NEET Important Questions
Chemistry
Amines

Multiple Choice Type

1. Amongst the following, the strongest base in aqueous medium is
NCERT Exemplar

$(A) CH_3NH_2$

$(B) NCCH_2NH_2$

$(C) (CH_3)_2 NH$

$(D) C_6H_5NHCH_3$

2. Which of the following is the weakest Bronsted base?
NCERT Exemplar

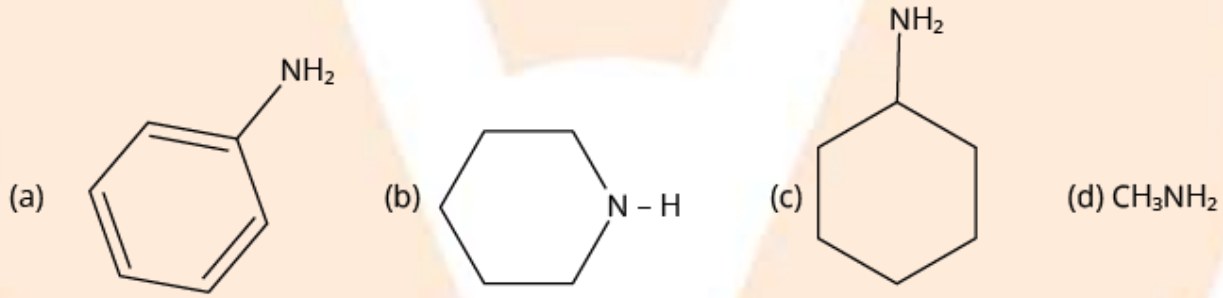

Image: amines

3. Which one of the following gives the most stable Diazonium salt?
JEE MAIN 2022

(A) CH_3-CH_2-CH_2-NH_2

(B)

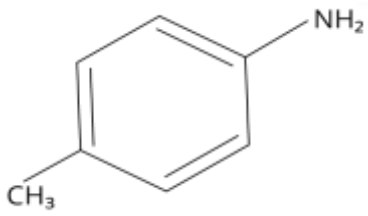

Image: 4-methylbenzylamine

(C)

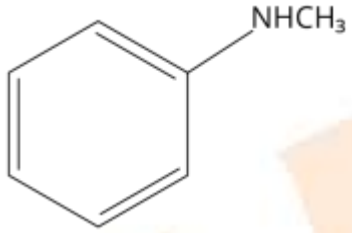

Image: N-methylbenzylamine

(D)

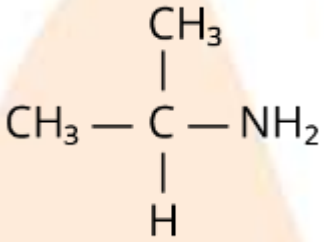

Image: Isopropylamine

4. Which of the following is not a correct statement for primary aliphatic amines?

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(A) The intermolecular association in primary amines is less than the intermolecular association in secondary amines.

(B) Primary amines are treated with nitrous acid solution from corresponding alcohols except methyl amines.

(C) Primary amines are less basic than the secondary amines.

(D) Primary amines can be prepared by the Gabriel phthalimide synthesis.

5. Given below are two statements:

Statement I: Aniline is less basic than acetamide.

Statement II: In aniline, the lone pair of electrons on a nitrogen atom is delocalized over a benzene ring due to resonance and hence less available to a proton.

Choose the most appropriate option;

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(A) Statement I is true but statement II is false.

(B) Statement I is false but statement II is true.

(C) Both statement I and statement II are true.

(D) Both statement I and statement II are false.

6. A reaction of benzonitrile with one equivalent CH_3MgBr followed by hydrolysis produces a yellow liquid "P". The compound "P" will give positive _____.

