

AMINES

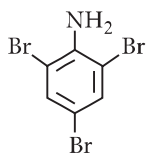
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Previous Years' CBSE Board Questions

13.3 Nomenclature

VSA (1 mark)

1. Write the IUPAC name of the given compound:

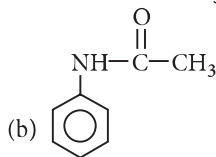
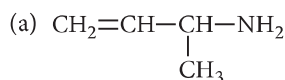


(Delhi 2016)

2. Write the structure of *N*-methylethanamine. (AI 2013)
3. Write the structure of 2-aminotoluene. (AI 2013)
4. Give the IUPAC name of $\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{CH}=\text{CH}_2$. (Delhi 2010)
5. Write the structure for *N*, *N*-ethylmethylamine. (1/3, Delhi 2010C)

SA I (2 marks)

6. Give IUPAC names of the following compounds:



(Delhi 2012C)

13.4 Preparation of Amines

VSA (1 mark)

7. Write the chemical equation involved in the following reaction :
Hofmann bromamide degradation reaction
(1/2, AI 2016, 2012, Delhi 2008C)
8. How do you convert the following :
Ethanenitrile to ethanamine (1/3, AI 2015)
9. State and illustrate the following :
Gabriel synthesis (1/2, AI 2013C)

10. Write chemical equations for the following conversion :

Benzyl chloride to 2-phenylethanamine.

(1/3, Delhi 2012)

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

(1/2, AI 2011C)

12. Write the chemical reaction to illustrate the following :

Ammonolysis

(1/2, Delhi 2009C)

SA I (2 marks)

13. How will you convert the following :

(i) Nitrobenzene into aniline

(ii) Ethanoic acid into methanamine

(2/3, Delhi 2014)

14. How are the following conversions carried out?

(i) $\text{CH}_3\text{CH}_2\text{Cl}$ to $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$

(ii) Benzene to aniline. (Delhi 2012C)

15. Illustrate the following reactions giving a chemical equation in each case :

(i) Gabriel phthalimide synthesis

(ii) Hofmann's bromamide reaction.

(2/3, Foreign 2011, AI 2008)

16. How would you achieve the following conversions :

(i) Nitrobenzene to aniline.

(ii) An alkyl halide to a quaternary ammonium salt.

Write the chemical equation with reaction conditions in each case. (2/3, Delhi 2007)

13.5 Physical Properties

VSA (1 mark)

17. Give reasons for the following :

Primary amines have higher boiling point than tertiary amines. (1/3, AI 2016, Delhi 2008C)

18. Arrange the following in the increasing order of their boiling point :

$\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_2\text{H}_5\text{OH}$, $(\text{CH}_3)_3\text{N}$ (1/5, Delhi 2015)

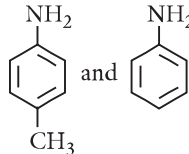
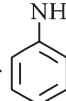
19. Account for the following :
Primary amines ($R-NH_2$) have higher boiling point than tertiary amines (R_3N). (1/3, AI 2014)
20. Out of CH_3NH_2 and $(CH_3)_3N$, which one has higher boiling point? (Delhi 2014C)
21. Account for the following :
Ethylamine is soluble in water whereas aniline is not. (1/3, Delhi 2014C, Delhi 2009C)
22. Account for the following :
Nitro compounds have higher boiling points than the hydrocarbons having almost the same molecular mass. (1/3, AI 2007)

SA I (2 marks)

23. State reasons for the following :
(i) Ethylamine is soluble in water whereas aniline is not soluble in water.
(ii) Primary amines have higher boiling points than tertiary amines. (2/3, AI 2011)

13.6 Chemical Reactions (Amines)

VSA (1 mark)

