Cu2Br2/HBr

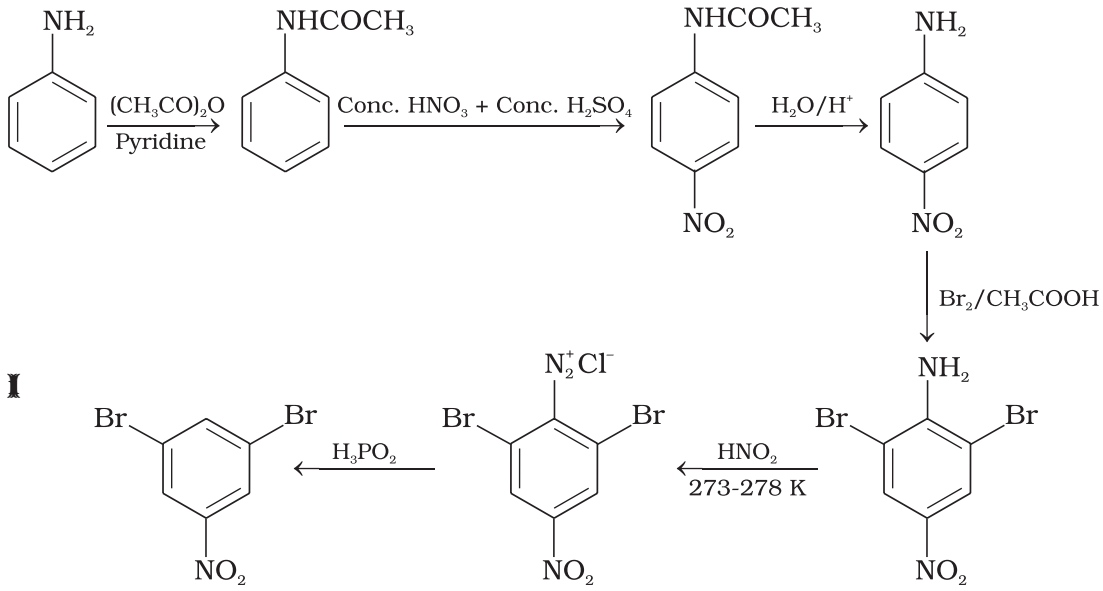
63.


Conc. HNO3 + Conc. H2SO4
NO2
Sn/HCl
NH2
(CH3CO2)2O
Pyridine
NHCOCH3
Conc. HNO3 + Conc. H2SO4
H2O/H+

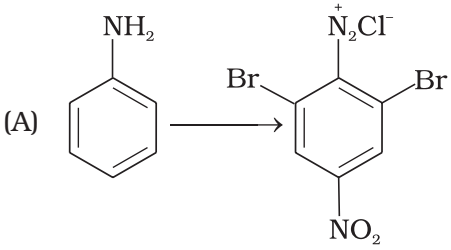
64.

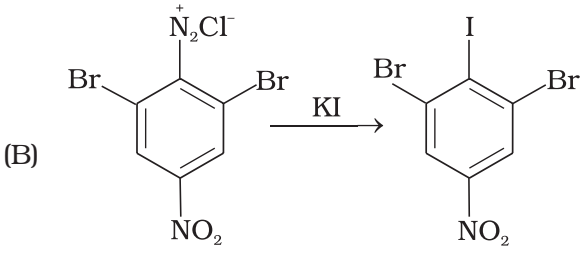

NH2
HNO2
273-278 K
N2+Cl−
HBF4
N2+BF4−
NaNO2
Cu, Δ
NO2
Br2/CH3COOH
Br

65. (i)



(ii) Conversion (A) given below is same as in part (i) given above after that reaction (B) can be carried out.





IV. Matching Type

66. (i) → (d) (ii) → (c) (iii) → (a) (iv) → (b)
67. (i) → (b) (ii) → (a) (iii) → (d) (iv) → (c)

V. Assertion and Reason Type

68. (iii) 69. (iii) 70. (iv) 71. (ii) 72. (iv) 73. (i) 74. (iv)

VI. Long Answer Type

75. (A) $\xrightarrow{\text{Ozonolysis}}$ $2CH_3CHO$

$C_4H_8 \xrightarrow{HCl} C_4H_9Cl$
(A) (B)

Addition of HCl has occurred on 'A'. This implies 'A' is an alkene.