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(A) Iodoform test

(B) Schiff's test

(C) Ninhydrin's test

(D) Tollen's test

7. In Carius method, halogen containing organic compound is heated with fuming nitric acid in the presence of:

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(A) HNO_3

(B) $AgNO_3$

(C) $CuSO_4$

(D) $BaSO_4$

8. Compound A is converted to B on reaction with $CHCl_3$ and KOH. The compound B is toxic and can be decomposed by C. A, B and C respectively are:

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(A) Primary amine, nitrile compound, conc. HCl

(B) Secondary amine, isonitrile compound, conc. NaOH

(C) Primary amine, isonitrile compound, conc. HCl

(D) Secondary amine, nitrile compound, conc. NaOH

9. In the reaction of hypobromite with amide, the carbonyl carbon is lost as:

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(A) CO_2

(B) CO

(C) HCO_3^-

(D) CO_3^{2-}

10. Ammonolysis of Alkyl halides followed by the treatment with NaOH solution can be used to prepare primary, secondary and tertiary amines. The purpose of NaOH in the reaction is:

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(A) to remove acidic impurities

(B) to remove basic impurities

(C) to activate NH_3 used in the reaction

(D) to increase the reactivity of alkyl halide

11. Given below are two statements:

Statement I: A mixture of chloroform and aniline can be separated by simple distillation.

Statement II: When separating aniline from a mixture of aniline and water by steam distillation aniline boils below its boiling point.

In the light of the above statements, choose the most appropriate answer from the options given below:

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(A) Both statement I and statement II are true.

(B) Both statement I and statement II are false.

(C) Statement I is true but statement II is false.

(D) Statement I is false but statement II is true.

12. The most appropriate reagent for conversion of C_2H_5CN into $CH_3CH_2CH_2NH_2$ is

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(A) $NaBH_4$

(B) CaH_2

(C) $Na(CN)BH_3$

(D) $LiAlH_4$

13. Which of the following will react with $CHCl_3$ +alc.KOH?

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(A) Adenine and thymine

(B) Thymine and proline

(C) Adenine and lysine
(D) Adenine and proline

14. Ethylamine $\left(C_2H_5NH_2\right)$ can be obtained from N-ethylphatalimide on treatment with :
JEE MAIN 2019
(A) CaH_2
(B) H_2O
(C) $NaBH_4$
(D) NH_2NH_2

15. A compound 'X' on treatment with Br_2/NaOH, provided C_3H_9N, which gives positive carbylamine test. Compound 'X' is:
(A) $CH_3CH_2CH_2CONH_2$
(B) $CH_3CON\left(CH_3\right)_2$
(C) $CH_3CH_2COCH_2NH$
(D) $CH_3COCH_2NHCH_3$

Multiple Choice Type

16. Which of the following cannot be prepared by Sandmeyer's reaction?
NCERT exemplar
(A) Chlorobenzene
(B) Bromobenzene
(C) Iodobenzene
(D) Fluorobenzene

17. The reagents that can be used to convert benzene diazonium chloride to benzene are
NCERT exemplar

(A) $SnCl_2/HCl$
(B) CH_3CH_2OH
(C) H_3PO_2
(D) $LiAlH_4$

18. Under which of the following reaction conditions, aniline gives p-nitro derivative as the major product?
NCERT exemplar
(A) Acetyl chloride/pyridine followed by reaction with conc.H_2SO_4+conc.HNO_3
(B) Acetic anhydride/pyridine followed by conc.H_2SO_4+conc.HNO_3
(C) Dil. HCl followed by reaction with conc.H_2SO_4+conc.HNO_3
(D) Reaction with conc.H_2SO_4+conc.HNO_3