24. Give a simple chemical test to distinguish between the following pair of compounds :
 $(CH_3)_2NH$ and $(CH_3)_3N$ (1/5, Delhi 2015)
25. Arrange the following in increasing order of basic strength :
Aniline, *p*-nitroaniline, and *p*-toluidine (AI 2015C)
26. Arrange the following compounds in increasing order of solubility in water :
 $C_6H_5NH_2$, $(C_2H_5)_2NH$, $C_2H_5NH_2$ (Delhi 2014, AI 2011C)
27. How will you convert the following :
Aniline into *N*-phenylethanamide
(Write the chemical equations involved.) (1/3, Delhi 2014)
28. Arrange the following in increasing order of basic strength :
 $C_6H_5NH_2$, $C_6H_5NHCH_3$, $C_6H_5CH_2NH_2$ (Delhi 2014)
29. Arrange the following in increasing order of basic strength :
 $C_6H_5NH_2$, $C_6H_5NHCH_3$, $C_6H_5N(CH_3)_2$ (Delhi 2014)
30. Which of the two is more basic and why?
 CH_3NH_2 or NH_3 (Foreign 2014)
31. Which of the two is more basic and why?
 (Foreign 2014)
32. Which of the two is more basic and why?
 CH_3NH_2 or  (Foreign 2014)
33. Arrange the following in increasing order of their basic strength in aqueous solution :
 CH_3NH_2 , $(CH_3)_3N$, $(CH_3)_2NH$ (Delhi 2013)
34. Arrange the following in the decreasing order of their basic strength in aqueous solutions :
 CH_3NH_2 , $(CH_3)_2NH$, $(CH_3)_3N$ and NH_3 (Delhi 2012, AI 2009)
35. Describe the following giving the relevant chemical equation :
Carbylamine reaction (1/2, AI 2012, Delhi 2008C)
36. Complete the following reaction equation :
 $C_6H_5NH_2 + Br_{2(aq)} \rightarrow$ (1/2, AI 2012)
37. Rearrange the following in an increasing order of their basic strengths :
 $C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_6H_5)_2NH$ and CH_3NH_2 (AI 2011)
38. State reasons for the following :
 pK_b value for aniline is more than that for ethylamine. (1/3, AI 2011)
39. How will you differentiate between aniline and ethylamine? (AI 2011)
40. Why is an alkylamine more basic than ammonia? (Foreign 2011, Delhi 2009)
41. How will you bring about the following conversion :
Ethanamine to ethanoic acid (Delhi 2011C)
42. Assign reason for the following :
The pK_b of aniline is higher than that of methylamine. (1/2, Delhi 2009C)
43. Why do amines act as nucleophiles? (AI 2007)

44. Account for the following :

Amines are basic substances while amides are neutral. (1/3, AI 2007)

SA I (2 marks)

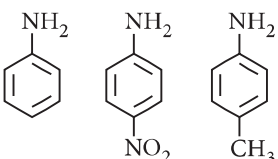
45. Give reasons for the following :

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

(ii) $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ in an aqueous solution. (2/3, AI 2016, 2014)

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

(i) $\text{C}_6\text{H}_5-\text{NH}_2$, $\text{C}_6\text{H}_5-\text{CH}_2-\text{NH}_2$,
 $\text{C}_6\text{H}_5-\text{NH}-\text{CH}_3$

(ii)  (AI 2015)

47. How do you convert the following :

(i) $\text{C}_6\text{H}_5\text{CONH}_2$ to $\text{C}_6\text{H}_5\text{NH}_2$

(ii) Aniline to phenol (2/3, AI 2015)

48. Illustrate the following reactions giving suitable example in each case :

(i) Ammonolysis

(ii) Acetylation of amines (2/5, Foreign 2015)

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

(i) $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Sn} + \text{HCl}} \text{A} \xrightarrow[273 \text{ K}]{\text{NaNO}_2 + \text{HCl}} \text{B}$

$\xrightarrow{\text{H}_2\text{O}} \text{C}$

(ii) $\text{CH}_3\text{CN} \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{A} \xrightarrow[\Delta]{\text{NH}_3} \text{B}$

$\xrightarrow{\text{Br}_2 + \text{KOH}} \text{C}$ (2/3, Delhi, AI 2014)

50. Account for the following :

(i) Aniline does not give Friedel-Crafts reaction.

