1. Which of the following tests is suitable to differentiate between aniline and benzylamine?

(a) Anilines gives dye test on diazotization and reaction with $\beta-$ naphthol while bezylamines gives alcohol.

(b) Benzylamine gives green dry with β naphthol after diazotization while aniline gives orange dye.

(c) Aniline gives carbylamines reaction while benzylamine does not

(d) Benzylamine gives carbylamines reaction while aniline does not.

2. The Hinsberg test of a compound $C_5H_{14}N_2$ produces a solid that is insoluble in 10% aq. NaOH. This solid derivative dissolves is 10% aqueous sulphuric acid. Which of the following would best describe these facts?

(a) $NH_2CH_2CH_2N(CH_3)_2$

(b) $(CH_3)_2NCH_2CH_2NHCH_3$

(c) $NH_2CH_2C(CH_3)_2CH_2NH_2$

(d) $(CH_3)_2NCH_2N(CH_3)_2$

3. Amino group is o,p-directing for electrophilic substitution reaction. But on nitration the major products is m-nitroaniline because

(a) Aniline gets protonated with strong acids to give anilinium ion which is m-directing.

(b) Nitration requires nitric acid which oxidizes $-NH_2$ to $-NO_2$ group.

(c) Electrophile NO_2^+ is a m-directing group.

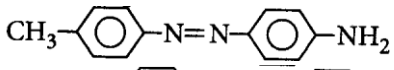
(d) Benzene ring exerts +I effect and deactivates the ring.

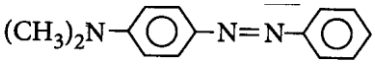
4. A compound (X) with molecular formula C_3H_9N reacts with l $C_6H_5SO_2Cl$ to give a solid which is insoluble in alkali.(X) is

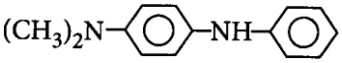
(a) $CH_3CH_2CH_2NH_2$ (b) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{N}}}}:$

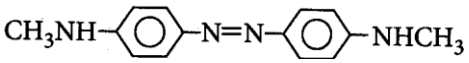
(c) $CH_3-NH-CH_2CH_3$ (d) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-NH_2$

5. Aniline whne diazotized in cold and then treated with N, N-dimethylaniline gives a coloured product. The structure of this products is

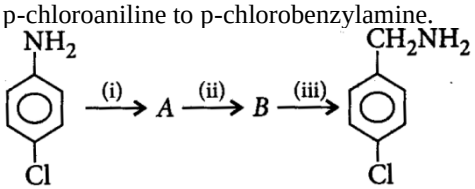
(a) 

(b) 

(c) 

(d) 

6. Mark the correct route of the conversion of p-chloroaniline to p-chlorobenzylamine.



	(i)	(ii)	(iii)
(a)	Alkylation	KCN	H_2/Pt
(b)	Diazotisation	CuCN	H_2/Pt
(c)	Oxidation	H_2/Pt	Hydrolysis
(d)	Diazotisation	H_2O/H^+	Sn/HCl

7. The source of nitrogen in Gabriel synthesis of amines is

(a) Sodium azide, NaN_3

(b) Sodium nitrite, $NaNO_2$

(c) Potassium cyanide, KCN

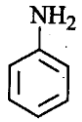
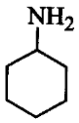
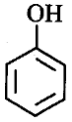
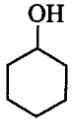
(d) Potassium phthalimide, $C_6H_4(CO)_2N^-K^+$

8. Methylamine reacts with HNO_2 to form

(a) $CH_3-O-N=0$ (b) CH_3-O-CH_3

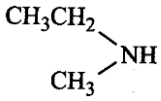
(c) CH_3OH (d) CH_3CHO

9. Which of the following compounds is the weakest BrÖnsted base?

(a)  (b)  (c)  (d) 