19. Which of the following reactions are correct?
NCERT exemplar

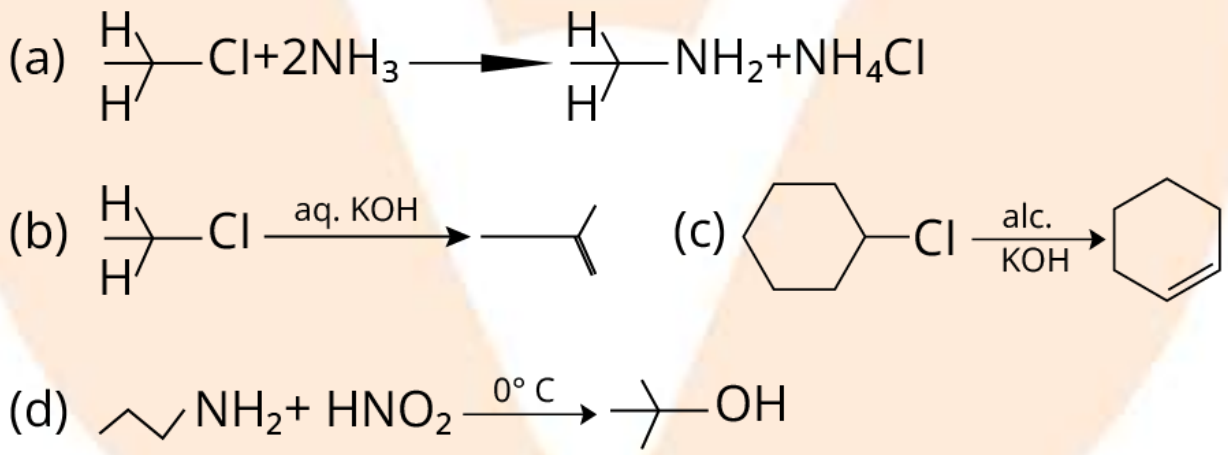

Image: Reactions of amino compounds

Numerical Type
20. The total number of reagents from those given below, that can convert nitrobenzene into aniline is _____. (Integer answer)
I.Sn − HCl
II.Sn − NH_4OH
III.Fe − HCl

IV.Zn − HCl
V.H_2 − Pd
VI. H_2 − Raney Nickel
JEE Main 2021

21. The total number of amines among the following which can be synthesised by Gabriel synthesis is _____.
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22. The mass percentage of nitrogen in histamine is _____.
JEE MAIN 2020

23. The number of chiral centres present in [B] is _____.
JEE MAIN 2020

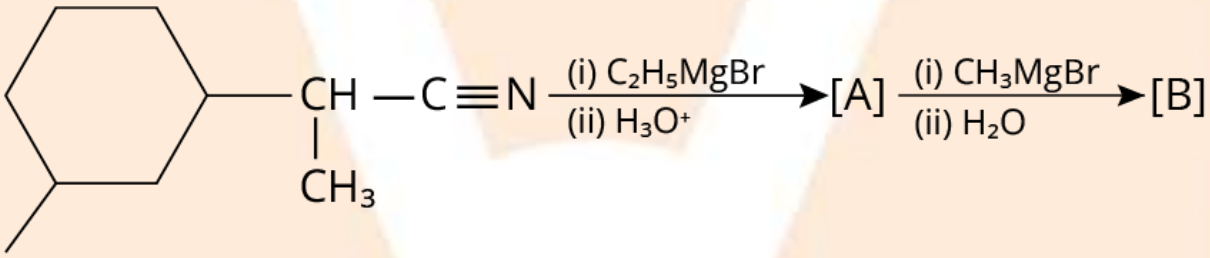

Image: Reactions of aromatic amino compounds

24. In gaseous triethylamine the "−C−N−C−" bond angle is _____ degree.
JEE MAIN 2021

25. The number of nitrogen atoms in a semicarbazone molecule of acetone is _____
JEE MAIN 2021

Solutions

1. (C)

The general trend of Basicity of amines is in order- $3^o > 2^o > 1^o$ As (C) is an secondary amine, so it will be more basic than CH_3NH_2 which is the primary amine. In $C_6H_5CHNH_3$, delocalisation of lone pairs of electrons occurs on the n atom into

the benzene ring. Also, due to the -I effect of the CN group in (B), it is less basic than (C) Overall from the given options, (C) is the list basic amine.

2. (A)

When an amine group NH_2 is attached to a benzene ring, lone pairs of nitrogen electrons delocalize into the benzene ring and are no longer available for donation. As a result, they are the weakest base.

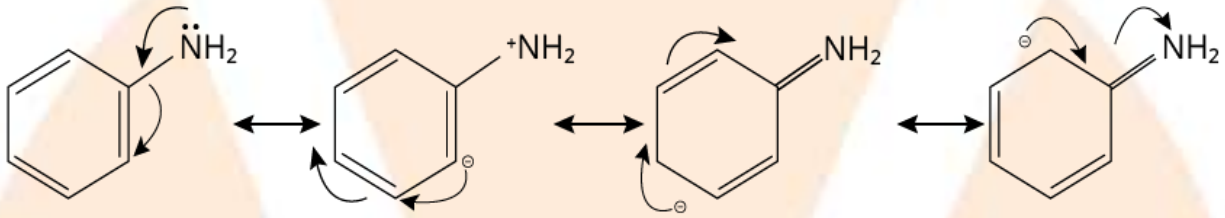

Image: Aniline

Thus, option (A) is correct.

