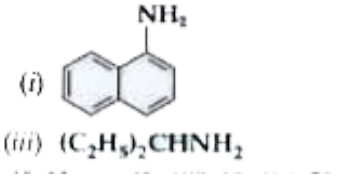
CHEMISTRY

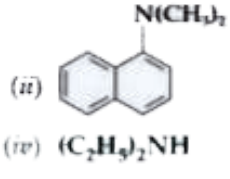
BOOKS - U-LIKE CHEMISTRY (HINGLISH)

AMINES

Ncert Intext Questions

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





(iii) $(C_2H_5)_2CHNH_2$ (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) $CH_3NH_2, (CH_3)_2NH, (CH_3)_3N, C_6H_5NH_2, C_6H_5NH_2$.

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

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Ncert Textbook Exercises

1. 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) $CH_3NHCH(CH_3)_2$ (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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2. Give one chemical test to distinguish between the following pairs of compounds :

Methylamine and dimethylamine

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

Secondary and tertiary amines

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

Ethylamine and aniline

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

Aniline and benzylamine

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

Aniline and N-methylaniline

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7. Account for the following :

pK_b of aniline is more than that of methylamine.

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8. Account for the following :

Ethylamine is soluble in water whereas aniline is not.

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9. Account for the following :

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

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10. Account for the following :

Although amino group is o- and p- directing in aromatic, electrophilic

substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline.

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11. Account for the following :

Aniline does not undergo Friedel-Crafts reaction.

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12. Account for the following :

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

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13. Account for the following :

Gabriel phthalimide synthesis is preferred for synthesising primary

amines.

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14. Arrange the following :

In decreasing order of the pK_b values :

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

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15. Arrange the following :

In increasing order of basic strength :

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

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16. Arrange the following :

In increasing order of basic strength :

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

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

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17. Arrange the following :

In decreasing order of basic strength in gas phase :

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

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18. Arrange the following :

In increasing order of boiling point :

C_2H_5OH, $(CH_3)_2NH$, $C_2H_5NH_2$.

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19. Arrange the following :

In increasing order of solubility in water :

$C_6H_5NH_2, (C_2H_5)_2NH, C_2H_5NH_2.$

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20. How will you convert :

Ethanoic acid into methanamine

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21. How will you convert :

Hexanenitrile into 1-aminopentane

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22. How will you convert :

Methanol to ethanoic acid

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23. How will you convert :

Ethanamine into methanamine

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24. How will you convert :

Ethanoic acid into propanoic acid

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25. How will you convert :

Methanamine into ethanamine

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26. How will you convert :

Nitromethane into dimethylamine

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27. How will you convert :

Propanoic acid into ethanoic acid ?

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

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29. Write short notes on the following :

(i) Carbylamine reaction
(ii) Diazotisaton
(iii) Hoffmann's bromamide reaction
(iv) Coupling reaction
(v) Ammonolysis
(vi) Acetylation
(vii) Gabriel phthalimide synthesis

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30. Accomplish the following conversions :

Nitrobenzene to benzoic acid

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31. Accomplish the following conversions :

Benzene to m-bromophenol

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32. Accomplish the following conversions :

Benzoic acid to aniline

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33. Accomplish the following conversions :

Aniline to 2, 4, 6-tribromofluorobenzene

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34. Accomplish the following conversions :

Benzyl chloride to 2-phenylethanamine

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35. Accomplish the following conversions :

Chlorobenzene to p-chloraniline

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36. Accomplish the following conversions :

Aniline to p-bromoaniline

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37. Accomplish the following conversions :

Benzamide to toluene

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38. Accomplish the following conversions :

Aniline to benzyl alcohol.

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

$$CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow{NaOH + Br_2} C$$

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

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

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

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

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

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

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

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

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

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

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45. 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.

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46. Complete the following reactions :

$C_6H_5NH_2 + CHCl_3 + alc.\ KOH \rightarrow$

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47. Complete the following reactions :

$C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

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48. Complete the following reactions :

$C_6H_5NH_2 + H_2SO_4(conc.) \rightarrow$

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49. Complete the following reactions :

$C_6H_5N_2Cl + C_2H_5OH \rightarrow$

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50. Complete the following reactions :

$C_6H_5NH_2 + Br_2(aq) \rightarrow$

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51. Complete the following reactions :

$C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$

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52. Complete the following reactions :

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

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

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

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55. Give plausible explanation for each of the following :

Why ae amines less acidic than alcohols of comparable molecular masses ?

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56. Give plausible explanation for each of the following :

Why do primary amines have higher boiling points than tertiary amines ?

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57. Give plausible explanation for each of the following :

Why are aliphatic amines stronger bases than aromatic amines ?

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Case Based Source Based Integrated Questions

1. Read the given passage and answer questions number 1 to 5 that follow :

In common system, an aliphatic amine is named by prefixing alkyl group to amine, i.e., alkylamine as one word (e.g., methylamine). In secondary and tertiary amines, when two or more groups are the same, the prefix di or tri is appended before the name of alkyl group. In IUPAC system,

primary amines are names as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as methanamine. In case, more than one amino group is present at different positions in the parent chain, their positions are specified by giving numbers to the carbon atoms bearing $-NH_2$ groups and suitable prefix such as di, tri, etc., is attached to the amine. The letter 'e' of the suffix of the hydrocarbon part is retained. For example, $H_2N-CH_2-CH_2-NH_2$ is named as ethane-1, 2-diamine.

To name secondary and tertiary amines, we use locant N to designate substituent attached to a nitrogen atom. For example, $CH_3NHCH_2CH_3$ is named as N-methylethanamine and $(CH_3CH_2)_3N$ is named as N, N-diethylethanamine. In arylamines, $-NH_2$ group is directly attached to the benzene ring. $C_6H_5NH_2$ is the simplest example of arylamine. In common system, it is known as aniline. It is also an accepted IUPAC name. While naming arylamines according to IUPAC system, suffix 'e' of arene is replaced by 'amine'. Thus in IUPAC system, $C_6H_5-NH_2$ is named as benzenamine.

How do we name secondary and tertiary amines according to common system?

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2. Read the given passage and answer questions number 1 to 5 that follow :

In common system, an aliphatic amine is named by prefixing alkyl group to amine, i.e., alkylamine as one word (e.g., methylamine). In secondary and tertiary amines, when two or more groups are the same, the prefix di or tri is appended before the name of alkyl group. In IUPAC system, primary amines are names as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as methanamine. In case, more than one amino group is present at different positions in the parent chain, their positions are specified by giving numbers to the carbon atoms bearing $-NH_2$ groups and suitable prefix such as di, tri, etc., is attached to the amine. The letter 'e' of the suffix of

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How do we name primary amines according to IUPAC system ?