10. Which of the following should be most volatile?

(I) $CH_3CH_2CH_2NH_2$ (II) $(CH_3)_3N$

(III)  (IV) $CH_3CH_2CH_3$

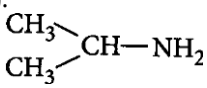
(a) II (b) IV (c) I (d) III

11. Which of the following reactions is not correctly metched?

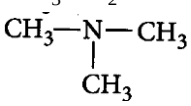
(a)	Reaction used to convert amide into primary amine with one carbon atom less	-	Hofmann bromamide reaction
(b)	Reaction used to convert primary amines into isocyanides	-	Carbylamine reaction
(c)	Reaction used to distinguish primary, secondary and tertiary amines	-	Hinsberg's reaction
(d)	Preparation of primary amines using phthalimede	-	Victor meyer's synthesis

12. An organic compound (C_3H_9N) (A), when treated with nitrous acid, gave and alcohol and N_2 gas was evolved.

(A) On warming with $CHCl_3$ and caustic potash gave (C) which on reduction gave isopropylmethylamine. Predict the structure of (A).

(a) 

(b) $CH_3CH_2-NH-CH_3$

(c) 

(d) $CH_3CH_2CH_2-NH_2$

13. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Reaction of benzene diazonium chloride with cuprous salts dissolved in the halogen acid	(i)	Sandmeyer reaction
(B)	Reaction of benzene Diazonium chloride with halogen acid in the presence of copper powder	(ii)	Gatterman Reaction
(C)	Reaction of amines with chloroform	(iii)	Hinsberg's reaction
(D)	Reaction of amines with benzene sulphonyl chloride	(iv)	Carbylamine reaction

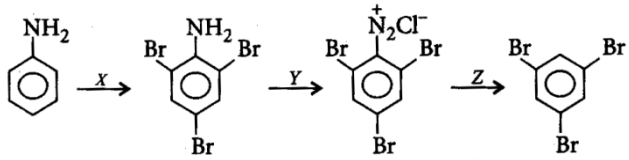
(a) (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iii), (D) $\rightarrow$ (iv)

(b) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (i)

(c) (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv), (C) $\rightarrow$ (i), (D) $\rightarrow$ (ii)

(d) (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (iii)

14. Identify X, Y and Z in the given sequence of reactions.



(a) $X = HBr; Y = NaNO_2 + HCl; Z = heat$

(b) $X = Br_2 / CCl_4; Y = HNO_2; Z = CH_3OH$

(c) $X = Br_2 / CuBr; Y = NaNO_2 + HCl; Z = NaOH$

(d) $X = Br_2(aq); Y = NaNO_2 + HCl(0 - 4^oC);$
$Z = H_3PO_2 + H_2O$ _

15. Nitrolim is

(a) $CaC_2 + N_2$ (b) $CaCN_2 + C$

(c) $Ca(CN)_2 + C$ (d) $Ca(CN)_2 + NH_4CN$

16. On strong heating, ammonium acetate gives

(a) Acetamide

(b) Methyl cyanide

(c) Urea

(d) Formamide

17. In amines, the hybridisation state of *N* is

(a) sp (b) sp^2

(c) sp^3 (d) sp^2d

18. The end product of the reaction

$\text{ethylamine} \xrightarrow{HNO_2} A \xrightarrow{PCl_5} B \xrightarrow{KCN} C$ is

(a) Ethyl amine

(b) Diethyl amine

(c) Propane nitrite

(d) Triethyl amine

(e) Methyl amine

19. The increasing basicity order of the following compounds is:

(A) $CH_3CH_2NH_2$

(B) $CH_3CH_2NH(CH_2CH_3)$

(C) $H_3C-N(CH_3)-CH_3$

(D) $Ph-N(H)-H$

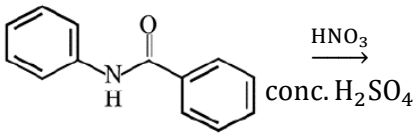
(a) (D) < (C) < (B) < (A)