3. (B)

Primary aromatic amines would be able to give the most stable diazonium salt in the presence of nitrous acid.

The reaction is shown below.

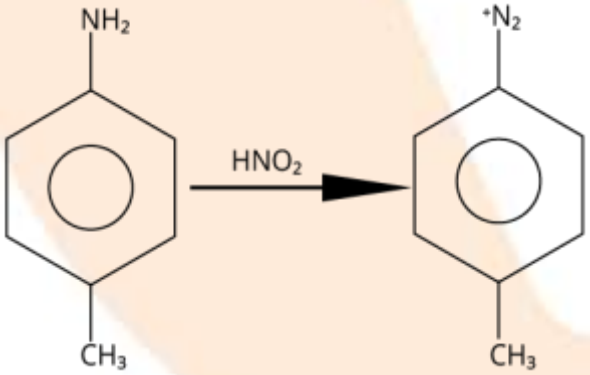

Image: Reaction of 4-methylaniline

4. (A)

Due to the availability of two hydrogen atoms, the intermolecular interaction is more pronounced in primary amines compared to secondary amines.

5. (B)

Since the lone pair of nitrogen in acetamide is delocalized to the more electronegative element oxygen, aniline is more basic than acetamide.
The nitrogen lone pair delocalized over the benzene ring in aniline.

6. (A)
A reaction of benzonitrile with one equivalent CH_3MgBr followed by hydrolysis is shown below.

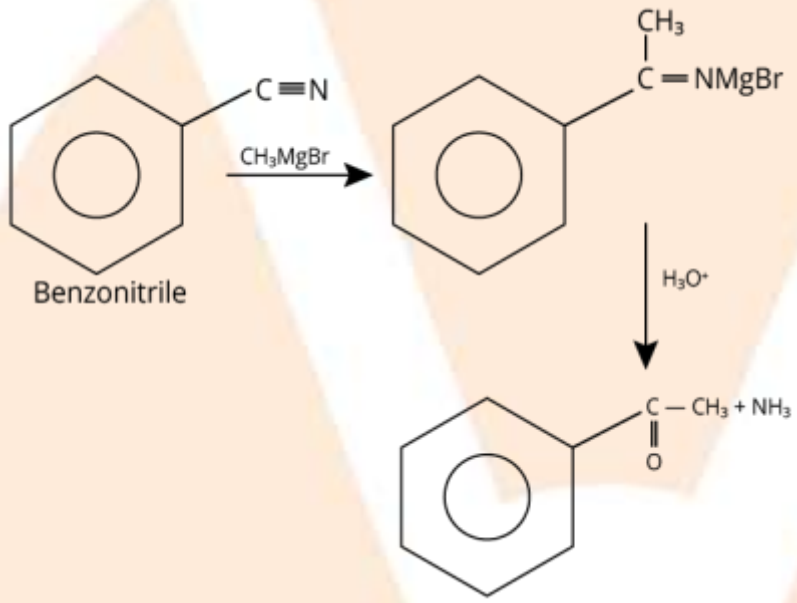

Image: Hydrolysis of benzonitrile

The compound formed other than amine in the product is a yellow liquid "P" and it gives the positive iodoform test.

7. (B)
The carius method involves heating an organic molecule with fuming nitric acid while silver nitrate is present.
As a reagent, lunar caustic $\left(AgNO_3\right)$ is used to identify Cl, Br, and I ions respectively.

8. (C)
When primary amine combines with chloroform, poisonous isonitrile is produced. When isonitrile then reacts with HCl / H_3O^+, primary amine and acid are produced.

Hence, A-primary amine, B-isonitrile compound and C-conc. HCl.

9. (D)

The reaction of hypobromite with amide is shown below.

