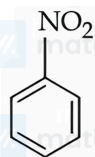


## Q1. JEE Main 2026 (21 January Shift 2)



- (1)  $\text{Br}_2/\text{FeBr}_3/\Delta$   
 (2)  $\text{Sn}/\text{HCl}/\Delta$   
 (3) pH neutralisation  
 (4)  $\text{Br}_2/\text{H}_2\text{O}$   
 (5)  $\text{NaNO}_2/\text{HBr}$ ,  $0 - 5^\circ\text{C}$   
 (6)  $\text{CuBr}/\text{NaBr}$

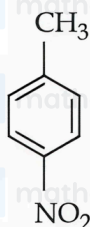
Major Product (P)

Consider the above sequence of reactions. The number of bromine atom(s) in the final product (P) will be :

- (1) 3      (2) 5      (3) 6      (4) 1

## Q2. JEE Main 2026 (23 January Shift 1)

Consider the following sequence of reactions.



- (i)  $\text{Sn}$ ,  $\text{HCl}/\Delta$   
 (ii) pH neutralisation

(A)

- (i)  $(\text{H}_3\text{CCO})_2\text{O}$   
 (ii)  $\text{Br}_2/\text{AcOH}$

(B)

4-Nitrotoluene

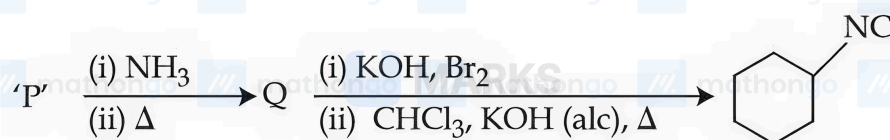
Assuming that the reaction proceeds to completion, then 137 mg of 4-nitrotoluene will produce \_\_\_\_\_ mg of B.

(Given molar mass in  $\text{gmol}^{-1}$ : H : 1, C : 12, N : 14, O : 16, Br : 80)

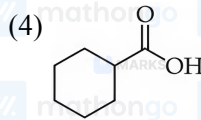
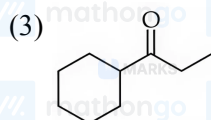
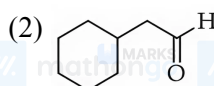
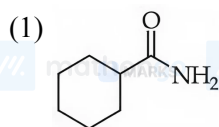
- (1) 208      (2) 301      (3) 228      (4) 146

## Q3. JEE Main 2026 (23 January Shift 1)

Compound 'P' undergoes the following sequence of reactions :



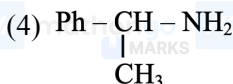
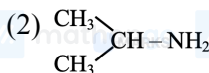
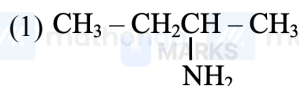
'P' is :



**Q4. JEE Main 2026 (28 January Shift 2)**

A student performed analysis of aliphatic organic compound 'X' which on analysis gave  $C = 61.01\%$ ,  $H = 15.25\%$ ,  $N = 23.74\%$ .

This compound, on treatment with  $HNO_2/H_2O$  produced another compound 'Y' which did not contain any nitrogen atom. However, the compound 'Y' upon controlled oxidation produced another compound 'Z' that responded to iodoform test. The structure of 'X' is :

**Q5. JEE Main 2026 (28 January Shift 2)**

Total number of alkali insoluble solid sulphonamides obtained by reaction of given amines with Hinsberg's reagent is \_\_\_\_\_.

Aniline, N-Methylaniline, Methanamine, N, N-Dimethylmethanamine, N-Methyl methanamine,

Phenylmethanamine, N-propylaniline, N-phenylaniline, N, N-Dimethylaniline, Allyl amine, Isopropyl amine

(1) 2

(2) 5

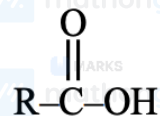
(3) 4

(4) 8

**Q6. JEE Main 2026 (24 January Shift 2)**

Given below are two statements:

**Statement I:** The dipole moment of R-CN is greater than R-NC and R-NC can undergo hydrolysis under acidic medium to produce



**Statement II:** R-CN hydrolyses under acidic medium to produce a compound which on treatment with  $SOCl_2$ , followed by the addition of  $NH_3$  gives another compound (x). This compound (x) on treatment with  $NaOCl/NaOH$  gives a product, that on treatment with  $CHCl_3/KOH/\Delta$  produces R-NC.