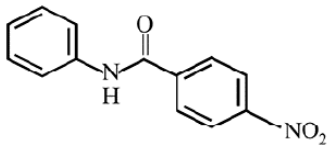
(b) (D) < (C) < (A) < (B)

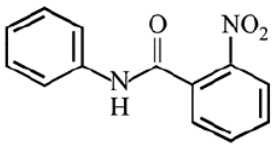
(c) (A) < (B) < (C) < (D)

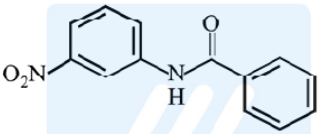
(d) (A) < (B) < (D) < (C)

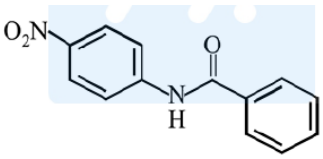
20. What will be the major product in the following mononitration reaction?



(a) 

(b) 

(c) 

(d) 

21. A compound 'X' on treatment with $Br_2/NaOH_2$, provided C_3H_9N, which gives positive carbylamine test. Compound 'X' is :

(a) $CH_3COCH_2NHCH_3$

(b) $CH_3CH_2COCH_2NH_2$

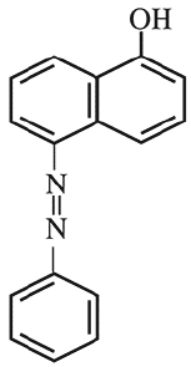
(c) $CH_3CH_2CH_2CONH_2$

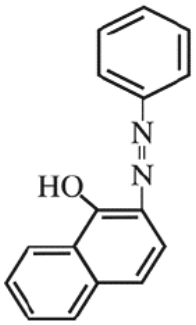
(d) $CH_3CON(CH_3)_2$

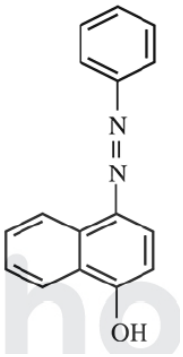
22. In the following compounds, the decreasing order of basic strength will be :

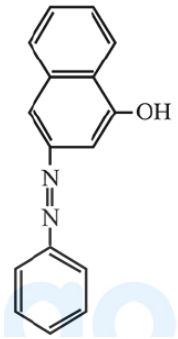
(a) $C_2H_5NH_2 > NH_3 > (C_2H_5)_2NH$
(b) $(C_2H_5)_2NH > NH_3 > C_2H_5NH_2$
(c) $(C_2H_5)_2NH > C_2H_5NH_2 > NH_3$
(d) $NH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$

23. Coupling of benzene diazonium chloride with 1-napthol in alkaline medium will give :

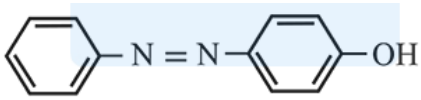
(a) 

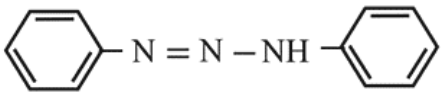
(b) 

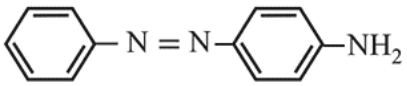
(c) 

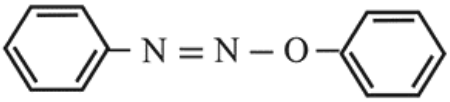
(d) 

24. Aniline dissolved in dilute HCl is reacted with sodium nitrate at 0° C. This solution was added dropwise to a solution containing equimolar mixture of aniline and phenol in dil. HCl. The structure of the major product is :

(a) 

(b) 

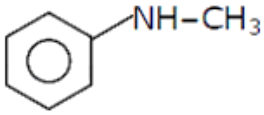
(c) 

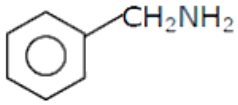
(d) 