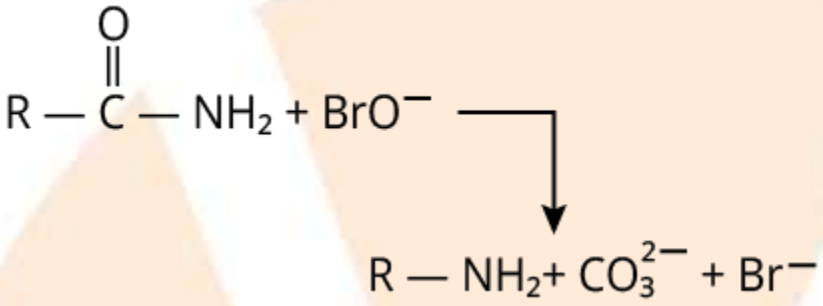

Image: Reaction of amide with hypobromite

Here, carbonyl carbon is lost as CO_3^{2-}.

10. (A)

The complete reaction is shown below.

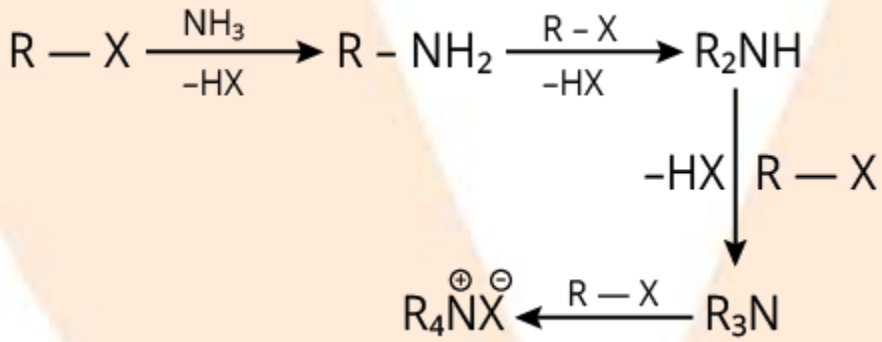

Image: Reaction of alkyl halide with amine

The reaction produces HX (acid).

So, to get rid of these acidic contaminants, we utilise NaOH.

11. (A)

Simple distillation can be used to separate a mixture of aniline and chloroform because their boiling points are sufficiently different.

Aniline (b.p. 334 K) , and chloroform (b.p. 457 K)

In steam distillation, the mixture will boil close to but below 373 K if one of the ingredients is water and the other is a water-insoluble chemical (like aniline).

12. (D)

13. (C)

Primary online from adenine and lysine both react with $CHCl_3$ +alc.KOH.

The formula of adenine and lysine are shown below.

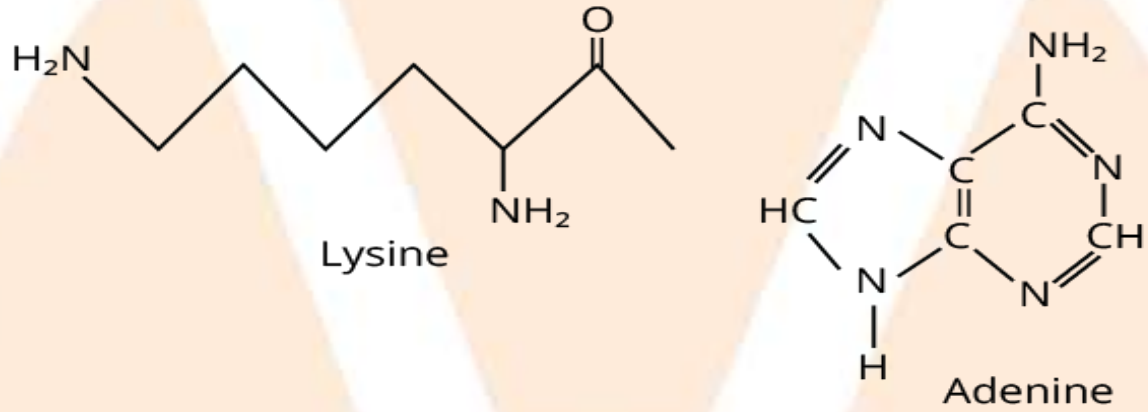

Image: Adenine and Lysine

14. (D)

After being treated with NH_2NH_2, N-ethyl phthalimide produces ethylamine. The Galbriel phatalimide manufacturing reaction ends with this stage.