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3. Read the given passage and answer questions number 1 to 5 that follow :

In common system, an aliphatic amine is named by prefixing alkyl group to amine, i.e., alkylamine as one word (e.g., methylamine). In secondary

and tertiary amines, when two or more groups are the same, the prefix di or tri is appended before the name of alkyl group. In IUPAC system, primary amines are names as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as methanamine. In case, more than one amino group is present at different positions in the parent chain, their positions are specified by giving numbers to the carbon atoms bearing $-NH_2$ groups and suitable prefix such as di, tri, etc., is attached to the amine. The letter 'e' of the suffix of the hydrocarbon part is retained. For example, $H_2N-CH_2-CH_2-NH_2$ is named as ethane-1, 2-diamine.

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system, suffix 'e' of arene is replaced by 'amine'. Thus in IUPAC system, $C_6H_5 - NH_2$ is named as benzenamine.

Name the compound according to IUPAC system :

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

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4. Read the given passage and answer questions number 1 to 5 that follow :

In common system, an aliphatic amine is named by prefixing alkyl group to amine, i.e., alkylamine as one word (e.g., methylamine). In secondary and tertiary amines, when two or more groups are the same, the prefix di or tri is appended before the name of alkyl group. In IUPAC system, primary amines are names as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as methanamine. In case, more than one amino group is present at different positions in the parent chain, their positions are specified by giving

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How do we name secondary and tertiary amines according to IUPAC nomenclature ?

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5. Read the given passage and answer questions number 1 to 5 that follow :

In common system, an aliphatic amine is named by prefixing alkyl group to amine, i.e., alkylamine as one word (e.g., methylamine). In secondary and tertiary amines, when two or more groups are the same, the prefix di or tri is appended before the name of alkyl group. In IUPAC system, primary amines are names as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as alkanamines. The name is derived by replacement of 'e' of alkane by the word amine. For example, CH_3NH_2 is named as methanamine. In case, more than one amino group is present at different positions in the parent chain, their positions are specified by giving numbers to the carbon atoms bearing $-NH_2$ groups and suitable prefix such as di, tri, etc., is attached to the amine. The letter 'e' of the suffix of the hydrocarbon part is retained. For example, $H_2N-CH_2-CH_2-NH_2$ is named as ethane-1, 2-diamine.

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Give the name of the compound :

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6. Read the given passage and answer questions number 1 to 5 that follow :

The lower aliphatic amines are gases with fishy odour. Primary amines with three or more carbon atoms are liquid and still higher one are solid. Aniline and other arylamines are usually colourless but get coloured on storage due to atmospheric oxidation. Lower aliphatic amines are soluble in water because they can form hydrogen bonds with water molecules. However, solubility decreases with increase in molar mass of amines due to increase in size of the hydrophobic alkyl part. Higher amines are essentially insoluble in water. Considering the electronegativity of nitrogen of amine and oxygen of alcohols in water. Out of butan-1-ol and butan-1-amine, which will be more soluble in water and why? Amines are soluble in organic solvents like alcohol, ether and benzene. You may remember that alcohols are more polar than amines and form stronger intermolecular hydrogen bonds than amines. Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one and hydrogen of another molecule. This intermolecular association is more in primary amines than in

secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it. Tertiary amines do not have intermolecular association due to the absence of hydrogen atom available for hydrogen bond formation. Therefore, the order of boiling points of isomeric amines is as follows :

$$\text{Primary} > \text{secondary} > \text{Tertiary.}$$

Why does the solubility of amines decrease with the increase of molar mass ?

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7. Read the given passage and answer questions number 1 to 5 that follow :

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$$\text{Primary} > \text{secondary} > \text{Tertiary.}$$

Out of $C_5H_{11}OH$ and $C_5H_{11}NH_2$, which is more soluble in water and why ?

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8. Read the given passage and answer questions number 1 to 5 that follow :

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$$\text{Primary} > \text{secondary} > \text{Tertiary.}$$

Out of benzene and water which will dissolve $C_6H_{13}NH_2$ more ?

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9. Read the given passage and answer questions number 1 to 5 that follow :

The lower aliphatic amines are gases with fishy odour. Primary amines with three or more carbon atoms are liquid and still higher one are solid. Aniline and other arylamines are usually colourless but get coloured on storage due to atmospheric oxidation. Lower aliphatic amines are soluble in water because they can form hydrogen bonds with water molecules. However, solubility decreases with increase in molar mass of amines due to increase in size of the hydrophobic alkyl part. Higher amines are

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$$\text{Primary} > \text{secondary} > \text{Tertiary.}$$

Arrange the following compounds in increasing order of boiling point :

$$CH_3 - CH_2 - \underset{CH_3}{\underset{|}{CH}} - NH_2, CH_3 - \overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}} - NH_2, CH_3CH_2CH_2CH_2NH$$

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10. Read the given passage and answer questions number 1 to 5 that follow :

Consider the reaction of an alkanamine and ammonia with a proton to compare their basicity. Due to the electron releasing nature of alkyl group, it (R) pushes electrons towards nitrogen and thus makes the unshared electron pair more available for sharing with the proton of the acid. Moreover, the substituted ammonium ion formed formed from the amine gets stabilised due to dispersal of the positive charge by the +I effect of the alkyl group. Hence, alkylamines are stronger bases than ammonia. Thus, the basic nature of aliphatic amines should increase with increase in the number of alkyl groups. This trend is followed in the gaseous phase. The order of basicity of amines in the gaseous phase follows the expected order : tertiary amine > secondary amine > primary amine > NH_3. Th trend is not regular in the aqueous state as evident by their pK_b values. In the aqueous phase, the substituted ammonium cations get stabilised not only by electron releasing effect of the alkyl group (+I) but also by solvation with water molecules. The greater the size of the ion, lesser will be the solvation and the less stabilised is the

ion.

What is the role of alkyl group towards the basicity of an amine ?

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11. Read the given passage and answer questions number 1 to 5 that follow :

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How is the basicity of an amine effected with increase in the number of alkyl groups ?

