

IMPORTANT QUESTIONS CLASS – 12

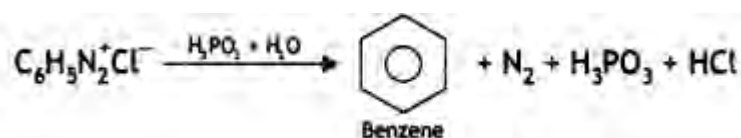
CHEMISTRY CHAPTER – 9 AMINES

Question 1.

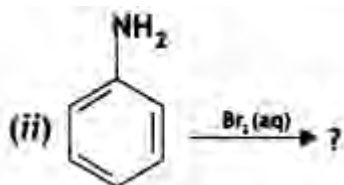
Write the main products of the following reactions:



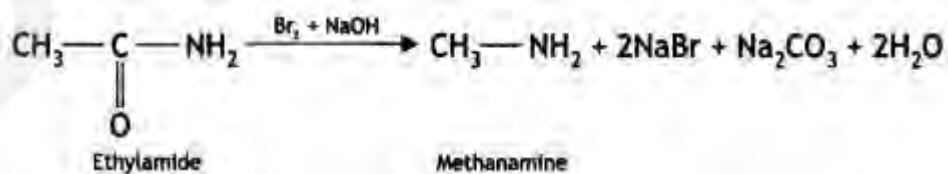
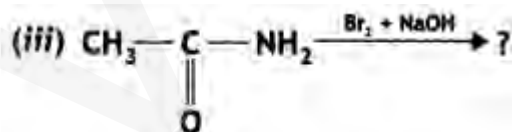
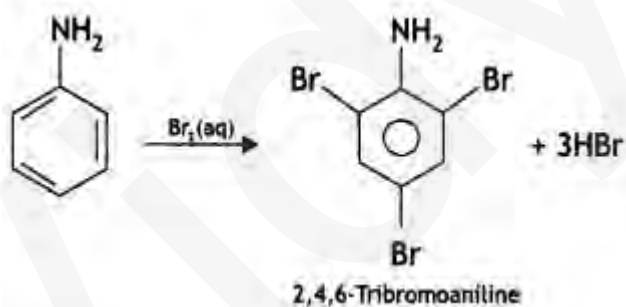
Answer:



Answer:

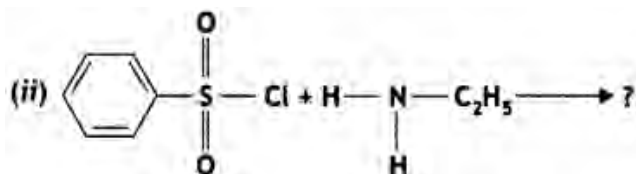
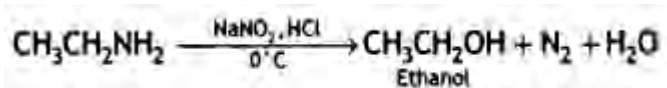
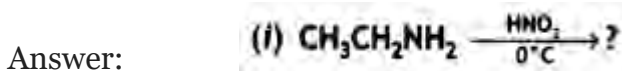


Answer:

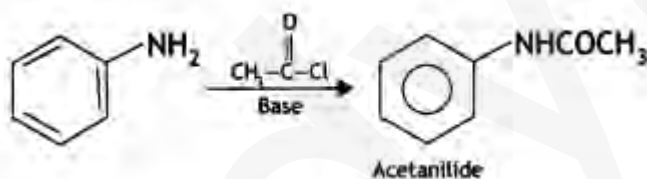
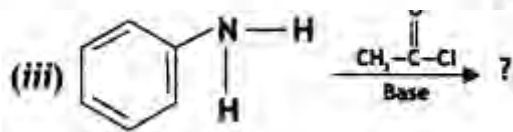
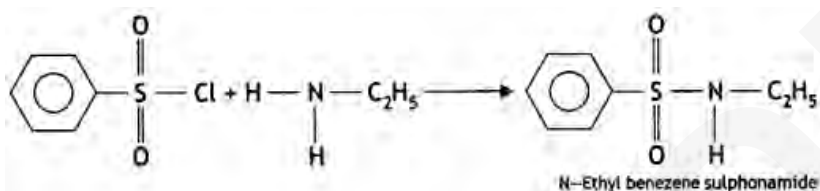


Question 2.