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

(1) Both Statement I and Statement II are false

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

(4) Statement I is true but Statement II is false

**Q7. JEE Main 2026 (24 January Shift 2)**

A student has planned to prepare acetanilide from aniline using acetic anhydride. The student has started from 9.3 g of aniline. However, the student has managed to obtain 11 g of dry acetanilide. The % yield of this reaction is :-

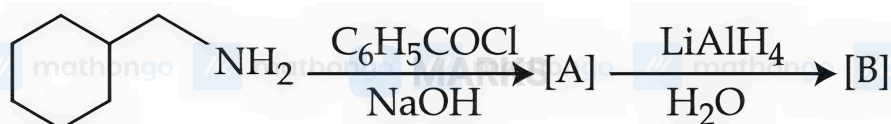
(1) 59.5 %

(2) 72.5%

(3) 97.5%

(4) 81.5%

## Q8. JEE Main 2026 (22 January Shift 2)



The final product [B] is :

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

## Q9. JEE Main 2026 (22 January Shift 2)

The mass of benzanilide obtained from the benzoylation reaction of 5.8 g of aniline, if yield of product is 82%, is \_\_\_\_\_ g (nearest integer). (Given molar mass in  $\text{gmol}^{-1}$ : H : 1, C : 12, N : 14, O : 16)

## Q10. JEE Main 2026 (22 January Shift 1)

'A' is a neutral organic compound (M. F :  $\text{C}_8\text{H}_9\text{ON}$ ). On treatment with aqueous  $\text{Br}_2/\text{HO}^-$ , 'A' forms a compound 'B' which is soluble in dilute acid. 'B' on treatment with aqueous  $\text{NaNO}_2/\text{HCl}$  ( $0 - 5^\circ\text{C}$ ) produces a compound 'C' which on treatment with  $\text{CuCN}/\text{NaCN}$  produces 'D'. Hydrolysis of 'D' produces 'E' which is also obtainable from the hydrolysis of 'A'. 'E' on treatment with acidified  $\text{KMnO}_4$  produces 'F'. 'F' contains two different types of hydrogen atoms. The structure of 'A' is

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

## Q11. JEE Main 2026 (23 January Shift 2)

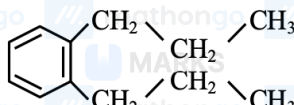
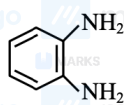
A student has been given a compound "x" of molecular formula-  $\text{C}_6\text{H}_7\text{N}$ . 'x' is sparingly soluble in water.

However, on addition of dilute mineral acid, 'x' becomes soluble in water. 'x' when treated with  $\text{CHCl}_3$  and  $\text{KOH}$  (alc), 'y' is produced. 'y' has a specific unpleasant smell. On treatment with benzenesulphonyl chloride, 'x' gives a compound 'z' which is soluble in alkali. The number of different "H" atoms present in 'z' is:-

- (1) 8                      (2) 4                      (3) 5                      (4) 7

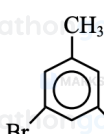
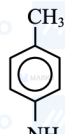
## Q12. JEE Main 2026 (23 January Shift 2)

Given below are two statements:



Statement I: 1,2-diaminobenzene can be synthesized from 1,2-dimethyl-4-propylbenzene using simpler reagents in the order i)

Acidic  $\text{KMnO}_4$ , ii) Ammonia, iii) Bromine and alkali



Statement II: N-methylaniline can be converted into 1-bromo-3,5-dibromobenzene using reagents in the order

i) Bromine-  $\text{H}_2\text{O}$

ii)  $\text{NaNO}_2/\text{HCl}$  ( $0 - 5^\circ\text{C}$ )

iii) Aq.  $\text{H}_3\text{PO}_2$ .

