CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

NITROGEN CONTAINING COMPOUNDS

Problem

1. Aromatic rings containing $-NH_2$ $-NHR$ or $-NR_2$ groups do not undergo Friedel-Crafts reaction. Why?

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2. Which of the following is used in Friedel-Craft acylation reaction

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3. Write the structure of eight isomeric amines with the formula $C_{14}H_{11}N$.

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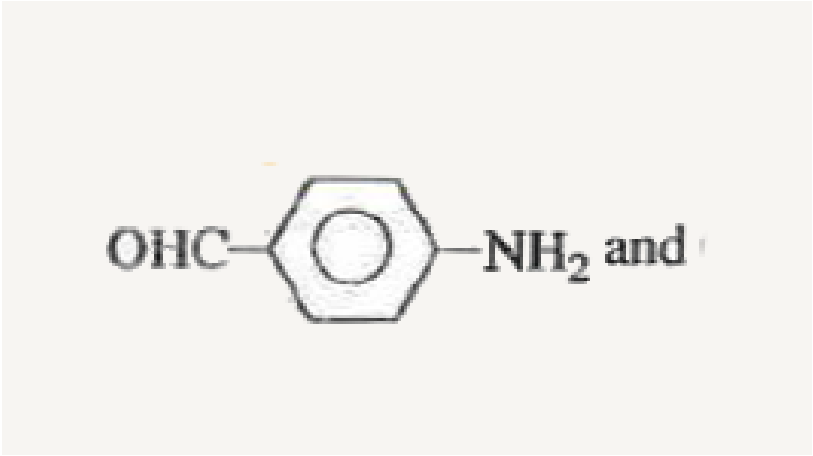
4. Write the IUPAC names of



(b)

$$CH_3CH_2 - \underset{\underset{CH_3}{|}}{N} - CH_2CH_2CH_3$$

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5. Classification of aliphatic amines and alcohols is different. Comment

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6. Give the structures and names of various amines with the formula C_7H_9N

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7. Arrange the following in the decreasing order of basic strength: $CH_3CH_2CH_2NH_2, CH_2=CH-CH_2NH_2$ and $CH\equiv -CH_2NH_2$

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8. $\underset{(X)}{H_2N} - \overset{NH(y)}{\overset{|}{C}} - \underset{(Z)}{NH_2}$ has 3 amino groups x,y and z. Which amino group is more basic?

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9. Arrange the following in the decreasing order of basic strength:

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

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

(c) $(C_2H_5)_2NH, C_6H_5NH_2, C_2H_5NH_2$ and NH_3

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

(i) Aniline, ortho, meta and para toluidines

(ii) Benzyl amine and aniline

(iii) Aniline and cyclohexylamine and (iv) Aniline, N-methylaniline and N, N-dimethylaniline

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11. How is aliphatic primary amine distinguished from aromatic primary amine?

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12. Mixture of nitrobenzene and aniline can be separated by

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13. How is toluene converted to phenyl ethanamine?

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14. Arrange the following in the order of boiling points: (A) n-Butyl amine, (B) Secondary butyl amine, (C) Isobutyl amine and (D) Tertiary butyl amine

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15. How is benzoic acid converted to aniline and benzylamine?

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16. How is benzoic acid converted to aniline and benzylamine?

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17. How is aniline converted to benzene? Discuss the reactions

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18. Amino group in anilines it ortho and para directing. But on nitration, aniline gives an appreciable amount of m-nitroaniline alos. Explain.

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19. How do you convert aniline to parabromo aniline.

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20. Why aniline does not undergo Friedel - Crafts reaction ?

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21. What is the product of the reaction: $C_6H_5N = NCl \xrightarrow{\text{Phenol}}$?

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22. Write chemical equations for the following reactions :

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

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23. How benzyl chloride can be converted to 2-phenylethanamine?

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24. Write structures and IUPAC names of

the amide which gives propanamine by Hoffmann bromamide recation.

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

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26. $C_6H_5N_2Cl \xrightarrow[KCN]{CuCN} A \xrightarrow[H^+]{H_2O} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[NaOH]{Br_2} D.$ Identify the final product, D.

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27. Aniline to benzyl alcohol

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28. How is nitrobenzene converted to benzoic acid?

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29. How is methyl cyanide converted to ethanol?

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30. How cyanides are identified from isocyanides?

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Exercise 5 1 1

1. Write any two methods of preparation of nitrobenzene

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2. Discuss various reduction properties of nitrobenzene is different media

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3. What happends when nitrobenzene is heated with solid potassium hydroxide?

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4. How is aniline prepared from nitrobenzene? Discuss the properties of aniline

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Exercise 5 1 2

1. How are (a) C_6H_5COOH (b) C_6H_5OH and (c) C_6H_5Cl converted to aniline?

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2. What happends when aniline is treated with $NaNO_2$ and HCl at $0^\circ C$?