$C_4H_9Cl \xrightarrow{NH_3} C_4H_{11}N$
(B) (C)

Cl in compound 'B' is substituted by NH_2 to give 'C'.

(C) $\xrightarrow[H_2O]{NaNO_2/HCl}$ (D)

'C' gives a diazonium salt with $NaNO_2/HCl$ that liberates N_2 to give optically active alcohol. This means that 'C' is an aliphatic amine. Number of carbon atoms in amine is same as in compound 'A'.

Since products of ozonolysis of compound 'A' are $CH_3-CH=O$ and $O=CH-CH_3$. The compound 'A' is $CH_3-CH=CH-CH_3$

On the basis of structure of 'A' reactions can be explained as follows :

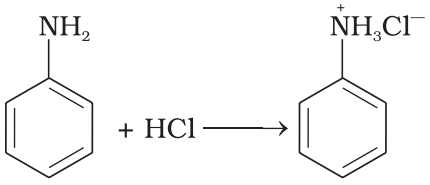
$$CH_3-CH=CH-CH_3 \xrightarrow{HCl} CH_3CH_2-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_3$$
(A) (B)

$$CH_3-CH_2-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_3 \xrightarrow{NH_3} CH_3-CH_2-\underset{\displaystyle NH_2}{\underset{|}{CH}}-CH_3$$
(B) (C)

$$CH_3-CH_2-\underset{\displaystyle NH_2}{\underset{|}{CH}}-CH_3 \xrightarrow[H_2O]{NaNO_2/HCl} CH_3-\underset{\displaystyle OH}{\underset{|}{\overset{\displaystyle CH_2CH_3}{\overset{|}{C}}}}-H$$
(Optically active)

(C) (D)

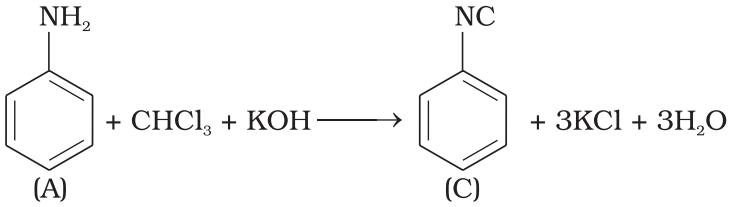
76.



(A) (B)

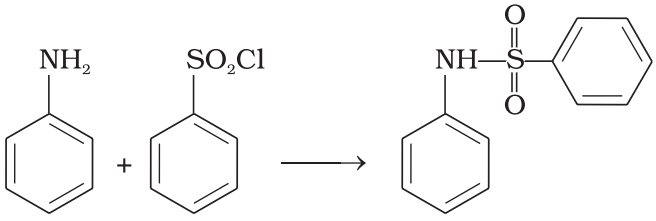
Aniline (Colourless liquid, sparingly soluble in water)

Anilinium chloride (Water soluble salt)



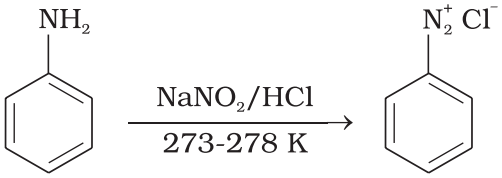
(A) (C)

Benzene isonitrile

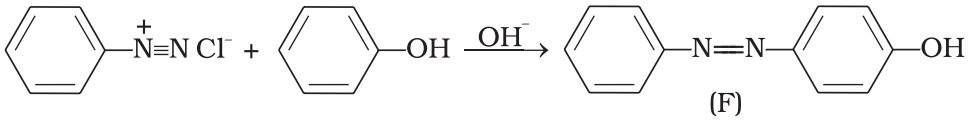


(A) (D)

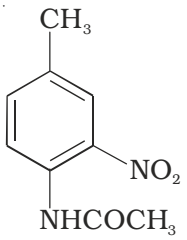
N-Phenylbenzenesulphonamide
(soluble in alkali)



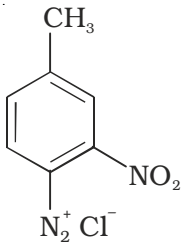
(A) (E)



(F)
Orange dye

77. 1. Sn-HCl 2. 

3. H_2O/H^+

4. 

5. H_3PO_2/H_2O