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

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

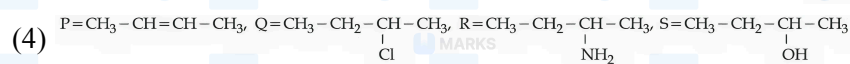
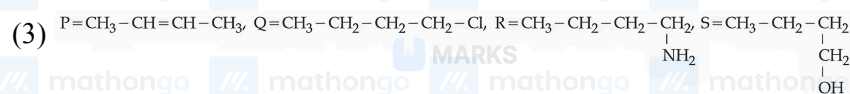
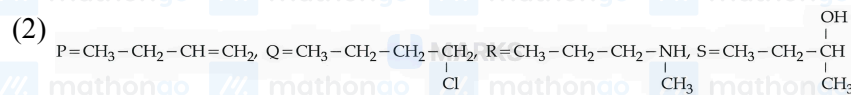
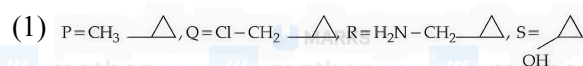
(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

## Q13. JEE Main 2026 (21 January Shift 1)

A hydrocarbon 'P' ( $\text{C}_4\text{H}_8$ ) on reaction with  $\text{HCl}$  gives an optically active compound 'Q' ( $\text{C}_4\text{H}_9\text{Cl}$ ) which on reaction with one mole of ammonia gives compound 'R' ( $\text{C}_4\text{H}_{11}\text{N}$ ). 'R' on diazotization followed by hydrolysis gives 'S'.

Identify P, Q, R and S.



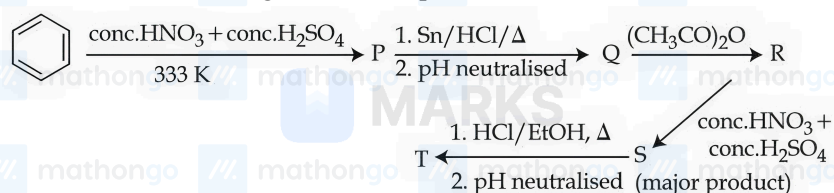
**Q14. JEE Main 2026 (21 January Shift 1)**

An organic compound (P) on treatment with aqueous ammonia under hot condition forms compound (Q) which on heating with  $\text{Br}_2$  and  $\text{KOH}$  forms compound (R) having molecular formula  $\text{C}_6\text{H}_7\text{N}$ . Names of P, Q and R respectively are.

- (1) Phenylethanoic acid, phenylethanamide, benzamine
- (2) Benzoic acid, 4-methylbenzamide, 4-methylaniline
- (3) Toluic acid, methylbenzamide, 2-methylaniline
- (4) Benzoic acid, benzamide, aniline

**Q15. JEE Main 2026 (21 January Shift 1)**

Consider the following reaction sequence

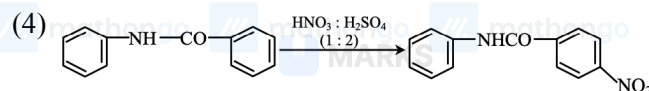
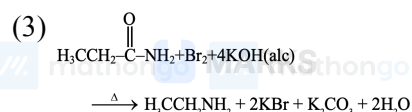
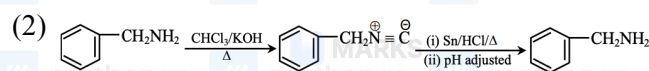
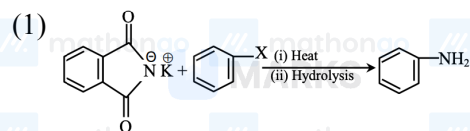


The percentage of nitrogen in product 'T' formed is \_\_\_\_%. (Nearest integer)

(Given molar mass in  $\text{gmol}^{-1}$ : H : 1, C : 12, N : 14, O : 16)

**Q16. JEE Main 2026 (28 January Shift 1)**

Consider the following reactions giving major product. Identify the correct reaction.



**Q17. JEE Main 2026 (28 January Shift 1)**

Given below are two statements:

**Statement I:** Griss-Ilosvay test is used for the detection of nitrite ion, which involves the use of sulphanilic acid and  $\alpha$ -naphthylamine reagent.

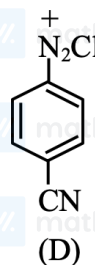
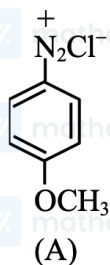
**Statement II:** In the above test, sulphanilic acid is diazotized by the acidified nitrite ion, which on further coupling with  $\alpha$ -naphthylamine forms an azo-dye.