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12. Read the given passage and answer questions number 1 to 5 that follow :

Consider the reaction of an alkanamine and ammonia with a proton to compare their basicity. Due to the electron releasing nature of alkyl group, it (R) pushes electrons towards nitrogen and thus makes the unshared electron pair more available for sharing with the proton of the acid. Moreover, the substituted ammonium ion formed formed from the amine gets stabilised due to dispersal of the positive charge by the +I effect of the alkyl group. Hence, alkylamines are stronger bases than

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Arrange the following compounds in increasing order basicity in the gaseous phase :

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

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13. Read the given passage and answer questions number 1 to 5 that follow :

Consider the reaction of an alkanamine and ammonia with a proton to

compare their basicity. Due to the electron releasing nature of alkyl group, it (R) pushes electrons towards nitrogen and thus makes the unshared electron pair more available for sharing with the proton of the acid. Moreover, the substituted ammonium ion formed formed from the amine gets stabilised due to dispersal of the positive charge by the +I effect of the alkyl group. Hence, alkylamines are stronger bases than ammonia. Thus, the basic nature of aliphatic amines should increase with increase in the number of alkyl groups. This trend is followed in the gaseous phase. The order of basicity of amines in the gaseous phase follows the expected order : tertiary amine > secondary amine > primary amine > NH_3. Th trend is not regular in the aqueous state as evident by their pK_b values. In the aqueous phase, the substituted ammonium cations get stabilised not only by electron releasing effect of the alkyl group (+I) but also by solvation with water molecules. The greater the size of the ion, lesser will be the solvation and the less stabilised is the ion.

Why does the sequence of basicity of an amine change when we move from the gaseous phase to the aqueous solution phase ?

View Text Solution

14. Read the given passage and answer questions number 1 to 5 that follow :

Consider the reaction of an alkanamine and ammonia with a proton to compare their basicity. Due to the electron releasing nature of alkyl group, it (R) pushes electrons towards nitrogen and thus makes the unshared electron pair more available for sharing with the proton of the acid. Moreover, the substituted ammonium ion formed formed from the amine gets stabilised due to dispersal of the positive charge by the +I effect of the alkyl group. Hence, alkylamines are stronger bases than ammonia. Thus, the basic nature of aliphatic amines should increase with increase in the number of alkyl groups. This trend is followed in the gaseous phase. The order of basicity of amines in the gaseous phase follows the expected order : tertiary amine > secondary amine > primary amine > NH_3. Th trend is not regular in the aqueous state as evident by their pK_b values. In the aqueous phase, the substituted ammonium cations get stabilised not only by electron releasing effect of the alkyl group (+I) but also by solvation with water molecules. The greater the size of the ion, lesser will be the solvation and the less stabilised is the

ion.

What is the basicity order of the following compounds in aqueous solution ?

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

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Multiple Choice Questions

1. Nitrobenzene can be prepared from benzene diazonium chloride by using the reagents

A. $HBF_4 / NaNO_2$

B. HNO_3 / H_2SO_4

C. HBF_4 / HNO_3

D. Fuming HNO_3

Answer: A

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2. Nitrobenzene can be converted to aniline by the following reagents :

A. H_2 / Pd

B. Sn / HCl

C. Fe / HCl

D. All of the above.

Answer: D

View Text Solution

3. Benedryl a well known drug contains the following group :

A. Primary amine

B. Diazonium group

C. Secondary amine

D. Tertiary amine

Answer: D

View Text Solution

4. In Hoffmann Bromamide reaction which substance is treated with Br_2 and $NaOH$ to obtain amine ?

A. Isonitrile

B. Nitrile

C. Amide

D. Nitro

Answer: C

View Text Solution

5. Benzylamine may be alkylated as shown in the following equation :

$$C_6H_5CH_2NH_2 + R - X \rightarrow C_6H_5CH_2NHR$$

Which of the following alkylhalides is best suited for this reaction through S_N1 mechanism ?

A. CH_3Br

B. C_6H_5Br

C. C_6H_5Br

D. $C_6H_5CH_2Br$

Answer: C

View Text Solution

6. Which of the following does not affect the K_b of an organic base ?

A. $+I$ or $-I$ effect

B. Solvation effect

C. Density

D. Steric hinderance

Answer: C

View Text Solution

7. The order of reactivity of halides with amines is

A. $RI > RBr > RCl$

B. $RBr > RI > RCl$

C. $RCl > RBr > RI$

D. $RBr > RCl > RI$

Answer: A

View Text Solution

8. Hinsberg reagent can be used to distinguish between

A. primary and secondary amine.

B. primary and secondary alcohol.

C. cyanide and isocyanide.

D. aldehyde and ketone.

Answer: A

View Text Solution

9. Amines can be prepared from phthalimide on treatment with ethanolic KOH and further heating with alkyl halide. This reaction is known as

A. Wurtz reaction.

B. Gabriel phthalmide synthesis.

C. Sandmeyer's reaction.

D. Kolbe's reaction.

Answer: B

View Text Solution

10. The acetylation of amines is carried out in the presence of a base

A. stronger than the amine

B. as strong as the amine

C. weaker than the amine.

D. very weak base

Answer: A

View Text Solution

11. In carbylamine test, we heat a primary amine with a substance X and a base. The substance X is

A. CCl_4

B. CS_2

C. CCl_3

D. CH_2Cl_2

Answer: A

View Text Solution

12. In order to prepare a 1° amine from an alkyl halide with simultaneous addition of one CH_2 group in the carbon chain, the reagent used as source of nitrogen is _____.

A. Sodium amide, $NaNH_2$

B. Sodium azide, NaN_3

C. Potassium cyanide, KCN

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

Answer: C

View Text Solution

13. Amongst the given set of reactants, the most appropriate for preparing 2° amine is _____.

A. $2^{\circ} R - Br + NH_3$

B. $2^{\circ} R - Br + NaCN$ followed by H_2 / Pt

C. $1^{\circ} R - NH_2 + RCHO$ followed by H_2 / Pt

D. $1^{\circ} R - Br(2mol) +$ potassium phthalimide followed by H_3O^+ / heat

Answer: C

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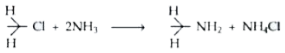
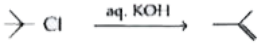
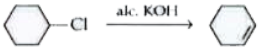
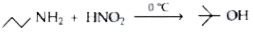
14. Which of the following reactions are correct ?

A. 

B. 

C. 

D. 