(ii) $\text{p}K_b$ of methylamine is less than that of aniline. (2/3, Delhi 2014C)

51. (i) Arrange the following compounds in an increasing order of basic strength :

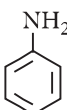
$\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2$, $(\text{C}_2\text{H}_5)_2\text{NH}$ and CH_3NH_2

(ii) Arrange the following compounds in a decreasing order of $\text{p}K_b$ values :

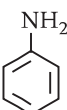
$\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $(\text{C}_2\text{H}_5)_2\text{NH}$ and $\text{C}_6\text{H}_5\text{NH}_2$ (Delhi 2014C)

52. Complete the following reactions :

(i) $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{CHCl}_3 + \text{alc. KOH} \longrightarrow$

(ii)  + $\text{HCl}_{(aq)} \longrightarrow$ (2/3, AI 2013)

53. Write the main products of the following reactions :

(i)  $\xrightarrow{\text{Br}_{2(aq)}} ?$

(ii) $\text{CH}_3-\overset{\text{NH}_2}{\underset{\text{O}}{\parallel}}{\text{C}}-\text{NH}_2 \xrightarrow{\text{Br}_2 + \text{NaOH}} ?$ (2/3, AI 2013)

54. Give chemical tests to distinguish between the following pairs of compounds :

(i) Aniline and ethylamine

(ii) Ethylamine and dimethylamine

(Delhi 2013C)

55. Give reasons :

(i) Aniline is a weaker base than cyclohexyl amine.

(ii) It is difficult to prepare pure amines by ammonolysis of alkyl halides. (AI 2013C)

56. Give reasons :

(i) Electrophilic substitution in aromatic amines takes place more readily than benzene.

(ii) CH_3CONH_2 is weaker base than $\text{CH}_3\text{CH}_2\text{NH}_2$. (AI 2013C)

57. How would you account for the following :

(i) Aniline is a weaker base than cyclohexylamine.

(ii) Methylamine in aqueous medium gives reddish-brown precipitate with FeCl_3 .

(AI 2012C)

58. Give the chemical tests to distinguish between the following pairs of compounds :

(i) Ethylamine and aniline

(ii) Aniline and benzylamine (AI 2010)

59. Give the chemical tests to distinguish between the following pairs of compounds :

(i) Methylamine and dimethylamine

(ii) Aniline and *N*-methylaniline (AI 2010)

60. Write one chemical reaction each to illustrate the following :
- Carbylamine reaction
 - Acetylation reaction (2/3, Delhi 2010C)
61. Account for the following :
- pK_b of aniline is more than that of methylamine.
 - Aniline does not undergo Friedel-Crafts reaction. (AI 2010C)
62. Describe a chemical test each to distinguish between the following :
- Ethylamine and aniline
 - Methylamine and dimethylamine (AI 2010C, 2009C)
63. Assign reason for the following :
- Amines are less acidic than alcohols of comparable molecular masses.
 - Aliphatic amines are stronger bases than aromatic amines. (AI 2009C)
64. (i) Arrange the following in an increasing order of basic strength in water : $C_6H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ and NH_3 .
- (ii) Arrange the following in increasing order or basic strength in gas phase : $C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ and CH_3NH_2 . (AI 2008)
65. Account for the following :
- Aniline does not undergo Friedel-Crafts reaction.
 - Aliphatic amines are stronger bases than aromatic amines. (AI 2008C)
66. Give one chemical test each to distinguish between the following pairs of compounds :
- Ethylamine and aniline
 - Aniline and *N*-methylaniline (AI 2008C)
- SA II (3 marks)**
67. Write the structures of A, B and C in the following :
- $$C_6H_5-CONH_2 \xrightarrow{Br_2/aq. KOH} A \xrightarrow{KI} C \xrightarrow{NaNO_2 + HCl, 0-5^\circ C} B$$
 - $$CH_3-Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow{\Delta, CHCl_3 + alc. KOH} C$$
- (Delhi 2016)
68. Write the structures of main products when aniline reacts with the following reagents :
- Br_2 water
 - HCl
 - $(CH_3CO)_2O$ /pyridine (3/5, Delhi 2015)
69. Write the chemical equations involved when aniline is treated with the following reagents :
- Br_2 water
 - $CHCl_3 + KOH$
 - HCl (AI 2015)
70. Write the structures of A, B and C in the following reactions :
- $$C_6H_5NO_2 \xrightarrow{Sn/HCl} A \xrightarrow[273 K]{NaNO_2 + HCl} B \xrightarrow[\Delta]{H_2O} C$$
 - $$CH_3Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[273 K]{HNO_2} C$$
- (3/5, Foreign 2015)
71. An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B' which on heating with Br_2 and KOH forms a compound 'C' of molecular formula C_6H_7N . Write the structures and IUPAC names of compounds A, B and C. (Delhi 2015C)
72. Give the structures of A, B and C in the following reactions :
- $$CH_3Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[273 K]{HNO_2} C$$
 - $$CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{Br_2 + KOH} B \xrightarrow{CHCl_3 + NaOH} C$$
- (Delhi 2014)
73. Give the structures of products A, B and C in the following reactions :
- $$CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^\circ C]{HNO_2} C$$
 - $$CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOH + Br_2} B \xrightarrow{CHCl_3 + Alc. NaOH} C$$
- (Delhi 2013)
74. Account for the following observations :
- pK_b for aniline is more than that for methylamine.
 - Methylamine solution in water reacts with ferric chloride solution to give a precipitate of ferric hydroxide.
 - Aniline does not undergo Friedel-Crafts reaction. (Delhi, AI 2008)

