CHEMISTRY

NCERT - NCERT CHEMISTRY(HINGLISH)

AMINES

Solved Examples

1. Write chemical equations for the following reactions:

(i) Reaction of ethanolic NH_3 with C_2H_5Cl.

(ii) Ammonolysis of benzyl chloride and reaction of amine so formed with two moles of CH_3Cl.

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2. Write chemical equations for the following conversions:

$(i) CH_3 - CH_2 - Cl \text{into} CH_3 - CH_2 CH_2 - NH_2$

$(ii) C_6H_5 - CH_2 - Cl \text{into} C_6H_5 - CH_2 - NH_2$

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3. Write structures and IUPAC names of

(i) the amide which gives propanamine by Hoffmann bromamide reaction.

(ii) the amine produced by the Hoffmann degradation of benzamide.

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4. Arrange the following in decreasing order of their basic strength :

$C_6H_5NH_2, C_2H_5NH_2, (C_2H_5)_2NH_3$

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5. How will you convert 4-nitrotoluene to 2-bromobenzoic acid ?

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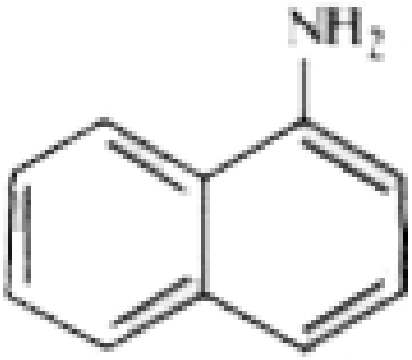
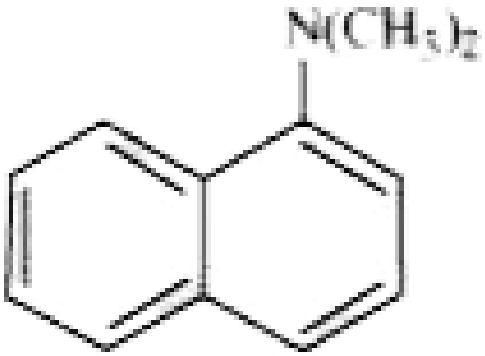
Exercise

1. Classify the following amines as primary, secondary or tertiary:

(i)



(ii)



(iiii) $(C_2H_5)_2CHNH_2$ $(iv)(C_2H_5)_2NH$

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2. (i) Write structures of different isomeric amines corresponding to the molecular formula, $C_4H_{11}N$.

ii) Write IUPAC names of all the isomers.

(iii) What type of isomerism is exhibited by different pairs of amines?

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3. How will you convert

(i) Benzene into aniline (ii) Benzene into N, N-dimethylaniline

(iii) $Cl-(CH_2)_4-Cl$ into hexane- 1,6- diamine ?

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4. Arrange the following in increasing order of their basic strength:

(i) $C_2H_5NH_2, C_6H_5NH_2, NH_3, C_6H_5CH_2NH_2$ and $(C_2H_5)_2NH$

(ii) $C_2H_5NH_2, (C_2H_5)_2NH, (C_2H_5)_3N, C_6H_5NH_2$

(iii) $CH_3NH_2, (CH_3)_2NH, (CH_3)_3N, C_6H_5CH_2NH_2$

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5. Complete the following acid-base reactions and name the products:

$(i) CH_3CH_2CH_2NH_2 + HCl \rightarrow$ (ii) $(C_2H_5)_3N + HCl \rightarrow$

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6. Write reactions of the final alkylation product of aniline with excess of methyl iodide in the presence of sodium carbonate solution.

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7. Write chemical reaction of aniline with benzoyl chloride and write the name of the product obtained.

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8. Write structures of different isomers corresponding to the molecular formula, C_3H_9N. Write IUPAC names of the isomers which will liberate nitrogen gas on treatment with nitrous acid.

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9. Convert

(i) 3-Methylaniline into 3-nitrotoluene.

(ii) Aniline into 1,3,5 - tribromobenzene.

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10. Write IUPAC names of the following compounds and classify them into primary, secondary and tertiary amines.

$(i)(CH_3)_2CHNH_2$ $(ii)CH_3(CH_2)_2NH_2$ $(iii)CH_3NHCH(CH_3)$

$(iv)(CH_3)_3CNH_2$ $(v)C_6H_5NHCH_3$ $(vi)(CH_3CH_2)_2NCH_3$

$(vii)m-BrC_6H_4NH_2$

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11. Give one chemical test to distinguish between the following pairs of compounds .

i. Methylamine and dimethylamine

ii. Secondary and tertiary amines

iii. Ethylamine and aniline

iv. Aniline and benzylamine

v. Aniline and N-methylaniline

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12. Account for the following:

(i) pK_b of aniline is more than that of methylamine.