15. (A)

A primary amine with one fewer carbon atom than the original amide is created by the Br_2 / NaOH

(Hoffman Hypobromide reagent), which produces the carbylamine test. There should be $-CONH_2$ group in the amine that produces primary amine.

16. (C), (D)

Sandmeyer's reaction makes it simple to prepare chloro and bromo arenes. Simply warming the diazonium salt solution with aqueous KI solution yields iodoarenes.

The Balz-Schiemann reaction is used to synthesise fluoroarenes.

All of the other reagents produce aniline. Thus, option (c) and (d) are correct.

17. (B), (C)

Mild reducing agents given in option B and C convert the benzene diazonium chloride into benzene while the reagents given in options a and d are strong reducing agents, they produce $C_6H_5NHNH_2$.

The reactions are shown below.

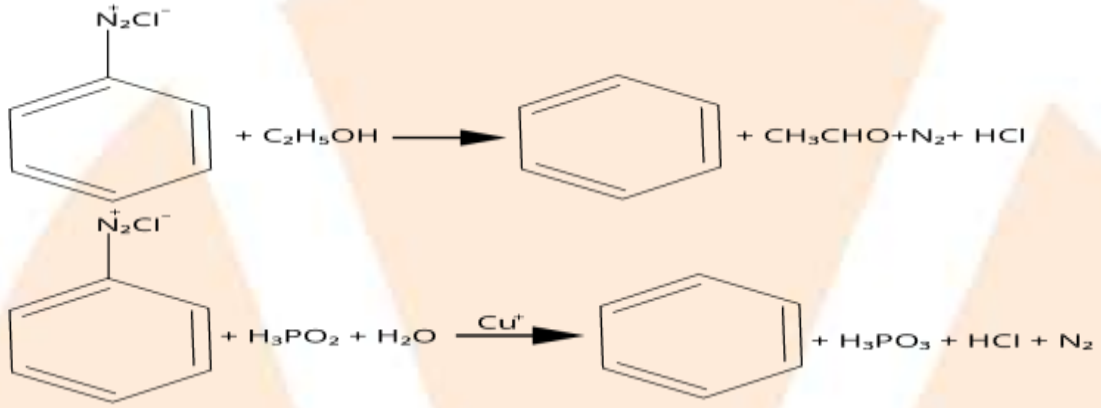

Image: Reactions of diazonium salt with different reagents

Thus, option (B) and (C) are correct.

18. (A), (B)

Aniline is acetylated when it reacts with acetyl chloride or acetic anhydride in the presence of pyridine base. On treatment with concentrated sulfuric acid and nitric acid, the N-acetyl aniline formed is ortho para directing group, which guides the further reagent to attack on the para position and produce p-nitroaniline.

The reaction is shown below.

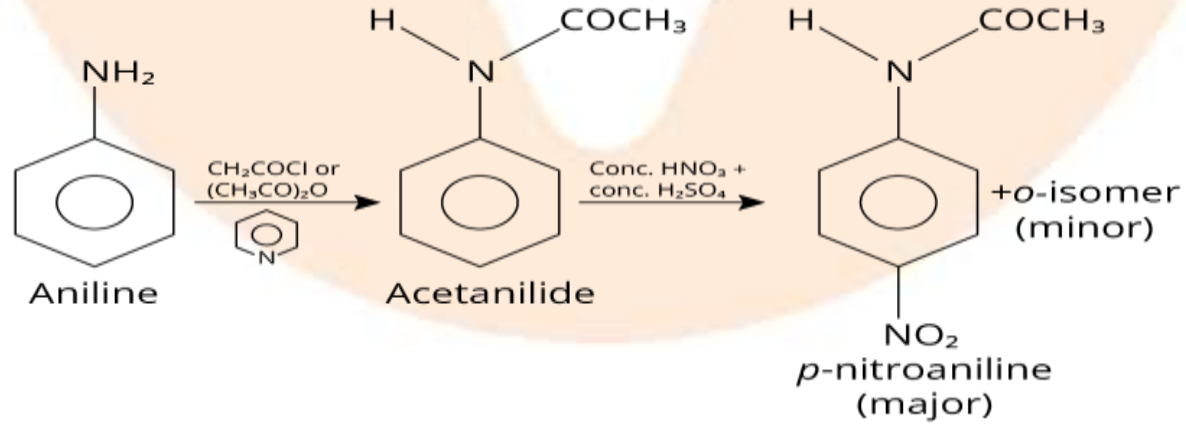

Image: Reaction of aniline

Thus, option (A) and (B) are correct.