Write the main products of the following reactions:



Answer:



Answer:

Question 3.

Account for the following:

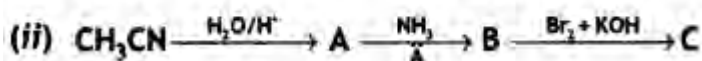
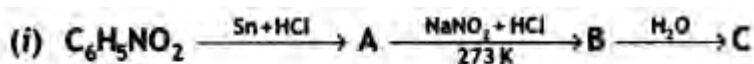
(i) Primary amines (R-NH_2) have a higher boiling point than tertiary amines (R_3N).

(ii) Aniline does not undergo Friedel – Crafts reaction.

(iii) $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ in an aqueous solution.

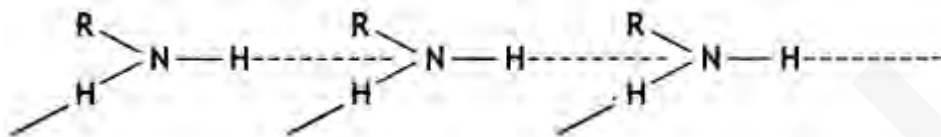
OR

Give the structures of A, B, and C in the following reactions:



Answer:

(i) Primary amines (RNH_2) have two hydrogen atoms on the N atom and therefore, form intermolecular hydrogen bonding.



Tertiary amines (R_3N) do not have hydrogen atoms on the N atom and therefore, these do not form hydrogen bonds. As a result of hydrogen bonding in primary amines, they have higher boiling points than tertiary amines of comparable molecular mass. For example, b.p. of n-butylamine is 351 K while that of tert-butylamine is 319 K.

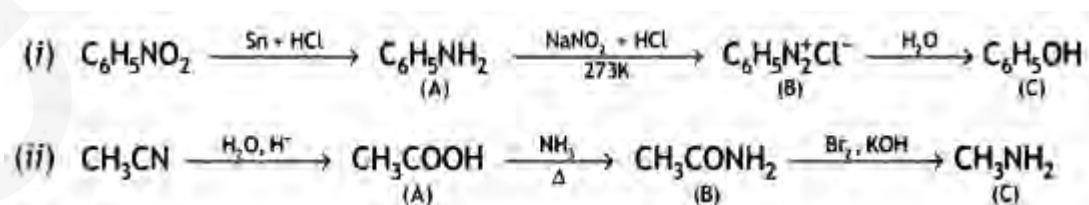
(ii) Aniline being a Lewis base reacts with Lewis acid such as AlCl_3 to form a salt.



As a result, N of aniline acquires +ve charge and hence it acts as a strong deactivating group for electrophilic substitution reactions. Hence aniline does not undergo Friedel Crafts reaction.

(iii) Due to the presence of lone pair of electrons on the N atom, amines are basic in nature. The methyl group is the electron releasing group (+I inductive effect) and therefore, it increases the electron density on the N atom, and therefore, basic character increases, so that $(\text{CH}_3)_3\text{N}$ should be more basic than $(\text{CH}_3)_2\text{NH}$. But tertiary ammonium ion formed from tertiary amines is less hydrated than secondary ammonium ion formed from secondary amine. Therefore, $(\text{CH}_3)_3\text{N}$ has less tendency to form ammonium ion, and consequently, it is less basic than $(\text{CH}_3)_2\text{NH}$. Thus, $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ due to the combined effect of inductive effect and hydration effect.