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

- (1) Both Statement I and Statement II are true
- (2) Both Statement I and Statement II are false
- (3) Statement I is false but Statement II is true
- (4) Statement I is true but Statement II is false

**Q18. JEE Main 2026 (24 January Shift 1)**

The correct stability order of the following diazonium salts is



- (1)  $C > A > D > B$
- (2)  $A > C > D > B$
- (3)  $A > B > C > D$
- (4)  $C > D > B > A$

## ANSWERS AND SOLUTIONS

1. (2)      2. (3)      3. (4)      4. (2)      5. (3)      6. (2)      7. (4)      8. (4)  
 9. 10      10. (3)      11. (4)      12. (2)      13. (4)      14. (4)      15. 20      16. (3)  
 17. (1)      18. (2)

1. (2) The reaction sequence is as follows:

1. Bromination of nitrobenzene with  $Br_2/FeBr_3$  results in meta-bromonitrobenzene because the  $-NO_2$  group is meta-directing. (1 Br atom)
2. Reduction of the nitro group using  $Sn/HCl$  followed by pH neutralization converts  $-NO_2$  to  $-NH_2$ . The product is m-bromoaniline.
3. Reaction with  $Br_2/H_2O$  (bromine water) on m-bromoaniline: The  $-NH_2$  group is highly activating and ortho/para directing. In m-bromoaniline, the positions ortho and para to  $-NH_2$  are vacant (positions 2, 4, and 6 relative to  $-NH_2$ ). Bromine water causes polybromination at all available ortho and para positions. This adds 3 more bromine atoms. (Total  $1 + 3 = 4$  Br atoms)
4. Diazotization with  $NaNO_2/HBr$  at  $0 - 5^\circ C$  converts the  $-NH_2$  group into a diazonium salt  $-N_2^+ Br^-$ .
5. Sandmeyer reaction with  $CuBr/NaBr$  replaces the diazonium group with a bromine atom. (Total  $4 + 1 = 5$  Br atoms)

The final product (P) is 1,2,3,4,5-pentabromobenzene. Therefore, the number of bromine atoms in the final product is 5.

2. (3) Starting with 137 mg of 4-nitrotoluene ( $C_7H_9NO_2$ , MW = 137).

Step 1: Reduction with  $Sn/HCl$  converts  $NO_2$  to  $NH_2$ , producing 4-aminotoluene (A).

Step 2: Acetylation with  $(CH_3CO)_2O$  produces the acetamide intermediate, then bromination with  $Br_2/AcOH$  adds bromine to the para position (ortho-para directing due to acetamide group), yielding 4-bromo-N-(4-methylphenyl)acetamide (B) with molecular formula  $C_9H_{10}BrNO$  and MW = 228 g/mol.

Moles of starting material =  $137 \text{ mg} \div 137 \text{ g/mol} = 1 \text{ mmol}$ .

Assuming complete reaction, moles of B produced = 1 mmol.

Mass of B =  $1 \text{ mmol} \times 228 \text{ mg/mmol} = 228 \text{ mg}$ .

3. (4) The final product is cyclohexyl isocyanide ( $C_6H_{11}NC$ ).

Working backwards from the final product:

The last step involves  $CHCl_3$  and  $KOH$  (alc), which is the Carbylamine reaction.

This reaction converts a primary amine ( $R - NH_2$ ) into an isocyanide ( $R - NC$ ). Thus, the intermediate before this step must be cyclohexylamine ( $C_6H_{11}NH_2$ ).

The step before cyclohexylamine involves  $Br_2$  and  $KOH$ , which is the Hoffmann Bromamide Degradation reaction.

This reaction converts an amide ( $R - CONH_2$ ) into a primary amine ( $R - NH_2$ ) with one less carbon atom.

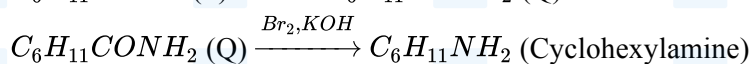
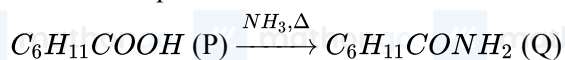
Therefore, the amide 'Q' must be cyclohexanecarboxamide ( $C_6H_{11}CONH_2$ ).

The first step converts 'P' into 'Q' using  $NH_3$  and heat.