Answer: A::C::D

View Text Solution

15. Which of the following reactions belong to electrophilic aromatic substitution ?

A. Bromination of acetanilide

B. Coupling reaction of aryldiazonium salts

C. Diazotisation of aniline

D. Acylation of aniline

Answer: A::B::D

View Text Solution

16. The strongest base in aqueous solution among the following amines is

A. N, N-diethylethanamine

B. N-ethylethanamine

C. N-methylmethanamine

D. ethanamine

Answer: B

View Text Solution

17. Which of the following reagents would not be a good choice for reducing an aryl nitro compound to an amine ?

A. $H_2 \quad (\text{excess}) / Pt$

B. $LiAlH_4$ in ether

C. Fe and HCl

D. Sn and HCl

Answer: B

View Text Solution

18. 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, $C_6H_4(CO)_2N^-K^+$

Answer: D

View Text Solution

19. Which of the following amines can be prepared by Gabriel synthesis ?

A. Isobutyl amine

B. 2-Phenylethylamine

C. N-methylbenzylamine

D. Aniline

Answer: A::B::D

View Text Solution

20. Anilinium hydrogensulphate on heating with sulphuric acid at 453-473 K produces

A. benzene sulphonic acid.

B. anthranilic acid.

C. sulphanilic acid.

D. m-aminobenzene sulphonic acid.

Answer: C

View Text Solution

Assertion Reason Questions

1. Assertion (A) : Amines can be considered as derivatives of ammonia.

Reason (R) : Quaternary ammonium salts are used as surfactants.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

View Text Solution

2. Assertion (A) : IUPAC name of ethanamine is ethylamine.

Reason (R) : In IUPAC system, $C_6H_5 - NH_2$ is named as benzenamine.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

3. Assertion (A) : Nitro compounds are reduced to amines by passing hydrogen gas in the presence of finely divided nickel.

Reason (R) : Nitriles cannot be reduced to primary amines using lithium aluminium hydride.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

4. Assertion (A) : Gabriel synthesis is used for the preparation of primary amines.

Reason (R) : In Hoffmann bromamide, the amine obtained contains one carbon atom more than the amide.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

5. Assertion (A) : Solubility of amines decreases with increase in the molar mass of mines.

Reason (R) : The hydrophobic alkyl part increases with the increase in molar mass in amines.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: A

View Text Solution

6. Assertion (A) : Primary amines with three or more carbon atoms are liquids.

Reason (R) : The intermolecular association is more in primary amines than in secondary amines.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

7. Assertion (A) : Amines being basic in nature react with acids to form salts.

Reason (R) : Aromatic amines are stronger bases than ammonia.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

8. Assertion : When the alkyl group is small like $-CH_3$ group, there is n steric hindrance to H-bonding.

Reason (R) : In aniline or other arylamines, the $-NH_2$ group is attached directly to the benzene ring.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

9. Assertion (A) : The hydrogen attached to nitrogen in sulphonamide is strongly acidic.

Reason (R) : Benzene sulphonyl chloride is also known as Hinsberg's reagent.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

10. Assertion (A) : Benzene diazonium chloride is a coloured gas.

Reason (R) : Direct nitration of aniline yields tarry oxidation product.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

Fill In The Blanks

1. Amines can be considered as derivatives of _____ obtained by the replacement of hydrogen atom with alkyl or aryl groups.

View Text Solution

2. Electrophilic substitution in aromic amines can be carried out by _____ the $-NH_2$ group by acetylation.

View Text Solution

3. Aliphatic amines are stronger bases than ammonia due to _____ of alkyl groups.

View Text Solution

4. Aryl _____ and _____ cannot be prepared by direct halogenation.

View Text Solution

5. The main problem encountered during electrophilic subsitution reactions of aromatic amines is that they have _____.

View Text Solution

6. The reagent used to convert $ArN_2^+Cl^-$ to ArH is _____.

View Text Solution

7. Aniline reacts with $NaO_2 + HCl$ at 273 - 278 K to form _____.

View Text Solution

8. The by-product obtained in the preparation of fluorobenzene from benzene diazonium chloride using HBF_4 is _____.

View Text Solution

9. Direct nitration of aniline yields _____ oxidation products in addition to nitro derivatives.

View Text Solution

10. Since N, N-diethylbenzene sulphonamide does not contain any hydrogen atom attached to N-atom, it is not _____ and hence _____ in alkali.

View Text Solution

True Or False

1. $R-CN$ and $R-\overset{\overset{O}{||}}{C}-NH_2$ both can be reduced to $R-CH_2-NH_2$ by using suitable reducing agents.

View Text Solution

2. The reaction of amines with benzoyl chloride is called benzoylation.

View Text Solution

3. Amines behave as nucleophiles due to the presence of unshared election pair.

View Text Solution

4. Lower aliphatic amines are gases with fishy odour.

View Text Solution

5. Hoffmann bromamide reaction can be used to reduce the length of carbon chain by one carbon atom.

View Text Solution

6. The intermediate product in Gabriel phthalimide synthesis is N-Alkylphthalimide.

View Text Solution

Very Short Answer Questions 1 Mark Each

1. Write IUPAC name of the following compound :

$$(CH_3CH_2)_2NCH_3$$

View Text Solution

2. Write the structure of 2, 4-dinitrochlorobenzene.

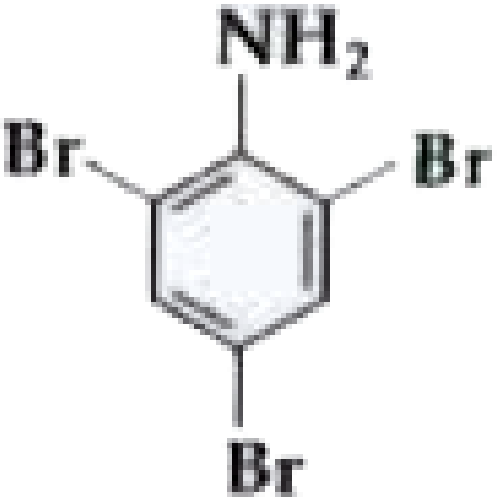
View Text Solution

3. Write IUPAC name of the following compound :

$$CH_3NHCH(CH_3)_2$$

View Text Solution

4. Write the IUPAC name of the given compound :



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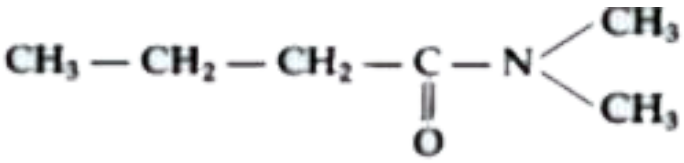
5. Write the IUPAC name of the given compound :