OR



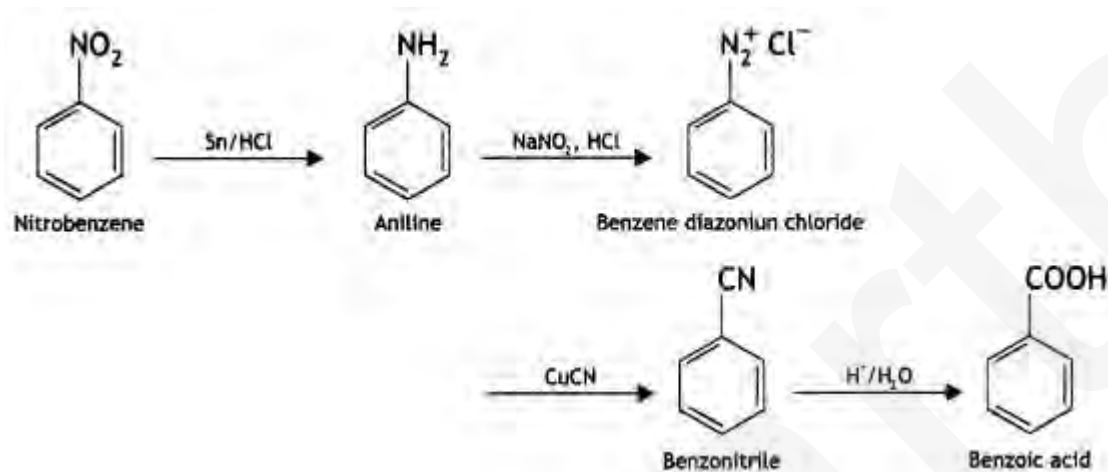
Give the structures of A, B, and C in the following reactions:

Question 5.

Write chemical equations for the following conversions:

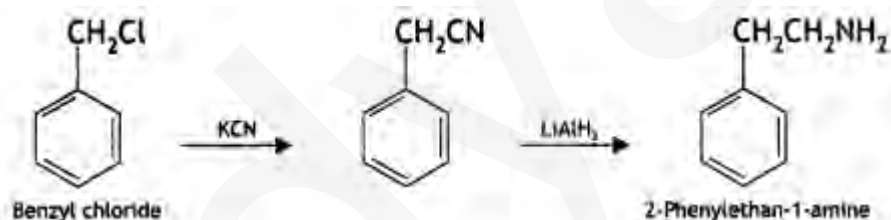
(i) Nitrobenzene to benzoic acid.

Answer:



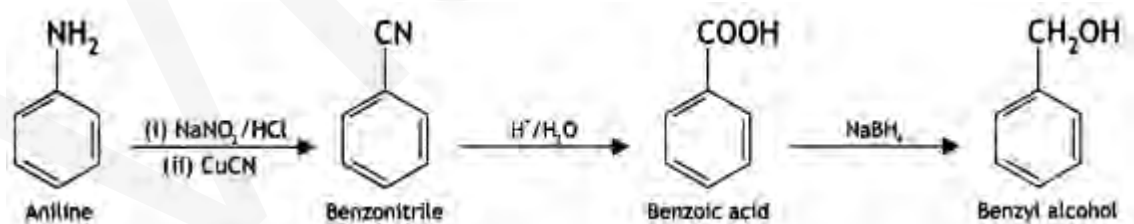
(ii) Benzyl chloride to 2-phenylethanamine.

Answer:



(iii) Aniline to benzyl alcohol. (CBSE Delhi 2012)

Answer:



Question 12.

(a) Identify 'A' and 'B' in the following reaction:

Answer:



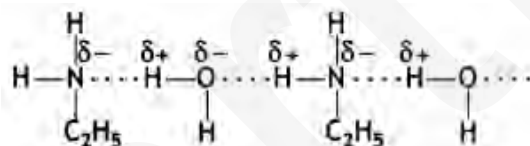


(b) Why is ethylamine soluble in water whereas aniline is not?

Answer:

Ethylamine dissolves in water due to intermolecular hydrogen bonding as shown below:

However, because of the large hydrophobic part (i.e. hydrocarbon part) of aniline, the extent of hydrogen bonding is less and therefore, aniline is insoluble in water.