19. (A), (C)

(A) Primary alkyl halides react with ammonia to give primary amines. So, option (A) is correct.

(B) Elimination process doesn't occur with aq.KOH, with aq.KOH, hydrolysis process takes place. So, (B) is incorrect

(C) Dehydrohalogenation i.e. elimination of HCl occurs which produces alkene as product takes place with alc.KOH (C) is correct

(D) In this reaction, aliphatic primary amines, on treatment with nitrous acid, produce primary alcohol as a product.

Therefore (D) is incorrect.

20. 5

The reagents that can convert nitrobenzene to aniline are shown below.

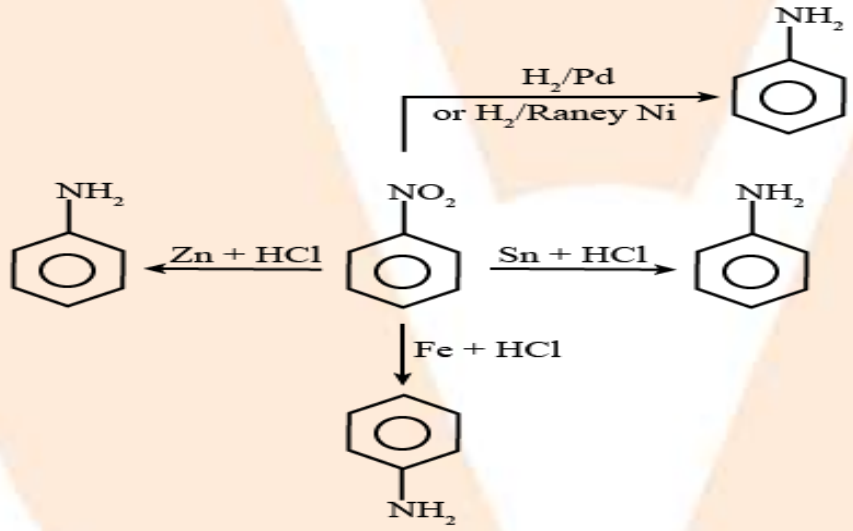

Image: Reaction of aniline with different reagents

(i) Sn + HCl

(ii) Fe + HCl

(iii) Zn + HCl

(iv) H_2 − Pd

(v) H_2 (Raney Ni)

The total number of reagents from those given below, that can convert nitrobenzene into aniline is 5

21. 3

One aliphatic or alicyclic amine is made using the Gabriel phthalimide synthesis. As a result, the amine that can be produced using the Gabriel phthalimide synthesis technique contains alpha -carbon.

Since aniline lacks alpha-C, the Gabriel reaction cannot be used to create it.

The remaining amines all have alpha-C in the appropriate location, making them capable of producing the Gabriel phthalimide reaction with ease.

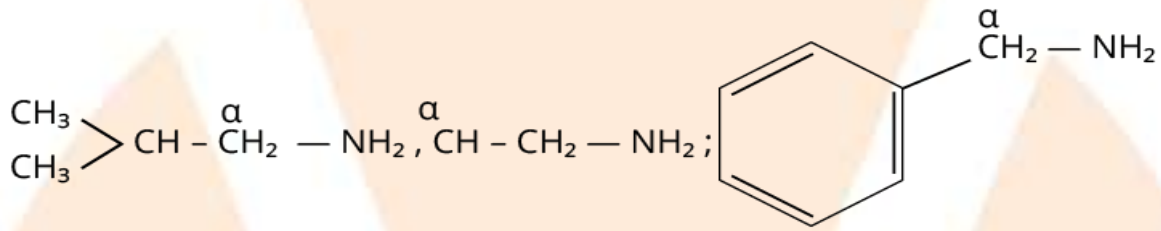

Image: Amines

22. 37.80

The structure of histamine is shown below.