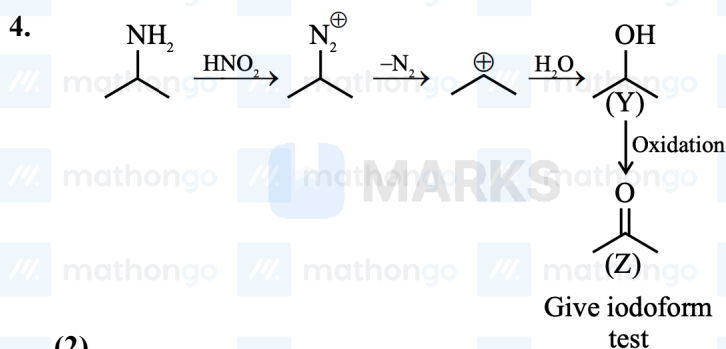
Carboxylic acids react with  $NH_3$  followed by heating to form amides.

Thus, 'P' must be cyclohexanecarboxylic acid ( $C_6H_{11}COOH$ ).

Reaction sequence:



Comparing with the options, 'P' is cyclohexanecarboxylic acid, which corresponds to option (4).



(2)

5. (3) Hinsberg's reagent (benzenesulfonyl chloride) classifies amines by their reaction products:

Primary amines ( $RNH_2$ ) form alkali-soluble sulfonamides (soluble in  $NaOH$ ).

Secondary amines ( $R_2NH$ ) form alkali-insoluble sulfonamides (precipitate in  $NaOH$ ).

Tertiary amines ( $R_3N$ ) do not react.

Analyzing the given amines:

Aniline (primary), Methanamine (primary), Phenylmethanamine (primary), Allyl amine (primary), Isopropyl amine (primary)  $\rightarrow$  alkali-soluble.

N,N-Dimethylmethanamine (tertiary), N,N-Dimethylaniline (tertiary)  $\rightarrow$  no reaction.

N-Methylaniline (secondary), N-Methyl methanamine (secondary), N-Propylaniline (secondary), N-Phenylaniline (secondary)  $\rightarrow$  alkali-insoluble.

Total alkali-insoluble sulfonamides: 4.

6. (2) Statement I: The dipole moment of alkyl cyanides ( $R-CN$ ) is indeed greater than alkyl isocyanides ( $R-NC$ ) because the  $C \equiv N$  bond is more polar than the  $N^+ \equiv C^-$  bond where formal charges oppose the electronegativity difference. However, the acidic hydrolysis of  $R-NC$  produces a primary amine ( $R-NH_2$ ) and formic acid ( $HCOOH$ ), not a carboxylic acid ( $R-COOH$ ). Thus, Statement I is false.

Statement II:  $R-CN$  on acidic hydrolysis gives  $R-COOH$ . Treatment with  $SOCl_2$  gives  $R-COCl$ .

Addition of  $NH_3$  gives  $R-CONH_2$  (compound x). Treatment of  $R-CONH_2$  with  $NaOCl/NaOH$

(Hofmann Bromamide Degradation equivalent) gives  $R-NH_2$ .  $R-NH_2$  on treatment with  $CHCl_3/KOH/\Delta$

(Carbylamine reaction) produces  $R - NC$ . Thus, Statement II is true.

Therefore, Statement I is false but Statement II is true.

7. (4) Molar mass of aniline ( $C_6H_5NH_2$ ) = 93 g/mol.

Moles of aniline =  $9.3/93 = 0.1$  mol.

From the reaction, theoretical yield of acetanilide = 0.1 mol.

Molar mass of acetanilide ( $C_6H_5NHCOCH_3$ ) = 135 g/mol.

Theoretical mass =  $0.1 \times 135 = 13.5$  g.

Percentage yield =  $(11/13.5) \times 100 = 81.5\%$

8. (4) Cyclohexylmethylamine reacts with benzoyl chloride under basic conditions to form amide [A]: cyclohexylmethyl benzoamide.

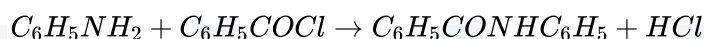
$LiAlH_4$  reduces the amide carbonyl to  $CH_2$ , converting the N-benzoyl group to a benzyl group.

The product [B] is a secondary amine formed by reduction:

cyclohexylmethyl-benzylamine ( $C_6H_{11} - CH_2 - NH - CH_2 - C_6H_5$ ).

This structure contains secondary amine (N-H) with two carbon substituents: cyclohexylmethyl and benzyl groups.