Question 6.

(a) Identify X and Y in the following:

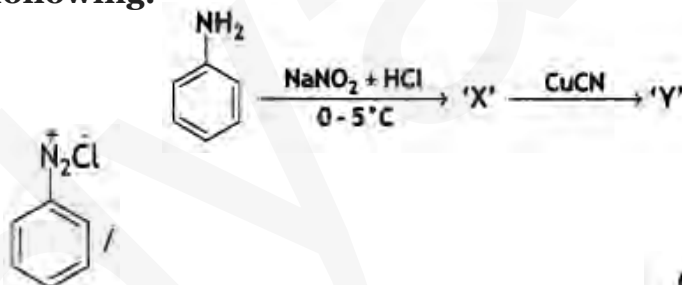
Answer:

X =

benzene diazonium chloride,

Y =

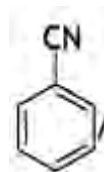
Cyanobenzene



(b) Amino group is o, p-directing for aromatic electrophilic substitution reactions. Why does aniline on nitration give m-nitroaniline? (CBSE 2019C)

Answer:

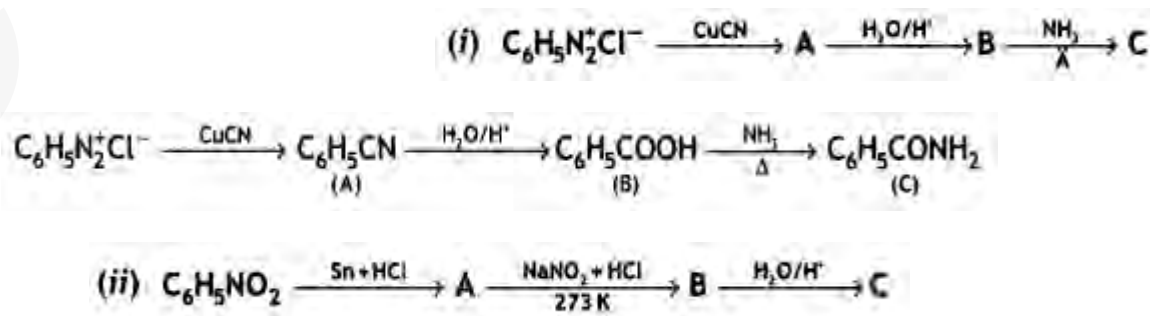
Under strongly acidic conditions of nitration, most of the aniline is converted into anilinium ion having an NH_3^+ group. This group is an m-directing group, therefore, m-nitro aniline is also obtained along with o- and p-products.



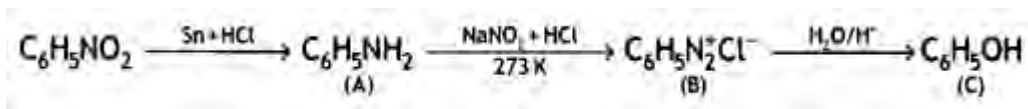
Question 14.

Give the structures of A, B, and C in the following reactions: (CBSE Delhi 2013)

Answer:



Answer:



Question 7.

Do as directed:

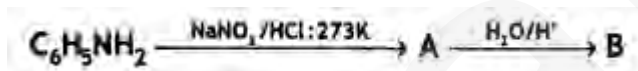
(i) Arrange the following compounds in the increasing order of their basic strength in an aqueous solution:

CH_3NH_3 , $(\text{CH}_3)_3\text{N}$, $(\text{CH}_3)_2\text{NH}$.

Answer:

$(\text{CH}_3)_3\text{N} < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$

(ii) Identify 'A' and 'B':

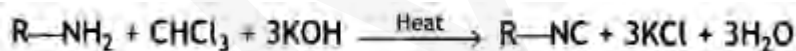


Answer:

A: $\text{C}_6\text{H}_5\text{N}_2^+ \text{Cl}^-$ B: $\text{C}_6\text{H}_5\text{OH}$

(iii) Write the equation of carbylamine reaction. (CBSE 2018C)

Answer:



Question 8.