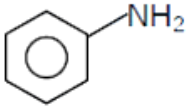
25. Ethylamine ($C_2H_5NH_2$) can be obtained from N-ethylphthalimide on treatment with :

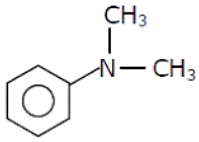
(a) NH_2NH_2 (b) CaH_2
(c) $NaBH_4$ (d) H_2O

26. The diazonium salt of which of the following compounds will form a coloured dye on reaction with β-Naphthol inNaOH?

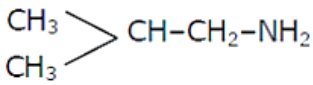
(a) 

(b) 

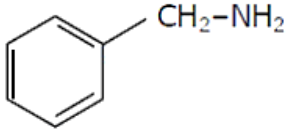
(c) 

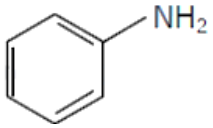
(d) 

27. The total number of amines among the following which can be synthesized by Gabriel synthesis is:

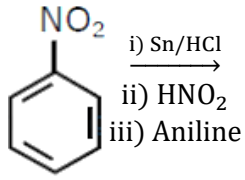
(a) 

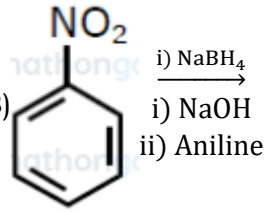
(b) $CH_3CH_2NH_2$

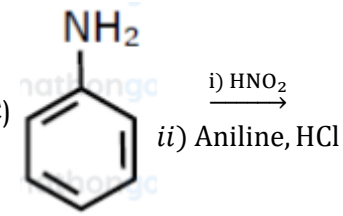
(c) 

(d) 

28. Which of the following reaction/s will not give p-aminoazobenzene?

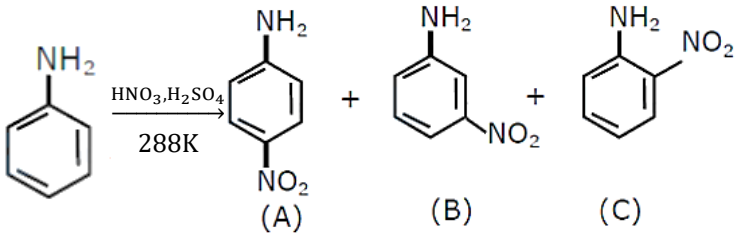
(A) 

(B) 

(C) 

(a) B only (b) A and B

(c) C only (d) A only

29. 

Correct statement about the given chemical reaction is :

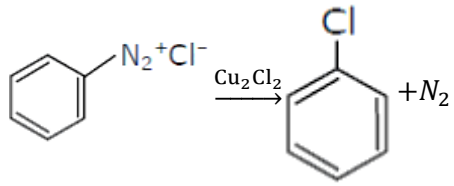
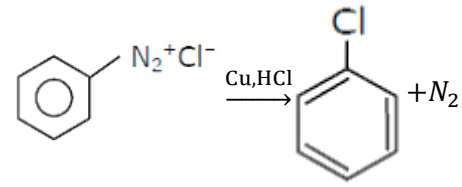
(a) Reaction is possible and compound (A) will be major product.

(b) The reaction will form sulphonated product instead of nitration.

(c) $-NH_2$group is ortho and para directive, so product (B) is not possible.

(d) Reaction is possible and compound (B) will be the major product.