View Text Solution

6. The conversion of primary aromatic amines into diazonium salts is known as _____.

View Text Solution

7. Arrange the following in the decreasing order of their basic strength in aqueous solutions :

$$CH_3NH_2, (CH_3)_2NH, (CH_3)_3N \text{ and } NH_3$$

View Text Solution

8. Rearrange the following in an increasing order of their basic strengths :

$$C_6H_5NH_2, C_6H_5N(CH_3)_2, (C_6H_5)_2NH \text{ and } CH_3NH_2$$

View Text Solution

9. Direct nitration of aniline is not carried out. Explain why ?

View Text Solution

10. Give a chemical test to distinguish between ethylamine and aniline.

View Text Solution

11. Of methylamine and aniline which is a stronger base and why ?

View Text Solution

12. Why is an alkylamine more basic than ammonia ?

View Text Solution

13. Write the IUPAC name of the compound

$$CH_2(Cl)COCH(CH_3)CONH_2$$

View Text Solution

14. Rearrange the following compounds in an increasing order of their basic strengths :

Aniline, p-nitroaniline, p-toluidine

View Text Solution

15. Arrange the following compounds in an increasing order of basic strengths in their aqueous solutions :

$NH_3, CH_3NH_2, (CH_3)_2NH, (CH_3)_3N$

View Text Solution

16. What is the role of HNO_3 in the nitrating mixture used for nitration of benzene ?

View Text Solution

17. Why is NH_2 group of aniline acetylated before carrying out nitration ?

View Text Solution

18. What is the product obtained when $C_6H_5CH_2NH_2$ reacts with HNO_2?

View Text Solution

19. What is the best reagent to convert nitrile to primary amine ?

View Text Solution

20. What is Hinsberg's reagent ?

View Text Solution

21. Why is benzene diazonium chloride not stored and is used immediately after its preparation ?

View Text Solution

22. Under what reaction conditions (acidic/basic), the coupling reaction of aryldiazonium chloride with aniline is carried out ?

View Text Solution

23. Write the chemical reaction occuring in the preparation of fluorobenzene from aniline.

View Text Solution

24. Predict the product of reaction of aniline with bromine in non-polar solvent such as CS_2.

View Text Solution

25. What is the structure and IUPAC name of the compound, allyl amine ?

View Text Solution

26. Arrange the following compounds in increasing order of dipole moment :

$$CH_3CH_2CH_3, CH_3CH_2OH, CH_3CH_2NH_2$$

View Text Solution

27. Write down the IUPAC name of

.

View Text Solution

28. Write the chemical equation for the following reaction :

A primary amine is prepared from a primary alkyl halide.

View Text Solution

29. Why are aqueous solutions of amines basic in nature ?

View Text Solution

30. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt.

View Text Solution

31. Give a chemical test to distinguish between aniline and N-methylaniline.

View Text Solution

32. Why do amines react as nucleophiles ?

View Text Solution

33. Aniline is a weaker base than cyclohexylamine. Explain.

View Text Solution

34. How is m-nitroaniline obtained from nitrobenzene ?

View Text Solution

35. Mention one commercial use of N, N-Dimethylaniline.

View Text Solution

36. Give a chemical test to distinguish between aniline and ethylamine.

View Text Solution

37. Why primary amines have higher boiling than tertiary amines ?

View Text Solution

38. Write the IUPAC name of the following :

View Text Solution

39. Write IUPAC name of the following :

$$CH_3 - NH - \overset{1}{C}H_2 - \underset{NO_2}{\overset{2}{C}H} - \overset{3}{C}H_3$$

View Text Solution

40. How is aniline obtained from benzoic acid ?

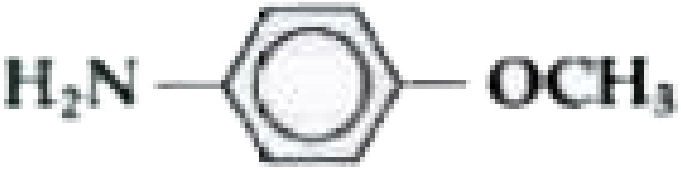
View Text Solution

41. Account for the following :

Ammonolysis of alkyl halide does not give a corresponding amine in pure state.

View Text Solution

42. Write IUPAC name of the following



View Text Solution

43. How is phenylaminomethane obtained from phenylnitrile ?

View Text Solution

44. How is the basic strength of aromatic amines affected by the presence of an electron releasing group on the benzene ring ?

View Text Solution

45. Arrange the following in the order of their increasing basic character in solution :

$$NH_3, EtNH_2, EtNH, Et_3N$$

View Text Solution

46. Give chemical test to distinguish between $C_6H_5CH_2NH_2$ and C_6HNH_2.

View Text Solution

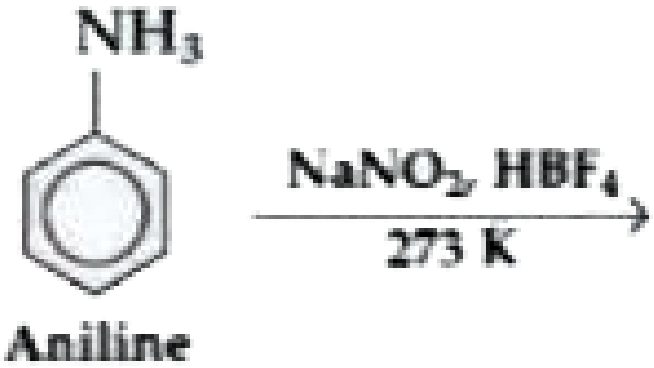
47. Convert aniline to sulphanilic acid.

View Text Solution

48. Convert aniline to phenylisocyanide.

View Text Solution

49. Complete the following reaction :



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50. Identify A and B in the following sequence :

$$CH_3COOC_2H_5 \xrightarrow{NH_3} A \xrightarrow{Br_2/KOH} B$$

View Text Solution

51. Give chemical tests to distinguish between the following pair of compounds :

$$CH_3 - CH_2 - NH_2 \text{ and } (CH_3)_2NH$$

View Text Solution

52. Complete the following equation :

$$RNC \xrightarrow{H_2 / Pt}$$

View Text Solution

53. How is orange-I prepared?

View Text Solution

54. How is acetanilide prepared from aniline ?

View Text Solution

View Text Solution

55. Illustrate the following with an example : Acetylation reaction.

View Text Solution

56. Write IUPAC name :

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57. What does K_b value for an amine stand for ?