(i) Illustrate the following reactions giving a suitable example in each case:

(a) Hoffmann bromamide degradation reaction

(b) Diazotisation

(c) Gabriel phthalimide synthesis

(ii) Distinguish between the following pairs of compounds:

(a) Aniline and N-methylaniline

(b) $(\text{CH}_3)_2\text{NH}$ and $(\text{CH}_3)_3\text{N}$

OR

(i) Write the structures of main products when benzene diazonium chloride ($\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$) reacts with the following reagents:

(a) CuCN/KCN

(b) H_2O

(c) $\text{CH}_3\text{CH}_2\text{OH}$

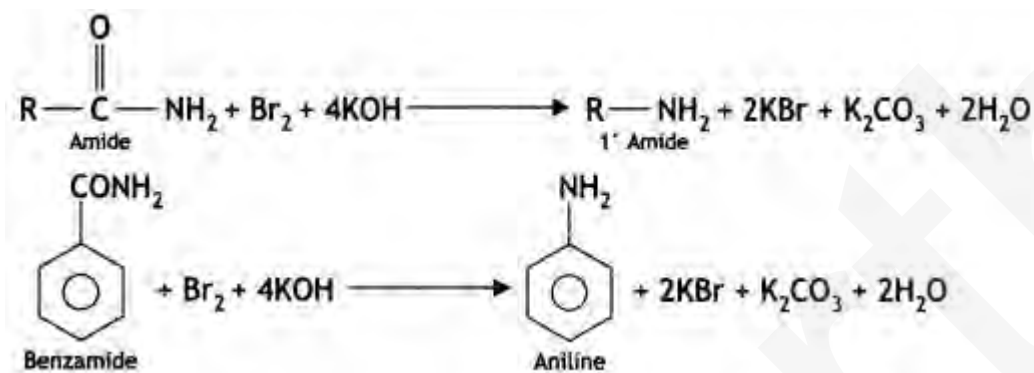
(ii) Arrange the following:

(a) $\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_2\text{H}_5\text{OH}$, $(\text{CH}_3)_3\text{N}$ – in the increasing order of their boiling point.

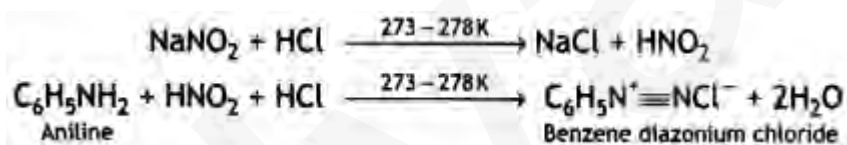
(b) Aniline, p-nitroaniline, p-methyl aniline – in the increasing order of their basic strength. (CBSE Delhi 2015)

Answer:

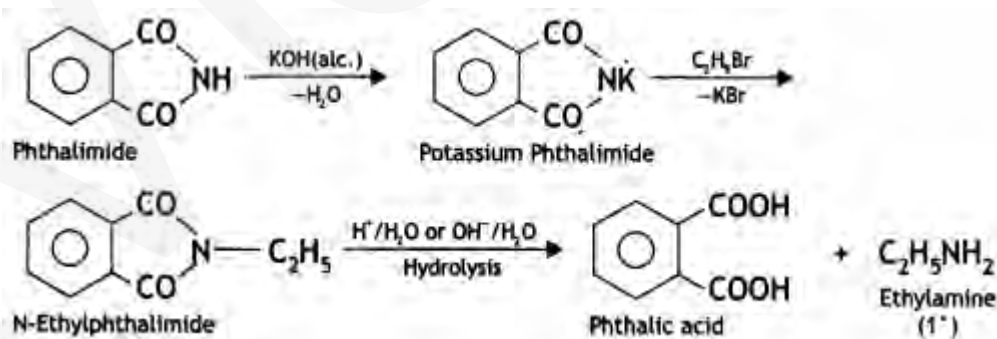
(i) (a) Hoffmann bromamide degradation reaction: Primary amines can be prepared from amides by treatment with Br_2 and KOH solution. The amine formed contains one carbon atom less than the parent amide.