(ii) Ethylamine is soluble in water whereas aniline is not.

(iii) Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.

(iv) Although amino group is o– and p– directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of

m-nitroaniline.

(v) Aniline does not undergo Friedel-Crafts reaction.

(vi) Diazonium salts of aromatic amines are more stable than those of aliphatic amines.

(vii) Gabriel phthalimide synthesis is preferred for synthesising primary amines.

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13. Arrange the following:

(i) In decreasing order of the pK_b values:

$C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$

(ii) In increasing order of basic strength:

$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2

(iii) In increasing order of basic strength:

(a) Aniline, p-nitroaniline and p-toluidine

(b) $C_6H_5NH_2$, $C_6H_5NHCH_3$, $C_6H_5CH_2NH_2$

(iv) In decreasing order of basic strength in gas phase:

$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ and NH_3

(v) In increasing order of boiling point:

$C_2H_5OH, (CH_3)_2NH, C_2H_5NH_2$

(vi) In increasing order of solubility in water:

$C_6H_5NH_2, (C_2H_5)_2NH, C_2H_5NH_2$

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14. Convert :

i. Ethanoic acid into methylamine

ii. Hexanenitrile into 1-aminopentane

iii. Methanol to ethanoic acid

iv. Ethanoic acid into propanoic acid

v. Ethanamine to Methanamine

vi. Methanamine into ethanamine

vii. Nitromethane into dimethylamine

viii. Propanoic acid into ethanoic acid .

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15. Describe a method for the identification of primary , secondary and tertiary amines . Also write the chemical equations for the reactions involved .

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16. Write short notes on the following :

i. Carbylamine reaction

ii. Diazotisation

iii . Hofmann bromamide reaction

iv.Coupling reaction

v. Ammonolysis

iv. Acetylation

vii. gabriel phthalimide synthesis

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17. Accomplish the following conversions :

i. Nitrobenzene to benzoic acid ii. Benzene to m-bromophenol

iii. Benzoic acid to aniline iv. Aniline to 2,4,6, -tribromofluorobenzene v. Benzyl chloride to 2-phenylethanamine

vi. Chlorobenzene to p-chloroaniline

vii. Aniline to p-bromoaniline viii. Benzamide to toluene xi. Aniline to benzyl alcohol .

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

(i) $CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[\text{Partial h ydrolysis}]{OH^-} B \xrightarrow{NaOH + Br_2} C$

(ii) $C_6H_5N_2Cl \xrightarrow{CuCN} A \xrightarrow{H_2O / H^+} B \xrightarrow[\Delta]{NH_3} C$

(iii) $CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^\circ C]{HNO_2} C$

(iv) $C_6H_5NO_2 \xrightarrow{Fe / HCl} A \xrightarrow[273K]{NaNO_2 + HCl} B \xrightarrow[\Delta]{H_2O / H^+} C$

(v) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOBr} B \xrightarrow{NaNO_2 / HCl} C$

(vi) $C_6H_5NO_2 \xrightarrow{Fe / HCl} A \xrightarrow[273K]{HNO_2} B \xrightarrow{C_6H_5OH} C$

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19. An aromatic compound (A) on treatment with aqueous ammonia and heating forms compound (B) which on heating with Br_2 and KOH froms a compound (C) of the molecular formula C_6H_7N. Write the structures and $IUPAC$ names of compounds (A) . (B) and (C).

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20. Complete the following reactions:

(i) $C_6H_5NH_2 + CHCl_3 + alc.\ KOH \rightarrow$

(ii) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

(iii) $C_6H_5NH_2 + H_2SO_4(conc.\ ) \rightarrow$

(iv) $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

(v) $C_6H_5NH_2 + Br_2(aq) \rightarrow$

(vi) $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$

(vii) $C_6H_5N_2Cl \xrightarrow[(ii)\ NaNO_2/Cu,\ \Delta]{(1)\ HBF_4}$

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21. Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis?

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22. Write the reaction of (i) aromatic and (ii) aliphatic primary amines with nitrous acid .

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23. Give explanation for each of the following :

(i) Why are amines less acidic than alcohols of comparable molecular masses ?

(ii). Why do primary amines have higher boiling points than tertiary amines ?

iii. Why are aliphatic amines stroner bases than aromatic amines ?

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