30. Match List I with List II

List I	**List II**
(A) 	(i) Wurtz reaction
(B) 	(ii) Sandmeyer reaction
(C) $2CH_3CH_2Cl + 2Na \xrightarrow{Ether} C_2H_5 - C_2H_5 + 2NaCl$	(iii) Fitting reaction
(D) $2C_5H_5Cl + 2Na \xrightarrow{Ether} C_6H_5 - C_6H_5 + 2NaCl$	(iv) Gatterman reaction

Choose the correct answer from the option given below:

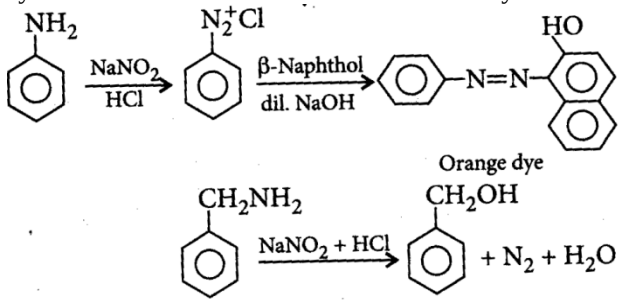
(a) (A) – (ii),(B) – (i),(C) – (iv),(D) – (iii)

(b) (A) – (iii),(B) – (iv),(C) – (i),(D) – (ii)

(c) (A) – (ii),(B) – (iv),(C) – (i),(D) – (iii)

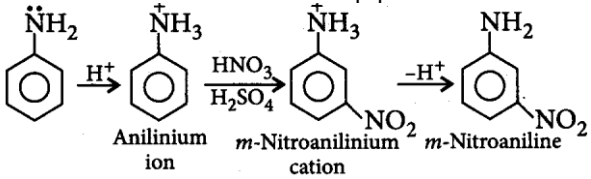
(d) (A) – (iii),(B) – (i),(C) – (iv),(D) – (ii)

1. (a) : Aniline gives dye test while benzylamine reacts with nitrous acid to form benzyl alcohol and nitrogen gas.



2. (b) : 3^{o} amine does not react with Hinsberg reagent, 2^{o} amine reacts but is not soluble in alkali.

3. (a) : Anilinium ion formed by protonation of aniline deactivates o- and p-position hence substitution takes place at m-position.



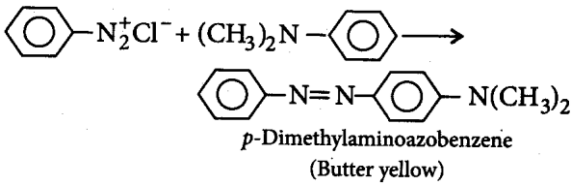
4. (c) : Since the compound reacts with bezenesulphonyl chloride to give a product which is insoluble in alkali, it shows there is no H attached to N in the product hence the compound X is a secondary amine.

$$CH_3 - NH - C_2H_5 + C_6H_5SO_2Cl \longrightarrow$$

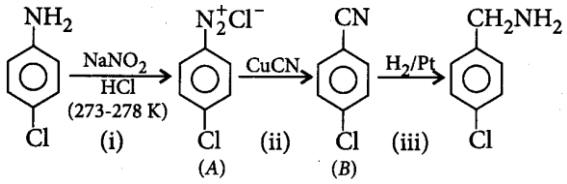
$$CH_3 - \underset{\underset{C_2H_5}{|}}{N} - SO_2C_6H_5$$

N – Ethyl – N – Methylbenzene sulphonamide

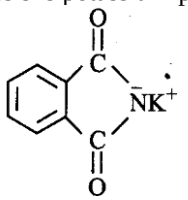
5. (b) :



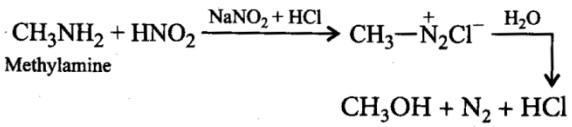
6. (b) :



7. (d) : The source of nitrogen in Gabriel phthalimide synthesis is potassium phthalimide.



8. (c) :



9. (c) : Amines are stronger bronsted bases than alcohols and phenols as they have tendency to accept a proton. Phenols are more acidic than alcohols. Thus, phenol has least tendency to accept a proton hence, is the weakest bronsted base.