View Text Solution

58. Name a synthetic amino compound which is used as an anaesthetic in dentistry.

View Text Solution

59. Name a well known antihistaminic drug containing tertiary amino group.

View Text Solution

60. Name the type of hybridisation in nitrogen orbitals in amines.

View Text Solution

61. Give the IUPAC name of the compound $(CH_3CH_2)_3N$.

View Text Solution

62. What is obtained when nitrobenzene is reduced with Sn and HCl ?

View Text Solution

63. What is obtained finally by continued ammonolysis of alkyl halide ?

View Text Solution

64. Name the reagent for the conversion of an amide to amine containing the same number of carbon atoms.

View Text Solution

65. Name the synthesis used to prepare primary amine from phthalimide.

View Text Solution

66. CH_3CONH_2 is subjected to Hoffmann bromamide degradation. Name the main nitrogen containing compound obtained.

View Text Solution

67. What is the odour of lower aliphatic amines ?

View Text Solution

68. Which type of bond helps in the solubility of lower aliphatic amines in water ?

View Text Solution

69. Out of butan-1-ol and but-1-amine, which is more soluble ?

View Text Solution

70. What kind of substitution is involved in the reaction of amines with carboxylic acid derivatives ?

View Text Solution

71. Methanamine reacts with a carboxylic acid derivative to form N-methylbenzamide. What kind of reaction is it called ?

View Text Solution

72. A poisonous gas is formed by the reaction of $R-NH_2$ with $CHCl_3, KOH$. What is this test known as ?

View Text Solution

73. Which reagent is used to distinguish between primary, secondary and tertiary amines ?

View Text Solution

74. What do we obtain when we treat aniline with bromine water ?

View Text Solution

75. What is the solvent that we use in the acetylation of aniling using acetic anhydride ?

View Text Solution

76. What is the major product in the nitration of acetanilide ?

View Text Solution

77. What is the major product obtained when $ArN_2^+Cl^-$ treated with KI ?

View Text Solution

Short Answer Questions 2 Marks Each

1. Write the chemical equations in the following reactions :

(i) Hoffmann-bromamide degradation reaction

(ii) Carbylamine reaction

View Text Solution

2. Arrange the following :

(i) In increasing order of basic strength :

$C_6H_5-NH_2, CH_3-CH_2-NH_2, C_6H_5-NH-CH_3$

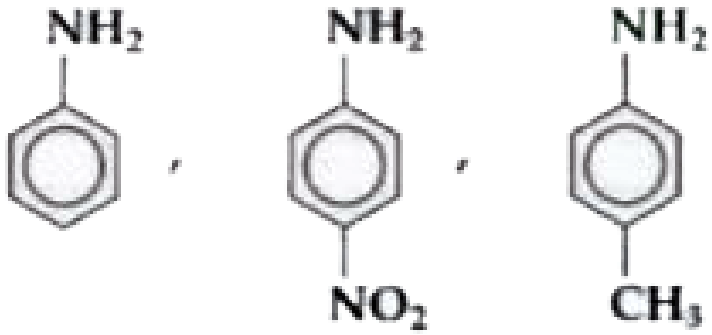
In increasing order of boiling point :

$C_2H_5OH, CH_3-CH_2-NH_2, CH_3NHCH_3$

View Text Solution

3. Arrange the following in increasing order basic strength :

(i) $C_6H_5-NH_2, C_6H_5CH_2-NH_2, C_6H_5NH-CH_3$



(ii)

View Text Solution

4. Arrange the following :

(i) In increasing order of their basic strength :

$C_6H_5 - NH_2, CH_3 - CH_2 - NH_2, CH_3 - NH - CH_3$

In increasing order of solubility in water :

$CH_3 - NH_2, (CH_3)_3N, CH_3 - NH - CH_3$

View Text Solution

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

(i) Ethylamine and Aniline (ii) Aniline and Benzylamine

View Text Solution

6. Identify A and B in each of the following processes :

(i) $CH_3CH_2Cl \xrightarrow{NaCN} A \xrightarrow[Ni/H_2]{\text{reduction}} B$

(ii) $C_6H_5NH_2 \overset{NaNO_2/HCl}{\underset{}{A}} \underset{OH^-}{C_6H_5NH_2B}$

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7. Write a chemcial equation each to represent

(a) Gatterman reaction

(b) Carbylamine reaction

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8. Show the mechanism of acylation of ethanamine and write the IUPAC name of the product formed.

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9. Write the names associated with the following reactions :

(a)

$$RCONH_2 + Br_2 + 4NaOH \rightarrow RNH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

(b) $ArN_2^+ X^- \xrightarrow{CuCN / KCN} ArCN + N_2$

(c) $R - NH_2 + CHCl_3 + 3KOH \overset{\text{Heat}}{} R - NC + 3KCl + 3H_2O$

(d) $ArN_2^+ X \xrightarrow{Cu / HCl} ArCl + N_2 + CuX$

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10. How will you distinguish between :

and CH_3NH_2

(b) $CH_3 - \underset{\underset{CH_3}{|}}{N} - H$ and $(CH_3)_3N$

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11. How can you convert an amide into an amine having one caron less than the starting compound ?

(b) Name the reaction.

(c) Give the IUPAC name and structure of the amine obtained by the above method if the amide is 3-chlorobutanamide.

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12. How can you obtain p-aminobenzene from aniline ?

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13. Complete and name the following reactions :

(a) $RNH_2 + CHCl_3 + 3KOH \rightarrow$

(b) $RCONH_2 + Br_2 + 4NaOH \rightarrow$

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14. Predict giving reasons, the order of basicity of the following compounds in (i) gaseous phase and in (ii) aqueous solutions $(CH_3)_3N, (CH_3)_2NH, CH_3NH_2, NH_3$.

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15. What is the role of pyridine in the acetylation reaction of amines ?

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16. Account for the following :

(a) Aniline does not undergo Friedel Crafts alkylation.

(b) Although $-NH_2$ group is an ortho and para-directing group,

nitration of aniline gives alongwith ortho and para-derivatives meta-derivative also.

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17. For an amine RNH_2, write an expression for K_b to indicate its basic strength.