9. (10) Benzoylation of aniline:



Molar mass of aniline:

$$M = 6(12) + 7(1) + 14 = 93 \text{ g/mol}$$

Moles of aniline:

$$n = \frac{5.8}{93} = 0.0624 \text{ mol}$$

Molar mass of benzanilide ( $C_{13}H_{11}NO$ ):

$$M = 13(12) + 11(1) + 14 + 16 = 197 \text{ g/mol}$$

Theoretical mass of benzanilide:

$$m_{\text{theoretical}} = 0.0624 \times 197 = 12.29 \text{ g}$$

Actual mass with 82% yield:

$$m_{\text{actual}} = 12.29 \times 0.82 = 10.08 \approx 10 \text{ g}$$

10. (3) Compound A undergoes bromination with aqueous  $Br_2/HO^-$  to form B, which is soluble in dilute acid, indicating an amino group is present.

B undergoes diazotization with  $NaNO_2/HCl$  at  $0-5^\circ C$  to form diazonium compound C.

The diazonium compound is then treated with  $CaCN/NaOH$  to form nitrile compound D.

Hydrolysis of D produces carboxylic acid E.

When A is treated with acidified  $\text{KMnO}_4$ , it produces F containing two different types of hydrogen atoms.

This reaction sequence is characteristic of anthranilic acid (2-aminobenzoic acid), where the amino group directs bromination to the para position, and subsequent reactions proceed through the diazonium intermediate.

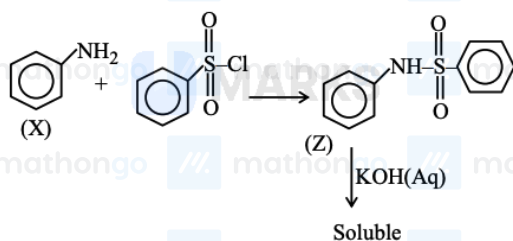
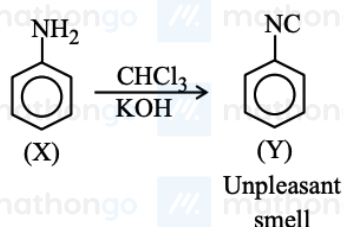
The structure shown in option (3), which is 2-aminobenzoic acid, fits all these transformations.

11. (4) Compound X has molecular formula  $\text{C}_6\text{H}_7\text{N}$ , is sparingly soluble in water but soluble in dilute mineral acid  $\rightarrow$  primary aromatic amine (aniline).

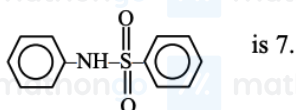
X with  $\text{CHCl}_3 + \text{KOH}$  (alc.) gives Y with unpleasant smell  $\rightarrow$  carbylamine reaction, confirms primary amine.

X with benzenesulphonyl chloride gives Z which is soluble in alkali  $\rightarrow$  Hinsberg test confirms primary amine. Z is N-phenylbenzenesulfonamide.

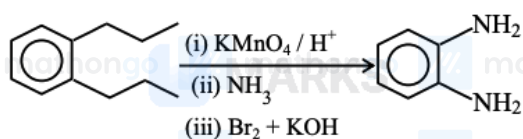
Structure of Z:  $\text{C}_6\text{H}_5\text{-NH-SO}_2\text{-C}_6\text{H}_5$



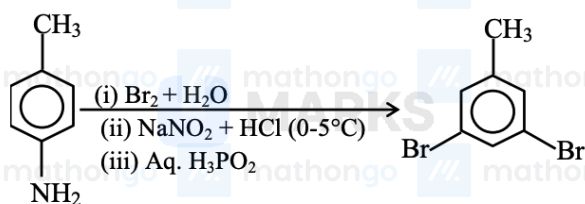
Number of different H atom in



12. (2) Statement I:



Statement II:



Therefore, both statements are true.

13. (4) For Q ( $C_4H_9Cl$ ) to be optically active, it must have a chiral center.

P ( $C_4H_8$ ) = but-2-ene ( $CH_3 - CH = CH - CH_3$ )

P + HCl  $\rightarrow$  Q:  $CH_3 - CH = CH - CH_3 + HCl \rightarrow CH_3 - CH(Cl) - CH_2 - CH_3$  (2-chlorobutane, chiral at C-2)

Q +  $NH_3 \rightarrow$  R: 2-chlorobutane +  $NH_3 \rightarrow CH_3 - CH(NH_2) - CH_2 - CH_3$  (2-aminobutane)

R  $\rightarrow$  diazotization  $\rightarrow$  hydrolysis  $\rightarrow$  S: 2-aminobutane  $\xrightarrow{NaNO_2/HCl}$  diazonium salt  $\xrightarrow{H_2O}$   $CH_3 - CH(OH) - CH_2 - CH_3$  (butan-2-ol)

14. (4) Q +  $Br_2/KOH \rightarrow$  R is Hofmann bromamide degradation: Amide  $\rightarrow$  Amine (with one less carbon).