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3. Write short notes on carbylamine reaction

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4. How primary amines are distinguished from secondary and tertiary amines?

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5. Write short notes on (i) Hoffmann bromamide reaction (ii) Gabriel phthalimide synthesis and (iii) Ammonolysis

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6. Discuss the mechanism of acetylation of aniline

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7. How do you convert C_6H_5Cl and C_6H_5OH to aniline?

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8. Give equation for diazotisation reaction? Give the examples

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9. Write the important uses of aniline

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Exercise 5 1 3

1. How is benzene diazonium chloride prepared ? What are its properties?

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2. Write short notes on coupling reactions giving azo-dyes

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3. Explain the following name reactions :

Sandmeyer reaction

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4. How the following are obtained from benzene diazonium chloride?

(a) Iodobenzene, (b) Chlorobenzene, (c) Phenyl hydrazine and (d) Nitrobenzene

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Exercise 5 1 4

1. How cyanides are distinguished from isocyanides?

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2. Write short notes on carbylamine reaction

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3. Explain why cyanides have higher boiling points and more solubility in water than isocyanides

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4. Write a note on the reduction of cyanides and isocyanides

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Exercise 5 2

1. Explain the basic nature of amines. What are the factors influencing basic nature?

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2. Write a note on coupling reactions of benzene diazonium chloride

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3. Write resonance structures to explain the nitration of nitrobenzene giving mainly m-dimitrobenzene.

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4. Why amines are basic. Explain

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5. Aliphatic amines are more basic than aromatic amines. Explain

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6. Write the effect of substituents on the basic nature of aniline

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7. Write the mechanism of Hoffmann bromamide reaction.

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8. Write the behaviour of aliphatic $1^{\circ}, 2^{\circ}$ and 3° amines towards reaction with nitrous acid

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9. How the three types of amines are distinguished?

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10. Write the reactions of aliphatic and aromatic primary amines with nitrous acid

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11. Aniline is insoluble in water, but ethyl amine is soluble. Explain

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12. Aniline is less basic than ammonia. Why?

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13. How is chlorobenzene prepared from aniline?

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14. What is Hinsberg's reagent? How it is useful to identiy $1^{\circ}, 2^{\circ}, 3^{\circ}$ amines?

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15. Write resonance structures of benzee diazonium ion

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16. Diazonium salts are useful for preparation of halobenzenes. Give reaction

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17. Aromatic amines can not be prepared by Gabriel phthalimide method. Justiry

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18. Comment on the conversion of methyl chloride into acetaldehyde

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19. How ethyl cyanide is converted to diethyl ketone? What are the special features of the conversion?

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20. $X \xrightarrow{Sn, HCl} Y \xrightarrow{KNO_2, HCl} Z$. The compound 'Z' reacts with 'Y' at pH value 6 to give an yellow coloured dye. What is 'X'?

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21. How is aniline converted to benzene? Discuss the reactions

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22. $C_6H_5N_2Cl \xrightarrow[KCN]{CuCN} A \xrightarrow[H^+]{H_2O} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[NaOH]{Br_2} D.$ Identify the final product, D.

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23. $C_6H_5NH_2 \xrightarrow[H_2O]{Br_2} A \xrightarrow[0^\circ C]{NaNO_2, HCl} B \xrightarrow{H_3PO_2} C.$ Identify the organic product 'C'. Write the reactions

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24. $X \xrightarrow{CHCl_3, KOH} Y \xrightarrow{H_3O^+} X$. If 'Y' is a compound with awful odour, identify the starting compound X ?

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25. How do you distinguish cyanides and isocyanides by hydrolysis and reducation.

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26. What happens upon hetating anorganic isocyanide?

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Conversions

1. Ethanamine to methanamine

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2. Methanamine to ethanamine

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3. Ethanoic acid to aminomethane

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4. Pentyl cyanide to 1-aminopentane

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5. Nitromethane to N-methylmethanamine

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6. Benzoic acid to aniline

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7. How do you convert aniline to parabromo aniline.

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8. Aniline to benzyl alcohol

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9. Benzamide to toluene

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10. Benzylchloride to 2-phenulethanamine

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11. Aniline to sym-tribromofluorobenzene

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12. Chlorobenzene to p-chloroaniline

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13. Ethylchloride to propanamine-1

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14. convert Methyl chloride to 2-phenylethanamine.

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15. How will you convert

benzene into N, N-dimethlaniline ?

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16. 1,4-Dichlorobutane to hexane-1,6- diamine

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17. Benzene to p-nitrobenzaldehyde

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18. Benzoic acid to m-nitrobenzylalcohol

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