(b) Diazotisation: The reaction of aniline or other aromatic amines, with nitrous acid at 0-5 °C to form diazonium salts is called diazotization. Nitrous acid needed for this reaction is prepared in situ by the action of dil. HCl on NaNO_2 .

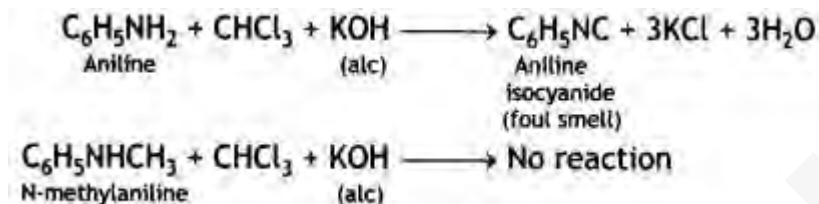


(c) Gabriel's phthalimide synthesis. This method is used for preparing only primary amines. In this method, phthalimide is treated with alcoholic KOH to give potassium phthalimide, which is treated with an alkyl halide or benzyl halide to form N-alkyl or aryl phthalimide. The hydrolysis of N-alkyl phthalimide with 20% HCl under pressure or refluxing with NaOH gives primary amine.



Phthalic acid can again be converted into phthalimide and is used again and again. This method is very useful because it gives pure amines. Aryl halides cannot be converted to arylamines by Gabriel synthesis because they do not undergo nucleophilic substitution with potassium phthalimide.

(ii) (a) Add an alcoholic solution of KOH and CHCl_3 to the compounds. Aniline gives the foul smell of isocyanide whereas N-methyl aniline does not give a foul smell.

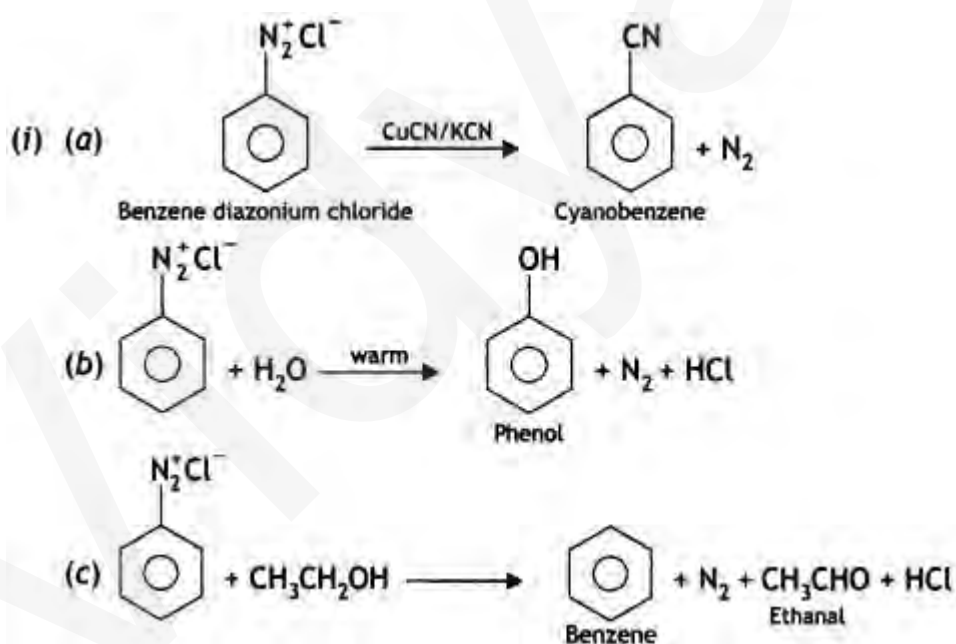


(b) When treated with Hinsberg's reagent (benzene sulphonyl chloride, $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$), dimethylamine, $(\text{CH}_3)_2\text{NH}$ gives precipitate which is insoluble in aqueous KOH.