10. (b) : The order of boiling points of isomeric amines is 1^o amines > 2^o amines > 3^o amines

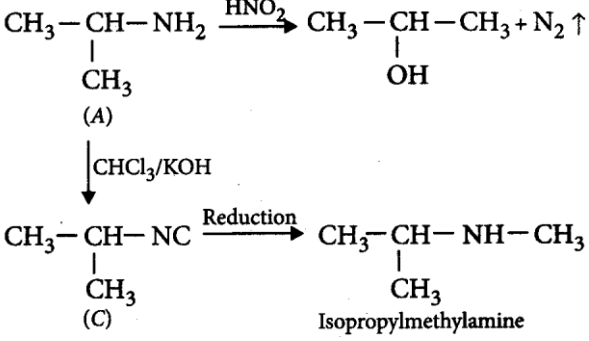
Because of absence of H-atom available for hydrogen bonding, 3^o amines do not have intermolecular association. Intermolecular association is more in 1^o amines than in 2^o amines as there are two H-atoms available for H-bonding. hydrocarbons are almost non-polar molecules and possess weak van der Waals forces and hence has lowest boiling point i.e. most volatile.

11. (d) : The synthesis of primary amines from phtalimide is known as Gabriel phthalimide synthesis

12. (a) : As (A) gives alcohol on treatment with nitrous acid thus it should be primary amine. C_3H_9N has two possible structure with $-NH_2$ group.

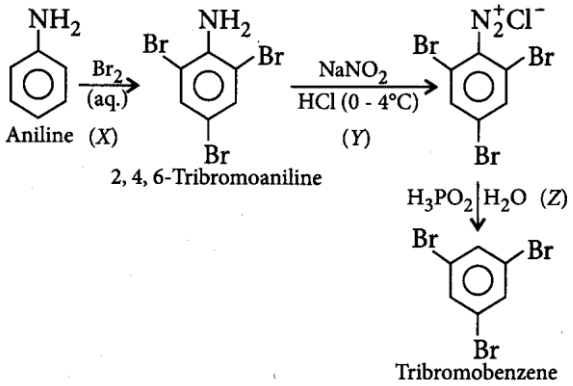
$CH_3-CH_2-CH_2-NH_2$ or $CH_3-\underset{\underset{CH_3}{|}}{CH}-NH_2$

As it gives isopropylmethyl amine thus it should be isopropyl amine non n-propylamine



13. (d) : (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (iii)

14. (d) :



15. (b)Nitrolim is a mixturee of calcium cyanamide and carbon.

16. (b) $CH_3COONH_4 \xrightarrow{\Delta} CH_3CONH_2 \xrightarrow{\Delta} CH_3CN + H_2O$

17. (c)It is similar that of NH_3 except *H*- is replaced by –*R* group.

$\because \ddot{N}H_3 \rightarrow \frac{5+3}{2} \Rightarrow 4 \Rightarrow sp^3$.

18. (c) $C_2H_5NH_2 + HNO_2 \rightarrow \underset{(A)}{C_2H_5OH} + N_2 + H_2O$

$C_2H_5OH + PCl_5 \rightarrow \underset{(B)}{C_2H_5Cl} + POCl_3 + HCl$

$C_2H_5Cl + KCN \rightarrow \underset{(C)\text{Propane nitrile}}{C_2H_5CN} + KCl$

19. (b) **JEE Main 2019**

	pK_b
(A) $EtNH_2$	3.29
(B) $(Et_2)NH$	3.00
(C) Me_3N	4.22
(D) $Ph-NH-Me$	4.7

So, order of basic strength is:

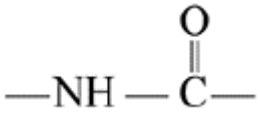
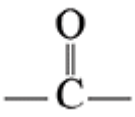
$C_2H_5 \rightarrow NH \leftarrow C_2H_5$