13.9 Chemical Reactions (Diazonium salts)

VSA (1 mark)

75. Complete the following reaction equation :
 $C_6H_5N_2Cl + H_3PO_2 + H_2O \longrightarrow \dots$
(Delhi 2015C, AI 2013, 2012)
76. The conversion of primary aromatic amines into diazonium salts is known as _____.
(AI 2014)
77. Complete the following reactions :
 $C_6H_5N_2^+Cl^- \xrightarrow[\text{(Room temp.)}]{H_2O} \dots$ *(1/3, AI 2013)*
78. State and illustrate the following :
 Coupling reaction *(1/2, AI 2013C, Foreign 2011)*
79. How is the following conversion carried out :
 Aniline to *p*-hydroxyazobenzene.
(1/2, Delhi 2012C)

80. How will you bring about the following conversion :
 Nitrobenzene to phenol *(1/2, Delhi 2011C)*
81. How will you bring about the following conversion :
 Aniline to chlorobenzene
 Write the chemical equation involved.
(1/2, Delhi 2011C)
82. How will you bring about the following conversion :
 Aniline to benzonitrile. *(Delhi 2011C)*
83. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt.
(Delhi 2008)
84. How would you achieve the following conversion :
 Aniline to benzonitrile.
 Write the chemical equation with reaction conditions in each case. *(Delhi 2007)*

SA I (2 marks)

85. Write chemical equations for the following conversions :
 (i) Nitrobenzene to benzoic acid.
 (ii) Aniline to benzyl alcohol. *(2/3, Delhi 2012)*

86. Illustrate the following with an example of reaction in each case :
 (i) Sandmeyer's reaction
 (ii) Coupling reaction.

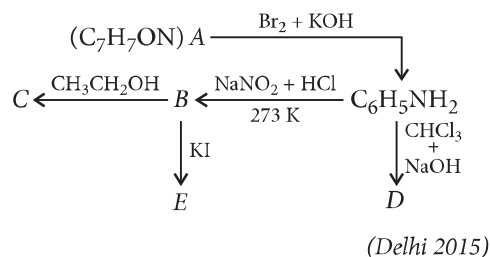
(AI 2012C, Delhi 2011C)

SA II (3 marks)

87. Give the structure of A, B and C in the following reactions :
- (i) $C_6H_5N_2^+Cl^- \xrightarrow{CuCN} A \xrightarrow{H_2O/H^+} B \xrightarrow[\Delta]{NH_3} C$
- (ii) $C_6H_5NO_2 \xrightarrow{Sn + HCl} A \xrightarrow[273\text{ K}]{NaNO_2 + HCl} B \xrightarrow[H_2O/H^+]{\Delta} C$
(Delhi 2013)

LA (5 marks)

88. An aromatic compound 'A' of molecular formula C_7H_7ON undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions :



89. (i) Write the structures of main products when benzenediazonium chloride ($C_6H_5N_2^+Cl^-$) reacts with the following reagents :
 (a) HBF_4/Δ (b) Cu/HBr
- (ii) Write the structures of A, B and C in the following reactions :