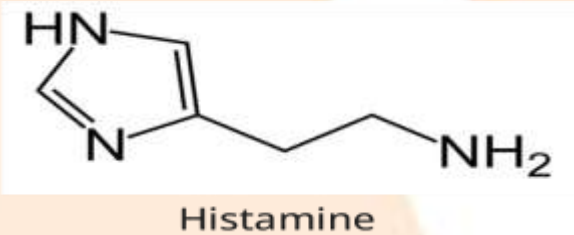

Image: Histidine

The chemical formula of Histamine is $C_5H_9N_3$.

So, the percentage by mass of N can be calculated by the formula,

$$\%\text{bymass} = \frac{3\times \text{Atomic mass of N}}{9\times \text{Atomic mass of H} + 5\times \text{Atomic mass of C} + 3\times \text{Atomic mass of N}} \times 100$$

Substitute all the known values,

$$\%\text{bymass} = \frac{3\times 14}{9\times 1 + 5\times 12 + 3\times 14} \times 100$$

$$= \frac{42}{111} \times 100$$

$$= 37.84\%$$

23. 4

The complete reaction is shown below.

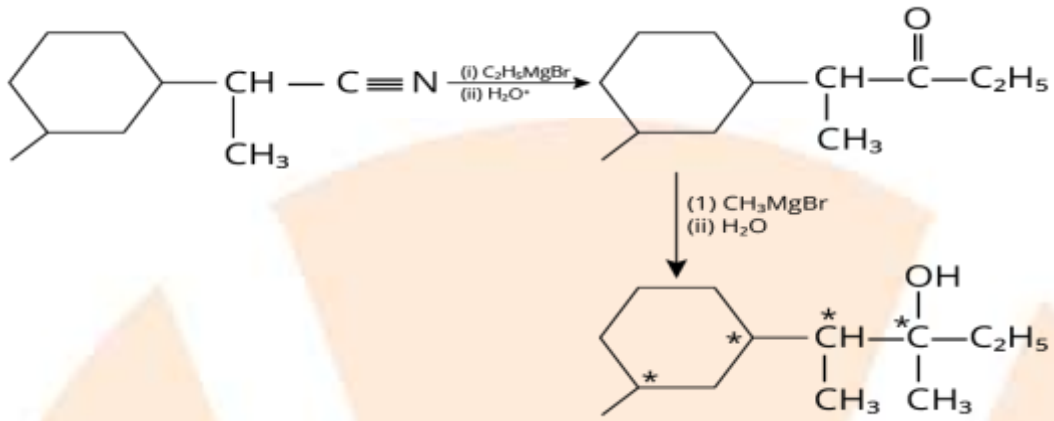

Image: Reduction of amine

In the final products, there are four chiral carbons present.

24. 180

In triethylamine, the central atoms (nitrogen) contain 3 bond pairs and 1 lone pair. So, according to the VSEPR theory, the hybridization of nitrogen is sp^3 and bond angle is 180°.

Pyramidal shape of triethylamine:

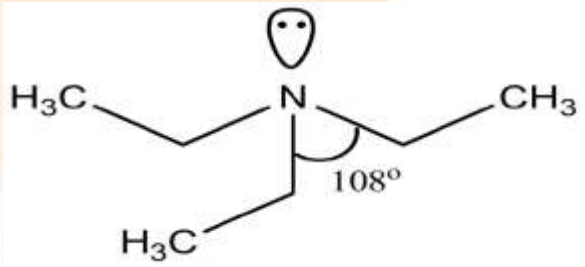

Image: Triethylamine

25. 3

The structure of semicarbazone is shown below.

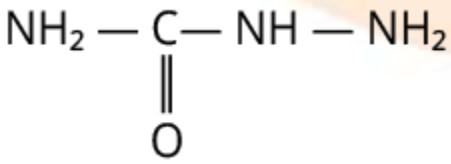

Image: semicarbazone

Here. Three nitrogen atoms are present.