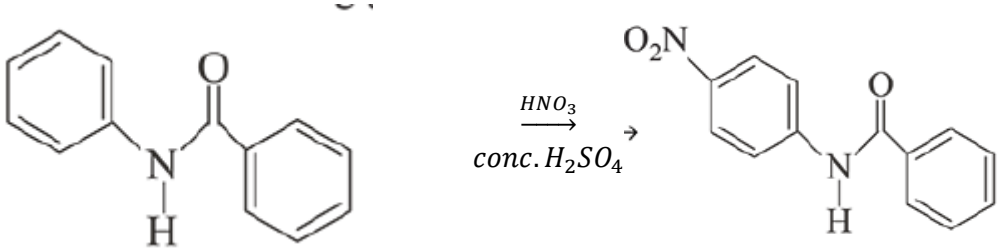
$C_2H_5 \rightarrow NH \leftarrow C_2H_5 > C_2H_5NH_2 > Me_3N > PhNH-Me$

$2C_2H_5$ groups	$1C_2H_2$ groups	steric factor	e pair delocalized over Ph –ring

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

20. (d) **JEE Main 2019**

In the given nitration reaction, major product will be formed as per the activating group, – NH part of  is activating while  part is deactivating group.



Activated ring	Deactivated ring

21. (c) **JEE Main 2019**

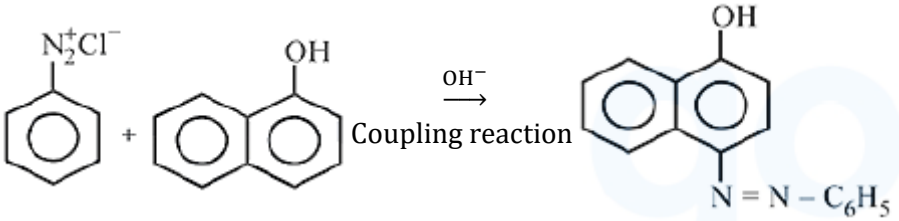
$CH_3CH_2CH_2CONH_2$ (X) $\xrightarrow{Br_2/NaOH}$ (Hofmann rearrangement) $CH_3CH_2CH_2NH_2$ (C_3H_9N)

$\xrightarrow{CHCl_3}$ KOH (Carbylamine reaction) $CH_3CH_2CH_2NC$

22. (c) **JEE Main 2019**

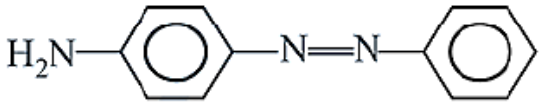
$(CH_2H_5)_2NH$	>	$C_2H_5NH_2$	>	NH_4
Two + Igp.		One+I gp.		No+I gp.

23. (c) **JEE Main 2019**



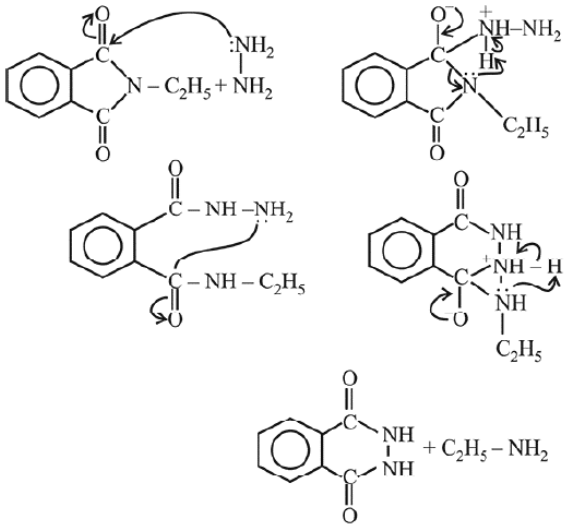
24. (c) **JEE Main 2019**

In acidic medium aniline is more reactive than phenol that's why electrophilic aromatic substitution of $Ph - N_2^+$ takes place with aniline.