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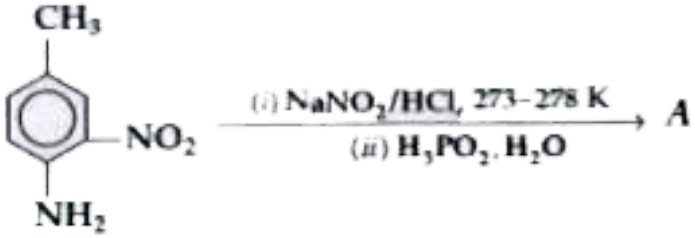
18. Give the structure of A in the following reaction :



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19. Explain why $MeNH_2$ is stronger base than MeOH ?

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20. A primary amine, RNH_2 can be reacted with $CH_3 - X$ to get secondary amine, $R - NHCH_3$ but the only disadvantage is that 3° amine and quaternary ammonium salts are also obtained as side products. Can you suggest a method where RNH_2 forms only 2° amine ?

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21. Write the chemical equations for one example of each of the following :

(a) Coupling reaction (b) Hoffmann's bromamide reaction

(c) Acetylation.

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22. Why does acetylation of $-NH_2$ group of aniline reduce its activating effect ?

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23. Complete the following reaction :

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24. A compound Z with molecular formula C_3H_9N reacts with $C_6H_5SO_2Cl$ to give a solid, insoluble in alkali. Identify Z.

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25. Identify A and B in the following reaction :

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26. Suggest a route by which the following conversion can be accomplished.

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27. How will you bring about the following conversion ?

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28. Write one chemical reaction each to illustrate the following :

(i) Hoffmann Bromamide reaction.

(ii) Gabriel phthalimide reaction.

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29. Give reasons :

(a) Methylamine is a stronger base than ammonia.

(b) Reactivity of $-NH_2$ groups gets reduced in acetanilide.

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30. Account for any two of the following :

(a) Amines are basic substances while amides are neutral.

(b) Aromatic amines are weaker bases than aliphatic amines.

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31. (a) Assign a reason for the following statements :

Alkylamines are stronger bases than arylamines.

(b) How would you convert methylamine into ethylamine ?

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32. (a) How will you convert an alkyl halide to a primary amine whose molecule has one more carbon atom than the used alkyl halide molecule ?

(b) Why are amines more basic than the comparable alcohols ?

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33. Give reasons for the following observations :

(i) It is difficult to prepare pure amines by ammonolysis of alkyl halides.

(ii) Electrophilic substitution in case of aromatic amines takes place more readily than in benzene.

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34. Illustrate the following with an example of reaction in each case :

(i) Sandmeyer reaction. (ii) Coupling reaction.

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35. Explain the following observations :

(i) In aqueous solution the K_b order is

$$Et_2NH > Et_3N > EtNH_2$$

(ii) Amines are more basic than comparable alcohols.

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36. What happens when (Write reactions only) :

(i) Nitroethane is treated with $LiAlH_4$?

(ii) Diazonium chloride reacts with phenol in basic medium ?

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37. State the reactions for obtaining benzoic acid from aniline.

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38. Account for the following :

(i) Aniline is weaker base than methylamine.

(ii) Aryl cyanides cannot be formed by the reaction of aryl halides and sodium cyanide.

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39. Illustrate each of the following with an example of reaction.

(i) Sandmeyer reaction. (ii) Diazotisation reaction.

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40. Write the IUPAC names for :

(i) `CH_(3)-underset(underset(NH_(2))(|))(CH)-underset(underset(CH_(3))(|))(CH)-CONH_(2)" (ii) " (##U_LIK_SP_CHE_XII_C13_E09_040_Q01.png" width="80%">

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41. Before reacting aniline with HNO_3 for nitration, it is converted to acetanilide. Why is this done and how is nitroaniline obtained subsequently ?

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Long Answer Questions I 3 Marks Each

1. (i) Acetylation of aniline reduces its activation effect.

(ii) CH_3NH_2 is more basic than $C_6H_5NH_2$.

(iii) Although $-NH_2$ is olp directing group, yet aniline on nitration gives a significant amount of m-nitroaniline.

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2. Write the structures of compounds A, B and C in the following reactions :

(a) $CH_3 - COOH \xrightarrow{NH_3/\Delta} A \xrightarrow{Br_2/KOH} B \xrightarrow{CHCl_3+alc.KOH} C$

(b) $C_6H_5N_2^+BF_4^- \xrightarrow[\Delta]{NaNO_2/Cu} A \xrightarrow{Fe/HCl} B \xrightarrow{CH_3COCl/Pyrid\in e} C$

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3. Write the structures of A, B and C in the following :

(i) $C_6H_5 - CONH_2 \xrightarrow{Br_2/aq.KOH} A \xrightarrow[0-5^\circ C]{NaNO_2+HCl} B \xrightarrow{KI} C$

(ii) $CH_3 - Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[\Delta]{CHCl_3+alc.KOH} C$

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4. Give reasons for the following :

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

(ii) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.

(iii) Primary amines have higher boiling point than tertiary amines.

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5. How do you convert the following :

(i) Aniline to benzene

(ii) Ethanamide to methanamine

(iii) Nitrobenzene to aniline ?

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6. Write the chemical equations involved when $C_2H_5NH_2$ is treated with the following reagents :

(i) $CH_3COCl/\text{pyridine}$

(ii) $C_6H_5SO_2Cl$

(iii) $CHCl_3 + KOH$

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7. How will you convert the following :

(i) Nitrobenzene into aniline

(ii) Ethanoic acid into methanamine

(iii) Aniline into N-phenylethanamide.

Write the chemical equations involved.

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

(i) $C_6H_5NO_2 \xrightarrow{Sn+HCl} A \xrightarrow[273K]{NaNO_2+HCl} B \xrightarrow{H_2O} C$

(ii) $CH_3CN \xrightarrow{H_2 \frac{\emptyset}{H^+}} A \xrightarrow[\Delta]{NH_3} B \xrightarrow{Br_2+KOH} C$

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9. Account for the following :

(i) Primary amines $(R-NH_2)$ have higher boiling points than tertiary amines (R_3N).

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

(iii) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.

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10. Give the structures 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) $C_6H_5NO_2 \xrightarrow{Sn+HCl} A \xrightarrow[273K]{NaNO_2+HCl} B \xrightarrow[\Delta]{H_2O/H^+} C$

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11. State reasons for the following :

(i) pK_b value for aniline is more than that for methylamine.

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

(iii) Primary amines have higher boiling points than tertiary amines.

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12. (i) Explain why an alkylamine is more basic than ammonia.

(ii) How would you convert

(a) aniline to nitrobenzene, (b) aniline to iodobenzene ?