R =  $C_6H_7N = C_6H_5NH_2$  = Aniline

For Q to give aniline, Q = Benzamide ( $C_6H_5CONH_2$ )

$C_6H_5CONH_2 \xrightarrow{Br_2/KOH} C_6H_5NH_2$

P + hot  $NH_3 \rightarrow$  Q: Carboxylic acid +  $NH_3 \rightarrow$  Amide

P = Benzoic acid ( $C_6H_5COOH$ )

$C_6H_5COOH \xrightarrow{NH_3, \Delta} C_6H_5CONH_2$

P = Benzoic acid, Q = Benzamide, R = Aniline

15. (20) Benzene  $\xrightarrow{HNO_3/H_2SO_4}$  Nitrobenzene (P)  $\xrightarrow{Sn/HCl}$  Aniline (Q)  $\xrightarrow{(CH_3CO)_2O}$  Acetanilide (R)  
 R  $\xrightarrow{HNO_3/H_2SO_4}$  p-Nitroacetanilide (S)  $\xrightarrow{HCl/EtOH, \Delta}$  p-Nitroaniline (T)

T = p-Nitroaniline ( $O_2N - C_6H_4 - NH_2$ ), molecular formula  $C_6H_6N_2O_2$

Molar mass =  $6(12) + 6(1) + 2(14) + 2(16) = 72 + 6 + 28 + 32 = 138$  g/mol

% N =  $\frac{28}{138} \times 100 = 20.29\%$

Nearest integer = 20

16. (3) In reaction (1), Gabriel phthalimide synthesis cannot be used to prepare aniline because aryl halides do not undergo nucleophilic substitution ( $S_N2$ ) with potassium phthalimide due to partial double bond character of the C-X bond.

In reaction (2), the reduction of isocyanide ( $R - NC$ ) with  $Sn/HCl$  yields a secondary amine ( $R - NHCH_3$ ), not a primary amine ( $R - CH_2NH_2$ ).

In reaction (3), propanamide reacts with  $Br_2$  and  $KOH$  (Hofmann Bromamide Degradation) to give ethanamine.

This is a correct reaction.

In reaction (4), the  $-NHCO-$  group is attached to two rings. The ring attached to the nitrogen atom is activated (ortho/para directing) due to the lone pair on N, while the ring attached to the carbonyl group is deactivated.

Therefore, nitration should occur on the ring attached to the Nitrogen atom at the para position, not on the ring attached to the Carbonyl group.

**17. (1)** The Griss-Ilosvay test for nitrite ion detection involves adding sulphanilic acid and  $\alpha$ -naphthylamine reagent.

Acidified nitrite ions diazotize sulphanilic acid, forming a diazonium salt that undergoes azo coupling with  $\alpha$ -naphthylamine to produce a characteristic red azo-dye. Both statements accurately describe this test and its mechanism, making both statements true.

**18. (2)** The stability of benzenediazonium salts is governed by the electronic effects of the substituents present on the benzene ring.

The diazonium group  $-N_2^+$  is strongly electron-withdrawing. Electron-donating groups (EDG) stabilize the diazonium cation by dispersing the positive charge through resonance or inductive effects, whereas electron-withdrawing groups (EWG) destabilize it by increasing the positive charge density.

In (A), the  $-OCH_3$  group at the para position is a strong electron-donating group via the  $+M$  effect, which significantly stabilizes the diazonium ion.

In (C), there is no substituent (hydrogen), providing a baseline stability.

In (D), the  $-CN$  group is an electron-withdrawing group via  $-M$  and  $-I$  effects, which destabilizes the cation.

In (B), the  $-NO_2$  group is a very strong electron-withdrawing group via  $-M$  and  $-I$  effects, even stronger than  $-CN$ , leading to the least stability.

Comparing the effects:  $+M$  of  $-OCH_3$  (A)  $>$   $H$  (C)  $>$   $-M$  of  $-CN$  (D)  $>$   $-M$  of  $-NO_2$  (B).

Therefore, the correct stability order is  $A > C > D > B$ .