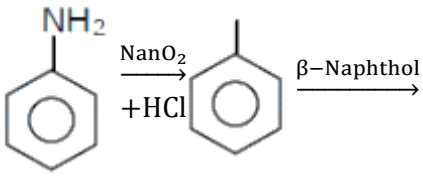
25. (a) **JEE Main 2019**

N-Ethyl pthalimide on treatement with $NH_2 - NH_2$ gives ethylamine.



In place of NH_2NH_2, we can also use H_2O in presence of H^+ or OH^- as a catalyst.

26. (c) JEE Main 2021

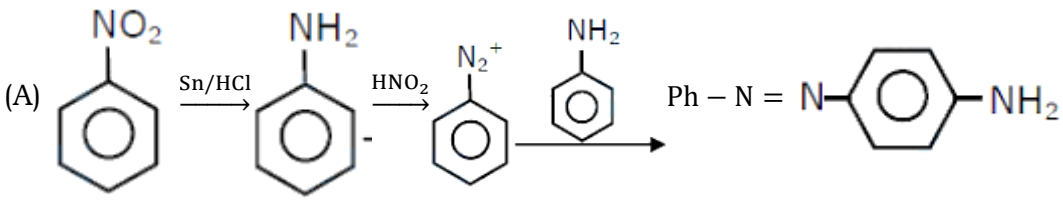


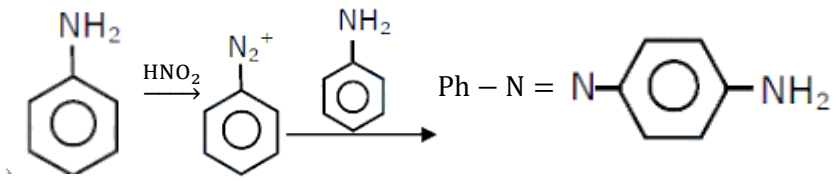
Orange bright dye.

27. (c) JEE Main 2021

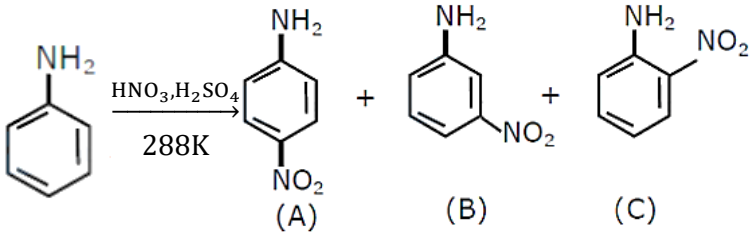
Only aliphatic amines can be prepared by Gabriel synthesis.
1.86 g of aniline completely reacts to form acetanilide. 10%of the product is lost during purification. Amount ofacetanilide obtained after purification (in g)is $\times 10^{-2}$.

28. (a) JEE Main 2021



(B) 

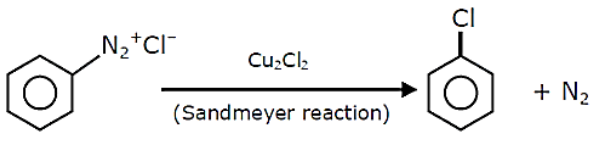
29. (a) JEE Main 2021

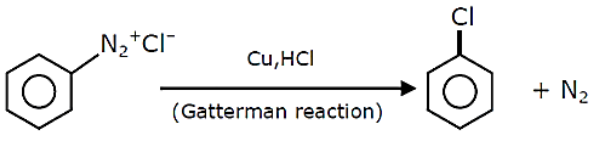


(A) (B) (C)

51% 47% 2%

30. (c) JEE Main 2021

(a) 

(b) 

(c) $2CH_3 - CH_2Cl + 2Na \xrightarrow{\text{Ether}} C_2H_5 - C_2H_5 + 2NaCl$

Wurtz reaction

(d) $2C_6H_5Cl + 2Na \xrightarrow{\text{Ether}} C_6H_5 - C_6H_5 + 2NaCl$

Fitting reaction