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13. (a) Give one chemical test to distinguish between the following pairs of compounds :

(i) Methylamine and dimethylamine (ii) Aniline and benzylamine.

(b) Write the structures of different isomers corresponding to the molecular formula C_3H_9N, which will liberate nitrogen gas on treatment with nitrous acid.

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14. Giving an example of each, describe the following reactions :

(i) Hoffmann's bromamide reaction. (ii) Gatterman reaction.

(iii) A coupling reaction.

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15. State the reactions and reactions conditions for the following conversions :

(i) Benzene diazonium chloride to nitrobenzene

(ii) Aniline to benzene diazonium chloride

(iii) Ethylamide to methylamine.

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16. Complete the following reaction equations :

(i) Complete the following reaction equations :

(i) $R-\overset{O}{\overset{||}{C}}-NH_2 \xrightarrow[H_2O]{LiAlH_4}$ (ii) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

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

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17. (a) Give plausible explanation for each of the following :

(i) The presence of a base is needed in the ammonolysis of alkyl halides.

(ii) Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis.

(b) Write the IUPAC name of

$$CH_3-\underset{\underset{C_2H_5}{|}}{N}-\overset{\overset{O}{||}}{C}-CH_3$$

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18. (a) Give chemical tests to distinguish between the following compounds (One test in each case) :

(i) Aniline and ethyl amine. (ii) Methyl amine and dimethyl amine.

(b) How will you convert aniline to sulphanilic acid ?

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19. Account for the following observations :

(i) PK_b for aniline is more than that for methylamine.

(ii) Methylamine solution in water reacts with ferric chloride solution to give a precipitate of ferric hydroxide.

(iii) Aniline does not undergo Friedel Crafts reaction.

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20. An aromatic compound (A) on treatment with ammonia followed by heating forms compound (B), which on heating with Br_2 and KOH forms a compound (C) having molecular formula C_6H_7N. Give the structures of A, B and C and write the reactions involved.

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21. State the reactions and reaction conditions for the following conversions :

(i) Benzene diazonium chloride to nitrobenzene.

(ii) Aniline to benzene diazonium chloride.

(iii) Ethyl amide to methylamine.

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22. (i) Stating the necessary reaction conditions write chemical reaction equations to obtain the following :

Chlorobenzene from aniline :

(ii) Identify A and B in the following :

(a) 

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23. Explain why the amino group in aniline acts as a powerful activator and o- and p- director towards electrophilic substitution reaction.

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

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25. Two isomeric compounds A and B having molecular formula $C_4H_{11}N$, both lose N_2 on treatment with HNO_2 and gives compound C and D, respectively. C is resistant to oxidation but immediately responds to

Lucas reagent, whereas 'D' responds to Lucas reagent after 5 minutes and gives a positive iodoform test. Identify A and B.

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26. (i) Illustrate the following reactions :

(a) Hoffmann bromamide degradation reaction.

(b) Coupling reaction.

(ii) Write a chemical test to distinguish between aniline and methylamine.

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27. An organic aromatic compound 'A' with the molecular formula C_6H_7N is sparingly soluble in water. 'A' on treatment with dil. HCl gives a water soluble compound 'B'. 'A' also reacts with chloroform in presence of alcoholic KOH to form an obnoxious smelling compound 'C'. 'A' reacts with benzene sulphonyl chloride to form an alkali soluble compound 'D'. 'A' reacts with $NaNO_2$ and HCl to form a compound 'E' which on reaction

with phenol forms an orange red dye 'F'. Elucidate the structures of the organic compounds from 'A' to 'F'

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Long Answer Questions Ii 5 Marks Each

1. (a) Write the reactions involved in the following :

(i) Hofmann bromamide degradation reaction.

(ii) Diazotisation.

(iii) Gabrieol phthalimide synthesis.

(b) Give reasons :

(i) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.

(ii) Aromatic diazonium salts are more stable than aliphatic diazonium salts.

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2. Write the structures of A, B, C, D and E in the following reactions :

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3. (a) Write the structures of main products when benzene diazonium chloride reacts with the following reagents :

(i) $H_3PO_2 + H_2O$

(ii) CuCN/KCN

(iii) H_2O

(b) Arrange the following in the increasing order of their basic character in an aqueous solution :

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

(c) Give a chemical test to distinguish between the following pair of compounds :

$$C_6H_5 - NH_2 \text{ and } C_6H_5 - NH - CH_3$$

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4. (a) Write the structures of main products when aniline reacts with the following reagents :

(i) Br_2 water

(ii) HCl

(iii) $(CH_3CO)_2O$ / pyridine

(b) Arrange the following in the increasing order of their boiling points :

$$C_2H_5NH_2, C_2H_5OH, (CH_3)_3N$$

(c) Give a simple chemical test to distinguish between the following pair of compounds :

$$(CH_3)_2NH \text{ and } (CH_3)_3N$$

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5. An aromatic compound 'A' of molecular formula $C_7H_6O_2$ undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions :

View Text Solution

6. 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 :

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Self Assessment Test

1. Nitro compounds are reduced to amines by

A. passing hydrogen gas in the presence of finely divided Ni.

B. reduction with metals in acidic medium.

C. passing hydrogen in the presence of platinum.

D. all of the above.

Answer: D

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2. The order of reactivity of alkyl halides with ammonia is in the order :

A. $RI > RBr > RCl$

B. $RI > RCI > RBr$

C. $RCl > RBr > RI$

D. $RBr > RCl > RI$

Answer: A

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3. In the preparation of amines by Gabriel phthalimide synthesis the second product that is obtained is

A. phthalimide

B. phthalic acid

C. phthaloyl chloride.

D. disodium phthalate.

Answer: D

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4. Boiling points of isomeric amines follow the order :

A. Primary $>$ Secondary $>$ Tertiary

B. Secondary $>$ Primary $>$ Tertiary

C. Tertiary $>$ Secondary $>$ Primary

D. Tertiary $>$ Primary $>$ Secondary

Answer: A

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5. The relation between pK_b and $\log K_b$ is given by

A. $pK_b = \log K_b$

B. $pK_b = \ln K_b$

C. $pK_b = -\log K_b$

D. $pK_b = -InK_b$

Answer: C

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6. Assertion (A) : Nitrogen orbitals in amines are sp^3 hybridised and the geometry of amines is pyramidal.

Reason (R) : Amines may be regarded as derivations of ammonia.

A. (a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Asssertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

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