$(\text{CH}_3)_3\text{N}$ does not react with Hinsberg's reagent.

Or



(ii) (a) $(\text{CH}_3)_2\text{N} < \text{C}_2\text{H}_5\text{NH}_2 < \text{C}_2\text{H}_5\text{OH}$

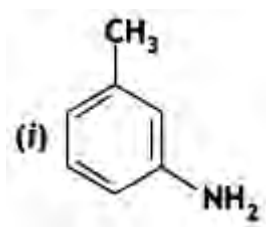
(b) p-nitroaniline < aniline < p-methylaniline

Question 9.

Give the IUPAC names of the following compounds:

Answer:

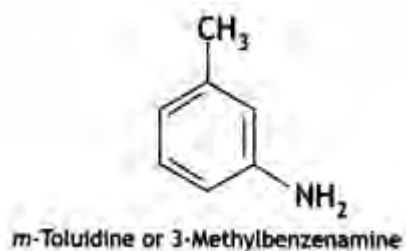
Answer:



Answer:

Answer:

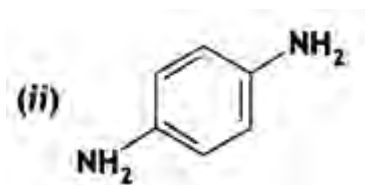
Answer:



Answer:

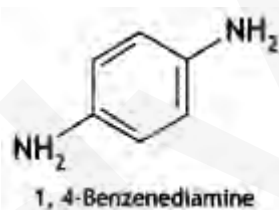
(CBSE Delhi 2017)

Answer:

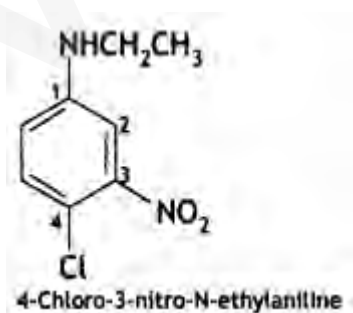
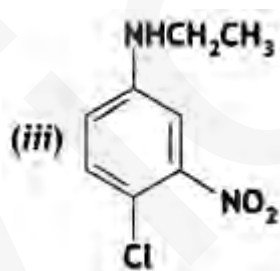


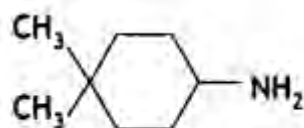
(CBSE Delhi 2017)

Answer:

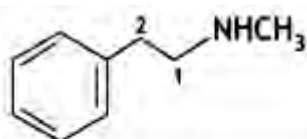
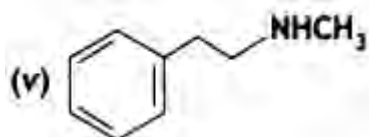


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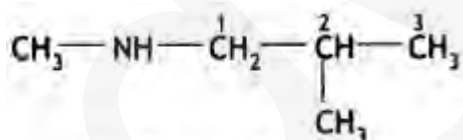
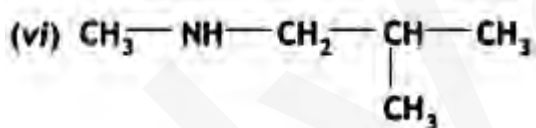




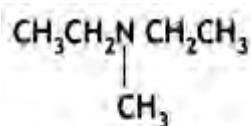
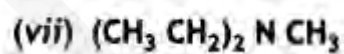
4, 4-Dimethylcyclohexanamine



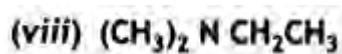
N-Methyl-2-phenylethanamine



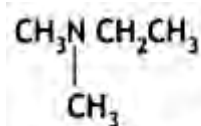
N-Methyl-2-methylpropanamine



N-Ethyl-N-methylethanamine



N-Methylethanamine



N,N-Dimethylethanamine

